

BUILDING RESILIENCE: NAVIGATING THE BARRIERS OF INNOVATION IN CONSTRUCTION SMES OF SRI LANKA

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ABSTRACT

Small and Medium Enterprises (SMEs) are recognised as a crucial sector responsible for the growth and social development of Sri Lanka. However, compared with global trends, many sectors of Sri Lanka's SMEs are far behind in embracing innovation. The Sri Lankan construction sector is no exception, as it continues to face various barriers in implementing innovation day by day. The primary reasons are some barriers that negatively affect the project's performance. This study aims to investigate these specific barriers, with a particular focus on construction SMEs in Sri Lanka, and to address a gap in the existing literature. The study adopted a mixed approach following a comprehensive literature review. Data were collected through semi-structured interviews conducted with 8 construction SME owners/managers. To assess the impact of barriers on innovation adoption, a 5-point Likert scale was included in the interview guideline. The collected data were then analysed using both code-based content analysis and descriptive statistical tools such as percentages, means, and weighted averages. The author identified several barriers with high impacts: high costs of obtaining external capital and lack of access to finance were identified as barriers with very high impact, lack of or insufficient access to knowledge, lack of skilled workers, lack of government support, low level of innovation on the market, and no infrastructure available on the market. The study proposes a set of strategies to enhance awareness of innovation within the construction sector. It concludes that improving the innovative performance of Sri Lankan SMEs and enabling them to compete globally requires reducing or eliminating the identified barriers. The study suggests promoting industry-wide collaboration by establishing innovation hubs and events that showcase innovation and foster knowledge exchange among organisations. The study may help industry practitioners identify barriers and take proactive measures to overcome them.

Keywords: Barriers; External; Innovation; Internal; SMEs.

1. INTRODUCTION

While long-standing evidence indicates slower progress and notable resistance to innovation in construction (Sayyed et al., 2023; Wei & Lam, 2014), the construction industry is criticised for being conservative and non-innovative, in both developed and developing countries. However, globalisation, economic changes, technological advancements, and increased competition have necessitated adopting innovations in

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organisational structures, process technologies, and culture to establish a competitive advantage (Lasanthika & Pavithra, 2025).

For construction organisations, adopting innovation is essential for improved outcomes in the design-construction process and for many other reasons, such as leading projects to success and creating opportunities for competitive advantage and organisational survival. Innovation encompasses concepts like novelty, modifications, opportunities, creative ideas, organisational adoption, and value creation (Koffi et al., 2021). However, from a construction industry perspective, innovation is a structured strategy of organisational functioning, comprising aspects such as goals, environmental barriers/drivers, strategies, and organisational factors, performing as a prototype for bringing systematic change to the construction industry (Qi et al., 2023). When innovation brings long-term benefits to the business and users by creating value and uniqueness in the product or service (Mohammed, 2019), the level and quality of innovation depend on several factors. Among these factors are employees' expertise, operational quality, and the ability to adapt to continuous changes in the business environment (Nguyen, 2023), to name a few. By nature, the construction industry is complex and faces tension due to high competition driven by technological advances and modern construction techniques (Egwunatum & Oboreh, 2022). As a result, alongside market competitiveness, barriers to innovation are rapidly growing, slowing or preventing novel ideas from moving forward and hindering business development and the ability to remain competitive in the market (Beyer, 2022). Despite this situation, many countries and businesses are now making strong efforts to implement innovation within their organisational environments to survive in the highly competitive construction landscape (Mohammed, 2019).

However, this situation is not common across all construction environments. While construction sector organisations in some countries are successfully innovating, those in developing countries often face critical barriers in implementing innovation, with a key barrier being a lack of expertise and knowledge (Sayyed et al., 2023). Most of the construction businesses in both developed and developing countries are SMEs. These SMEs play a special role in driving the diffusion of entrepreneurial skills, innovation, and employment in modern economies (Egwunatum & Oboreh, 2022). SMEs lack an accepted definition, as criteria vary across countries and regions based on factors such as employment size, investment, and turnover. In the Sri Lankan construction sector, SMEs are identified using the ICTAD grading system, with firms having an annual turnover below Rs. 40 million also classified as small-scale enterprises. In today's dynamic business environment, construction SMEs must prioritise gaining a competitive advantage and expanding their market share. In the context of innovation, there is an opportunity for them to improve their business performance and gain a competitive advantage (Koffi et al., 2021). As competition intensifies, traditional methods available become less effective; therefore, these organisations must adopt innovative methods to differentiate themselves from competitors and increase their market share. According to Modranský et al. (2020), these innovative approaches involve adapting to new technologies, changing market conditions, and evolving customer needs.

Despite being the backbone of the economy and bridging supply gaps, SMEs in the construction industry face unique competitive risks and numerous barriers in incorporating innovation into their operations and business processes (Owolabi et al., 2019). Therefore, exploring context-specific barriers faced by construction SMEs in

adopting innovation is of contemporary relevance to the current economic recovery of the Sri Lankan construction sector. Existing research highlights the importance of innovation (Madhavika et.al., 2024; Lasanthika & Pavithra, 2025), but the research on construction SMEs in developing countries like Sri Lanka has received limited attention. There is insufficient understanding of context-specific barriers and their impact on innovation adoption and performance in the construction industry (Madhavika et.al., 2024). Since SMEs are crucial for economic growth (Madhavika et al., 2024; Lasanthika & Pavithra, 2025), but face barriers in adopting innovation, especially in the construction industry, it is essential to identify and examine the impact of these barriers on performance and competitiveness in the industry. Therefore, the following four objectives were set in this research,

1: Review the barriers to implementing innovation and its impact on the performance of construction organizations, 2: Investigate the barriers to implementing innovation in construction SMEs in Sri Lanka, 3: Examine the impacts of barriers to implementing innovation on the performance of construction SMEs in Sri Lanka and 4: Propose strategies for overcoming innovation barriers in Sri Lankan construction SMEs

2. LITERATURE REVIEW

2.1 THE CONCEPT OF INNOVATION

The term "innovation" is not limited to economics but also encompasses sociology, political science, and science (Beyer, 2022). Innovation involves adopting "new ideas or behaviours, whether in systems, policies, programs, devices, processes, products, or services, that were not previously familiar to the adopting organisation (Nguyen, 2023). It is also seen as the application of new or upgraded products, processes, marketing methods, or organisational practices (Bolosha et al., 2022).

2.2 BARRIERS TO IMPLEMENTING INNOVATION IN THE CONSTRUCTION INDUSTRY

Barriers to implementing innovation are mainly classified as external or internal (Larenwaju Nassar & Olaleye Faloye, 2015). Internal barriers can be further sub-classified into financial resources, human resources, and organisational barriers, whereas external barriers include government, infrastructure, and other factors (Banu, 2020).

2.2.1 Internal Barriers

Internal barriers related to barriers stem within the business and can be further classified into organisational, human resources, and economic subgroups (Nguyen, 2023). These barriers usually include resistance to change, limited access to knowledge, and ineffective communication with external stakeholders, as identified by Beyer (2022). **Organisational Barriers:** internal policies and performance measures hinder innovation within organisations (Nguyen, 2023). Researchers highlight various management barriers that impede innovation. Among them are enterprise rigidity, which hinders the implementation of innovative ideas; inadequate access to knowledge and a lack of awareness of the importance of implementing innovations pose (Beyer, 2022), lack of an innovation-friendly culture within organisations which further hampers progress (Wei & Lam, 2014) a limited understanding of the benefits of innovation, which reduces motivation for innovation efforts (Owolabi et al., 2019), to name a few. **Human Resource**

Barriers: Human resource barriers in organisations contain several complications related to human factors. In the construction industry, labour costs can represent a significant portion (30–50%) of the total project budget (Nguyen, 2023). Barriers within human resources include a lack of skilled workers and a refusal to develop employees' skills due to fear and resistance to change (Beyer, 2022). Skills shortages, particularly in science, technology, and soft skills for collaboration and intercultural competence, pose significant barriers to innovation (Modranský et al., 2020). These human resources barriers, including organisational policies, management barriers, communication barriers, short-term orientation, cultural barriers, and a lack of understanding of innovation benefits, hinder progress (Nguyen, 2023; Beyer, 2022; Modranský et al., 2020; Owolabi et al., 2019; Wei & Lam, 2014). **Financial Barriers:** These barriers include insufficient funds and the high costs of securing external capital. For construction organisations, the pursuit of short-term profits and the need for immediate capital outlay are critical due to funding gaps and substantial initial investments. Another side of financial barriers is the challenging access to external financing sources and the high capital associated with innovation (Beyer, 2022). Moreover, barriers such as funding shortages, inadequate salaries, and a lack of job security significantly affect innovation in this sector. Construction companies' culture of risk and fear of failure further impedes innovation, as it increases the perceived risk and uncertainty associated with exploring innovative alternatives and experimenting with new ideas (Nguyen, 2023).

2.2.2 External Barriers

External barriers to innovation stem from the external environment (Nguyen, 2023). According to Modranský et al. (2020), significant barriers to adopting an innovative culture include regulations, bureaucracy, societal norms, acquiring skilled employees, accessing knowledge, securing funding, and navigating the external environment. External barriers can be classified into the following areas:

Government Barriers: The construction industry faces barriers in achieving a positive innovation cycle since the government fail to support innovation (Nguyen, 2023). Beyond regulatory issues that play a crucial role in applying innovation (Wei & Lam, 2014), avoiding and limiting legal regulations are identified as the primary barriers, ranking first and second, respectively, mainly impacting innovation motivation and adherence to innovative solutions (Wei & Lam, 2014). **Legal Barriers:** Legal barriers related to ecological policy, the lack of state policy on innovation, and restrictions on intellectual property rights (Beyer, 2022) lead to external barriers to innovation. Market barriers, such as intense competition, limited innovation, and inadequate market infrastructure (Beyer, 2022), further impede innovation. **Other Barriers:** Adequate funding for research and development, along with active research activities, is essential for fostering innovation (Owolabi et al., 2019).

2.3 THE IMPACT OF BARRIERS TO IMPLEMENTING INNOVATION IN CONSTRUCTION SMES.

According to Nguyen (2023), certain factors impede innovation in construction organisations. *Client influence* plays a specific role in innovation. However, clients can motivate innovation by improving collaboration and identifying new desires; their limited ability to clearly articulate requirements may act as a barrier to innovation performance. Additionally, *the low education level of construction workers* often leads to a closed mindset; making them less willing to question traditional practices. Employees may also

dislike the implementation of innovation due to issues about high workload and job security. Furthermore, the *lack of internal training opportunities* reduces employees' concern and participation in innovation activities. Economic barriers such as high inflation, expensive loans, and limited tax benefits also restrict innovation efforts, particularly in SMEs in developing countries. Modranský et al. (2020) identified several organisational and market-related barriers to innovation. *A poor innovation culture within organisations*, characterised by *inadequate resource allocation*, *bureaucratic decision-making*, and *risk-averse attitudes*, can negatively affect creativity and innovation. Additionally, when firms undertake innovation projects together, the high costs and time required to identify the most commercially viable options pose a challenge. Paying attention to a few strategically selected projects can improve resource utilisation and efficiency. Furthermore, lengthy product development and market launch processes may lead to missed opportunities, allowing competitors to introduce innovations more quickly.

3. METHODOLOGY

Following a comprehensive literature review primarily based on journal articles and conference proceedings, the barriers to innovation in construction organisations were identified. In light of the Literature findings, and the selected qualitative approach, the author conducted a series of semi-structured interviews with owners and/or top managers of SMEs to identify the barriers to innovation and their impact on construction SMEs in Sri Lanka. The rationale behind selecting each SME as a suitable candidate for the semi-structured interview is that they hold significant decision-making authority within their respective SMEs.

This study adopts Individual In-Depth Interviews (IDI) as its primary research approach. IDI focuses on building trust, empathy, and effective communication between the researcher and participant to obtain detailed insights. It is well-suited for in-depth exploration and has long been a widely used, practical qualitative data collection method (Boyce & Neale, 2006; Kvale & Brinkmann, 2009). To ensure the effectiveness of the semi-structured interview approach, the author conducted a pilot interview prior to the main study. Two individuals with extensive experience in the construction industry (each with over 10 of experience) participated in the pilot interview. Based on the insights gained from the pilot interviews, the semi-structured interviews were conducted in accordance with the refined guidelines. The semi-structured interview consisted of 12 open-ended questions. A list of innovation barriers was presented to respondents, who ranked their level of impact using a five-point Likert scale below, where "1" denoted "very low" and "5" denoted "very high" as shown in Table 1 below.

Table 1: Likert scale for the level of the impact of innovation barriers

Scale	Interpretation	Range
1	Very low	1.00 – 1.80
2	Low	1.81 – 2.60
3	Moderate	2.61 – 3.40
4	High	3.41 – 4.20
5	Very high	4.21 – 5.00

Although the study is basically qualitative, a five-point Likert scale was used to capture respondents' perceptions of the impact of innovation barriers. The Likert-scale responses were used descriptively to identify general patterns and support comparison across key themes derived from the qualitative findings. According to Frels & Onwuegbuzie (2013), including rating-scale questions alongside open-ended discussion allows researchers to obtain both numerical assessments and detailed explanations, thereby enhancing the robustness of the findings. Accordingly, the study adopts a predominantly qualitative design with a limited quantitative component rather than a fully balanced mixed-methods approach.

Purposive sampling was used to select participants with relevant experience in the construction industry. The study targeted practitioners with 5–20 years of experience in SME building and infrastructure projects, mainly recruited through LinkedIn. Owners, managers, and industry experts were selected because they possess decision-making authority and valuable insights, making them suitable for semi-structured interviews. The participants included Quantity Surveyors (QS), Engineers, and Project Managers (PM). Although the study initially planned to conduct 10 interviews, only 8 were completed due to practical constraints, including participant unavailability and lack of responsiveness. Despite this, the achieved sample size was considered sufficient, as data saturation was reached and no new significant insights emerged from additional interviews. Therefore, the 8 interviews provided adequate depth and richness of data to address the research objectives. The study employed inductive thematic analysis with manual coding to analyse qualitative data, providing flexibility to explore participants' perceptions and experiences. The process involved familiarisation, coding, theme development, and refinement. Initial coding was conducted using NVivo by the lead researcher, followed by team review to ensure consistency and accuracy. An iterative approach, involving repeated engagement with the data, was used to refine themes and enhance the depth and reliability of the findings.

4. RESULTS AND DISCUSSION

4.1 DEMOGRAPHIC FINDINGS

The below Table 2 presents below the professions and the industry experience of the participants.

Table 2: Composition of participants

Respondent	Profession	Industry experience
R1	Project Manager	More than 15
R2	Project Manager	More than 6
R3	Project Manager	More than 20
R4	Senior Quantity surveyor	More than 24
R5	Senior Quantity surveyor	More than 10
R6	Chatted Quantity surveyor	More than 20
R7	Civil Engineer	More than 15
R8	Civil Engineer	More than 8

Participants in Sri Lankan building-construction SMEs report their years of experience. According to the data received, 75% of the population claimed more than 10 years of experience in construction SMEs.

4.2 INNOVATION FROM THE EYE OF CONSTRUCTION INDUSTRY

The expert responses collectively suggest that construction innovation consists of the introduction and application of new ideas, technologies, and practices to improve project performance. The built environment recognised innovation as *“Successful introduction of new technologies or procedures into the construction industry”* (R₁). However, the responses also indicated that practitioners tend to prioritise technological and practical improvements, while giving less attention to organisational, institutional, and systemic aspects of innovation. R₄ argued that *“Innovation means trying out methods not commonly adopted in the industry as well as testing unique and novel methods”*. At the same time, R₃ claimed *“innovation in construction means using new ideas, methods, technologies, or processes to make building projects better, safer, and more sustainable”*. The novelty includes advances in materials, tools, hardware, and machinery, leading to improvements across various aspects of construction projects. Another opinion was that the concept of innovativeness must be a better, safer, and more sustainable approach to creating a *better built environment* that addresses society's evolving needs. At the same time, another respondent shared the opinion that *“innovation in construction means using new ideas, methods, technologies, or processes to make building projects better, safer, and more sustainable”* (R₃).

This analysis shows the need for a more holistic understanding of construction innovation, one that integrates technological, managerial, and organisational factors to capture the complexity of innovation within the construction industry.

4.3 BARRIERS FACED BY SMEs IN IMPLEMENTING INNOVATION IN SRI LANKA

The results revealed a clear divergence of opinion among experts. While 43% of respondents believed that SMEs could implement innovation without major barriers, the majority 57% argued that these enterprises encounter significant barriers. The findings suggest that the innovation capacity of SMEs within the Sri Lankan construction context is context-dependent, shaped by organisational capabilities, access to resources, and external support mechanisms. Table 3 below presents the interview insights on barriers to innovation.

Table 3: Interview insights on barriers to innovation in Sri Lankan SMEs

Respondent	Opinion	Justification for their statement
R1	Yes	“SMEs in Sri Lanka can now leverage the same information and technology as larger companies to stay updated on innovations and implement them”.
R2	No	(SMEs) may face barriers in obtaining the necessary funding to invest in innovative projects.
R3	No	SMEs may struggle to find skilled labour for new technology implementation and maintenance.

Respondent	Opinion	Justification for their statement
R4	Yes	Sri Lankan SMEs are known for their creativity and willingness to try new things.
R5	No	SMEs may be unaware of construction industry innovations and their benefits.
R6	Yes	Several organizations in Sri Lanka support SMEs with resources for growth and innovation.
R7	No	There exist some initial costs and a lack of competence

The opinions show a slight negativity toward SME innovation in Sri Lanka. Some respondents believe that SMEs can adopt innovation due to access to technology, creativity, and institutional support; others highlight barriers such as limited funding (R2), lack of skilled labour (R3), low awareness (R6), and high initial costs. However, the barriers outweigh the advantages. The reason can be that prevailing economic uncertainty encourages firms to prioritise operational continuity over long-term innovation investments, resulting in perceived barriers exerting a stronger influence than available opportunities.

4.3.1 Pathways for Enhancing Innovation Adoption in Sri Lankan SMEs

Furthermore, respondents highlighted several factors that facilitate innovation among local construction SMEs. They are: *Access to Information and Technology*: Respondents highlighted that, today, as with large organisations, SMEs can also fully access information and technological resources through digital platforms, online sources, and affordable technologies. It has reduced the industry gap between large-scale and SMEs. Therefore, SMEs can stay up to date with innovations and industry developments. *Entrepreneurial Culture and Creativity*: the willingness and the creativity of SMEs to explore novel ideas. By nature, SMEs are flexible and adaptable, and they make quick decisions, unlike larger organisations, which makes them more responsive to innovative opportunities. *Institutional support*: Another highlighted opinion was that the support they receive from government agencies, industry associations, and development programs for SME development and innovation, includes training opportunities, funding mechanisms, and knowledge-sharing platforms that help overcome barriers to innovation. In contrast to the enabling factors, some respondents pointed out a few barriers to innovation in the Sri Lankan context.

4.3.2 Fundamental Systemic Barriers to Innovation Adoption in Sri Lankan Construction SMEs

Financial Constraints: Limited access to funding facilities is one of the major barriers identified by R2. The respondent further elaborated that, innovation requires investment in technology and research and development. Many SMEs struggle with training and infrastructure, as well as with limited financial capacity and difficulty accessing external financing. In Beyer's (2022) research on enterprises in the West Pomeranian region of Poland, limited access to external financing and high innovation related capital cost were identified as significant barriers. Similarly, the study's interview findings revealed that SMEs in Sri Lanka's construction industry face difficulties obtaining the necessary funding to invest in innovative projects.

Shortage of skilled labour: Respondents claimed that implementing and maintaining new technology requires skilled labour; however, the construction industry often suffers from

shortages of specialised skilled labour in digital technologies, automation, and advanced construction methods. SMEs may struggle to find skilled labour to implement and maintain new technologies. Similarly, Beyer (2022) identified a shortage of skilled workers and reluctance to develop employees' skills, driven by fear and resistance to change, as significant human resource barriers to innovation. These findings are consistent with the interview results of the present study, which revealed that construction SMEs in Sri Lanka face barriers in accessing and developing the skilled workforce required to support innovation.

Lack of awareness: Respondents noted that limited awareness of innovations and their benefits is another reason SMEs struggle to implement them within organisations. Since SMEs get exposed to novel technologies, best practices, and case studies, they are reluctant to adopt innovation. A lack of understanding of the benefits of innovation further reinforces these human resource barriers. Similarly, Nguyen (2023) found that SMEs are often unaware of innovations available in the construction industry and the benefits they offer. This finding is consistent with the interview results, which revealed that limited awareness and understanding of innovation hinder its adoption among construction SMEs.

Limited Competence and Initial Costs: Even though these SMEs realise the value of innovation, the lack of expertise within the organisations and the financial risks associated with early adoption discourage them from implementing innovative practices, as identified by Nguyen (2023) in the Vietnamese engineering industry.

According to the data, Sri Lankan construction SMEs face several key barriers to innovation, primarily driven by limited financial capacity: firms operate on tight margins, face cash flow constraints, and have restricted access to credit due to high borrowing risks. The industry's traditionally risk-averse nature further discourages innovation, as firms prefer established methods and perceive little need for change. Additionally, limited awareness of emerging technologies and global practices leads to a poor understanding and communication of innovation within organisations. A skills gap in the workforce, particularly in digital and advanced construction methods, further constrains innovation. At the same time, low investment in training and development reflects a focus on short-term survival over long-term growth. Together, these factors significantly hinder the adoption of innovation in SMEs.

4.4 THE BARRIERS AND THE RATINGS PROVIDED BY THE INTERVIEWEES FOR EACH LEVEL OF BARRIERS

According to respondents, the identified barriers are at least partially significant in hindering innovation within construction SMEs in Sri Lanka. It implies that there are no negligible barriers to innovation; every identified barrier poses a challenge that requires immediate actions to foster a more innovative environment. Table 4 below summarises the barriers to implementing innovation experienced by SMEs in Sri Lanka and the level of impact of each barrier.

Table 4: Barriers of implementing innovation experienced SMEs in Sri Lanka

Type	Barrier	Finding	Level
Internal	Financial Barriers	Lack of own funds	High
		High costs of obtaining external capital	Very high
		Lack of access to finance	Very high
		High-interest rates on loans	High
	Organisational Barriers	Fear of taking risks	High
		The firmness of the enterprise is unfavourable for introducing innovation	Moderate
		Lack of a sense of the need to implement innovations.	Moderate
		Lack of understandable messages about the need for innovation	High
		Management barriers	Moderate
		Lack or insufficient access to knowledge.	Very high
	Human resources Barriers	Limited allocation of funds for employee training	High
		Lack of knowledge to analyse the durability and profitability of the innovation	High
		High labour turnover	High
		Lack of skilled workers	Very high
		Lack of willingness to improve employees' competencies.	Low
		Barriers resulting from the employees' fear and reluctance to implement changes.	Low
External	Legal Barriers	High taxes and other regulatory fees	Moderate
		Poor innovation policy	High
		Restrictions on intellectual property rights	Moderate
	Government Barriers	Difficulty in obtaining government grants	High
		Political instability	Moderate
		Lack of government support	Very high
	Market Barriers	Difficulty in accessing international markets	Moderate
		Low level of innovation on the market	Very high
		No infrastructure available on the market	Very high
	Other Barriers	Economic crisis	High
		High import traffic	Moderate

Type	Barrier	Finding	Level
		Lack of opportunities for research development	High
		Poor funding for research and developments	High
		Poor industry cooperation	High
		Lack of customer responsiveness	High

The highlighted barriers above, with very high impact, reflect the realities of the construction industry, especially in developing countries like Sri Lanka, where the sector is capital based, fragile, and highly risk sensitive (Madhavika et.al., 2024). SMEs face critical financial issues such as limited access to funding, high borrowing costs, and lack of internal capital, which strongly hinder the adoption of innovation (Pallegedara, 2017). Furthermore, human resource barriers such as shortages of skilled labour, low investment in training, and high employee turnover limit SMEs' ability to implement new technologies and innovative practices (Lasanthika & Pavithra, 2025; Loosemore, 2015). External factors such as weak government support, poor innovation ecosystems, and limited industry engagement also magnify these difficulties, as construction innovation heavily depends on institutional and policy support (Gann, 2000; Manley, 2008). Overall, these combined financial, organisational, and external constraints explain why the barriers are rated very high compared to those in more developed construction environments.

4.5 IMPACT OF INNOVATION BARRIERS ON CONSTRUCTION SME PERFORMANCE IN SRI LANKA

Barriers to implementing innovation in construction SMEs can be categorised into financial, organisational, management, human resource, and external barriers, all of which influence sales growth and profitability. *“Many firms face limitations on their ability to invest in innovation due to a lack of internal funding, high costs associated with obtaining external capital, and restricted access to finance. These barriers impede their capacity to develop new products, enhance processes, or expand into new markets, thereby reducing their competitiveness, market share, profitability, and sales growth.”* (R₁-R₈).

Financial barriers, such as limited internal funds and high costs of external financing, **restrict** SMEs' ability to invest in research and development, new technologies, and innovative processes (R₂ & R₇). *Organisational barriers*, including rigid structures and a lack of awareness of the importance of innovation, **reduce** firms' ability to adapt to changing market demands, potentially leading to stagnant or declining sales and profits (R₇ & R₃). *Management barriers*, particularly ineffective leadership, further **limit** SMEs' ability to pursue innovative opportunities and expand revenue streams (R₇ & R₃). *Human resource barriers*, such as limited access to knowledge, a shortage of skilled workers, and inadequate employee training, **hinder** the adoption of new technologies and processes, affecting productivity and competitiveness (R₃, R₅ & R₇). *External barriers* also significantly influence innovation activities. Factors such as weak innovation policies, limited government support, intellectual property restrictions, lack of infrastructure, insufficient Research and Development (R&D) funding, low market innovation, and poor customer responsiveness create an **unfavourable** environment for innovation (R₄ & R₅).

These barriers collectively **reduce** SMEs' capacity to innovate, ultimately affecting their sales growth, competitiveness, and profitability (R₁, R₂, R₃ & R₅).

4.6 STRATEGIES FOR OVERCOMING INNOVATION BARRIERS IN SRI LANKAN CONSTRUCTION SMEs

The experts suggested several strategies to overcome innovation barriers faced by SMEs in Sri Lanka. Among these suggestions, *"There is a growing awareness of the need for innovation in the industry"* (R₁ & R₅). growing awareness of innovation: by promoting innovation among construction organisations and educating these organisational professionals about the importance of innovation to sustain competitiveness and long-term success, was identified as one of the main tasks. Emerging culture of change: The construction industry has now recognised the importance of change and is gradually shifting towards an open-minded approach, overcoming its inherent resistance to it. Increased focus on employee development: SMEs must provide training opportunities to help employees upskill and embrace new ideas and technologies (R₄). *"If we can identify the key barriers, we can focus our efforts on overcoming them and creating an environment that better supports innovation"* (R₃) - This recognises opportunity for targeted interventions: Exploring these barriers may offer opportunities to implement targeted interventions that further reduce the impact and encourage an innovation-conducive setting.

Furthermore, the respondents showed the importance of continuous improvement, highlighting that any barrier cannot be treated as minor, as it may escalate to a much more critical level. Reforming innovation policies can also make a big impact on promoting innovation among SMEs in Sri Lanka. The respondents also pointed out, *"The government must review and revise existing innovation policies to create a more supportive environment for innovation"* (R₁). The policymaker's responsibility is to review and revise current innovation policies to create a more supportive environment for innovation by providing incentives for research and development, tax breaks for innovative firms, and streamlined regulations. Strengthening government support: from the Government's perspective, respondents stated that to promote innovation, the Government must introduce various schemes, such as grants, subsidies, and technology transfer programs, to assist and encourage construction firms - *"the government could collaborate with educational institutions or industry associations"* (R₁, R₃, R₄ & R₅). Respondents suggested that *"there is a greater need for industry associations and leading construction firms to promote collaboration and knowledge sharing through forums, workshops, and partnerships"* (R₄, R₅ & R₆) to nurture the innovation ecosystem. The best step is to promote industry-wide collaboration by establishing innovation hubs and hosting events that showcase innovation and foster knowledge exchange among organisations.

5. CONCLUSIONS AND FUTURE DIRECTIONS

5.1 REVIEW THE BARRIERS THAT HINDER THE IMPLEMENTATION OF INNOVATION IN CONSTRUCTION ORGANISATIONS

A comprehensive literature review was conducted using academic databases, industry journals, and relevant books to identify barriers to innovation in construction organisations. In light of findings from previous studies, the author developed a comprehensive list of barriers. These barriers were categorised as internal and external barriers. Internal barriers include organisational, financial, and human resource factors, while external barriers include legal, government, market, and other external factors. Key studies such as Nguyen (2023), Beyer (2022), Modranský et al. (2020), Owolabi et al. (2019) and Wei & Lam (2014) were reviewed to identify and analyse these barriers.

5.2 THE BARRIERS TO IMPLEMENTING INNOVATION IN CONSTRUCTION SMES IN SRI LANKA

The findings show that a combination of internal and external barriers has been severely distracting the implementation of innovation in Sri Lankan construction SMEs. Internal barriers include financial constraints, organisational resistance to change, lack of innovation awareness, limited knowledge and skills, and inadequate employee development, while external barriers are regulatory barriers, insufficient government support, political instability, market limitations, economic uncertainties, and weak industry collaboration. Among these, financial limitations and the lack of skilled human resources come as the most significant barriers, restricting SMEs' ability to invest in innovative practices. These findings are supported by the existing literature, confirming that innovation barriers faced by Sri Lankan construction SMEs are same as the ones that are experienced globally. Therefore, addressing these barriers needs greater financial support, capacity building, policy improvements, and stronger collaboration among industry stakeholders to promote a more innovation friendly environment within the construction industry.

5.3 THE IMPACTS OF BARRIERS TO INNOVATION IMPLEMENTATION ON THE PERFORMANCE OF CONSTRUCTION SMES IN SRI LANKA

The findings of this objective show that barriers to innovation have a crucial overall impact on the performance of construction SMEs in Sri Lanka, with financial constraints, lack of finance, shortage of skilled labour, weak infrastructure, and limited market innovation identified as having a very high impact. Other factors such as poor government support, high implementation costs, limited R&D opportunities, and weak industry collaboration also show a high impact, while organisational and regulatory issues have a moderate effect. Only the employees' hesitation to adopt change and improve skills was found to have a low impact. Overall, the results confirm that financial and resource related barriers are the most critical factors affecting innovation performance, which aligns with existing literature.

5.4 RECOMMENDATIONS

The study identifies opportunities for innovation in the construction sector while highlighting existing barriers and their impacts. It emphasises the need for further

research to develop effective strategies to overcome these barriers, especially in light of the new barriers posed by the pandemic to construction SMEs in Sri Lanka.

5.5 LIMITATIONS

The study depends on a small purposive sample, which limits the generalisability of the findings. In addition, the Likert-scale analysis only acted as a supplementary tool to support the qualitative findings rather than to provide statistically generalisable results. It provides a descriptive indication of respondents' perceived level of impact of innovation barriers. Therefore, the study is better positioned as a qualitative dominant design with a supplementary quantitative component rather than a fully structured mixed-methods approach.

5.6 FUTURE RESEARCH STUDIES

Based on an analysis of the existing literature, a conceptual framework can be developed to guide more in-depth research on innovation in the construction sector, focusing on the opportunities it creates the advantages it delivers, and the barriers to its adoption. It may also help structure future studies by connecting internal factors such as financial, organisational, and human resource barriers with external influences, including market conditions, regulatory requirements, and government support. Further research is needed to gain a deeper understanding of the crucial barriers construction SMEs face in implementing innovative solutions in practice, as well as to examine how these barriers vary across firm types, project contexts, and economic environments. In addition, comparative studies across regions or countries would be important for providing a more comprehensive understanding of barriers to innovation and for developing more effective strategies to promote innovation in the construction industry. Moreover, future research could use a larger sample and a fully quantitative or mixed-methods approach to improve generalisability and enable more robust statistical analysis of innovation barriers among Sri Lankan SMEs.

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