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ENHANCING SUSTAINABILITY IN RENOVATION PROJECTS: THE ROLES OF THE CONTRACTOR AND CONSULTANT

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ABSTRACT

The construction industry significantly impacts the global economy, with renovation projects offering key opportunities for sustainable practices due to their flexibility and resource efficiency. However, in Sri Lanka, stakeholder collaboration particularly between contractors and consultants remains weak, hindering effective sustainability integration. This study investigates how contractors and consultants contribute to adopting sustainable practices in renovation projects. A qualitative research approach was adopted, combining a comprehensive literature review and semi-structured interviews with twelve construction industry professionals. The interview responses were analysed using manual content analysis methods to identify the roles of contractor and consultant, challenges, and to develop suitable recommendations for improving the integration of sustainable practices in renovation projects. The research findings revealed that consultants primarily contribute to sustainability assessments, material selection, and client advising, while contractors focus on implementing sustainable practices on-site, such as waste minimisation and efficient resource management. Although, the findings identified the key challenges including lack of understanding among clients, high initial costs, and limited availability of resources, which significantly affect the practical integration of sustainability in Sri Lankan renovation projects. The study contributes to the integration of sustainable renovation by providing recommendations including improved stakeholder communication, the adoption of sustainable materials, design Integration and climate adaptation. Moreover, it mainly highlights the importance of government support, policy changes and proper training to improve the sustainable integration. These findings provide a strong foundation for improving policy frameworks and professional practices in renovation projects across Sri Lanka.

Keywords: *Buildings; Consultant; Contractor; Renovation Projects; Sustainability.*

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1. INTRODUCTION

Sustainable development is an approach that meets current needs without compromising the ability of future generations to meet their own needs (Purvis et al., 2019). The goal of sustainable development is to establish a balance between social, economic, and environmental sustainability (Mensah, 2019). The demand for renovation projects is growing as buildings in many developed nations age and people pay increasing attention to sustainability (Vilches et al., 2017). The term "sustainable renovation" defines a comprehensive approach for improving existing structures that minimises energy and resource consumption, improves safety and resilience against natural disasters, and reduces environmental impacts throughout every stage of the building's life cycle (Passoni et al., 2024). Sustainable building renovation has gained increasing importance in recent years due to excessive energy consumption in existing buildings (Jowkar et al., 2022). According to Jafari and Valentin (2017), sustainable renovations provide significant long-term cost benefits by reducing operating expenses and increasing property values, although they need higher initial costs. On the social level, improved indoor air quality enhances health, comfort, and productivity (Wei et al., 2015).

Developing guidelines for sustainable renovation projects will be critical to addressing the environmental challenges facing the built environment while meeting the increasing need for higher building performance and occupant satisfaction (Nielsen et al., 2016). In addition, sustainable renovations improve resource efficiency and contribute to the development of a circular economy in the construction sector (Sáez-de-Guinoa et al., 2022). The construction industry plays a key role in achieving sustainability objectives by integrating sustainable concepts into renovation methods, thereby increasing the durability, efficiency, and safety of built environments (Sev, 2009). Stakeholder engagement is essential for renovation project success, as it aligns project goals with stakeholder demands, promotes innovative approaches, and minimizes disputes (Aapaoja et al., 2013).

In Sri Lanka, there is a noticeable lack of developed guidelines or policies for sustainable renovation practices, and poor involvement of stakeholders has a negative impact on adoption and implementation. A comprehensive, stakeholder-inclusive guideline is essential for reducing pollution, increasing efficient resource use, and achieving global sustainability objectives, which requires a more stakeholder-focused approach. Therefore, this research aims at investigating how contractors and consultants contribute to adopting sustainable practices in renovation projects. The research explores three main dimensions of sustainability: environmental, economic, and social. These dimensions are examined through practices such as increasing energy efficiency and minimising construction waste, improving cost-effectiveness and assessing lifecycle performance, and enhancing occupant well-being through effective stakeholder collaboration.

This paper begins with an introduction to the topic and provides a comprehensive literature review on stakeholder engagement and challenges in renovation projects. Subsequently, the research methodology, comprising data collection and data analysis, is elaborated. The conclusion summarizes the study and presents recommendations.

2. LITERATURE REVIEW

2.1 SUSTAINABILITY CONCEPT

Sustainability is designed to achieve an equilibrium of both the global environment and human civilisation (Yang & Zeng, 2020). Moreover, the sustainability concept is currently extended to include wider social and economic aspects, highlighting the need to balance resource utilisation with economic growth and social equality (Purvis et al., 2019). Sustainability practices in different industry sectors are evolving and needing a common concept for achieving sustainable development across all sectors (John & Narayanamurthy, 2015). The need for sustainability is an essential aspect of the construction industry, which is one of the primary consumers of natural resources and a major contributor to environmental degradation (Akhanova et al., 2019).

2.2 SUSTAINABILITY PRACTICES IN RENOVATION PROJECTS

Sustainable practices for renovation projects are becoming more essential while considering that buildings contribute a significant portion of Global Greenhouse Gas (GHG) emissions (Sabet & Easterbrook, 2016). Renovating existing structures, instead of deciding on demolition and new construction, is an effective way to reduce carbon emissions (Zimmermann et al., 2023). Sustainability is essential in renovation projects as it involves an integrated strategy that examines economic, social, and environmental aspects (Simpson & Owen, 2020). Sustainable renovations can considerably reduce operational costs and increase property values (Hardie et al., 2011). Moreover, the adoption of green technology and materials can improve the marketability of properties, consequently determining higher rental and sales prices (Liao et al., 2023). Social sustainability in renovation projects prioritises community engagement and occupant participation, ensuring effective stakeholder awareness for successful renovation outcomes (Simpson & Owen, 2020). Renovating existing structures for environmental sustainability can be more sustainable than new construction, related to the embodied energy utilised in the original materials (Psilovikos, 2023).

Researchers identified numerous sustainable practices in renovation projects, including sustainable material utilisation, waste management, biophilic design, value management, and Building Information Modelling (BIM). Sustainable material utilisation considers the building's overall lifetime impacts, while waste management reduces environmental impact (Liu, Bengtsson, et al., 2020). Biophilic design focuses on natural elements, while value management improves resource efficiency and cost-effectiveness (Ekanayake et al., 2018; Sharifi & Sabernejad, 2016). A BIM system is important for stakeholders to integrate sustainable design principles using the detailed simulations of the project (Lu et al., 2017).

In Sri Lanka, previous research has mainly focused on the sustainable practices for new construction projects and a few for renovation projects (Ekanayake et al., 2018). However, a limited number of researchers have focused on the roles of consultants and contractors in sustainable renovation projects. It shows a clear gap in understanding of how stakeholders support sustainability when working within the technological, legal, and physical limitations of existing buildings.

2.3 CHALLENGES IN RENOVATION PROJECTS

Renovation projects possess environmental, economic, technical, and social challenges, with constructing and demolition waste causing a massive load on the environment, with 60-85% ending up in landfills (Al-Raqeb et al., 2023). Urban degradation due to pollution, loss of biodiversity, and reduction of green spaces are also major challenges in urban renovation initiatives (Shahraki, 2022).

Challenges in the renovation projects can be divided into four main categories: economic, environmental, technical, and social challenges (Al-Raqeb et al., 2023). Economic challenges include high initial investments (Haase et al., 2020; Liao et al., 2023), cost overruns (D'Oca et al., 2018; Liao et al., 2023), low awareness of energy efficiency benefits, and lack of integrated solutions for energy saving (Haase et al., 2020). Environmental challenges involve high greenhouse gas emissions (Ntouros et al., 2022), demolished waste issues (Al-Raqeb et al., 2023), and poor thermal performance (Yang et al., 2021). Although, technical challenges include lack of standardisation process (Ntouros et al., 2022; Pikas et al., 2021), insufficient data (Konstantinou et al., 2021; Prieto et al., 2024)and limited space around buildings (Pikas et al., 2021). Moreover, social challenges consist of regulatory challenges (Ntouros et al., 2022; Prieto et al., 2024), safety risks (Haase et al., 2020), and occupant disruption (D'Oca et al., 2018; Liao et al., 2023)

2.4 ROLES OF KEY STAKEHOLDERS IN IMPLEMENTATION OF SUSTAINABLE PRACTICES

Stakeholders in renovation projects include owners, contractors, consultants, and governmental and non-governmental organisations, requiring careful consideration of various views and interests (Liao et al., 2023). Each of the parties performs a unique function in establishing the renovation process, making decisions, and verifying that sustainability goals are achieved (Ilkhanizadeh, 2021). Sustainable renovation projects engage stakeholders who ensure effective implementation of sustainable practices, ensuring environmental, economic, and social goals are satisfied throughout the project lifetime, from initial planning to post-completion evaluation (Prieto et al., 2024).

Table 1 illustrates stakeholder engagement over five phases of a renovation project. The phases are Phase 1 (Pre-project)- focusing on initial feasibility and planning; Phase 2 (Concept design)- developing preliminary designs; Phase 3 (Final design)- preparing detailed technical plans; Phase 4 (Execution and handover)- involving construction and delivery; and Phase 5 (Post-construction)- focusing on maintenance and operations. The colour intensity illustrates the various levels of participation of stakeholders in each phase. Where darker colours indicate stronger involvement, and lighter colours represent lower involvement. The following subsections discuss the key stakeholders: consultants and contractors' involvement in renovation projects.

2.4.1 Contractors

Contractors play a major role in the process of renovation, executing projects with an understanding of sustainable construction methods and materials to ensure energy-efficient solutions (Hofmann et al., 2014). However, various smaller contractors can lack the expertise and tools needed to implement sustainable practices effectively (Jung et al., 2014). Therefore, training and developing capacity operations are essential to provide small companies with the skills required for sustainable renovation (Zagonari, 2024).

Moreover, contractors' engagement in sustainable renovation is usually focused on the construction phase, allowing for a small percentage of the entire project's sustainability implementation, although their significant contributions into design and planning (Holloway & Parrish, 2015). Effective project management is essential for contractors as it ensures well-coordinated phases, sustainable practices, and effective resource management (Yoon & Yu, 2019). Moreover, the considerable waste produced by renovation activities, highlighting the importance of sustainable approaches develop and execute by the contractors such as deconstruction and material reuse, which reduce landfill contributions and promote a circular economy (Lynch, 2022). The following Table 1 presents the different levels of key-stakeholder involvement in renovation projects.

Table 1: Key stakeholders' involvement in renovation projects
Source: (Prieto et al., 2024)

Stakeholder	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Architects					
Engineering Consultants					
Contractors					
System Suppliers					
Energy Solution Providers					
Building Users and Managers					
Building Owners					
Developers / Investors					
Government Bodies					

2.4.2 Consultants

Consultants assist clients in selecting sustainable materials, and advising clients of long-term benefits, including reduced energy consumption, which involves the total energy utilised during the product's entire lifespan (Hu, 2021). Consultants are responsible for examining contractors' work, monitoring the implementation of sustainability standards, and confirming that contractors utilise specified sustainable practices on-site (Ghuzdewan et al., 2023). Moreover, Simpson and Owen (2020) stated that consultants collaborate with local stakeholders, including community members, local governments, and industry professionals, to encourage sustainable renovation by obtaining different perspectives that guide the renovation process. Consultants conduct sustainability assessments during renovations, evaluate energy performance, identify improvement opportunities, and analyse environmental impacts (Hu, 2021).

The stakeholder involvement in the renovation projects are usually varies from traditional new construction projects as contractors in renovation projects are responsible for managing selective demolition, reusing materials, and implementing sustainable practices within site restrictions, while consultants need to evaluate existing conditions, advise on sustainable materials, and coordinate with various stakeholders to ensure legal

compliance. These roles are determined by the limits and challenges of working within existing structures, which makes renovation a unique environment for collaboration among stakeholders (Kaewunruen et al., 2024).

3. METHODOLOGY

The comprehensive literature review was focused on existing sustainable practices in building renovation projects. A qualitative approach was applied to accomplish the study goals effectively. Further, all objectives required in-depth investigation of experts to get broad knowledge. Semi-structured interviews were conducted to gain information from professionals who are actively involved in renovation projects. The interview guideline was structured into two main sections, including the general information of the interviewee, and then it defines sustainability in renovation projects, analysing contractor and consultant roles, identifying common challenges, and proposing suitable recommendations for improvement of the integration of sustainable practices. The interview participants included 12 professionals including quantity surveyors, engineers, architects and project managers in both the consultant and contractor firms selected through purposive sampling and snowball sampling methods with broad experience in renovation projects and sustainability practices. The qualitative data have been analysed using manual content analysis. The profile of experts is presented in below Table 2.

Table 2: Profile of the respondents

Expert Code	Type of the Organization	Profession	Industry Experience	Work Experience in Renovation Projects	
				No. of Projects	Type of Projects
R1	Contractor	Quantity Surveyor	10 Years	2	Hotels, Commercial
R2	Consultant	Quantity Surveyor	27 Years	5	Commercial
R3	Contractor	Civil Engineer	8 Years	4	Residential
R4	Consultant	Charted Architect	24 Years	22	Apartment, Commercial, Institutional, Banks, Military
R5	Contractor	Quantity Surveyor	5 Years	4	Hotel, commercial
R6	Contractor	Quantity Surveyor	5 Years	13	MEP Projects
R7	Contractor	Civil Engineer	13 Years	11	Infrastructure, Resort
R8	Contractor	Civil Engineer	9 Years	4	Mall, Road
R9	Contractor	Civil Engineer	8 Years	4	Warehouses, Utility Spaces
R10	Consultant	Chartered CE	13 Years	5	Historical, Clinics
R11	Consultant	Chartered Architect	7 Years	12	Residential, Cafes, Clinics, Hotels
R12	Consultant	Chartered Architect	29 Years	52	Apartments, Banks, Factories, Showrooms, Hotels, Temples

4. RESEARCH FINDINGS

4.1 ROLES OF CONSULTANTS AND CONTRACTORS IN RENOVATION PROJECTS

The following subsections present the involvement of consultants and contractors in renovation projects across the main five phases: planning & research, design & concept development, demolition, execution & handover, and post construction.

4.1.1 Phase 1 - Planning and Research

According to the respondent's answers, during the planning and research phase, contractor engineers are assigned to the projects for the purpose of conduct site assessments for resource efficiency and identify reusing opportunities, and **R3** highlighted "*Ensuring stakeholders understand the environmental, financial, and social benefits of adopting sustainable practices is essential in the early stages of the project*." Additionally, material selection is one of the important responsibilities in this stage for maintaining the durability and recyclability of materials for both parties, and R8 emphasised material selection, including locally available and long-term usage options, passive lighting implementation, and water efficiency. Respondents mentioned that the consultant quantity surveyors are mainly responsible to do the site inspections, feasibility studies, and cost analysis works to verify that the sustainable features are always aligned with budgets during this stage. Considering contractor project managers, as expressed by R7 and R9, they must carry feasibility studies and examine the possibilities of sustainable solutions to check that sustainability is integrated from the project's inception stage, and **R7** expressed that "*I make sure that sustainability elements are incorporated from the design phase to minimises future inefficiencies*." R10 expressed the consultant engineers largely contribute to sustainable integration by influencing the project's design and execution strategies by focusing on resource planning, historical data analysis, and operational scheduling throughout the planning stage and **R10** highlighted "*Gathering available data, operation planning, and resource planning are the primary responsibilities*."

4.1.2 Phase 2 - Design and Concept Development

In the design and concept development stage in renovation project, contractor engineers are needs to improve the sustainable material selection process and integrate passive design techniques, as **R8** recognised "*It must improve material choices, integrate passive ventilation strategies, and make sure design efficiency in every aspect*." Consultant architects, as **R12** said, "*Understanding client needs and educating them on sustainable options are essential, where they implement cost-effective sustainable materials and finishes and check that energy-efficient techniques are established*."

4.1.3 Phase 3 - Demolition

During the demolition stage, contractor engineers are focused on minimising pollution and salvaging reusable materials, as stated by R3, the importance of reducing waste and make sure the materials are salvaged for reuse or recycling, while **R10** added that "*Operation planning, logistics, and safety arrangements are essential components of a structured demolition process*." Consultant quantity surveyors, as underlined by **R2**, "*I require planning selective demolition to maximise salvageable materials and overseeing on-site segregation of waste materials for reuse or recycling*." Contractor project

managers, according to R7, focus on considering waste management strategies, such as reusing demolition waste for backfilling. Consultant engineers verify that the safety precautions and suitable procedures are followed, and R10 highlighted operation planning, logistic planning, and safety arrangement planning. Consultant architects focus on minimising waste and salvaging useful materials, as R11 pointed out minimising waste generation by careful deconstruction while R12 highlighted salvaging reusable materials like bricks and timber.

4.1.4 Phase 4 - Execution and Handover

In the execution and handover phase, contractor engineers are responsible for supervising the implementation of sustainable practices for the effective application, and **R3** suggested that "*Ensuring sustainable practices are consistently implemented during construction is essential for creating long-term project sustainability*." Additionally, engineers supervise inspections, resource allocation, and the acquisition of sustainable materials. Contractor quantity surveyors, as mentioned by **R1**, "*I am responsible for supervising labour and subcontractors, monitoring quality, reducing pollutants, ensuring health and safety, and managing the budget*." Contractor project managers are requiring verifying accordance with specifications, including sustainable aspects such as solar panels, and R9 advised that collaboration between consultant, contractor, and client is necessary to facilitate the process. Consultant engineers, as **R10** said "*I perform responsibilities such as obtaining necessary approvals, overseeing handing over document preparation, and final inspections, and carry out progress monitoring, quality control, and inspections*."

4.1.5 Phase 5 - Post-Construction

During the post-construction stage, contractor engineers must analyse the functioning of implemented sustainable features, where R8 focused on long-term maintenance planning, make sure optimal performance, and minimising renovation costs, while **R3** emphasised "*Conducting follow-up evaluations to make sure energy systems and other features are performing as expected is essential*." Contractor quantity surveyors, as commented by **R5**, "*I check sustainability performance, update certifications, and check that everything follows cost-efficient sustainability measures*." Contractor project managers, according to R7, are responsible for analysing final connections of sustainable systems, such as linking solar panels to the power grid, to guarantee long-term operating efficiency. Consultant engineers work on getting completion certifications and retention management, and **R10** stated, "*Attending to defects and ensuring the long-term performance of sustainable features is part of our responsibilities*."

Table 3 highlights the major roles of contractors and consultants in integrating sustainability practices through each phase of renovation projects. The key terms were identified and highlighted separately to clearly present their contributions at each stage of renovation projects.

Table 3: Key roles of consultants and contractors at each phase of renovation projects

Phase	Consultant	Contractor
1	Conduct site inspections, Perform feasibility studies, Cost analysis, Resource planning	Conduct site assessments, Review material options, Evaluate sustainability alternatives
2	Understand client requirements, Educate clients on sustainability, Assess energy efficient techniques, Recommend cost effective solutions	Improve material choices, Implement passive design strategies and design efficiency
3	Plan selective demolition, Ensure safety precautions are in place, Evaluate opportunities for reuse or recycling	Minimize pollution & environmental impact, Salvage reusable materials, Arrange site safety measures, Waste management, Plan site logistics
4	Obtain necessary approvals, Inspection, Quality control, Progress monitoring	Supervise construction activities, Resource allocation, Procure sustainable materials, Monitor quality, Ensure safety compliance and manage budget effectively
5	Conduct Post-occupancy evaluations, Establish long-term maintenance strategies, Maintain sustainability documentation	Develop maintenance plans, Conduct follow-up evaluations

4.2 CHALLENGES IN INTEGRATING SUSTAINABILITY PRACTICES IN RENOVATION PROJECTS

According to the respondents, the cost for implementation of sustainable practices is considered as one of the primary challenges to renovation projects. Nine out of twelve professionals mentioned the high initial cost of sustainable materials as a challenge, with R1 highlighting that the "High cost of sustainable materials can become more challenging for contractors to justify the application of sustainable alternatives over traditional materials." Additionally, **R1** said that "*Time delays caused by using sustainable materials also increase project expenses, which leads to preventing stakeholders from investing in sustainability."* R4, R5, R6, R7, and R8 also expressed similar concerns throughout the cost impact related to sustainable construction materials. R9 and R10 recognised the unwillingness of clients to adopt sustainability due to cost concerns. **R9** stated that "*Client's unwillingness due to cost concerns usually restricts the adoption of sustainable options*."

Another major challenge mentioned by five professionals is the difficulties in obtaining sustainable materials. **R1** clearly emphasised "D*ifficulty in finding sustainable materials, which leads to project delays and extra costs*." R5 and R6 identified similar difficulties, with **R5** stating that "*Difficulty in sourcing renewable and recycled materials frequently makes contractors decide for conventional options*." Furthermore, quality concerns contribute to this difficulty, as **R10** pointed out that "*Lack of methods to verify the quality of recycled materials leads to unwillingness among engineers and employers when considering sustainable options*." Proper disposal and recycling of construction waste become essential challenges in sustainable renovation, as emphasised by the respondents R1, R4, R5, R8, R10 and R12. R4 and R5 examined the practical challenges involved,

with **R4** pointing out that "*Removing debris and finding places to dump is an important difficulty in renovation projects*." Similarly, **R12** emphasised its challenge to waste separation and reuse, stating that "*Contractors prefer quick disposal over reuse, which opposes the principles of sustainability*." The lack of skilled laborers with expertise in sustainable construction is identified as a common challenge in renovation projects by R1, R2, R3, R4, R5, R8, R9 and R11. **R10** further focused on it, mentioning that "*Lack of trained professionals limits the use of digital tools like BIM in renovation projects*". R3 and R5 also observed that BIM is not widely used in Sri Lanka due to the lack of past building drawings and the high initial cost of software and training. Regulatory challenges were another common challenge identified by the three professionals through the interviews. **R2** highlighted that "*Regulatory challenges and lack of standardisation processes lead to difficulty in integrating sustainability effectively in renovation projects*." Moreover, R10 stated that these challenges, including the difficulty in getting approval from local authorities, is a significant challenge created more complexity to sustainable renovation, since regulatory delays generally discourage contractors from adopting sustainable renovations.

Another major challenge mentioned in the interviews by seven out of twelve professionals included the resistance from the stakeholders, such as clients and contractors. **R3** noted that "*Resistance from contractors due to perceived additional effort commonly restrict the integration of sustainability*." R5 and R7 highlighted client dissatisfaction, with **R5** indicating that "*Clients may reject reused materials due to appearance concerns*". Similarly, **R12** said that "*Clients assume low-cost finishes look cheap*", clarifies about the preference for conventional materials over choosing the sustainable materials. **R10** further highlighted that "*The attitude of engineers and employers regarding the reuse and recycling of materials is often unfavourable, making it difficult to encourage sustainable methods*." R11 also observed that sustainability is not always integrated into renovation projects, indicating a common lack of adoption among industry professionals.

4.3 RECOMMENDATIONS FOR IMPROVING THE INTEGRATION OF SUSTAINABLE PRACTICES IN RENOVATION PROJECTS IN SRI LANKA

Respondents highlighted the need for training, government support, improved design approaches, sustainable materials, and engagement of stakeholders through interviews. **R1** stated that "*Providing proper knowledge and training is essential*," while **R2** discussed that "*Conducting workshops and training sessions for clients, contractors, and professionals can improve awareness of sustainability benefits, such as cost savings and environmental impact reduction*." Similarly, **R4** suggested, "*Arranging specialized training is needed for workers through workshops to provide proper idea about the sustainable design*," while R6, R9, and R1 pointed out the significance of education and awareness campaigns to improve the integration of sustainability in the construction industry. Government support is also another significant aspect in supporting sustainable renovation. **R1** proposed that "*Tax reductions should be provided for sustainable practices*", while R2 emphasised the necessity for financial incentives such as tax breaks and subsidies, along with stronger sustainability regulations. R3, R6, and R7 highlighted strengthening policies to promote renewable energy adoption and recycling initiatives. According to the respondents, sustainability should be focused on from the design process itself. **R1** said that "*Energy efficiency should be considered early in the process*," while

R3 emphasised the need for integrating biophilic design and adapting designs to Sri Lanka's tropical climate."

R5 emphasised the need to improve regulations related to waste management and drainage systems, especially for hotel renovations. **R7** mentioned "*Promoting the recycling of demolition waste through proper processing facilities*", while **R12** suggested "*Implementing policies that incentivise sustainable waste disposal and encouraging clients to prioritise sustainability over aesthetics*." R6, R9, and R11 pointed out the significance of arranging awareness campaigns and training programmes to provide clear ideas for professionals and the public on sustainable practices. **R8** expressed "*Increasing awareness about lifecycle cost benefits to encourage clients to invest in sustainable solutions*." Overall, the responses from the professionals show that improving sustainability in renovation projects needs an integrated strategy, including training programmes, government incentives, sustainable design integration, eco-friendly materials, stakeholder collaboration and waste management improvements.

5. DISCUSSION

The findings of the study provide more helpful information related to the contributions of contractors and consultants to adopting sustainable practices in renovation projects. The study mainly indicates that while awareness of sustainability is increasing, its actual implementation in the industry remains limited due to various challenges. Through the literature review, various sustainable practices were recognised to be essential in renovation projects. While considering the roles of contractor and consultant, the interview findings confirmed that they are important to sustainable integration, which relates to previous studies. Consultants were described as key advisors for clients in material selection and design solutions. However, many respondents indicated that their influence is often behind client interests and project cost constraints, which limits the scope of sustainable choices (Ghuzdewan et al., 2023; Hu, 2021). Contractors, on the other hand, were found to be mainly involved during the construction stage but rarely engaged in early decision-making phases. This is opposed to the literature review that advocates early-stage collaboration as important to achieving sustainability goals (Holloway & Parrish, 2015; Liu, Pauli, et al., 2020). Moreover, the findings revealed that many small and medium-sized contractors lack the technical training required to implement sustainable techniques effectively, reflecting concerns raised in earlier research (Jung et al., 2014; Mensah et al., 2022).

The study also highlighted several challenges that are similar to the literature review. High initial investment, absence of clear policy, limited incentives, and low client awareness were commonly identified challenges by professionals during interviews. These challenges relate to the literature review regarding cost-related challenges and institutional gaps that limit sustainability adoption in construction (D'Oca et al., 2018). Moreover, interviews emphasised the need for governmental support, awareness campaigns, and supportive regulations to improve sustainable practices in the construction industry. The literature review provides a comprehensive overview of the contributions of contractors and consultants in renovation projects. Although the research findings verify the importance of the identified sustainable practices, they expose major gaps in stakeholder engagement and policy support. Best practices, including educating the clients, integrating sustainability in contracts, conducting training, and better

communication required to bridge this gap among all stakeholders to align the Sri Lankan renovation projects with global sustainability objectives.

6. CONCLUSIONS

This section presents the conclusions drawn from the research conducted to investigate how contractors and consultants contribute to the adoption of sustainable practices in building renovation projects in Sri Lanka. The findings indicate that although many sustainable practices are conceptually recognised in Sri Lanka, their practical implementation remains limited and unbalanced. Consultants were identified as key contributors by advising clients, selecting appropriate sustainable materials, and addressing environmental considerations. On the other hand, contractors are mainly responsible for on-site works such as waste minimisation and efficient resource management. However, contractors and consultants mainly face numerous challenges related to lack of awareness, higher initial costs and lack of incentives from government in implementing the sustainable practices. To address these issues, several recommendations have been provided to enhance effective communication and facilitate the integration of sustainability into renovation projects. These recommendations focus on supporting a more coordinated and informed approach to sustainability, encouraging the adoption of locally available materials, the application of climate-responsive design strategies, and the implementation of policies. Overcoming the identified challenges requires an integrated and multi-stakeholder strategy incorporating expertise, supporting governmental frameworks, and enhanced client engagement to improve sustainable renovation methods in Sri Lanka. This study provides a comprehensive understanding of the practical roles of consultants and contractors throughout the phases of the renovation projects. Additionally, this research study provides specific industry-related recommendations that support practical implementation, policy improvements, and workshops for stakeholders on how to effectively integrate sustainable practices in renovation projects. Given that the scope of the study was limited to building renovation projects within the Sri Lankan context from the perspectives of contractors and consultants, future research could explore the role of client engagement in improving sustainable renovations and their decision-making. Additionally, investigating the impact of advanced technologies, financial incentives, and educational involvement could offer further insight into overcoming current limitations in renovation practices.

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