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# GREEN ADAPTIVE RE-USE OF BUILDINGS IN SRI LANKA

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## *ABSTRACT*

*Sustainability has emerged as a key component of the construction industry, and it is now incorporated into all aspects of building administration, construction, and design. In terms of sustainability, adaptive reuse of buildings and green building concepts can be considered superior alternatives to modern construction. Many past research studies have been carried out on the green building concept as well as the adaptive reuse of buildings in the construction industry. However, there is a lack of research related to the integration of green building concept with adaptive reuse of buildings. Thus, the aim of this research is to investigate the applicability of green building concepts to the adaptive reuse of buildings. Qualitative research approach was used to fulfil the objectives of this study. Semi-structured expert interviews were used to collect data and case studies were used to validate the findings which were obtained through expert interviews. To analysis the data, manual content analysis was used. During the expert interviews, factors considered in green adaptive reuse of buildings were identified. Through case studies, those findings were validated. Factors were categorised into nine (09) categories namely economic, environmental, social, functional, technological, legal, architectural, physical, and political. As there are less studies related to green adaptive reuse of buildings, the outcomes of the study can be used as a basis for future studies.*

***Keywords:*** *Green Building; Sustainable Construction; Green Adaptive Re-Use; Sri Lanka.*

## 1. INTRODUCTION

The construction industry's activities immensely contribute to the waste generation and negatively impact on sustainability (Yildirim & Turan, 2012) due to excessive energy and material use, solid waste creation, greenhouse gas emissions, external pollution, harm to the environment, and resource depletion (Chan et al., 2009). Sustainable construction practices have become crucial for obtaining social, economic, and environmental benefits from the sector (Alaloul et al., 2021). Green building techniques, such as energy-efficient HVAC systems, renewable energy sources, and sustainable materials, can be combined with adaptive re-use of buildings to further reduce energy consumption and waste (Maulina et al., 2022). Green building is an environmentally responsible approach to design, construct, and operate buildings, with the goal of creating energy-efficient structures that use renewable resources and minimize environmental impact while promoting healthy indoor environments (Saravanan, 2011; Nadeeshani et al., 2021). Further, green buildings improve resource efficiency through

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improved design, construction, operation, maintenance, waste collection, and recycling (Ragheb et al., 2016). The concept of green building comprises various elements and components that are intertwined to form the green building concept (Samer, 2013).

Adaptive re-use of existing structures is a well-established concept that extends the economic, environmental, and social functions of buildings, materials, and components (Misirlisoy & Günçe, 2016; Conejos et al., 2011). Adaptive re-use involves the transformation of a non-functional component into a new item that can be used for a different purpose (Bertino et al., 2021). This process involves upgrading the performance of the building to suit modern standards and changing user requirements while retaining as much of the original building as possible (Laefer & Manke, 2008). The technique provides the building with an innovative use while preserving its historical and cultural significance (Douglas, 2006). However, current adaptations rely on subjective methods and the intuition of practitioners, which can limit objective measurement (Tam & Hao, 2019).

There are number of research studies that have been carried out on the green building concept in the construction industry (Alsulaili et al., 2020; Ding et al., 2018; Hwang et al., 2017; Sharma, 2020; Liu & Lin, 2016). Further, research has been carried out on the adaptive re-use of buildings in the construction industry as well (Aigwi et al., 2021; Misirlisoy & Günçe, 2016; Tam & Hao, 2019). However, limited attention has been paid on integrating green building concepts and the adaptive re-use of buildings.

The construction industry in Sri Lanka is a fast-growing industry, which highly contributes on the economy of the country (Illankoon et al., 2022). Therefore, maintaining the productivity of the Sri Lankan construction industry is vital for the development of Sri Lanka (Manoharan et al., 2020). However, Nawarathna et al. (2019) stated that the development in the construction industry paves the way for the generation of environmentally hazardous outputs. Further, high solid waste generation (Kaluarachchi, 2018) and high energy consumption (Nadeeshani et al., 2021) can be identified as barriers that are being faced by the building construction in Sri Lanka. Therefore, sustainable construction practices should be adapted to mitigate the barriers and establish environmental, economic, and social sustainability in the country (Athapaththu & Karunasena, 2018). Green building concepts (Weerasinghe et al., 2021) and adaptive re-use of building concepts (De-Silva et al., 2019) can be introduced as modern and practical sustainable practices in the construction sector in Sri Lanka. According to the current situation of Sri Lanka, adaptive re-use of buildings will promote to minimize building redundancy in next year's rather than demolition and replacement of the existing buildings. Further, encouraging adaptive re-use of buildings can have various economic, socio-cultural, and historical benefits and the green building concept will add dynamic value to the adaptive reuse of buildings. Hence identifying the applicability of green building concepts to adaptive re-use of buildings would yield many benefits to the Sri Lankan construction industry. Accordingly, this study investigates the applicability of green adaptive re-use of buildings within the Sri Lankan context.

The aim of this study is to investigate the applicability of green building concepts to the adaptive reuse of buildings in Sri Lanka. To achieve this aim, the study first explores how green building concepts can be integrated within adaptive reuse projects in the Sri Lankan context. It then identifies the key factors influencing such integration by conducting expert interviews. Finally, it validates and refines these identified factors through in-depth case studies of selected green adaptive reuse projects.

# 2. LITERATURE REVIEW

## 2.1 ADAPTIVE RE-USE OF BUILDINGS

Repurposing existing buildings for new purposes while maintaining its structure and character is known as adaptive re-use (Bullen & Love, 2011). This technique is seen as sustainable since it adheres to the values of environmental preservation, cultural heritage preservation, and conservation (Balliana et al., 2016). According to studies, adaptive reuse extends a building's life by meeting contemporary needs, lowering waste from demolition, and lowering the need for new construction (Foster, 2020). In urban settings, where historic buildings are challenged by urbanization and functional obsolescence, adaptive reuse works especially well (Davies et al., 2024). In order to preserve historical and cultural value while pursuing sustainable development goals, important frameworks like Campbell's Planner's Triangle emphasize the necessity of striking a balance between social, economic, and environmental goals in reuse projects (Campbell, 2016). Additionally, the viability and sustainability of reuse programs are regularly evaluated using multi-criteria decision-making techniques (De-Feo et al., 2018).

## 2.2 GREEN ADAPTIVE RE-USE OF BUILDINGS

Adaptive reuse and green building techniques combine to form a hybrid approach with a sustainability focus (Spina, 2021). Green adaptive reuse addresses the environmental effects of both construction and operation by incorporating renewable energy technology, sustainable materials, and energy-efficient retrofitting into repurposed structures (Jane, 2025). This strategy is praised for fostering sustainability and preserving cultural heritage (Pai et al., 2025). By lowering resource consumption and extending the life cycle of existing structures, research shows how important green adaptive reuse is in promoting circular economies (Foster, 2020). High upfront expenditures, legal restrictions, and the technical challenges of incorporating contemporary green technologies into older buildings are some of the obstacles (Chan et al., 2017).

## 2.3 APPLICABILITY OF GREEN ADAPTIVE RE-USE BUILDINGS TO SRI LANKA

Sri Lanka's rich architectural legacy and escalating environmental issues present a special setting for green adaptive reuse (Wijesiri et al., 2022). The nation's traditional and historic colonial structures offer chances for green-minded adaptive reuse (Uekötter, 2010). However, implementation is frequently hampered by issues like low public awareness, insufficient policy frameworks, and budgetary limitations (Crosby, 1996). Sri Lanka may encourage green adaptive reuse by embracing internationally accepted sustainability standards and utilizing the cultural significance of its legacy (De-Silva et al., 2019). Stakeholder participation, professional training programs, and laws encouraging adaptive reuse should be the main goals of initiatives to accomplish sustainable urban growth while protecting architectural history (Yung & Chan, 2012).

## 2.4 FACTORS TO BE CONSIDERED IN GREEN ADAPTIVE RE-USE OF BUILDINGS

Integrating the green concept with the adaptive re-use of buildings is not an easy task, where it demands proper coordination, planning, and management is needed for succeeding in the integration (Wijesiri et al., 2021). Therefore, there are various factors to be considered when implementing a green adaptive re-use project (Vafaie et al., 2023).

Among those, the pioneering factors to be considered in green adaptive re-use of the building are the structural integrity (Wijesiri et al., 2021), architectural features of the building including the building layout and orientation (Celadyn, 2019), economic factors such as initial cost,

return on investment (ROI), and maintenance cost (Rockow et al., 2019), resource efficiency (Eray et al., 2019), innovative techniques (Celadyn, 2019; Conejos et al., 2011), occupancy comfort (Dewiyana et al., 2016), compliance with existing laws and regulations, and flexibility in future modifications and disassembly requirements (Rockow et al., 2019).

# 3. METHODOLOGY

The study required to gather the insight on green adaptive re-use of buildings within the context of Sri Lanka. Hence, the study incorporated the qualitative research approach in developing an in-depth inquiry on the two concepts, adaptive re-use of buildings and green building construction. The data collection was implemented in two phases as detailed below.

## 3.1 PHASE 1: EXPERT INTERVIEWS

Survey strategy can be identified as the most effective way to collect data since it explores the depths of what people think (Punch, 2014). Hence, the survey strategy was facilitated as the initial data collection strategy to identify and comprehend the current factors associated with green adaptive re-use of buildings in Sri Lanka. Table 2.1 elaborates the respective respondent profile incorporated in conducting the survey. A purposive sampling method was used to select the experts who possess substantial experience in both adaptive reuse and green building practices.

*Table 1: Respondent profiles for expert interviews*

| Respondent Code | Profession | Designation | Industry Experience | Experience in Adaptive Reuse of Buildings |
|---|---|---|---|---|
| E1 | Architect | Director/ Consultant | 20 | 12 |
| E2 | Architect | Director/ Consultant | 20 | 16 |
| E3 | Architect | Director/ Consultant | 20 | 12 |
| E4 | Architect | Director/ Consultant | 20 | 15 |
| E5 | Quantity Surveyor | Consultant | 22 | 14 |
| E6 | Quantity Surveyor | Consultant | 20 | 14 |
| E7 | Engineer | Director | 23 | 12 |
| E8 | Engineer | Director | 25 | 14 |
| E9 | Facilities Manager | Consultant | 10 | 08 |
| E10 | Facilities Manager | Consultant | 08 | 06 |

### 3.2 PHASE 2: CASE STUDY

Phase 02 of the data collection incorporated a case study approach to investigate the current applicability of the green adaptive re-use concept to the buildings in Sri Lanka. Accordingly, two building construction projects which have incorporated the said concept were selected.

#### 3.2.1 Description of Case Study – 1

Case 1 is one of the major green adaptive re-use of buildings projects done in Colombo city. It is the first real estate project initiated in Sri Lanka. The structure ended up in 152m in height and consisted of two 39 story towers connected by a four-story retail block. The total cost of construction of the building was $130 million and was opened on the 12th of October 1997. With over 750,000 sq. ft. of office and retail space, the building currently holds more than 120 local, international, and multinational brands which makes in Sri Lanka are most demanding commercial dwelling. After fifteen years of opening the building management team decided to renovate their building with green concepts. Currently, this building has been successfully adaptively re-used with applying green building concepts. They have initiated the Energy and water management.

#### 3.2.2 Description of Case Study – 2

This building is a public library building in Sri Lanka. The main building and its interior layout had been scientifically planned in the 1970s by an internationally renowned UNESCO consultant architect. In January 2017, this library building was allocated Rs 500 million by the department of budget to upgrade the national library of which Rs 400 million was for refurbishing with green concepts the present building and constructing an additional building while Rs 100 million was for furniture. Rainwater havering systems, Solar power systems, Indoor air quality systems are the main green concepts to be proposed.

*Table 2: Case study respondent profile*

| Description | Interview Code | Profession | Experience |
|---|---|---|---|
| Case 1 | C1A1 | Consultant Architect | 24 years |
| | C1E1 | Maintenance Engineer | 15 years |
| | C1QS1 | Quantity Surveyor | 10 years |
| Case 2 | C2A1 | Consultant Architect | 15 years |
| | C2E1 | Maintenance Engineer | 22 years |
| | C2QS1 | Quantity Surveyor | 10 years |

## 4. FINDINGS AND ANALYSIS

### 4.1 FACTORS CONSIDERED IN GREEN ADAPTIVE REUSE OF BUILDINGS: EXPERT INTERVIEW FINDINGS

Various factors have been identified by the experts regarding the green adaptive reuse of buildings. For obtaining the experts' opinion and validation process, those identified factors were categorised into nine (9) main categories named economic, environmental, social, functional, technological, legal, architectural, physical, and political.

#### 4.1.1 Physical Factors

Most of the respondents emphasised the importance of having the proper building orientation in making green adaptive buildings. E2 strengthened the fact by stating that "*proper building*

*orientation enables penetration of natural daylight into the building and also it allows buildings to have natural ventilation*". As per E5, this enables higher energy performance and upgrades the indoor building quality. Further, having a properly insulated building envelope is considered as a factor to be considered in green adaptive buildings by the respondents E2, E3 and E8. According to E8, possessing properly insulated building envelope engages in providing a precious temperature level and also minimises the energy usage. E1 identified structural integrity as an important attribute that is required to be considered while delivering green adaptive buildings. The respondent stated that "*while considering all other major physical factors, it is required to ensure the structural integrity of the particular building that shall enable the structural soundness and safe building environment*". Building materials is another attribute to be considered while delivering adaptively reuse of buildings. According to E10, it is more beneficial to have eco-friendly practices during the construction. The author further said that attaining eco-friendly construction is accelerated through the use of sustainable materials having low embodied energy and a higher durability. The incorporation of flexible design strategies is another physical factor highlighted by E7. The respondent stated that the "*use of modular construction in a building allows future changes with lesser effort on demolition and reconstruction*". Additionally, respondents identified several other factors that is ideal to be considered in case of an adaptive reuse of a building such as required workmanship, reuse age of the building, operational convenience, size of the building, and the available green space.

### 4.1.2 Economic Factors

Most of the respondents highlighted the possibility of acquiring financial incentives and rebates when implementing green adaptive reuse of buildings. E1 identified the availability of financial options such as loans, mortgages, or other financing options as another significant economic factor to be considered when considering the green adaptive reuse of buildings. As stated by the respondent "*the financial options offer favourable conditions to the building stakeholders such as favourable terms and conditions, and the interest rates*".

E8 stated that "*when considering green adaptive reuse of buildings, it is beneficial to account several factors such as initial cost on investment, operational and maintenance expenses, return on investment, and revenue generated*". Further, the respondent emphasised the importance of conducting a cost-benefit analysis in evaluating the financial implications of launching a green adaptive reuse of buildings. In relation to the response made by E8, E2 mentioned that green adaptive reuse of buildings is capable of making a significant financial benefit when the initial cost of building is comparatively lesser than the operational and maintenance cost.

Further, E6 stated *"...evaluating the building value is a mandatory factor to be considered when delivering a green adaptive reuse building. It is a well-known factor that this type of building has a higher sales prices or the rental fees due to the improved quality of living inside the building*". In addition, E2 highlighted that these buildings are capable of making energy savings as the buildings incorporate energy-efficient design strategies and also the tendency to integrate renewable energy into the building, which ultimately leads to an economic benefit.

### 4.1.3 Environmental Factors

Ensuring a favourable indoor environmental quality is another vital factor raised by many respondents including E2, E4, E6, E7, and E10. E4 stated that *"...controlling the amount of indoor pollutants, optimising the ventilation supply, and maintaining the thermal comfort are required to be considered when ensuring quality indoor environment*".

As highlighted by another factor to be considered in the green adaptive reuse of buildings is the reduction of resource consumption and resource conservation. E9 suggested the use of low embodied energy materials, material recycling, and minimised material wastage. As per E7, another mode to implement resource conservation having energy efficient design strategies which shall reduce the energy consumption. Further, the respondent emphasised that the water conservation also shall be implemented through sustainable water management practices.

### 4.1.4 Social Factors

As highlighted by most of the respondents, occupant comfort is an important social factor to be considered when delivering green adaptive reuse buildings. E3 stated, *"…increased occupant comfort is a good attribute that shall be considered when deciding the rental or selling fees*". Moreover, the safety and security of the occupants are required to be made confirmed mandatorily. This shall lead to make highly satisfied occupants.

Education and awareness of the occupants on the value of green adaptive reuse of buildings is important as it promotes this type of building construction by eradicating most of the misconceptions in the minds of the occupants.

### 4.1.5 Functional Factors

As per all the respondents, functional factors are crucial in ensuring the attainability of the requirements of the occupants and the surroundings. Flexibility is a main attribute that is required to be considered in these types of buildings, where it enables future changes without huge disturbance. E7 stated that *"…the required changes to a building are easily viable when the building possesses features such as modular sections, and also the multi-purpose spaces*". Operational efficiency is said to be another factor to be considered when delivering these types of buildings. This enables the operation of the building with less use of resources and less maintenance requirement. E1 stated, *"…operational efficiency shall be optimised with the integration of modern technology*".

### 4.1.6 Technological Factors

E3 mentioned that "*…the adaptability of buildings is compulsory to be considered when delivering green adaptive reuse buildings*". E10 suggested to use of innovative technological solutions as it is vital in delivering a green adaptive reuse building. These chosen technologies shall ensure the use of low embodied energy and low toxic material, as well the recycled materials.

### 4.1.7 Architectural Factors

E10 stated that "*accessibility is one of the major architectural factors to be considered in green adaptive reuse of buildings due to the consideration of vital factors such as better ergonomic designs, accessibility to all sort of people including disabled community and elderly people*". Further, E5, E7, and E8 identified optimization of the building envelope as a factor to be included under this category whereas E5 identified it as a mode of ensuring the comfort of building occupants.

### 4.1.8 Legal Factors

Most of the respondents identified environmental regulations as a crucial legal factor to be considered when delivering a green adaptive reuse building. As per E5, complying with legal requirements avoids unnecessary legal and financial risks for a project. Moreover, zoning regulations are required to be strictly followed as it avoids many legal issues. Also, complying with regional development policies were further emphasised by E4, E8, and E10. Further, E3

emphasised the importance of complying with green building rating systems in achieving green adaptive reuse of buildings.

### 4.1.9 Political Factors

As per most of the respondents, fulfilling the political factors has become crucial, as the political support is essential in streamlining the project approvals and acquisition of incentives provided by the government for the implementation of green building initiatives. E3 emphasised that the political leaders and policymakers are public figures who shall pioneer in publicising the green adaptive re-use of buildings and acquiring public support in the respective building practice. According to E5, collaboration among the stakeholders engaged in a project such as government, political leaders, community organisations, and other stakeholders, especially a project that gets more local and international attraction, demands higher collaboration among the stakeholders in getting successful project output.

## 4.2 FACTORS CONSIDERED IN GREEN BUILDING ADAPTIVE REUSE OF BUILDINGS: CASE STUDY FINDINGS

The findings of the expert interviews were validated through two case studies which have incorporated the green adaptive reuse concept in those buildings. Based on the findings of the case studies, the findings of expert interviews were subjected to addition, deletion, alteration, or else the data was kept with no change. Table 3 illustrates the factors to be considered in green adaptive reuse of buildings.

*Table 3: Factors to be considered in green adaptive re-use of buildings*

| | Factors (Expert Interview Findings) | Modifications made through Case Studies | Factors (After Validation with Case Study Findings) |
|---|---|---|---|
| Physical factors | Proper building orientation (Geometry) | No Change | Proper building orientation (Geometry) |
| | Properly insulated building envelope | No Change | Properly insulated building envelope |
| | Structural integrity | No Change | Structural integrity |
| | Building materials | No Change | Building materials |
| | Flexible design strategies | No Change | Flexible design strategies |
| | Workmanship | No Change | Workmanship |
| | Reuse age of the building | No Change | Reuse age of the building |
| | Operational convenience | No Change | Operational convenience |
| | Size of the building | No Change | Size of the building |
| | Green Space | No Change | Green Space |
| | Building location | Added | Building location |
| | Historic value of the building | Added | Historic value of the building |
| | Site amenities | Added | Site amenities |
| | Prevailing Climate | Added | Prevailing Climate |

| | Factors (Expert Interview Findings) | Modifications made through Case Studies | Factors (After Validation with Case Study Findings) |
|---|---|---|---|
| Economic factors | Financial incentives and rebates | Altered | Financial options (Including Tax incentives/ loans/ grants etc.) |
| | Financial options | | |
| | Initial cost on investment | Altered | Initial cost |
| | Operational and maintenance expenses | Altered | Operational and maintenance costs |
| | Return on investment | No Change | Return on investment |
| | Building value | No Change | Building value |
| | Revenue generated | Altered | Profitability |
| | Construction material cost | Added | Construction material cost |
| Environmental factors | Indoor environmental quality | No Change | Indoor environmental quality |
| | Reduction of resource consumption | | |
| | Use of low embodied energy materials | Altered | Resource conservation |
| | Material recycling | | |
| | Minimised material wastage | | |
| | Energy efficient design strategies | No Change | Energy efficient design strategies |
| | Environmental sensitivity | Deleted | - |
| | Water conservation | No Change | Water conservation |
| | Site and community | Added | Site and community |
| | Use of greenfield sites | Added | Use of greenfield sites |
| | Site layout, space gain and change and building character | Added | Site layout, space gain and change and building character |
| Social factors | Occupant comfort | No Change | Occupant comfort |
| | Occupant safety | No Change | Occupant safety |
| | Education and awareness | No Change | Education and awareness |
| | Social value | Added | Social value |
| | Compatibility of newly introduced uses with existing | Added | Compatibility of newly introduced uses with existing |
| | Identity | Added | Identity |
| | Access to facilities | Added | Access to facilities |
| Functional factors | Client's requirements | No Change | Client's requirements |
| | Flexibility | No Change | Flexibility |
| | Disassembly | Deleted | Considered under Flexibility |
| | Operational efficiency | No Change | Operational efficiency |
| | Building maintenance | Deleted | Operational efficiency ensures less resource usage and less maintenance requirement |
| | Structural Grid | Added | |

| | Factors (Expert Interview Findings) | Modifications made through Case Studies | Factors (After Validation with Case Study Findings) |
|---|---|---|---|
| Technological factors | Adaptability | No Change | Adaptability |
| | Innovation | No Change | Innovation |
| | Construction time period | Added | Construction time period |
| | Existing Building type | Added | Existing Building type |
| Architectural factors | Accessibility | No Change | Accessibility |
| | Optimisation of the building envelop | No Change | Optimisation of the building envelop |
| Legal factors | Official plan and zoning regulation | No Change | Official plan and zoning regulation |
| | Regional development policies | No Change | Regional development policies |
| | Environmental regulations | No Change | Environmental regulations |
| | Green building rating system | Added | Green building rating system |
| Political factors | Collaboration with government | No Change | Collaboration with government |
| | Political will | No Change | Political will |
| | Public opinion | Added | Public opinion |

Under physical factors, C1E1 stated, "*installation of water-efficient fixtures improved the energy efficiency of the building*". Further the respondent highlighted the rainwater harvesting system and the greywater recycling system available in the building which highly influenced on having a green adaptive building.

When considering economic factors, both C2QS1 and C2QS2 mentioned that the government takes steps to provide financial benefits such as financial incentives, grants, tax credits, and rebates when implementing green adaptive reuse of buildings. Moreover, C1A1 stated that *"…this type of building is having a good market demand when considering the prevailing market value. One reason for the increased market demand shall be the enhanced sustainable features of the building*". C2E1 further stated, "*it is more important to evaluate the risk associated in such a project as it allows to identify unforeseen and unpredictable market conditions and price fluctuations*". With the risk assessment, the economic feasibility of a project shall be predicted.

Moreover, adaptability becomes an environmental factor that is required to be considered in green adaptive reuse of buildings, where it enables future changes with less impact on the environment by reducing construction and demolition waste.

Under social factors, C1QS1 confirmed that this type of building construction shall make more job opportunities for the community as it contains an additional scope of work when compared to the traditional building construction. Accessibility to the facilities is another social factor that shall enable the access of most of the community groups including people of all the age levels, and economic backgrounds. C1E1 stated that "…*green adaptive reuse of buildings should provide uninterrupted access to all the people with an interest towards the facility*".

When considering the technological factors, C2E1, stated that "…*it is mandatory to consider the construction time when integrating green adaptive reuse strategies to the building, as it demands more financial resources as well as human resources*".

The case study findings reveal that the various physical factors such as structural integrity, material durability, design complexity, workmanship, reuse age, operational convenience, building size, and green space influence green adaptive reuse buildings in Sri Lanka. Since, the prevailing climate and the foundation were not identified through the case studies, those factors were removed from physical factors.

Additionally, building value, profitability, location, operational and maintenance costs, material, and structural costs are economic factors for all the two green adaptive reuse building projects. However, site amenities are not observed in the case studies, and therefore not considered an economic factor.

The expert interviewees considered technological factors such as adaptability, innovation, building services, existing building type, and construction time as the most critical when applying green concepts to adaptive reuse buildings. Further, structural conditions, building systems, materials, and decorations were excluded factors during the case studies.

Analysing all the findings of the literature review, expert interviews, and the case studies, factors to be considered in green building adaptive re-use of buildings established and it is illustrated through Table 3.

# 5. CONCLUSIONS

The concept of green adaptive re-use emphasizes the value of the existing building stock as an important economic, social, and cultural resource that should not be wasted. However, developing countries have not actively engaged in green adaptive reuse of buildings. Furthermore, converting adaptive reuse buildings into green buildings remains a challenging area with limited research attention. Environmentally friendly reuse of buildings is a key approach to achieving sustainability in the built environment by reducing the environmental impact of new construction and supporting more resilient and sustainable communities.

This study identified a set of key factors influencing green adaptive reuse, which adds to the existing body of knowledge and offers a structured basis for further research. The categorised factors provide practical guidance for practitioners and policymakers in planning and implementing green adaptive reuse projects. Future research may expand on these findings by exploring how these factors apply across different contexts, building types, and project scales, thereby enhancing both theoretical understanding and practical application in the field.

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