

# APPROACHES TO FOSTER GREEN BUILDING CONSTRUCTIONS IN SRI LANKA

R. Thalpage\* and Gayani Karunasena

Department of Building Economics, University of Moratuwa, Sri Lanka

## ABSTRACT

*With world's trend, though the Sri Lankan government has taken a substantial effort for local green building movement, still it has not become as a major and pressing concept in Sri Lanka due to several barriers. Those barriers could be identified under five key areas as financial barriers, regulatory barriers, social barriers, knowledge/skills barriers and industrial barriers. Thus, the purpose of this study is to recommend the probable approaches to foster green building constructions in Sri Lanka by overcoming the existing barriers.*

*A qualitative research approach was adopted for attaining the research aim while conducting semi structured interviews with 15 local professionals who are in local regulatory bodies for green buildings and sustainable constructions, who are involving with green building constructions as well as who have not still involved with green constructions but expect it in future. The findings were analyzed with content analysis technique. It was recommended to follow simple and primary green strategies, take the correct consultation, implement mandatory regulations, make collaboration between existing authorities, increase public awareness, correct common misconceptions, provide knowledge and education, promote research and development, government takes the leadership and take the support from organizational managements as few major approaches to overcome the identified barriers for Sri Lankan green building constructions. The recommended approaches can be followed by industry players in order to foster green building constructions in national level, local level or organizational level and it will provide a basis to achieve the sustainability goal of Sri Lanka.*

**Keywords:** Barriers; Foster Green Building Constructions; Green Building Concept; Probable Approaches.

## 1. INTRODUCTION

The Green Building has become as a salient concept in global construction industry in regard to protect the environment through sustainable development (Chan *et al.*, 2009). According to the World Green Building Council in California (World Green Building Council, 2013), there are more than 140,000 green buildings registered globally. The Leadership in Energy and Environmental Design (LEED) green building rating system has been applied to more than 72,500 projects in the world (USGBC, 2015). In Asian context, Singapore is at the top among 62 surveyed countries worldwide (McGraw-Hill Construction, 2013) and India is the third best country in the world on LEED (Astarini, 2015).

Equally, Sri Lankan government also has taken a significant effort for local green building movement. However, Waidyasekara and Sandamali (2012) revealed that still there is no significant result on local green building practices and there are many challenges to achieve the sustainability goal of Sri Lanka. There are only 16 LEED certified buildings (Sri Lanka Business and Biodiversity Platform, 2014) and 15 certified buildings under GREEN<sup>SL</sup> Rating (GBCSL, 2015). McGraw-Hill Construction (2013) identified the higher initial cost, lack of public awareness, lack of policy and governance, lack of coordination, lack of market demand and lack of trained green building professionals as barriers for green building movement in Asian countries.

Further, the improper understanding and misinterpretations within the society are the reasons for less embrace of sustainability concept (GBCSL, 2010 cited Waidyasekara and Sandamali, 2012). Therefore,

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\*Corresponding Author: E-mail - [rasanthithalpage@gmail.com](mailto:rasanthithalpage@gmail.com)

this study aims to recommend the probable approaches to foster green building constructions in Sri Lanka by overcoming the existing barriers. Next section of the paper presents compressive review on Sri Lankan context of green building constructions.

## 2. SRI LANKAN CONTEXT OF GREEN BUILDING CONSTRUCTION

With rapid growth of construction activities, adoption of green concept has become as a quick need in Sri Lankan construction industry (Waidyasekara and Fernando, 2013). Already there are several government rules and regulations in Sri Lanka that support the local green growth. The National Environmental Act established in 1980 and the Central Environmental Authority, Environmental Council as well as the District Environmental Agencies that were established under above act govern the environmental impact of local industries including construction industry with several rules and regulations (National Environmental Act, 1980). Additionally, the Sri Lankan government has introduced several national policies which indirectly drive the local green building movement as National Environment Policy (2003), National Energy Policy (2003), National Climate Change Policy (2011), National Air Quality Management Policy (2000), Cleaner Production Policy (2004), National Forestry Policy (1995), National Solid Waste Management Policy (2008) and National Bio safety Policy (2005) (Ministry of Environment Sri Lanka, 2012). The Green Building Council of Sri Lanka (GBCSL) works as the principal association by giving the foremost commitment in developing sustainable buildings in Sri Lanka (GBCSL, 2015). Thus, Ratnasiri (2012) identified several drivers for Sri Lankan green building constructions under three main categories (Refer Figure 1).

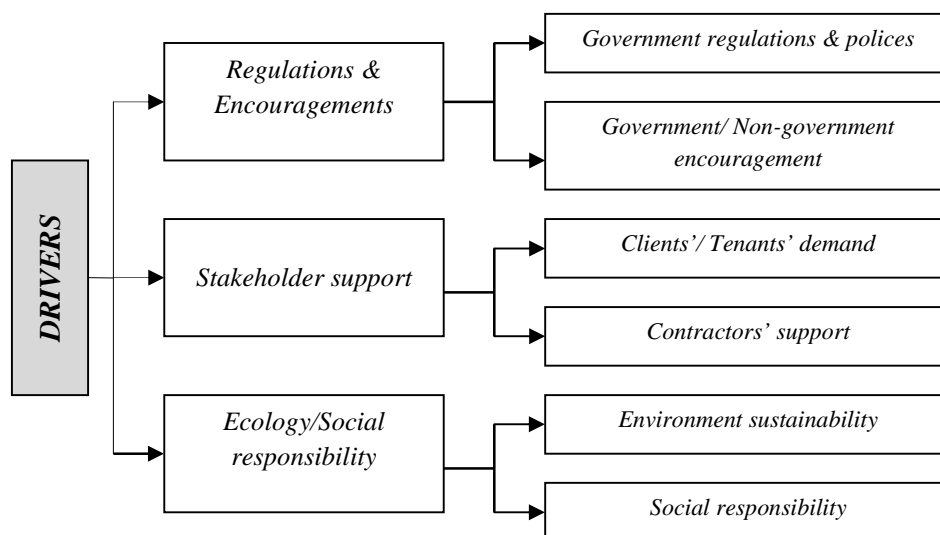


Figure 1: Drivers for Sri Lankan Green Building Construction

With above drivers, Sri Lanka already has LEED certified buildings as well as the buildings which are expecting to have the LEED certification in future (GBCSL, 2015). Sri Lanka has carried off the First LEED certified Green Hotel in the World; the Heritance Kandalama (Seneviratne, 2014). The other modern and innovative green construction in Sri Lanka is MAS Thurulie factory at Thulhiriya (MAS Holdings, 2015). Brandix Casual Wear Ltd. in Seeduwa is another highly recognized manufacturing company in Sri Lanka for its great environmental and social standards (OECD, 2012). Further, Jayalath (2010) mentioned the Hatton National Bank in Nittambuwa, CKT Apparel (Pvt) Ltd. in Agalawatte, Ulagalla Walawwe in Anuradhapura, Vocational training Centres in Ahangama and Ampara as other most identified green buildings in Sri Lanka.

Above mentioned green building practices are the evidences for the statement by Seneviratne (2014) that the Sri Lankan green buildings have a higher completion rate than other countries. But as per Waidyasekara and Sandamali (2012), this concept has been limited only for few buildings in Sri Lanka. Thus, it is important to identify the barriers for Sri Lankan green building constructions and search how to mitigate such barriers in order to foster green building constructions in Sri Lanka.

## **2.1. BARRIERS FOR SRI LANKAN GREEN BUILDING CONSTRUCTION**

Many studies have identified various barriers and implementation difficulties of green building construction in many countries (Arif *et al.*, 2009; Pedini and Ashuri, 2010; Bond and Perrett, 2012; Djokoto *et al.*, 2014; Ametepey *et al.*, 2015). Geelani *et al.* (2012) identified the higher initial cost as a major challenge associated with green buildings. Jayalath (2010) revealed that, there is 20 - 25% increment in construction costs of green buildings in Sri Lanka. It is substantiated by the fact that, the initial construction cost of Thurulie green factory building in Sri Lanka is 30% higher than a conventional factory building (Holcim Foundation for Sustainable Construction, 2009 cited Waidyasekara and Fernando, 2013). This financial barrier for green buildings is lifted up by the fact that, most of the benefits from green buildings can be achieved in long run with a high payback period (Kats 2003). Thus, Ametepey *et al.* (2015) identified the long Pay-back period as another barrier towards green building movement. On the other hand, Abidin *et al.* (2012) argued that, the government actions and guidance may be resulted for a pressure on the construction activities towards a better environmental safe guard. Though there is an adequate number of regulations and policies concerning the environmental protection, there is no any specific regulation or policy that directly focuses on the green building practices in Sri Lanka. As well as, lack of enforcement in existing government regulations and policies is another barrier (Hewage and Mallika, 2011).

There are common misconceptions of general public as green buildings are much more costly than traditional buildings and it is somewhat a difficult task to reach by middle or low class people (Azizi *et al.*, 2015). Therefore, Djokoto *et al.*, (2014) identified the lack of awareness as a serious barrier for green building constructions. Additionally, there is a resistance of people to change as they think that the change is always a challenge (CEC, 2008). Lack of professional knowledge is identified as another barrier for green constructions (Abidin *et al.*, 2012; Ametepey *et al.*, 2015). It is emphasized by the fact that the scarcity of professional knowledge may lengthen the green building development time frame (Choi, 2009). On the other hand, the inexperienced or untrained workforce may threaten the green building industry by increasing the risk (CEC, 2008). Further CEC (2008) revealed that averaged funding for green building related researches in United States of America (USA) is representing only 0.02% from the estimated annual value of USA building constructions. Thus, there is a lack of research investments on green building practices. Additionally, Financial Risks, Market Risks, Industry Risks, Performance Risks and Legislative Risks are identified by Pedini and Ashuri (2010) when going for a green building construction. Ametepey *et al.* (2015) identified several other technical barriers for sustainable constructions as lack of special materials that are environmentally sustainable, lack of demonstrations and lack of technology. Other than that, Ametepey *et al.* (2015) stated that the implementation of green building concept may be very difficult with the lack of support from management and leadership of the organizations.

By considering above exposed facts, the barriers for Sri Lankan green building constructions can be categorized as financial barriers, regulatory barriers, social barriers, knowledge/skills barriers and industrial barriers (refer Figure 2).

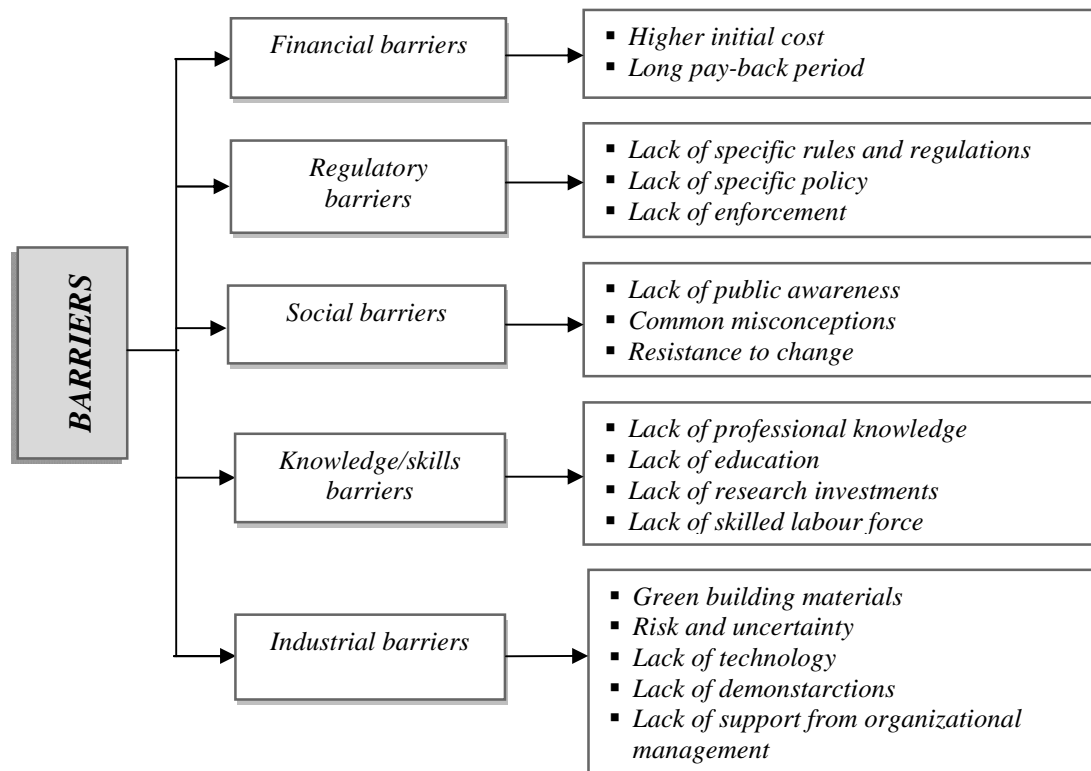


Figure 2: Barriers for Sri Lankan Green Building Construction

With identification of the reasons behind, it creates a further need of finding out the approaches to mitigate the identified barriers and next presents the methodology adopted.

### 3. RESEARCH METHODOLOGY

To verify the identified barriers and to recommend the probable approaches to mitigate those barriers, a qualitative research approach was adopted by carrying out the expert interviews. Semi structured interviews were selected as the mode of data collection with fifteen local professionals covering who are in local regulatory bodies for green buildings and sustainable constructions, who are involving with green building constructions as well as who have not still involved with green constructions but expect it in future (refer Table 1).

Table 1: Profile of Expert Interviews

| Category of Experts                                   | No. of Interviews |
|---|-------------------|
| Local regulatory bodies                               | 02                |
| Experts involve with green building constructions     | 10                |
| Experts not involve with green building constructions | 03                |

Code-based content analysis technique with NVivo software was adopted to analyze the findings from interviews in order to recommend the probable approaches for existing barriers under five key areas as financial barriers, regulatory barriers, social barriers, knowledge/skills barriers and industrial barriers.

#### 4. RESEARCH FINDINGS

As findings from expert interviews, it could be identified the severity of each identified barrier within the practical Sri Lankan context and various probable approaches to mitigate the each could be recommended under key five areas (refer Table 2).

Table 2: Recommended Approaches to Overcome the Identified Barriers

| Key Area                         | Identified Barrier                        | Approaches to Overcome the Barrier  |
|----------------------------------|---|---|
| <b>Financial Barriers</b>        | Higher initial cost                       | <ul style="list-style-type: none"> <li>▪ Follow simple and primary green strategies.</li> <li>▪ Select a suitable and honest green building consultant.</li> <li>▪ Buy green products from a reputed company for a reasonable price and warranty.</li> <li>▪ Achieve a majority of green features during design stage.</li> </ul>   |
|                                  | Long pay-back period                      | <ul style="list-style-type: none"> <li>▪ Follow the best design strategy as to achieve a shorter payback period.</li> <li>▪ In determining the payback period, weigh on intangible benefits also.</li> <li>▪ Consider the buildings' life span when applying green components.</li> <li>▪ Reduce the cost of green buildings with low cost green strategies.</li> </ul>   |
| <b>Regulatory Barriers</b>       | No specific rules and regulations         | <ul style="list-style-type: none"> <li>▪ Amending a provision in existing acts.</li> <li>▪ Implement mandatory regulations for green buildings.</li> </ul>  |
|                                  | No specific policy                        | <ul style="list-style-type: none"> <li>▪ Apply more green building concepts into existing policies.</li> <li>▪ Make collaboration between existing policies.</li> </ul>   |
|                                  | Lack of enforcement                       | <ul style="list-style-type: none"> <li>▪ Take acts and regulations into the action with hard rules.</li> <li>▪ Take political support to implement and enforce the rules.</li> <li>▪ Carry out a proper inspection for implemented rules.</li> </ul>  |
|                                  | Unavailability of a responsible authority | <ul style="list-style-type: none"> <li>▪ Appointing an authorized body for green buildings.</li> <li>▪ Make collaboration between existing authorities.</li> </ul>  |
| <b>Social Barriers</b>           | Lack of public awareness                  | <ul style="list-style-type: none"> <li>▪ Conduct exhibitions, seminars and workshops.</li> <li>▪ Conduct award ceremonies for green buildings and green professionals.</li> <li>▪ Organize competitions within schools and offices.</li> <li>▪ Give the publicity and awareness by media.</li> <li>▪ Practice green concept within government buildings and other public places.</li> <li>▪ Form social clubs for green buildings.</li> </ul> |
|                                  | Common misconceptions                     | <ul style="list-style-type: none"> <li>▪ Give the correct awareness for clients by professionals.</li> <li>▪ Give the correct publicity by media.</li> </ul>  |
|                                  | Resistance of people                      | <ul style="list-style-type: none"> <li>▪ Make more green building demonstrations and publish them.</li> <li>▪ Explain to the people about the danger of ignoring this concept.</li> <li>▪ Make people's minds with religious concepts to think about others and nature.</li> </ul>  |
| <b>Knowledge/Skills Barriers</b> | Lack of professional knowledge            | <ul style="list-style-type: none"> <li>▪ Conduct training programs for individual professionals.</li> <li>▪ Conducts training programs for professionals as company wise.</li> <li>▪ Consider the green certification for a professional as an important qualification.</li> <li>▪ Conduct CPD programs for professionals.</li> <li>▪ Include green concept related modules into university courses.</li> </ul>                               |
|                                  | Lack of education                         | <ul style="list-style-type: none"> <li>▪ Include green concept related subjects into school</li> </ul>  |

|                            |   |  |
|----------------------------|---|--|
|                            |   | <ul style="list-style-type: none"> <li>▪ syllabus.</li> <li>▪ Give the knowledge in all 3 main languages of the country.</li> <li>▪ Convert the schools, universities and other educational institutes into green.</li> </ul>  |
|                            | Lack of research investments                    | <ul style="list-style-type: none"> <li>▪ Universities can play a significant role.</li> <li>▪ Focus on green concept related R&amp;D by private companies.</li> </ul>  |
|                            | Lack of skilled labour force                    | <ul style="list-style-type: none"> <li>▪ Organize district or provincial training campaigns for construction labours.</li> <li>▪ Integrate the green concept with industrial training courses in technical colleges.</li> <li>▪ Allocate some amount from the contractors' fees of renewing their grades, to train labours.</li> </ul> |
| <b>Industrial Barriers</b> | Lack of green building materials                | <ul style="list-style-type: none"> <li>▪ Introduce green production methods as self-occupations for village people.</li> <li>▪ Encourage manufacturers who follow green production methods.</li> </ul>   |
|                            | Lack of demonstrations                          | <ul style="list-style-type: none"> <li>▪ Government takes the leadership in converting buildings into green.</li> </ul>  |
|                            | Lack of support from organizational managements | <ul style="list-style-type: none"> <li>▪ Give rewards for the management of green organizations.</li> <li>▪ Introduce a green services certification system.</li> </ul>  |

#### **4.1. FINANCIAL BARRIERS**

Financial barriers can't be identified as a major challenge to go for green buildings. The initial costs of green buildings are not always high. It may depend on several factors as building design and the technology used. That initial cost can be basically reduced by following simple and primary green strategies instead of using more advanced green technologies. As examples, to conserve energy, the buildings can be designed as to acquire the natural light and ventilation as much as possible with principles such as correct orientation, more openings and cross ventilation. As water conservation methods, it can be used advanced fittings for appliances which use low water amount with high pressure, used pipelines with small diameters and used rain water harvesting methods. As materials, it can be used green labeled materials which used a low energy consumption production process, used salvage materials after recycling and minimized the distance of material transportation. Further, the green concept promotes using of brown field lands instead of using vegie lands and also minimizing the material wastages. Thus, such primary green strategies actually reduce the unnecessary costs of constructions. Using advanced technologies such as solar panels is the next step for going green and they are not compulsory for buildings to be green.

Sometimes the costs of green buildings are unnecessarily increased by some parties by purposely. Therefore, the client should always be careful to select a suitable and honest green building consultant as major responsibility of reducing the cost is having for the consultant. A major part of the green concept can be achieved in the design stage of building without any additional cost. Thus, if the building design has been done well with a majority of green features, it can be achieved a lower initial cost as well as a shorter payback period.

#### **4.2. REGULATORY BARRIERS**

When it comes to the Sri Lankan context, the regulatory barriers identified from literature can be modified as no specific rules and regulations, no specific policy, lack of enforcement and unavailability of a responsible authority. Further, they are one of the major challenges in Sri Lanka to go for green buildings. It is better to amend a provision for green buildings in any existing act as National Environmental Act, Construction Industry Development Act or Urban Development Authority Act. Implementing mandatory regulations for green buildings is an essential approach in Sri Lankan context. As examples, it can be implemented the mandatory regulations to have the rain water harvesting in all

buildings, to have the green roofs with solar panels for buildings in which the roof area is more than a certain limit, to convert the building walls into green, in which the vertical area is more than a certain limit or it can be imposed high tax for buildings in which have higher monthly electricity and water bill than a certain limit. On the other hand, it should be applied more green building concepts into the existing policies as National Environment Policy, Energy Policy, Climate Change Policy, Air Quality Management Policy, Cleaner Production Policy, Solid Waste Management Policy and Bio safety Policy.

Most of the acts in Sri Lanka are limited only for their names. Lack of political support also is one of the main reasons in Sri Lanka for the low enforcement of rules and regulations. Therefore, the existing acts and regulations should be taken into the action with hard and fast rules with the support of all political parties. Mainly the National Environmental Authority, Construction Industry Development Authority, Green Building Council of Sri Lanka and Urban Development Authority have to collaborate with each other to implement and enforce the regulations related to green building concept.

#### **4.3. SOCIAL BARRIERS**

Social barrier is another major challenge to implement the green concept in Sri Lanka. Through exhibitions, seminars, workshops, competitions and award ceremonies, the green building concept can be carried into the close with general public. The public media can play a responsible role to attract the end users to adopt the green building practices. The consultants and other professionals should give the correct awareness for clients in order to correct the common misconceptions of general public. It can be made more green building demonstrations and publish them with their benefits in order to reduce the resistance of people to go for green buildings. It should be given an urgent explanation for people about the danger in front of them if they ignore this green building concept. Additionally, it can be formed some social clubs for green buildings in order to promote this concept among youths.

As per the experts' opinions, it should be made a mental revolution in our people at first. Most people are going to the green concept by looking for their personal benefits as awards, certificates, reputation or profits. Thus, people's minds and attitudes should be changed as to go for green concept voluntarily with an intention of saving our Mother Nature and future generations.

#### **4.4. KNOWLEDGE / SKILLS BARRIERS**

Overcoming knowledge/skills barriers is very important for fostering green constructions in Sri Lanka. Producing knowledgeable professionals by conducting training and CPD programs is essential because they are the people who can carry this green concept into general public. It can be done in individually or in company wise. If the certification as a green professional is considered as an important qualification, then the professionals always try to get the knowledge and to be certified as a green building professional. To give an education on this concept, green related subjects can be included into the university courses, technical college courses and school syllabus. It is very important that, the knowledge should be given in all 3 main languages of the country as in Sinhala, Tamil and English. Then only the knowledge is spread to all levels of the society. Promoting green research and developments is a further important approach. In there, local universities and private sector companies can play a significant role.

There is a responsibility on local contractors and on Construction Industry Development Authority (CIDA) to train the construction labors on green practices. It can be organized some training campaigns for those labors in district or province wise.

#### **4.5. INDUSTRIAL BARRIERS**

There are no industrial barriers as risk and uncertainty and lack of technology in Sri Lankan green building constructions and they are only our mental barriers.

Introducing green production methods as self-occupations for village people is a practical solution to increase the green construction materials in local market. Further, it can be encouraged the green product manufacturers by giving incentives, interest free loans, tax reductions and other benefits. The local government is the major party who should understand the importance and take the leadership in

converting buildings into green. Therefore, it should be started from government buildings as schools, universities, hospitals, public libraries, government offices and other public places as train stations, bus stands, cities and parks. To motivate the organizational managements, it should be introduced some reward systems with high recognitions for those who go for green within their organization. The services sector of the country can be promoted to practice this green concept by introducing a green service certification system.

As highlighted by experts, fostering green building constructions in Sri Lanka can't be done by one party. Thus, every one such as the government, political parties, public media, general public, professionals, schools, universities, industry players, organizational managements and all other parties have to play a significant role in the green building movement of Sri Lanka.

## 5. CONCLUSIONS

Since many nations have identified the importance of going for green buildings, there is an emerging trend in global green building practices. In Sri Lankan context also there are several drivers for green building movement as regulations and encouragements, stakeholder support and ecological goals and social responsibilities. With those drivers, Sri Lanka already has the green certified buildings with higher completion rates but, it has been limited only for few buildings. Many studies show that still the green building has not become as a major and pressing concept in Sri Lanka.

Literature findings revealed that there are several barriers for Sri Lankan green building constructions under five key areas as financial barriers, regulatory barriers, social barriers, knowledge/skills barriers and industrial barriers. Hence, this paper recommends the probable approaches to mitigate the identified barriers in order to foster green building constructions in Sri Lanka.

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