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DRIVERS AND BARRIERS TO IMPLEMENT GREEN BUILDING PRACTICES IN HIGHER EDUCATION INSTITUTES IN SRI LANKA

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ABSTRACT

Higher education institutes have a vast variety of humans, processes, and activities with significant waste generation, transportation, water and material consumption, and energy and electricity consumption. They have the potential to disseminate and lead future generations in the transition towards sustainability. Green buildings are designed, constructed, and operated by efficiently utilizing resources to provide a healthy and comfortable built environment while minimizing the life cycle cost. Higher education institutes across the world are several steps ahead of Sri Lanka in implementing green building practices. Thus, this research aimed to find approaches to increase the implementation of green building practices in higher education institutes in Sri Lanka. The research aim was approached through a qualitative case study. Accordingly, three cases were studied by collecting data through nine semi-structured interviews. Collected data were coded by using the NVivo 11 software and analysed using the cross-case analysis. Findings revealed that benefits associated with green buildings, leadership, specialization of the institute, institutional policy, and imposed regulations drive Sri Lankan higher education institutes to implement the green building practices. Lack of awareness, professional knowledge, skilled labour, and funds, political regime changes, poor planning, and stakeholder management were identified as barriers. The research outcomes guide the policymakers and management of the Sri Lankan higher education institutes to effectively implement green building practices. Further, the research outcomes will help to make strategies to reinforce the drivers and mitigate the barriers.

Keywords: *Barriers; Drivers; Green Building; Higher Education Institutes; Sri Lanka.*

1. INTRODUCTION

Sustainable Development (SD) was defined in the Brundtland Report as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p.37). There are various tools and mechanisms to incorporate SD features into various industries (Boons and Ludeke-Freund, 2013). Green Building (GB) has been globally recognised as a means of incorporating sustainability into the construction industry (Shen, et al., 2018). World Green Building Council (2021) defined

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a GB as "a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment". The GB concept is a catalyst that paves the way for sustainability by achieving 9 out of the 17 United Nations (UN) SD goals (Czerwinska, 2021).

As per Universities Act No. 16 of 1978, a Higher Education Institute (HEI) means a university, campus, open university, or university college established under the Act. Further, as per the Universities (amended) Act No. 7 of 1985, any institute or centre for higher learning and any degree awarding institute can be categorized as a HEI. Enriching the operations of HEIs with sustainable features become emphasized during the UN decade of Education for SD (2005-2014) (Qdais, et al., 2019). HEIs have the potential to disseminate and lead future generations in the transition towards sustainability (Corcoran and Wals, 2004). This has been recognised by the European Union SD strategy and the UN millennium development goals (Lukman and Glavic, 2007). Tennakoon (2017) and Anthony Jnr (2020) identified HEIs as the ideal places for introducing the GB concept with a futuristic view. Similarly, Fernando and Ariyawansa (2018) contended that developing and operating HEIs with green features significantly contribute to the nation's movement towards SD. Education and SD were first amalgamated by the Stockholm Declaration in 1972 (Grindsted, 2011). However, Tbilisi Declaration in 1977 laid the foundation for sustainability in higher education (Grindsted, 2011). Talloires Declaration assimilates sustainability and environmental literacy practices in teaching, research, and institutional operations (Association of University Leaders for a Sustainable Future, 2021).

HEIs across the world are several steps ahead of Sri Lanka in incorporating green concepts in operations, structures, and curricula (Lukman and Glavic, 2007). Moreover, greenness will be a key parameter in ranking universities globally in the future (Grindsted, 2011). Even though studies on sustainability in HEIs have increased in the recent past, only a few related studies have been conducted in the Sri Lankan context. By reviewing the literature base on the studies done on foreign green HEIs, Thennakoon (2017) proposed an agenda for Sri Lankan state universities in transforming into the green. On the other hand, Fernando and Ariyawansa (2018) developed a green rating system for new state university buildings in Sri Lanka by considering the criteria that affect sustainability. However, Fissi, et al. (2020) highlighted a research gap in empirical studies regarding the on-field realization of green HEIs. More importantly, Hoque, et al. (2016) highlighted the significance of studying the sustainability of HEIs in the South Asian context. On the other hand, Shen, et al. (2018) argued that more research should be done on identifying the barriers to implement the GB practices that are specific to developing countries. Moreover, the global trend of greening is knocking on the door of the Sri Lankan HEIs, leaving no option other than accepting (Tennakoon, 2017). Thus, it is important to understand the effective ways of implementing GB practices (Waidyasekara and Fernando, 2012). Hence, this research addresses the rising research question of "how the drivers and barriers affect the implementation of GB practices in HEIs in Sri Lanka".

2. LITERATURE REVIEW

2.1 DRIVERS TO IMPLEMENT THE GREEN BUILDING PRACTICES IN HIGHER EDUCATION INSTITUTES

Li, et al. (2011) identified two categories of driving forces of GBs namely market-led drivers and imposed drivers. Market-led drivers are the measurable benefits of GBs such as utility cost reductions and value addition to the brand name (Li, et al., 2011). A study that explored drivers of integrating sustainable practices in HEIs consolidated that by identifying reputation, image, goodwill, and credibility as driving forces (Blanco-Portela, et al., 2017). Imposed drivers are the rules and regulations that catalyse the adaptation. Dave, et al. (2014) identified environmental regulations as one of the top driving forces of GBs from 2018 to 2021. Declarations on sustainable higher education played a key role in developing monitoring tools for green HEIs (Grindsted, 2011). Anthony Jnr (2020) identified the ability of declarations and summits in higher education to foster sustainability attainment in HEIs in the Malaysian context. Stockholm Declaration, Tbilisi Declaration, and Talloires Declaration are the landmark declarations that initiated national legislation on sustainability in HEIs (Grindsted, 2011). However, the declarations were lacking in providing a framework on the critical GB practices that should be adopted by HEIs and thus not providing an interdisciplinary collaboration (Anthony Jnr, 2020). Beringer, et al. (2008) emphasized that merely signing declarations do not indicate the true sustainability efforts of the HEIs. For instance, researchers revealed that few signatory institutes of Talloires declaration in Atlantic Canada failed to reflect sustainability in institution policies (Beringer, et al., 2008).

Institutional commitments toward environmental conservation trigger the market demand for GBs (Shen, et al., 2018). The University of Florence realised the goal of being a green HEI by incorporating the green strategies into the institutional framework (Fissi, et al., 2020). Thus, sustainability became one of the basic strategic paths of the institute, and its mission and vision were defined accordingly (Fissi, et al., 2020). A study regarding Chinese HEIs concluded that the academic backgrounds of the staff members affect the institute's commitment to implement GB practices (Zhao and Zou, 2016). The study revealed that academic staff members from the environment, science, and technology backgrounds possessed greater abilities to contribute to the implementation of GB practices compared to members with backgrounds in art and sports. This was due to the ability to initiate platforms that increase active involvement via lectures or research on sustainability (Zhao and Zou, 2016). For instance, Tsinghua University developed China's first ultra-low energy building which was a platform for sustainability communication and increased the influence of green initiatives (Zhao and Zou, 2016). Similarly, Anthony Jnr (2020) highlighted the importance of the roles of academic professionals in related fields in pioneering the implementation of GB practices in respective HEIs in the Malaysian context. Moreover, Blanco-Portela, et al., (2017) identified that collaborative and interdisciplinary work between and among students, academic staff and external researchers as a unique driving force. A study regarding universities in Australia and England concluded that individuals who were committed to a more sustainable world would be a driving force that incorporates the green concept with university operations and activities (Ralph and Stubbs, 2014). Similarly, Shenyang University's green efforts project was driven towards success by the strong leadership

who encouraged stakeholders to provide ideas and coordinated them effectively (Geng, et al., 2012).

Accordingly, the literature reveals that associated benefits of implementing GB practices, imposed rules and regulations, institutional policy, strong leadership, and specialisation of the staff in the environmental, science, and technological fields drive the HEIs to implement the GB practices.

2.2 BARRIERS TO IMPLEMENT THE GREEN BUILDING PRACTICES IN HIGHER EDUCATION INSTITUTES

Lack of professional knowledge slows down the development of green construction (Abidin, et al., 2012; Ametepey, et al., 2015; Karunasena and Thalpage, 2016). Qualified GB professionals are required to adopt advanced green technologies and materials. Scarcity of professional knowledge causes additional costs (Choi, 2009). Labour without proper training in green construction hinders ensuring the quality (Karunasena and Thalpage, 2016). Even being the centres of knowledge creation and sharing these barriers can still be seen in HEIs (Blanco-Portela, et al., 2017). On the other hand, rigid organizational structures discourage effective communication and knowledge sharing (Verhulst and Lambrechts, 2015). Malaysian HEIs experienced a lack of integrated information on GB practices which is required in attaining sustainability (Anthony Jnr, 2020). This results in a lack of effective leadership and creates a change resistance culture (Adams, 2013 and Horhota, et al., 2014). Portuguese HEIs had experienced a lack of commitment, engagement, awareness, and interest of the key stakeholders toward green construction as barriers (Verhulst and Lambrechts, 2015). Similarly, Anthony Jnr (2020) specifically identified a lack of interdisciplinary collaboration and communication among the stakeholders involved in GB projects in Malaysian HEIs. A study that explored barriers to integrating sustainable practices in HEIs identified lack of engagement, and roles and involvement of stakeholders as the worst problems (Blanco-Portela, et al., 2017). Similarly, Blanco-Portela, et al. (2017) contended that community involvement is fundamental for the effective implementation of GB practices.

The lack of incentives is another barrier. According to Olubunmi, et al., (2016), GB incentives are two folds; external incentives and internal incentives. External incentives are the extrinsic motivation factors provided by the government upon the fulfilment of stipulated conditions (Olubunmi, et al., 2016). According to the authors, there are two types of external incentives; financial incentives and non-financial incentives. Financial incentives are direct grants, tax incentives, rebates, and discounted development application fees (Karkanias, et al., 2010; Shapiro, 2011). A study which analysed the level of the greenness of Chinese HEIs identified government-based funding inequalities as a major barrier to implement GB practices (Zhao and Zou, 2016). Accordingly, top-tier HEIs which had sufficient funding reported notable progress compared to tier-2 HEIs which had less funding (Zhao and Zou, 2016). Similarly, Fissi, et al., (2020) identified a lack of sufficient funding as a major barrier faced by the University of Florence during the journey towards greening. Non-financial incentives are technical assistance, expedited permitting, business planning assistance, marketing assistance, regulatory relief, and guarantee programmes (Choi, 2009). Internal intensives can be defined as circumstances where people are poised to act out personal endorsement. The authors specified that human well-being related incentives are highly effective to promote GBs in HEIs. A study based at the University of Waterloo - Ontario revealed that the existing

decision making process did not aim to reduce the long-term operating costs (Richardson and Lynes, 2007). The researchers further noticed that GBs were not prioritized even when the cost was the same as that of conventional buildings.

Accordingly, the literature reveals that lack of professional knowledge, lack of awareness and training, lack of interdisciplinary collaboration and communication, lack of finance, and lack of intensives act as barriers to implement the GB practices in HEIs.

3. METHODOLOGY

This study was intended an in-depth investigation with the aim of "finding approaches to increase the implementation of GB practices in HEIs in Sri Lanka". Kumar (2011) suggested using the qualitative approach when the study is about a particular situation, event, or emerging concept. On the other hand, it was impossible to go for a large sample due to the lack of implementation of GB practices in HEIs in Sri Lanka. The qualitative approach collects data from comparatively a lesser number of participants and analyses in-depth (Creswell, 2012). Hence qualitative approach was adopted for this research.

This study investigated the contemporary phenomenon of GB practice, within the real-life context of HEIs, in which the researcher had no opportunity to control or manipulate the behaviour. Moreover, context specific information was very important in this regard. Case studies provide a holistic view by deeply focusing on the context (Erickson, 2018). This research had a 'how' type research question. Yin (2014) recommended following the case study research strategy for the 'how' type research questions which are more explanatory. By considering all the above facts, the case study was selected as the research strategy. Since multiple cases reinforce the findings, more compared to a single case study, the researchers decided to go for three (03) cases. The number of cases was constrained by time and access limitations. According to Yin (2014) cases should be selected based on convenience, judgment, cost, and time limitations. Moreover, strategic selection of cases provides a competitive advantage over probability sampling (Patton and Appelbaum, 2003). Hence, judgemental sampling which allows selecting the cases that best suit the research question, was used. Accordingly, three (03) HEIs out of the universities, campuses, open universities, university colleges, institutes or centres for higher learning, and degree awarding institutes were selected based on the fact that having either rated GBs or GBs for which rating was pending. Profiles of the selected cases are presented in Table 1. Accordingly, GB practices were the unit of analysis and HEIs in Sri Lanka who involve in GB practices was the case boundary.

Table 1: Profiles of cases

Case	Description
C1	GBCSL gold rated building premises Constructed when the institute was relocating Institute established under the purview of the University Grants Commission (UGC) Established under the Ordinance No. 3 of 2000
C2	Green Mark gold certified building premises Degree awarding institute recognized by UGC Established under the State Ministry of Skills Development, Vocational Education, Research & Innovations

Case	Description
	Corporate entity incorporated under the Companies Act No. 07 of 2007 Sri Lanka's first HEI with rated GBs
C3	Pending GBCSL platinum rated building premises and non-rated building premises University established under the purview of UGC Established under the Universities Act No 16 of 1978

Interviewing is one of the most important data collection methods in the case study (Yin, 2014). In-depth interviews reflect interviewees' perspectives based on their experiences and understanding. Punch (2005) identified three (03) types of interviews namely structured, semi-structured, and unstructured. Semi-structured interviews, while being guided by a defined framework yet allow the researcher for situational questioning based on the responses. Yin (2014) recommended using a defined protocol when conducting multiple case studies yet inquire specific information becomes relevant during the data collection. Hence, semi-structured interviews were chosen for this research. Interviewees were selected within the case boundary based on their involvement and specialization in implementing GB practices. Accordingly, two (02) academic staff members and one (01) administrative staff member were interviewed in each case. All the interviews were conducted online via the Zoom platform due to the travel restrictions. The profiles of the interviewees are presented in Table 2.

Table 2: Profiles of interviewees

Case	Respondent	Description
C1	C1R1	Senior Lecturer (M.Phil., MSc, BSc in Engineering) Specialized in civil engineering
	C1R2	Lecturer (MSc, BSc in Engineering) Specialized in environmental engineering
	C1R3	Assistant Registrar (BSc)
C2	C2R1	Senior Lecturer (Chartered Architect) Research interests in minimal architecture and effective reusability of building spaces
	C2R2	Temporary Lecturer (BSc in Quantity Surveying) Research interests in GB and sustainability
	C2R3	Senior Manager (BSc)
C3	C3R1	Senior Lecturer (PhD, Master of Sustainability Science, MSc, BSc in Engineering) Member of Centre of Sustainable Solutions
	C3R2	Senior Lecturer (PhD, MBA, BSc) Accredited Professional-GBCSL Member of Centre of Sustainable Solutions
	C3R3	Assistant Registrar (BSc)

Interviewees were questioned under 4 major sections: the way of funding the GB implementations, factors/circumstances that drove the HEI to implement the GB practices, factors/circumstances that disturbed/hindered the implementation of GB practices within the HEI, and the ways of overcoming the challenges faced. Situational

questions were raised to clarify and explore the details further and in response to literature review outcomes. Data analysis is the way of linking collected data with the literature and the research question (Yin, 2014). Data was analysed through cross-case synthesis which is the dedicated data analysis method for multiple case studies (Yin, 2014). NVivo 11 software was used to code the data.

4. RESEARCH FINDINGS

4.1 DRIVERS TO IMPLEMENT THE GREEN BUILDING PRACTICES IN HIGHER EDUCATION INSTITUTES IN SRI LANKA

In case 1, implementing GB practices was a combined decision of the client's project director and the contractor. The client's project director was a renowned professional in the Sri Lankan construction industry with decades of multi-faceted experience. Thus, he not just initialized but also effectively coordinated and drove the project towards success. The client's project director's technical knowledge and managerial and administrative skills immensely helped to leverage the project through several challenges such as rigid government decision making processes. Being an institute of technology, which provides higher education in engineering and technological fields, case 1 was rich with expert knowledge in sustainable construction. The in-house experts visited and explored several recently constructed buildings of HEIs around the country to enrich the planning process. On the other hand, in case 1, the majority of the contractor and consultant professionals were alumni members of the institute or the affiliated university. It caused stakeholder collaboration much more convenient and smoother. C1R1 further elaborated it by mentioning that "*everybody enjoyed the success of the project with the 'our' feeling*". Further, C1R2 mentioned that effective stakeholder management of case 1 during the project period was a benchmark in the field. On the other hand, C1R2 stated that at the previous location case 1 had no burden of paying utility bills as it was settled by the affiliated university. Since it was going to be settled by case 1 itself at the new premises it was essential to reduce the forecasted operational costs. Thus, associated benefits of GBs such as energy cost reduction drove case 1 to implement the GB practices. Additionally, sustainability related modules were included in the programme curricular and civil engineering programmes exclusively discussed GBs. Thus, the requirement to practically implement the theories and allow the students to experience the sustainable built environment drove the implementation of GB practices. However, C1R1 emphasized that conducting academics through online platforms due to the COVID 19 pandemic prevents gaining the true benefits out of the implemented GB practices.

In case 2, the principal driving factor to construct the country's first rated green HEI was the client's project director's requirement to develop a fully-fledged HEI which stands out from the rest. The underlying factors which drove the implementation of GB practices were associated benefits of GBs such as indoor environmental quality, reduced utility costs, and reputation. Commenting about the long-term planning C2R3 mentioned that "*the planning process started from the mind of our visionary leader-the project director, who thinks 4-5 steps ahead. Without that, I don't think this journey would have been possible*". The client's project team visited renowned HEIs such as Harvard University and the Massachusetts Institute of Technology to get the inspiration to develop an iconic green HEI which would be compatible with the 21st century's demands. Further C2R2 mentioned that there were no doubts about implementing GB practices for phase 2 of the

projects due to the success achieved from initial implementations. Phase II was already underway with several GB practices. On the other hand, in case 2, the implementation of GB practices was driven by the corporate sustainability policy of the institute. The policy and a dedicated management framework institutionalised the green concept and ensured feasible and effective sustainability initiatives. Through that, the environmental considerations had been prioritised in future planning and day to day operations. In case 2, various state and semi-state organisations were involved in the project and all the stakeholders treated the project as of national importance. In addition to that, the visionary leadership of the client's project director enriched with vast experience in leading organizations and wide social networks played an immense role. C2R3 emphasized that the rapport among the key players: client, contractor, and financier highly determined the project's success. This was achieved by developing a team working culture with a common goal. Similarly, stringent project management and quality assurance ensured project success.

In case 03, the environmental policy of the institute drove the implementation of GB practices. Case 3 had taken several significant steps to institutionalise the green concept. The policy contained frameworks for environmental management, assessing and monitoring environmental impacts, and setting and reviewing environmental objectives and targets. Most importantly mission of the Centre of Sustainable Solutions (the dedicated centre that leads the implementation of the environmental policy within the institute) was to become the leading green university in Asia. In addition to those discussions were conducted with the International Cooperation Division of the Global Environment Centre Foundation on organizing collaborative programmes to implement the green concept at the university. Case 3 had experienced the benefits of GB practices before initiating the decision of constructing the pending GBCSL platinum rated GB premises. Case 3 had implemented GB practices such as solar energy generation, biogas generation, and organic waste recycling. Most importantly, in 2016 the institute was nominated for the UNESCO-Japan Prize for Education for SD considering the efforts to educate the youth by being an example through greening. In addition to that, the institute secured 259th place in GreenMetric World University Rankings in 2017 and 253rd place in 2016 while securing first place among Sri Lankan universities. In 2021 the institute held the 247th position. The main intended benefit of pending GBCSL platinum rated GB premises was to reduce the life cycle cost. C3R2 stated that "*the Building Energy Index of a typical higher education building is around 200 and we expect to maintain it around 100 in this premises*." Similarly, the institute intended to provide better indoor environmental quality for students and hire the auditorium for the outsiders and promote the landmark exceptional GB. Additionally, as mentioned by C3R1, sustainable technology is one of the specializations of degree programmes offered by the faculty and thus there was a requirement to enable the students to have a real-life experience in sustainability in a built environment. During the planning and designing stage of the new premises, case 3 got inspired by the net-zero energy buildings at Norfolk State University. On the other hand, for the new building premises for which the green rating was pending, constructing a rated GB was a condition stipulated by the funding agency.

Table 3 summarises the factors which drove each case to implement the GB practices.

Table 3: Drivers of each case

Drivers	Case 1	Case 2	Case 3
Associated benefits of implementing GB practices	√	√	√
Outstanding leadership	√	√	
Institutional policy		√	√
Specialised in environment, science, and technology	√		√
Imposed rules and regulations			√

All three cases evidenced the findings of Li, et al. (2011) and Blanco-Portela et al. (2017) regarding how the associated benefits drive the HEIs to implement the GB practices. In case 2, the client's project director was certain about how the GB practices were beneficial in developing a HEI which stands out from the rest. In case 1, the client's project director and the in-house experts had that understanding. On the other hand, in pending GBCSL platinum rated GB premises of case 3 and the second phase of case 2, the institutes had already enjoyed the benefits of GB practices and those experiences drove the further implementations. Thus, the findings revealed that in order to be driven by the associated benefits, firstly, the HEI must identify the benefits of the GB practices and secondly, must be aware of how the benefits are advantageous in achieving the desired goals. Evidencing the experiences of Shenyang University's green efforts project, in case 1 and case 2, strong leadership had driven the implementation of GB practices. The roles played by the client's project directors in both cases substantiated the findings of Ralph and Stubbs (2014) about committed individuals' ability to drive the green concept within the HEIs.

Prioritizing GB practices from the institutional policy can be seen in case 2 and case 3. Evidencing the findings of Fissi et al. (2020) regarding the University of Florence, case 3 had the clear mission of becoming the leading green university in Asia. A policy ensures continuous commitment to the green concept. Similarly, policies and frameworks guide the institutes towards a defined goal by integrating the implementation rather than the isolated implementation of GB practices. Findings were strongly in line with that of Zhao and Zou (2016) regarding the abilities of the institutes with the strong environment, science, and technology backgrounds to contribute to the implementation of GB practices. On the other hand, imposed regulations had driven the implementation of GB practices only in case 3. As argued by Beringer, et al. (2008) this can be explained by the fact that the law always set the minimum requirements and by nature people try to comply with the law just to avoid being subject to the remedies of non-compliance.

4.2 BARRIERS TO IMPLEMENT THE GREEN BUILDING PRACTICES IN HIGHER EDUCATION INSTITUTES IN SRI LANKA

The most significant challenge that case 1 faced was the 2015 political regime change. Even though the new government stopped funding many ongoing projects the project team with the support of the alumni of the institute built up healthy relationships with the government and made sure the project was funded uninterruptedly. In case 1, designing while ensuring minimum cut and fill was challenging due to the sloping nature of the ground. Thus, architects and structural engineers together with other professionals evaluated the designs together to choose the best one. As per the unique design, level zero floor (entering floor) of the main building was connected to every building and floors

were named Z0, U1, U2, U3, U4 for upwards, and D1 for downwards. However, the subcontractor did not agree to customize the buttons inside the elevators accordingly. Hence client had to go for another subcontractor. Case 1 had a closed wastewater treatment plant that was processed through an activated sludge process by using a patented material for bacteria growth. However, using the material was arguable as the subcontractor did not will to reveal it. Hence, regardless of being a turnkey project weekly progress review meetings and discussions were conducted. On the other hand, installing solar panels was not in the initial plans and changing the design later when it was required was costly. Similarly, the proposal made during the operational phase to install solar panels was not approved due to a lack of funds. It was noted that the awareness of the direct stakeholders about the implemented GB practices was very low. Even some people in senior administrative positions did not know that case 1 was a rated GB. Some of the academic staff members who were lecturing in related fields got to know about the institute's green rating from a plank demonstrated in the director's office.

Major challenges faced by case 2 during the 5 years project period were inflationary conditions, long spells of incessant rain, skilled labour shortage, and most importantly the 2015 political regime change. However, the evolving socio-political conditions were tactfully managed by the institutional leadership by using the vast experiences and social and professional network. The natural rock boulders in the land challenged the designers and thus, the design was done by incorporating them instead of removing. Initially, it was hard to convince that the location would be preferred by the potential students. As a result, obtaining funds was also challenging. Later case 2 managed to obtain a treasury guarantee and a loan facility from a local bank through the guarantee. On the other hand, the project obtained Board of Investment status and was carried out under stringent project management and quality assurance which ultimately resulted in lesser than the estimated cost per square foot. However, the project was slightly delayed than estimated.

In case 03, the major challenge was the lack of thorough understanding of the professionals about the GB concept. As a result, green features such as using rainwater for toilet flushing had to be partially removed. C3R1 argued that it was hard to convince the designers that using harvested rainwater for toilet flushing was required to get a higher rating score. The challenge had been mitigated through frequent monitoring, negotiations, and introducing some other green features to collect the lost points. C3R2 claimed that designers sometimes merely focused on getting the points without any clear idea about the outcome. She substantiated that "*once they tried to fix only a few CO2 sensors for the sake of getting the points instead of focusing on the indoor environmental quality*". The consequences were mitigated through weekly progress review meetings, acknowledging the project team about the green features and the point allocation, and organizing pre-evaluation visits of GBCSL.

Table 4 summarizes the barriers faced by each case when implementing the GB practices.

Table 4: Barriers faced by each case

Barriers	Case 1	Case 2	Case 3
Lack of awareness and commitment	√		
Lack of understanding of the professionals			√
Lack of skilled labour		√	

Barriers	Case 1	Case 2	Case 3
Lack of funds	√	√	
Political regime change during the project period	√	√	
Sloping nature of the land	√	√	
Natural rock boulders located in the land		√	
Stakeholder management	√	√	√
Lack of proper planning	√		

Similar to Portuguese HEIs, Case 1 experienced a lack of commitment, engagement, awareness, and interest of the key stakeholders. Even though case 1 had in-house experts and sustainability related modules included in the curricular, there was no proper mechanism for stakeholder collaboration during the operations phase. Obtaining the green certification should not be sufficient, especially when allowing the students to experience the sustainable built environment was an intended benefit. As contended by Blanco-Portela et al. (2017), it prevented case 1 from the effective and efficient implementation of GB practices. Substantiating the literature findings case 3 experienced a lack of professional knowledge while implementing the GB practices and evidencing the findings of Choi (2009) resulted in additional costs. As identified by Karunasena and Thalpage (2016), case 2 experienced a lack of skilled labour.

Cases had different experiences regarding the availability of funds. Case 1 suffered from a lack of funds to install a solar energy generation facility. Whereas, case 2 initially had to face various hardships in securing funds. In case 3, pending GBCSL platinum rating building premises was funded by a grant for GB construction and had not faced a lack of funds. Findings revealed that stakeholder management was critical and challenging in each case. This was identified in the literature as a lack of interdisciplinary collaboration and communication. Case 2 received BOI concession as a financial incentive and case 3 got technical assistance from GBCSL such as pre-evaluation visits. Thus, a lack of incentives could not be identified as a barrier to implement GB practices in the HEIs in Sri Lanka. Barriers faced by case 1 due to lack of proper planning can be referred to as a lesson learnt.

Case study findings revealed few barriers which had not been identified in the literature. Political regime change became a barrier due to the country's political culture, where the successor regime criticises and stops supporting the projects started by the previous regime. However, in both cases, funds and government support were secured by strategically managing the socio-political behaviour. It was possible due to the social networks and the experience of the client's project directors and especially in case 1 since the alumni members of the institute were there in top positions in the government. Barriers arise due to the sloping nature of the lands and the existence of rocks were project specific but not common. However, barriers related to political regime changes can be commonly expected in the Sri Lankan context.

5. CONCLUSIONS

Only a few studies related to sustainability in HEIs have been conducted in the Sri Lankan context. Thus, this paper attempts to fill the research gap of empirical studies regarding

green HEIs in Sri Lanka. Accordingly, three (03) Sri Lankan HEIs which had either rated rating pending GBs been selected for the case study.

Associated benefits of GBs drive the HEIs to implement the GB practices. In order to be driven, firstly, the HEI must identify the benefits of the GB practices and secondly, must be aware of how the benefits are advantageous in achieving the desired goals. Strong leadership backed with technical skills in related fields, social networking, and managerial skills drive the implementation of GB practices within the HEIs. Prioritising GB practices from the institutional policy is also a driving force. A policy ensures continuous commitment to the green concept and guides the institutes towards a defined goal by integrating the implementation of GB practices. Institutes with a strong environment, science, and technology backgrounds have competitive advantages over others in implementing GB practices. According to the findings, in the Sri Lankan context, the ability of imposed rules and regulations to drive the implementation of GB practices within the HEIs is less compared to other drivers. Obtaining the certification should not be sufficient. There should be a proper mechanism for stakeholder collaboration during the operations phase. Lack of commitment, engagement, awareness, and interest of the key stakeholders prevent the effective and efficient implementation of GB practices. The lack of professional knowledge and skilled labour are barriers to implement GB practices in HEIs in Sri Lanka. Lack of funds will be a barrier depending on the source of funds and the objective of the financer. Case study findings identified political regime change during the project period as a barrier to effective implementation of GB practices in the Sri Lankan context. It became a barrier due to the country's political culture. Barriers arise due to the sloping nature of the lands and the existence of natural rocks were project specific but not common. Lack of proper planning is also identified as a barrier. Findings did not identify a lack of incentives as a barrier to the effective implementation of GB practices in the HEIs in Sri Lanka. The empirical findings will be beneficial for the administrators, and policy makers of HEIs in Sri Lanka to effectively implement the GB practices. Research outcomes aid them to align the institutional strategies in a way that strengthens the drivers and mitigates the barriers. Similarly, the research findings can be referred to as lessons learned for future implementation projects. However, since the study is based on three (03) cases and all of them are located in the western province of Sri Lanka, the results cannot be generalised. Similarly, data collection interviews were limited to three (03) in each case and only two (02) members of the academic staff and one (01) member of the administrative staff were interviewed. These limitations should be addressed in future research by conducting quantitative studies which enable to generalise the findings. Similarly, data collection can be expanded to students of HEIs as well.

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