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Integrating Green Building Index Consultancy with Residential Building Design

Lesley Metibogun
Victoria University of Wellington, Wellington 6012, New Zealand

Abstract: Despite government incentives, developers are reluctant to invest in green building initiatives due to their perceived extra costs – in particular additional consultant and construction implementation costs. This paper examines the issues preventing the integration of Green Building Index (GBI) consultancy with residential building development in the Malaysian construction industry. Following a literature review of the challenges involving GBI consultancy at the early stage of green residential development, a semi-structured interview method was used to elicit opinion on perceived barriers to integrating the GBI process from 30 interviewees; mainly developers, GBI consultants, building consultants and regulators in the Malaysian construction industry with involvement in green building. The study found that a lack of communication between design team members and GBI consultants was a major barrier. This reduced the opportunity for a more collaborative effort to minimise costs and wastage during the design stages. Lack of insight into the impact of integrating the GBI consultancy into design process within the project time frames was evident. Effective coordination is necessary if the involvement of GBI consultants, particularly at early design stage, is to be successfully managed. It is recommended that work coordination among design team members and GBI consultants needs periodic review.

Key words: Green building index consultancy, early design stage, residential development, Malaysia.

1. Introduction

The Malaysian Construction Industry Master Plan (2005–2015) pinpointed sustainability as being indispensable in the Construction Industry Development Board [1]. Green Building Index is an extensive rating system and environmental assessment tool used for appraising the environmental design and the performance of buildings [2, 3]. The rating system had strong support from the government through income tax deductions equivalent to the additional capital expenditure incurred by building owners in obtaining GBI certification from 24 October 2009 to 31December 2014, and stamp duty exemption for the first owner of a green building [4, 5]. Construction stakeholders are beginning to implement the concept into their designs and projects.

The government has identified residential building development as an essential human requirement and an all-important ingredient in the nation's economy and it is used as part of the government's political strategy to achieve both its social and economic goals [6]. It is noted that the building industry alone contributed about 3-5% of Gross Domestic Product (GDP) and provided employment for close to 10% of the total labour force (Ministry of Finance (MOF)). In the 10th Malaysian Plan (EPU, 2010), it is projected that, urban areas in Malaysia alone will need to accommodate six million more residents between 2012-2020. Despite increased demand for residential buildings [7], green building practice is not yet a commonplace in residential building development. It is apparent that developers rarely engage the services provided by GBI consultants in their projects [8]. Therefore, it is important to get an appropriate understanding of the current scenarios and barriers to GBI implementation at early design stage in residential building development.The development of general strategies to improve acceptance of GBI

Corresponding author: Lesley Metibogun, Ph.D., research field: building performance.

consultancy in the construction industry whilst utilizing the expertise of professionals and regulators from both public (local building authorities and construction agencies) and private sectors (architects and planners) is imperative and it is the aim of this paper.

2. Literature Review

A brief description of GBI Consultancy, the rating tool and its categorization, and an overview of the link between residential needs and green practices are reviewed in the following section.

2.1 Green Building Index Consultancy

Green Building Index consultancy is a process of getting buildings rated as "green". It is an advisory service to clients in the building industry. This consultancy is focused on enabling architects, engineers, urban designers, developers, public authorities, contractors and other construction professionals to identify the benefits of considering sustainability within a construction project benefits such as reduced operational cost, improved resource use, waste minimisation, energy efficiency, the use of renewable energy and other innovative practices which aim to minimise the impact on our environment [9]. However, green building consultants in this context are construction professionals who are involved in green building practices.

The first suitability rating tool, the Building Research Establishment Environmental Assessment Method (BREEAM) was developed in the United Kingdom in 1990 and was brought to Canada in 1996. In 1998, the United States Green Building Council (USGBC) launched its own Leadership in Energy and Environmental Design (LEED) tool while in 2004 the Green Building Initiative (GBI) adapted the Canadian version of BREEAM to create Green Globes and began distributing it in the U.S. market in 2005 [10]. Australia's Green Star was developed in 2003, whereas, Singapore's Green Mark was launched in 2005. Japan's Comprehensive Assessment System for Built Environment Efficiency, (CASBEE) was developed in 2004, New Zealand's version, Green star was launched in 2007 (Prins, 2016) while Malaysia's Green Building Index (GBI) was established by Malaysian Green Building Confederation (MGBC) in 2009 [11].

In GBI rating categorisation, a Platinum rating is awarded to buildings scoring between 86 and 100 points. Buildings are also rated Gold when they score between 74 and 84, and Silver if between 66 and 75. Finally, buildings are rated Certified if between 50 and 65. Available data from Green Building Indexshow that 93 out of a total of 135 green rated residential new construction (RNC) are rated "Certified", 26 buildings are rated "Gold", 10 buildings are rated "Silver" and 4 are rated "Platinium" (see Table 1). For a building to be rated green, it is required to undergo a three-stage certification process. At stage one, Application and Registration,the clients or developers complete the GBI application form, afterwhich a GBI registration number is issued and the terms and conditions are signed between the developer and theMalaysian Green Building Council (MGBC) in which a GBI Certifier is then assigned for the project.

The second stage, Design Assessment (DA) is the process of ensuring that the specified points are met in the design. This will usually involve a presentation by the applicant and their project design team or a Green Building consultant. Upon completion, the GBI Certifier tables the assessment report to the GBI Accreditation Panel (GBIAP). If the assessment is successful, the design is certified as meeting the criteria [12]. At stage three, Completion and Verification Assessment (CVA), upon project completion, the client is required to prove that all the points are met by submitting a CVA usually within 12 months of the completion of the building or when the building becomes 50 percent occupied. The final GBI award isissued by the GBI Accreditation Panel (GBIAP). Points might be lost at this stage. An assessment of the building needs to be done annually in order to maintain their rating [13].

2.2 Green Building Index and Residential Needs

In the seventh Malaysia Plan, the government envisioned 800,000 housing units would be provided for its population [14]. 70% of this target had been realized by the end of 1999. Of the 110,644 units approved by the Ministry of Housing and Local Government (MHLG) for construction in the first six months of 2000, 25.4 % of the approved units were for low cost unit housing, 38.7 % medium cost housing and 35.5 % higher end housing. A total of 57,925 units of residential property were launched in housing schemes in the first half of 2000. Out of these, 39.4 % were condominium/apartment units and primarily concentrated in Selangor and Kuala Lumpur. This huge supply of higher end condominiums depressed the rental market [15].

In the eighth Malaysia Plan in (2001-2005), the country continues efforts to developing affordable and sustainable low and medium cost housing [16]. However, the country was faced with the challenging task of providing between 600,000 and 800,000 houses during a period when the residential construction industry faced various project-related factors that hindered the prompt completion of projects. At the end of 2013, there were 4,718,534 existing residential buildings as against 4,640,269 residential units in 2012 (RHEDA, 2014).

Meanwhile, statistics from MGBC show that, as of October 15 2015, (see Table 1) there were 361 Non-Residential New Construction (NRNC), 271 Residential New Construction (RNC), 20 Industrial New Construction (INC), 21 Non-Residential Existing Building (NREB), 4 Industrial Existing Building (IEB) and 16 Township (T) applications amounting to a total of 693 applications while only 650 were registered representing 333 NRNC, 259 RNC, 19 INC, 20 NREB, 3 IEB and 16 T green building [17]. Only 327 buildings received Green Building Index certification (164 NRNC representing 50% and 135 RNC (41%), 9 INC, 10 NREB, 2 IEB and 7 T representing 10%, 2% and 2% respectively). 118 RNC and 139 NRNC received provisional certification after design assessment while 17 RNC and 24 NRNC received final certification after CVA. It is apparent that green building is not commonly practised in residential buildings while most certified buildings are still at design stage. It can therefore be seen that while there are continous increases in conventional buildings, this is not echoed in the green building industry. The next section reviews the literature on the barriers toward implementing the green practices at an early design stage of residential buildings.

2.3 Barriers Toward Implementing GBI Consultancy

GBI practioners require more knowledge and experience of green principles to effectively cope with GBI requirements. As a result of intricacy of the design process, there could be insufficient or inappropriate

Table 1 GBI Certified Projects by Category.

Update on Green Building Index	TOTAL as of 15 OCTOBER 2015	NRNC Non Residential New Construction	RNC Residential New Construction	INC Industrial New Construction	NREB Non Residential Existing Building	IEB Industrial Existing Building	T Township
Applied	693	361	271	20	21	4	16
Registered	650	333	259	19	20	3	16
Total Certified	327 (100%)	164 (50%)	135 (41%)	9 (3%)	10 (3%)	2 (1%)	7 (2%)
Provisional Certification after DA	276	139	118	5	7	-	7
Final Certification after CVA	50	24	17	4	3	2	-
Renewal Certification after RVA	1	1	-	-	-	-	-

effort put in place for planning and control (Tilley, 2005). In a study on managing the cost of green buildings, Tyagi [18] highlighted that lack of experience with green building technology, components, and energy and water modeling programs can significantly impact the cost overruns. These have become critical issues for the industry.

The demand for green construction as well as the increased cost perception of green buildings means GBI Consultants have to manage green projects with tighter budget and tighter profit margins (Isa et al., 2014). Effectively managing the risks which could lead to cost overrun is essential in green building consultancy. Cost overruns according to Carter & Keeler are common problems in residential development. In their study reviewing the green building demand factors in Malaysia, Aliagha et al. found that the higher costs perceived to be associated with green building may have been based on outdated information and practices [19, 20].

Communication and coordination among design team members and GBI consultants could contribute to enhancing the success of project delivery at the early design stage; they are also required to reduce complications and challenges inherent within the design process of green buildings (Elforgani and Rahmat, 2012).There is rarely enough time for coordination meetings,and to research all the interesting new green materials.Green building consultants only observe the requirements specified in the sustainability guideline without assisting the clients to identify and develop other crucial objectives and requirements for the overall project. It is therefore useful to work out a process for discovery and decision-making ahead of time. The aim of this paper is to understand the barriers toward implementing Green Building index Consultancy and strategies to further improve green practices in residential building development. The strategy of inquiry into achieving this aim and the results of findings are discussed in the following section [21, 22].

3. Research Methodology

To achieve the aim of this paper a semi-structured interview of stakeholder group namely, consultants, developers/owners, builders/property owners and policy maker/regulators in the building construction industry from both private and public sectors was conducted. In terms of selection criteria, interviewees with the knowledge of, and experience in, green building were targeted. A semi-structured interview is one of the most appropriate ways of gathering data on phenomena which are not directly observable and was deemed to be the preferable approach here to generate the essential data for analysis [23-26]. Walker suggests that an interview of this nature requires between 20 and 40 respondents to generate the needed information for analysis. Of the 60 stakeholders sent an invitation 37 agreed to be interviewed. In the event,11 consultants, 4 developer/building owners, 6 builders/property managers from the private sector and 9 Policy makers/regulators from the public sector were interviewed, 30 in all. The data from the interviews were then analysed using discourse analysis. Discourse analysis is the study of social life, understood through analysis of language in its widest sense (including face-to-face talk, non-verbal interaction, images, symbols and documents. It offers ways of investigating meaning, whether in conversation or in culture [27-30]. Table 2 summarises the profiles of the interviewees.

4. Analyses of the Interviews

This section discusses the analyses of the interviews conducted. The findings were analyzed using discourse analysis and categorised into five themes namely: the stakeholders' understanding of GBI consultancy, meeting the sustainability goal, services provided by GBI consultants, cost related issues, and general strategies to improve GBI consultancy; and concludes by presenting a summary of all the points raised.

4.1 The Stakeholders' Understanding of GBI Consultancy

Interviewees were asked to define GBI consultancy, the aim being to ascertain individual perceptions of the practice. Interviewees were of the view that it is a new field in the construction industry that looks at a wide range of services across the board including architecture, engineering and planning, together with some knowledge of materials. Interviewees C4; C6; B3; P1 and P4 were consistent with their definition that it is a specialist service providing sustainable designs solutions and requires knowledge of every aspect business. Interviewee C3 lamented that there were a handful of firms that purely do green building consultancy while the ones that include analysis work, such as ventilation studies and energy studies are more successful.

Table 2 Summary of interviewees.

POSITION OF INTERVIEWEE	TYPE OF ORGANIZATION OR COMPANY	Code
CONSULTANTS:		
- Architect &Member of PAM	-Architectural consultant	C1
- Engineer & Member of MGBC	-Engineering consultant	C2
- Architect& Member of GBIAP	-Architectural consultant	C3
- Engineer & Member of GBIAP	-Architectural consultant	C4
- Architect & Member of PAM	-Architectural consultant	C5
- Architect, GBI Facilitator & Member of PAM	-Architectural consultant	C6
- Architect & GBI consultant	-Architectural consultant	C7
- Architect & GBI consultant	-Architectural consultant	C8
-Architect	-Architectural Consultant	C9
-Mechanical Engineer & GBI consultant	-Engineering consultant	C10
-Mechanical Engineer & GBI consultant	-Engineering consultant	C11
DEVELOPERS / BUILDING OWNERS:		
-Executive Director & Head of Corporate	- Real estate developer and investor	D1
- Senior General Manager	- Real estate contractor and developer	D2
- Director of Operations	- Real estate developer and investor	D3
- Managing Director	- Real estate developer	D4
BUILDERS/PROPERTY MANAGERS:		
-Executive Director	- Property contractor	B1
-Manager	- Facility Manager	B2
-Managing Director	- Property contractor	B3
-Director	- Project Management	B4
-Director	- Property contractor	B5
-General Manager	- Project management	B6
POLICY MAKERS/ REGULATORS:		
-Assistant Director	- Construction Industry Development Board	P1
-Director	- Construction Industry Development Board	P2
-Senior Architect	- Local Authority under Ministry of Federal Territories	P3
-Director	- Local Authority under Ministry of Federal Territories - Local Authority under Ministry of Federal Territories	P4
-Manager	- Statutory Body under Ministry of Works - Statutory Body under Ministry of Works	P5
-Manager	- Statutory Body under Ministry of Energy, Water and Communications	P6
-Senior Manager		P7
-Senior Technical Advisor	- Statutory Body under Ministry of Energy, Water and Communications	P8
- Senior Technical Advisor		P9

MGBC= Malaysian Green Building Confederation
GBIAP = GBI Accreditation Panel
PAM = Persatuan Arkitek Malaysia / Malaysian Institute of Architects
ACEM = Association of Consulting Engineers Malaysia
C = Consultant; D = Developer/ Building Owners; B = Builders / Property Managers; P = Policy Maker/Regulator

Two property contractors, interviewees B1 and B3opined that providing consultancy services in green building requires an organization or person with the right knowledge and right experience to be appointed to render advisory services on how to go green. The issue of right and adequate knowledge of green principle and practice cropped up during the interviews. This is consistent with the views of Samari et al. [31] on engaging well-qualified personnel with the right knowledge at the initial stage. Only one interviewee (C9) claimed to have a superficial understanding of GBI consultancy, having gone through the GBI rating system. He pointed out that it only focuses people's attention towards green. It can however be generalised that all the interviewees have a good understanding of GBI consultancy.

4.2 Meeting the Sustainability Goal

The opinions of interviewees were sought on how GBI consultation had assisted in meeting sustainability goals. C3 was particularly enthusiastic of the fact that GBI had exceeded its goal in some of the rated buildings. It was further stressed that some certified buildings have exceeded what they predicted in terms of energy saving and water savings.D2 opined that the minimum certification had already given a 20% saving; for anything higher than that, the GBI consultant must know the target in terms cost saving, energy saving and water conservation and not just ticking off points. This interviewee further stressed the missing link is that developers know it is a rating tool but do not understand the target is to achieve 20% reductions. Interviewee C5, on the other hand believes that a lot of time is needed to confirm targets are being met. He perceived the practice is focused on points gathering for financial benefits and not for sustainability. It was argued that if buildings are certified, developers can claim tax and have a lower running cost but the true green is not met as the focus is on money and image(C5). To support the point raised by C5, D1 in his response described the GBI industry as a market place for trading points. This is consistent with some of Prins' (2015) findings in his research into the application of New Zealand Green star sustainability rating tool.

4.3 Services Provided by GBI Consultants

Interviewees were asked to comment on the current services provided by GBI consultants. Some interviewees agreed consultants are very genuine in their practice; they hold on to the spirit of what the green building is really about. Most of the policy makers and regulators, P1, P3, P5, P7, P8, and P9 were impressed by the services provided so far. They agreed GBI consultants are successfully providing the services to the clients. They have made quite a good impact in the industry because of their services(P7). C3, a member of GBIAP, believes that there is need for more GBI consultants as there may not be enough in the industry now because the take up rate in GBI now is very high. It was emphasized that in the early days there was a bit of confusion because some of the fees charged were very high but over three and a half years the price has stabilized and became affordable. This statement is consistent with Darus et al.. It was further stressed that at the inception of GBI in 2009, it was argued that it was a waste of time but now it is seen as worthwhile. However, the real issue is the level of greenness their services have achieved. On the other hand, P2 complained that some GBI consultants are very poor in rendering the services while some are stronger. Those who have done a few projects and possess anin depth knowledge of mechanical and electrical engineering provide a better service than those who do not have that experience (P2).

Interviewee C4a member of GBIAP expressed that they have received a lot of complaints about GBI consultants in the industry who are not doing well due to the way they practise but that developers are actually committed to green building practice. Interview C1, shared that the initial projects were difficult because green building materials were available, there was no

information to show they were actually green. MGBC has now published green pages (The Green Building Products & Services Directory) and most green building materials suppliers have to demonstrate their green content. Also, with the recent Construction Industry Development Board's guideline on green building construction, this whole gap has been closed. Designing with the green rating tool has assisted in closing the design gap, while the procurement gap was closed using green material through the MGBC's green pages(C1).

The three–day GBI consultant training program does not cover the wider field of sustainability. Though seminars, workshops and conferences are organized to train GBI consultants and widen their knowledge of the concept, those without a prior knowledge of green building are disadvantaged. The process of certification is still weak due to some of the GBI consultants not knowing what documentation is required and how to present it to the client. There are no yardsticks to measure the performance of the consultants' services as there are for conventional buildings and developers do not see any need to engage GBIF in their projects (P3). D4 concluded that GBIC must be experienced practitioners, not someone who only completed the three-day training program.

4.4 Cost Related Issues

This section explores some of the cost issues in the mind of industry stakeholdersthat are seen as major challenges to the adoption of GBI consultancy. C7 was of the opinion that reducing green building cost at the early stage could be accomplished by enacting by-laws to address green building in Malaysia. According to him, there are regulations in Europe that glass must be double or triple glazing and the walls all need insulation while Malaysia has only fire rating to prevent fire spread. The new building by-laws coming up have all these things and it is partly driven by Green Building Index rating tools. Once the laws are in place the cost will come up and the base building cost will be negligible. "So when you say green building is expensive it's not true".

C1 and B6 argued that green building is not as expensive as perceived. They claimed it should not cost a lot because in the United Kingdom, the cost is about the same as conventional buildings. Green building materials are still being imported to Malaysia and not locally sourced, with the potential for delays in construction and extensions of completion periods(P9). In addressing cost related issues, Green building consultants' approach to cost effectiveness must be strong enough to critically examine how financially viable the design is. B7lamented that in order to do that, if GBI consultant is fully aware of the rating system it is better to go for a criterion that is low cost or no cost at the first before you actually do one that will take a lot of cost. Then one can have a green building with a very low cost.C5 opined that while the GBI proposes photovoltaic (PV), there is no reason for using solar PV cell unless looking at different energy systems. Everything is about optimisation and how to build sustainability. He argued that to make GBI cost effective is a long process and would require adopting a passive design approach. He further argued that the cost of installing PV cannot be recouped within the PV lifecycle. This is consistent with Applasamy's finding that, the cost to generate per kilowatt hour of electricity by applying life cycle costing (LCC) analysis for a typical household of four using stand-alone PV technology is more than five times the current cost of electricity for residential household.

4.5 General Strategies to Improve GBI Consultancy

Interviewees were given the opportunity to share their opinions on actions to improve GBI consultancy in order to promote green practices in the Malaysian construction industry. They suggested the government need to further encourage and support the implementation of green building practices by providing financial incentives to developers who may require assistance to cope with the increased up-front

costs of resource-efficient technologies in their projects. Suggestions were made that building capacity within the public sector will help to raise the level of understanding in government circles and the political class, thereby bringing the changes in policy and legislation necessary for the implementation of green building practices.

As a way to further improve green building consultancy in the industry, the general public which constitutes an integral part of the client base, require a number of public awareness campaigns and outreach programmes in schools and the media. Educating the public at large about the principles and concept of green building and how it relates to their lives and businesses and the benefits of demanding more sustainable options needs to be a priority. Not only that, incorporating green building practices in the built environment courses taught at tertiary institutions and monitored by the Malaysian Green Building Council and the Malaysian Board of Architects was suggested. In order for a building project to become green it is very important that the GBI consultants be involved at the onset of the project and get a proper direction of the project from the client then see what they think about sustainability and develop its scope. Once this is done, the whole team can actually sit around the table and workshop ideas and apply it to the actual project (D2.2). On the other hand, interviewee C1.9 was of the strong opinion that the services provided by GBI Consultants would eventually be phased out when all architects and engineers are fully experienced in green building technology. Finally, there was clarion call to MGBC to give an annual award to outstanding GBI consultant.

5. Discussion, Conclusion and Recommendation

The interviews revealed that the lack of involvement of the GBI consultants at the initial stage of the green building design process was a major barrier. The incompetence and lack of experience of some GBI Consultants in sustainable design affects design process duration and project resources. The stakeholders stressed poor coordination and ineffective communication among design team members and GBI consultants was a major concern. A more collaborative effort to reducing cost and wastage during design stages was vital. Design team members are required to have integrity and be cooperative, responsive, responsible, courteous, friendly and proactive in dealing with consultants. While better knowledge of the requirements of the client is also required, communication is needed with clients and consultants at all times. Setting up a third party to check the performance of the consultants will help identify the better performers and get rid of poor consultants in the industry. Training the architect to work with the climate and all those concerned is important and the GBI consultants should be part of the setup within the architectural firm rather than an external party. A lot of construction wastage, expensive errors and technical fallout may be averted when competent and appropriate GBI Consultants are engaged. However, ensuring a proper level of service and effective co-ordination with team members are pointers to managing GBI consultancy at the design stage; the introduction of green pages by MGBC has now made it very easy to get green materials and has helped to close the procurement gap in green material supply in the industry. CIDB's new release of guidelines on green building construction has helped to close the green construction gap.

A lack of performance evaluation of GBI consultants engaged in the design stage has hindered their development in Malaysia. It is recommended that engagement of GBI consultants be based on demonstrable skills, knowledge, and professionalism. In addition, they should be particularly responsive to the clients' requirements and feedback. The current green building guidelines should be reviewed from time to time and supported by proper research and decision making at the local level. Better collaboration amongst government agencies is also vital for effective implementation of these consultancies. Finally, a

process for independent third-party evaluation of the performance of GBI consultants is needed to ensure confidence in their skills.

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