VOL. 10, NO. 10, JUNE 2015 ISSN 1819-6608
ARPN Journal of Engineering and Applied Sciences

www.arpnjournals.com

SUSTAINABLE MANAGEMENT (SM) GUIDE IN GBI INTERIORS DESIGN PROJECT TOOLS

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ABSTRACT

The paper aims to study and measure the applicability of GBI tools for interior design project. The studies specifically focus on one of the GBI Tools assessment criteria which is Sustainable Planning and Management (SM). The SM criteria is chosen as assessment sampling as it make out the main point scoring system in GBI for Interiors Tools. The pilot study is to measure and benchmarked the standards and applicability of the tools. The methodology used is on-site observation and GBIAP score result. Outcome from the research suggest framework criteria are highly applicable and meet Malaysia Green Building Confederation (MGBC) standards. Based on selected related study, it is imperative to apply and highly encouraging to implement green design in interior design as it hold a significant sustainable awareness and marketable values.

Keywords: green building index, green interior tools, sustainable planning and management.

INTRODUCTION

Green or sustainable design ideations in interior design project are gaining momentum in the Malaysia because of the high awareness on societies and the extra marketable values that it carry along the extensive and diverse project development in capital Kuala Lumpur. This is evidenced by joint effort development of Malaysian Institute of Interior Designers (MIID) and Malaysia Green Building Confederation (MGBC) in establishing the framework of Green Building Index (GBI) Tools for interior design project. Such joint effort to address the gap required in supporting the ever complex design issues related to green and sustainability of interior design projects.

Green Building Index (GBI) Tools for interior is gaining acceptance as indexing work structure in implementing green interior benchmarking issues, disagreement and management requirements. The main goal of mainstreams green management for Interior and related assessment tools is to achieve sustainable use of design resources and user experience. As a first implemented pilot project and assessment criteria at the moment focuses on Sustainable Planning and Management (SM) only, overall consideration of what is needed to address beyond sustainable project life and to completely establish green-sustainable use systems is accounted to meet the standard set by MGBC and MIID.

Green Building Index (GBI) for interior project is a sustainable rating system developed by MGBC (Malaysia Green Building Confederation) and MIID (Malaysian Institute of Interior Designers). The developed GBI for Interiors will be first Malaysia's comprehensive assessment system for assessing the sustainable design and performance of interior design project upon six (6) main factors which is energy efficiency, indoor environment quality, sustainable planning management, materials resources, water efficiency, and innovation. The heading criterias set is to maintain all of standards scoring criteria in all previosly developed tools in GBI rating framework system. The GBI for Interiors is developed specifically for the Malaysian tropical weather, environmental and developmental context, cultural and social needs.

The GBI for Interiors initiative aims to assist the building industry in its march towards sustainable development in interior design, architecture and urban planning as a whole holistic approach. The aims is to set common accepted standards; promoting integrated interior and based building from inception of the project; recognised and reward green initiatives; and relevancy of interior projects in the future.

RELATED STUDIES

GBI Tools for interiors is the latest of developed tools for benchmarking the green indexing in Malaysia. The idea was first coined by Ar. Voon Kok Leong (2013) in the recently launched GBI Residential New Construction (RNC) Tools and Reference guide Version 2.0 in PAM (Architecture Association Malaysia) Head office in Kuala Lumpur. Following that, a Technical Working Committee for GBI Tools for Interiors was set-up with mixed members from both MGBC and MIID.

Main assessment criteria for GBI Tools for Interiors are based on comprehensive assessment system for evaluating the sustainable design and indoor performances in interior spaces. The principles is to design an assessment criteria for interior design project based on the following existing six (6) main criterias used in other GBI Tools is meant for consistency and uniformity of all GBI Tools. It is very important to set a common standard of assessment as practiced in other available tools in

Malaysia. The criterias are efficiency of energy usage (EE), good indoor environment quality (EQ), sustainable design and management (SM), materials resources (MR), efficiency in water comsumption (WE), and innovation in design (IN).

Table-1. GBI for Interiors Assessment Criteria-overall point score.

ASSESSMENT CRITERIA OVERALL POINTS SCORE			
PART	ITEM	MAXIMUM POINTS	SCORE
1	Energy Efficiency	28	
2	Indoor Environmental Quality	19	
3	Sustainable Planning & Management	25	
4	Material & Resources	14	
5	Water Efficiency	4	
6	Innovation	10	
	TOTAL SCORE	100	

OVERVIEW AND COMPARATIVE OF GREEN BUILDING INDEX RATING TOOLS

Troughout the world, variety assessment systems is developed around energy and environmental impacts on architecture. Conceptually a green building approach requires a holistic consideration of wellbeing and health of end users or stakeholders in each aspects of building project, not only the interior of space but the overall building, together with wider response and the site context and people within it. This could be a highly complex approach that would require integrated thinking by the architects, designers, developers and the local government responsible for the community planning (Plass and Kaltenegger, 2007).

Although it is relatively new, developing sustainable built projects has become an established concept with an increasing demand in every section of the continents, actively promoted by the Green Building Councils of the respective countries and supported by almost all governments of Europe, America, China, Hong Kong, Japan and Korea. Susceptible by climate change globally, there is an escalating needs for efficient energy and resource buildings, and also a need to build homes that are healthy and comfortable, not affected by undue emissions of harmful substances, glare or insufficient lighting, noise, hot and cold climate (Singh, Yu and Kim, 2010); where occupants can feel secure, can communicate with each other and can build hope for the future. For commercial buildings, there are reported evidences that environmentally certified buildings with improved personal control, day lighting, thermal comfort, air quality and noise reduction can enhance productivity of working personnel and business operation (Lee & Guerin, 2009).

To cultivate the development of sustainable buildings, numerous building environmental rating methods have been initiated based on practiced credits award, these include: LEED (USA), BREEAM (UK), Korean Green building Label, CASBEE (Japan), China Green Building Labels: GBDL, GBL, GOBAS, HK BEAM (Hong Kong), Green Stars (Australia), HQE (France), x PromisE (Finland), Green Globes (Canada), BCA Green Mark (Singapore), and GBI Malaysia.

(BREEAM), UK: Building research establishment environmental assessment method

BREEAM is one of the world's leading environmental rating method and assessment system for architecture, and it used as a reference in many countries. It was first launched in 1990 by Building Research Establishment, and now 200,000 buildings are certified BREEAM assessment ratings and over 1 million registered for assessment (BREEAM, 2102). BREEAM is the rating system for non-residential building and has different versions for various building types.

BREEAM uses a broad range of categories and indicators of performance to evaluate the design, construction and utilization of buildings. It provides different types of assessment, including pre-assessment, design and procurement assessments, management and operation assessments, post construction reviews, covers the whole life cycle of buildings

Table-2. Overview of GBI assessment tool in UK.

BREEAM, UK	
Author	**(BREEAM, 2012)**
Issues/Problem	Uses a broad range of categories and indicators of performance to evaluate the design, construction and utilization of buildings. Include features related to efficiency of energy and water, the indoor environment and pollution, transportation, resources, ecology, waste, and management process. Provides different types of assessment, including pre-assessment, design and procurement assessments, management and operation assessments, post construction reviews, covers the whole life cycle of buildings. (The Royal Town Planning Institute, 2012).
Remark	No specific GBI Criteria for Interiors

(LEED), US: Leadership in energy and environmental design

Green Building Rating System provides by The Leadership in Energy and Environmental Design (LEED) is a suite of standards and indicators for what institutes a "green building". LEED offers building owners and

operators with an outline for classifying and executing practical and assessable sustainable design, construction, operations and maintenance solutions of building (U.S. EPA, 2009). It was established by the Green Building Council od U.S (USGBC) in the year 2000, and until now, almost nine billion square feet of building plot assessed by the rating systems and certifying closed to 1.6 million feet daily all over the world (Jennifer, 2012).

LEED assessments system is used in rating the constructed environments from single buildings and homes to entire neighborhoods and communities. The type of rating systems is more comprehensive, includes existing buildings, new construction, commercial development, core and shell, institutions such as school, healthcare, residential, locality development.

Table-3. Overview of GBI assessment tool in US.

LEED, US	
Author	**(U.S. EPA, 2009), (Jennifer, 2012)**
Issues/Problem	LEED efforts to change the performance of architecture in design, built and operation stages, in main areas of social and environmental wellbeing: sustainable location development, water efficiency, energy usage, resources selection and internal environmental quality.
Remark	Specific GBI Criteria for Interiors, ID+C (Green Interior Design and Construction)

CASBEE, Japan: Comprehensive assessment system for building environmental efficiency

CASBEE, established by Japan Green Building Council (JaGBC) and Japan Sustainable Building Consortium (JSBC), is a means for rating and assessing the performance of building context and developed environment in Japan. It was launched from 2001, and has developed into 10 categories, which are existing building, new construction, urban development, heat island, urban area buildings, cities, renovation, home, market promotion, property appraisal.

CASBEE employed 2 categories of assessment: 1. Q (Quality)-Built Environment Quality, 2. L (Load)-Built Environment Load. CASBEE mostly focuses within four rating aspects, which are efficiency of energy, efficiency of resource, surrounding environment, and interior environment (IBEC, 2012).

Table-4. Overview of GBI assessment tool in Japan.

CASBEE, JAPAN	
Author	**(IBEC, 2012).**
Issues/Problem	Employed 2 categories of assessment: 1. Q (Quality)-Built Environment Quality, 2. L (Load)-Built Environment Load. Assessed the enhancement of living service for building occupants within the supposed bounded space, and the undesirable attributes of environmental effect which go superseded the supposed enclosed area to the external.
Remark	No specific GBI Criteria for Interiors

Korea's Green Building Rating System Criteria

GBCS or Korea's Green Building Certification System is the rating systems to gauge green performance of buildings and promote dissemination of green building in Korea. GBCS was launched in 2000, until now, it has developed into an integrated certification system, which measures the environmental performance of multi-unit residential buildings, mixed-use dwellings, office buildings and schools. And some indicators will be add or remove according to the different types of building.

Table-5. Overview of GBI assessment tool in South Korea.

Korea's Green building rating system criteria	
Author	**(KGBC, 2012).**
Issues/Problem	Major indicators cover land development, energy, commuting transportation, resource used, environment impacts, environment conservations, and indoor quality of the environment.
Remark	No specific GBI Criteria for Interiors

BCA, Singapore: Green Mark Scheme

The Green Mark Scheme by BCA Singapore is a plan to boost Singapore's development towards more sustainable-friendly buildings since the years 2005. It was established to encourage the sustainability of the built environment as well as to raise environment awareness of people during the design and construction period of buildings (BCA Green Marks, 2006).

One of the features of BCA Green Mark different from other rating systems is the pre-assessment in the assessment process in order to give the designs team a better apprehending of BCA Green Mark needs. At every 3 years, buildings certified by Green Mark need to re-evaluated to keep the certification status. BCA Green

Mark system evaluates new buildings and landed houses, existing buildings, schools, office interior, restaurants, districts and infrastructure. Based on the background of tropics area, Green Mark addresses focuses more on the priorities and needs of Singapore.

Table-6. Overview of GBI assessment tool in Singapore.

BCA Green Mark Scheme, Singapore	
Author	**(BCA Green Marks, 2006)**
Issues/Problem	based on 5 main criteria, efficiency of energy, water, protection to environment, quality of indoor environment and other sustainable qualities and innovation Different from other rating systems is the pre-assessment in the assessment process in order to give well understanding of Green Mark requirements the project team. Within 3 years, certified buildings need to re-evaluated to keep the BCA Green Mark status
Remark	Specific GBI Criteria for Interiors

Evaluation Standard for Green Building, China

The Evaluation Standard for Green Building (GB/T 50378-2006) is the national-level standards set by China Ministry of Housing and Urban-Rural Development. The evaluation standards system contains 6 criteria; land-optimization and outdoor environment, conservation and used of energy, water optimization and water utilization, material optimization and resources utilization, internal environmental quality, and management of operation and production (GBI. China, 2006). The Evaluation Standard for Green Building is comparable to LEED in framework and evaluating procedure.

Table-7. Overview of GBI assessment tool in People's Republic of China.

Evaluation standard for Green building, China	
Author	**(GBI. China, 2006).**
Issues/Problem	Contains 6 criteria; plot-saving and outdoor environment, conservation and used of energy, water optimization and water utilization, material optimization and resources utilization, internal environmental quality, and management of operation and production
Remark	No specific GBI Criteria for Interiors

HK-BEAM Plus: Hong Kong Building environmental assessment method plus

Hong Kong BEAM plus by the Hong Kong Green Building Council (HKGBC, 2010) has been formally introduced since April 2010. The overall assessment grade divided into 4 levels, platinum, gold, silver, bronze, and SA, EU and IEQ must meet with the minimum percentage. HK-BEAM Plus is the comprehensive environmental assessment scheme to assess, improve, certify and label the environmental performance of buildings. It provides comprehensive assessment details for both new building and existing buildings

Table-8. Overview of GBI assessment tool in Hong Kong.

Hong Kong (HK-BEAM Plus)	
Author	**(HKGBC, 2010).**
Issues/Problem	Criteria's cover aspects of site (SA), aspects of materials (MA), used energy (EU), used water (WU), quality of indoor environment (IEQ), innovations and additions (IA).
Remark	No specific GBI Criteria for Interiors

Green building index (GBI), Malaysia

Different from other rating system such as LEED, GBI is designed specifically for the tropical climate while integrates Malaysia's current social, infrastructure and economic development (Tan Loke Man, 2009). There are 6 main criteria of GBI rating tool to assess commercial and residential properties, which are energy efficiency, indoor environment quality, sustainable site planning and management, materials and resources, water efficiency, innovation.

Table-9. Overview of GBI assessment tool in Malaysia.

Green building index (GBI), Malaysia	
Author	**(Tan Loke Man, 2009).**
Issues/Problem	Specifically designed for the tropical environment. 6 main criteria of GBI rating tool to assess commercial and residential properties, which include efficiency of energy, quality of indoor environment, sustainable planning and management, materials resources, efficiency of water and innovation
Remark	No specific GBI Criteria for Interiors (Under development)

GBI MALAYSIA: SUSTAINABLE PLANNING AND MANAGEMENT(SM)

The Technical Working Committee (TWC) for Sustainable Planning and Management (SM) is a joint committee of MIID and MGBC. The main agenda of TWC is to set sub-criteria for SM and also to consensus on score able points set. The SM Criteria's of assessment is divided into four (4) main areas of assessment which is Site Planning; Interior Space Design and Quality; Construction and Management; and Operation. Each assessment criteria is sub-categorizing to more detail explanation, coded, detail points, maximum points and score. According to Ar. Voon (2013), assessment tools for interior design project weighting should be on SM, as the detail of interior works especially at designing, construction and commissioning phase are lies in it. Thus, applying the concept of green interior management systems is not only in architectural envelopes and engineering services, but more at early design stages, procurement, construction even execution of business operations, including the use of green practices and conducts as is seen as a catalyst for the concept of sustainable interior design (Ar. Voon, 2013).

Area of assessments for SM

The first main area of assessments for SM is Site Planning. It is divided into four (4) sections. The first section is coded as SM1, which entitled Building Selection. The overall ideas are to encourage the selection of a sustainable base building that is awarded with GBI certificate. Three (3) maximum score able points were given in SM1. The second area of assessment is SM2 is Refurbishment of Existing or Abandoned Interior Space. The main idea for SM2 is to encourage retrofitting of existing or abandoned interior space. One score (1) point is given for existing building restoration or refurbishment abandoned interior space that maintains equal or more than 25% of the existing fit-out and/or finishes. SM3 concerns on public transportation access where it encourage the reduction of substantial reliance on private transportation, which is the main cause of GHG or the Green House Gases

For SM3 one (1) maximum point is awarded either for building that is located within 500mm from a Public Transport Stop or for building that is located within 1km from a Public Transport Interchange. The fourth area of assessment for SM is Community Connectivity. The fourth section is coded as SM4. The main concept for SM4 is to promote the building selection closed to basic public amenities. The score is given for any ten of the basic amenities that are within 1km and with availability of foot-traveler entree in between the building and the amenities. The example of basic services stipulated as above proximity is Bank, Electronic Banking Centre, Place of Devotion, Grocery / Convenience Store / Hypermarket, Nursery, Police Office, Fire Office, Beauty Parlor, Hardware Store, Laundry, Medical / Dental, Public library, Old Citizens Care Facility, Gardens, Drug Store, Post Office, Eatery Outlet, School, Playhouse, Civic Centre or Wellness Centre.

Second main area of assessment in SM is Interior Space Design and Quality and divided into three (3) sections. The first section is coded as SM5; sustainable space design. SM5 encourage practicing sustainable interior space design. One (1) point is awarded for each sustainable space design. Total maximum score able point under SM5 is 8 points. The each one (1) score able points are Provision of open planning layout >50% OR any other equivalent space; Provision of flexible planning layout >25% OR any other equivalent space; Provision of wireless connectivity planning; Use of demountable partition OR any other equivalent pre-fabrication system; Provision of a dedicated enclose space with exhaust fan to accommodate the photocopy and/or plotter to contain the emission of O3 OR any other equivalent space; Provision of a dedicated Recreation / Break-out / Pantry Space OR any other equivalent space; Provision of Breastfeeding Room / Child Care Space / Sick Bay with First-Aid-Kit Facility OR any other equivalent space; Provision of Surau OR any other equivalent space and Provision of Universal Design.

Second sub criteria is SM6; Indoor Greenscape. SM6 encourage the provision of indoor greenscape within the interior space design. Points are awarded according to the percentage of the indoor greenscape (inclusive of wall area) comparatively to total GFA. Total score able points for SM6 is 2 points. The criteria for SM6 is to provide indoor greenscape with native plant to > 2.5% of the total

GFA; 1 scorable point, or to provide indoor greenscape with native plant to > 5.0% of the total GFA; 2 score able points. The last sub main criterion is Indoor Water Feature coded SM7. The criterion is to encourage the provision of indoor water feature within the interior space design. One (1) point is awarded for indoor water feature > 0.25% of the total GFA.

The third main area of assessment under SM is Construction Management. The first sub assessment a criterion is coded SM8, which entitled Sustainable Construction is to promote sustainable construction practice throughout the construction process. Maximum 2 points were awarded under SM8; 1 point will be awarded for any 2 of the items listed below, and up to a maximum of 2 points. The itemize criteria are to reduce potable water by reduce wet trade and encourage dry trade; or to reduce energy by harness daylight; or to reduce energy by using energy efficient equipment and/or appliances.

Second sub assessment criteria is SM9; Construction Pollution Control Policy. SM9 is to implement policy / strategies to reduce the impact of pollution during the construction process. One (1) point is awarded for implementing strategies to reduce Indoor Air Pollutants, to reduce Internal Noise Level, and to reduce Vibration Pollution. The third is SM10; Storage and Collection of Recyclables. SM10 is to encourage the waste reduction generated throughout construction and during building tenancy that is lugged and cleared off in dumping fills. One score (1) is awarded for SM10 whereby, during construction, by offering designated area and storage for collecting non-hazardous waste for recycling and on the period of building tenancy, by preparing permanent recycle waste bins for both non-hazardous and waste material. The fourth sub assessment criteria is SM11; Construction Waste Management. The criteria is to initiate and apply a construction debris management system that, as a minimum classifies the waste to be diverted from clearance regardless of whether the waste will be sorted on site or co-mingled. Measure by quantifying tonnage of debris sent for clearance. One score (1) is given for recycle and/or salvages ≥ 75% volume of non-hazardous debris. The last sub assessment criteria under Construction Management is SM12; Site Safety. It is to implement Site Amenities Plan and Safety and Health strategies for all construction workers. One (1) point will be awarded under SM12 which is to implement Site Amenities Plan; eg accommodation, toilet facilities and any to other Site Amenities deem applicable for construction works and to implement strategies to meet the requirement of Occupational Safety and Health Act 1994 (Act514).

The fourth main assessment criterion under SM is Operation. Under Operation, 4 maximum points is awarded and it was sub categorized into two-sub heading. The first sub category is SM13 Green Procurement Policy where the overall idea is to commit to and demonstrate best practice of green purchasing and sustainable daily operational solutions that are environmentally responsible and create a culture where sustainability is integrated into daily awareness. One score (1) point is given for any 2 of the items listed, up to a maximum of 2 score points. The itemize criteria under SM13 are procure and/or use multi-functional office equipment and/or appliances for entire office operations; procure and use all environmental friendly cleaning products and/or services; procure and use environmental friendly stationery for ≥ 75% of total stationery; procure and use paper, which consists of >50% recycled content and procure and use paper products, which consists of ≥50% recycle content or any alternative fiber products.

The second sub criterion is SM14 Sustainable Maintenance and Building User Manual. The concept of SM14 is to ensure the space will continue to perform as intended and to document all features and strategies in Building User Manual (BUM) for users information and in guiding them to sustain performance during occupancy. Maximum score able points in SM14 is 2 points and it is awarded based on planned and scheduled educational program for occupants for both the passive and active green features, and Trained personnel for monitoring and analyzing all active green features, and Preventive maintenance plan for at least 3 years. And another 1 point is awarded is to prepare a Space User Manual which filed both the active and passive sustainable design features.

Figure-1. SM assessment criteria and sub-criteria coding.

SM	SUSTAINABLE PLANNING and MANAGEMENT
Site Planning	
SM1	Building Selection
SM2	Refurbishment of Existing or Abandoned Inerior Space
SM3	Public Transportation Access
SM4	Community Connectivity
Interior Space Design and Quality	
SM5	Sustainable Space Design
SM6	Indoor Greenscape and Indoor Water Feature
Construction Management	
SM7	Sustainable Construction
SM8	Construction Pollution Control Policy
SM9	Storage and Collection of Recycleables
SM10	Construction Waste Management
SM11	Site Safety
Operation	
SM12	Green procurement and Operation Policy
SM13	Sustainable Maintenance and Building User Manual

METHODOLOGY

The research is about conducting comprehensive review on current Green Building Management System assessments tools, identifying Green Building Management System criteria's for interior elements and humanoid aspects within interiors design parameters and for developing new frameworks of assessment method, consensus of assessments weight indicators and applications for interior design project. The study look at new criteria on addressing 'greening of interiors design project' details that combines focus group discussion, semi-structured interviews and general online survey via digital media. Joint effort and involvement between MGBC and MIID, which researcher is one of the appointed Council Members will make the research more significant and impetus in establishing the criteria's and tools for GBI on interior projects. The study was carried out in series of focus group discussion group and semi structured interviews with qualified GBI facilitator and assessor, and registered interior designers in Kuala Lumpur. The scope of study was also extended via online general survey and comment to the other related stakeholders in GBI Malaysia, who are in the interior design fraternity, suppliers, manufacturers, building services providers and other similar professionals involved in interior projects.

The data was collected from focus group discussion in every thursday meeting which was held bimonthly at MIID Secretariat office at Solaris Dutamas, Kuala Lumpur or alternately at MGBC office at Menara UOA, Bangsar Kuala Lumpur. The joint Technical Working Committee (TWC) was set up to oversee and make policy on tools framework and reference guide. Exemplary on existing GBI Malaysia Non Residential New Construction (NRNC) framework, smaller working group chair by appointed TWC lead each of six (6) sub-assessment criteria namely Energy Efficiency(EE), Indoor Environment Quality (EQ), Sustainable Planning and Management (SM), Water Effiency (WE), Material and Resources (MR) and Innovation (IN). Based on feedback from working group the data then formulated and veted through in TWC meeting. The framework of GBI Tools for Interiors in particular SM later on was deliberated and vetted through structured interview with GBI expert such as GBI Assessor Panel (GBIAP), GBI Facilitator and MIID Council.

FINDING AND DISCUSSIONS

SM guide on Site Planning; Interior Space Design and Quality; Construction and Management; and Operation are the main aspect of these tools in accordance with interior designer's point of view. GBI Tools for Interiors is the first green interior management concept in this country that used the system consistent with all other GBI tools developed by MGBC. It differs from other interior tools, especially in terms of assessment sub-criteria's in interior space design and quality; construction and management; and operation available. Despite some similarities in site planning, but the concept is applied differently especially in terms of input and measures take from interior designer's approach. The Malaysia GBI Tools for Interiors concept is applied in interior projects as it compatible with Malaysia climatic conditions and standards. This is contrary to imported GBI tools which more general or based on specific country's Building By-Laws or Standards.

The data on SM was collected from series of focus group discussion and online general surveys and comments were analyzed, interpreted and elaborated using standard GBI Malaysia green rating and indexing. Based on findings a total 14 of area of assessment with a total 25 scoring points was awarded in SM. The 14 area of assessment is coded as SM1 Building Selection, SM2 Refurbishment of Existing or Abandoned Interior Space, SM3 Public Transportation Access and SM4 Community Connectivity which is group under Site Planning.

The second area of assessment is Interior Space Design and Quality, which consist of SM5 Sustainable Space Design and SM6 Indoor Greenscape and Water Feature. This section of assessment is very important in SM as it made half of total SM score points. The third area consist of five sub-assessment criteria's which are SM7 Sustainable Construction, SM8 Construction Pollution Control Policy, SM9 Storage and Collection of Recyclables, SM10 Construction Waste Management and SM11 Site Safety. This all five sub-assessment criteria is group under Construction Management.

The last area of assessment is Operation, which made up of two sub-assessment area; SM12 Green Procurement and Operation Policy and SM13 Sustainable Maintenance and Building User Manual. From the overall assessment criteria it is concluded that SM is one of the main area together with EE (Energy Efficiency), which made more than half total combined score of overall GBI Assessment Criteria for Interior Design project.

GBI Assessment Criteria basically covered everything for sustainable interior design from inception of design. It suggest a more sustainable site planning by encouraging selection of existing GBI certified building, retrofitting, closed to public transportation access and community connectivity. At design stage, sustainable design approach and indoor greenscape and water feature is emphasized. The tools also suggest sustainable construction phase by controlling waste and pollution, points also applied for recyclables. The tools further extended for post construction phase criteria's, encouraging green procurement and operation policy; and also sustainable maintenance.

Based on comparative table of generic assessment below (Table-11), all related studies suggest generic assessment of Energy Efficiency (EE), Indoor Air Quality (EQ), Sustainable Planning and Management (SM) and Material Resources (MR) is included in, except Water Efficiency is not specifically included in CASBEE and KGBC. Other criteria which lacking in related studies is

Innovation (IN), where it only specifically available in Green Mark, HK-BEAM Plus and GBI, Malaysia.

Table-10. Comparative generic assessment component in Green building management system.

GBI Tools	Generic assessment criteria						Remarks
	EE	EQ	SM	MR	WE	IN	
BREEAM	Y	Y	Y	Y	Y	N	Lack of IN
LEED, US	Y	Y	Y	Y	Y	N	Lack of IN
CASBEE	Y	Y	Y	Y	N	N	Lack of WE and IN
KGBC	Y	Y	Y	Y	N	N	Lack of WE and IN
Green Mark	Y	Y	Y	Y	Y	Y	Include all
GB, China	Y	Y	Y	Y	Y	N	Lack of IN
HK-BEAM Plus	Y	Y	Y	Y	Y	Y	Include all
GBI, Malaysia	Y	Y	Y	Y	Y	Y	Include all

In related studies comparatively on availability of specific tools for interior design project, Table-12 below suggest only LEED, US, Green Mark, Singapore has a specific assessment tools for interior design project while GBI, Malaysia is developing the tools currently. Even though all tools in related studies may somehow have an interior design component in it, but addressing a specific interior design tools is imperative as the scope, approach and duration of the projects may be different.

Table-11. Comparative on availability of specific ID tools in Green building management system.

GBI Tools	Specific ID Tools		Remarks
	Yes	No	
BREEAM		X	No specific GBI Criteria for Interiors
LEED, US	X		ID+C (Green Interior Design and Construction)
CASBEE		X	No specific GBI Criteria for Interiors
KGBC		X	No specific GBI Criteria for Interiors
Green Mark	X		Specific GBI Criteria for Interiors
GB, China		X	No specific GBI Criteria for Interiors
HK-BEAM Plus		X	No specific GBI Criteria for Interiors
GBI, Malaysia		X	No specific GBI Criteria for Interiors (Under development)

Based on comparative studies of selected GBI Management Tools available versus proposed assessment criteria of GBI Malaysia interior tools, specific sub criterias for interior design project it is imperative to include;

- A defined green interiors by establishing a common language and standard of measurement;
- Promoting integrated, whole interior and base-building design;
- Recognise and reward environmental leadership;
- Transform the built environment to reduce it's environmental impact; and

- Ensure new interiors remain relevant in the future and existing interiors are refurbished and upgraded properly to remain relevant.

CONCLUSIONS

The current GBI Assessment Tools in Malaysia are mostly devised to evaluate the environmental impacts of built project without emphasizing more on the impacts of the interior design element aspect on the end user who experience and occupy them. There are two significant reasons for this, firstly; there is no an assessment tool or method that specifically designed for an interior design projects. Even though the current GBI Assessment Tools do try to embark in assessing the internal spatial criteria but still it very much does not confirmed to the interior space experience and justify a green design aspect from interior designers' point of view. Secondly; the current assessment tools which available that closely related to interior design project is GBI for residential new construction (GBI-RNC). The mention assessments tools is designed specifically for new residential, hence designed for as an architect point of view. Interior designers' works from existing or readily available space and limitation not only for residential projects. Furthermore, since Interior Designers are legislated profession in Malaysia based on Amendment Architect Act 2007, the obligation and accountability of Interior Designers are on public spaces and generic stakeholders instead of private spaces and personal users. Hence, a new framework for developing GBI assessments criteria's and methods is needed to ensure that green and sustainable interiors will reduce environmental impacts while being design-effective and socially responsive. Besides the outcome of this research could be highly potential contribution of new GBI rating method for Malaysia, it also significant and could be replicated for formulating similar indicating frameworks for other countries. The outcomes of this research also provide an extended theoretical significance to the field of study by filling the gap in GBI assessments framework which specifically addresses an interior design project.

ACKNOWLEDGEMENT

The researcher and the team would like to record thousands of appreciation and thankful to the Universiti Teknologi MARA (UiTM) and Ministry of Education Malaysia (KPM) who give the grant on this research under *Research Acculturation Grant Scheme (RAGS)* which make this research possible. The thanks also go to Malaysian Institute of Interior Designers (MIID) and Malaysia Green Building Confederation (MGBC) for providing venue and related data to the research. Lastly, the appreciations go to any individuals and organizations that support us until the last day of research completion.

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