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RESIDENTIAL PERSPECTIVE TOWARDS SUSTAINABLE NEIGHBOURHOOD PLANNING AND DESIGN IN SARAWAK, MALAYSIA

F. M Raslim
Quantity Surveying Department, School of Housing, Building and Planning,
Universiti Sains, Malaysia, Gelugor, Pulau Pinang

S.M.H.W Othman
Quantity Surveying Department, School of Housing, Building and Planning,
Universiti Sains, Malaysia, Gelugor, Pulau Pinang

ABSTRACT

Sustainable development becomes as one of the important aspects in planning and design of building structure and infrastructure in this century. The land usage for development has given much impact towards the environment through overused and devastated. Malaysia, also facing this similar problem due to people needs and wants into providing modernized structures and infrastructures especially in urban area. The incorporated of sustainable planning and design in Malaysia is a must to ensure current and future generations can be benefited from this types of development. Sustainable neighbourhood planning and design were important to provide excellent living places without comprising the important of taking care towards environment. This paper emphasized on determining the residential perspective towards sustainable neighbourhood planning and design with the implementation of Green Building Index (GBI) conceptual for housing development in Sarawak. The outcome for this research will represent current level of awareness and perspective towards sustainable neighbourhood planning and design with Green Building Index (GBI) criteria implementation for neighbourhood area in Kuching, Sarawak, Malaysia.

Keywords: Green Building, Malaysia, Sustainable Development, GBI, Residential Perspective.

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1. INTRODUCTION

Malaysia has recognized the concept of sustainable development and implanted this concept in its policies, vision, mission, and plans (Holden et al. 2017) [10]. The main goals of GBI development is to save energy resources, recycle materials and harmonize the building with the Malaysia climate, traditions, culture and its environment as well as maintaining the capacity of the ecosystem at local and global levels (Mohd Adnan 2017) [22]. Active participation of various groups in society such as property owners, bankers, developers, architects, engineers, contractors, and other involved in real estates are important to improve the quality of living environment. (Shaikh et al., 2014) [15]. Housing normally considered as one of the predominating factors that affect the general economy which also acting as an essential segment of social development that develops social attribute, indication of aesthetic value and the lifestyle (Archnet, 2014) [2]. The limitations of the sustainability in housing development conceptual are consisting of fulfill human needs, minimizing the non-renewable resources, supporting usage renewable resources and absorptive capacity of waste absorption limits (Sarker et al., 2017) [19].

2. SUSTAINABLE DEVELOPMENT

The objective to accomplish sustainable development is among the difficult tasks, due to need a combination of great effort from the purchasers, the housing industry and government (Mahat et al. 2016; Pinz 2017) [13,16]. Besides that, there is a requirement of paradigm shift among designers, experts, developers, organizers and managers in preserving the sustainability in housing development (Mohd Adnan 2017) [22]. Therefore, both of the public and private sector are starting to request building that maximize the energy consumption, improve indoor environmental quality and promote resource efficiency (Samari et al. 2013) [18].

Economic sustainability can be assume as a system of production that achieving the current consumption levels without bargaining future needs; given the natural environmental expenses and constraints (Griggs 2013) [7]. Meanwhile, the current modern concept emphasizes as underlying the economic sustainability to optimize the direction of income that could be generated while at the same time maintaining the stock asset that have beneficial outputs (GhaffarianHoseini 2013) [6]. Other than that, it is important to develop the technology, building materials and housing designs that consider environmental impact of housing activities, and lastly its implication for financial viability of housing projects. Environmental costs need to be considered as production costs, if the long term sustainability and equity remain mandated by the advocacy of sustainable development (Zuo & Zhao 2014) [24].

Meanwhile, social capital is the asset which individuals attract upon quest for their aspirations and is expended by networks and connectivity, enrolment of more formalized group and relationship of trust, correspondence, and trades (Weingaertner 2014) [21]. Incorporated of equity and poverty alleviation are represent as important element of sustainability. Thus, the social dimension of development covers the defending strategies that limit the vulnerability, improve equity and at the same time ensure all basic needs are fulfilled (Chen et al. 2015) [3]. The establishment of socio-political institutions will help nurture future social development to withstand and adapt challenges of globalization. Normally, social sustainability also considered similar as ecological sustainability and hence analogous to ecological limits, as social constraints limiting the development and these are lay down by social norms (Fritz 2015) [5].

2.2. Sustainable Neighbourhood Design

The implementation of sustainability principles in the neighbourhood design is crucial due to many of the problems occurred at macro-city scale arise due to poor planning at the micro-neighbourhood level (Sharifi, 2016) [20]. The neighbourhood-scale analysis can enhance conceptual such as developing more efficient and sustainable local urban infrastructure that comprises of building, transportation, urban vegetation, and water (water supply, wastewater and storm water) systems (McMurray 2014) [14]. If these things could be achieved, it will lead to achieving sustainable development principles. Sustainable neighbourhood design covers the development of communities with the consideration to environmental, social and economic goals in a balanced perspective (Eskandarpour, 2013) [4]. The combination of engineers and specialist are important in sustainable neighbourhood design due to their ability create the local infrastructure system and excellent urban design (Hachem, 2016) [8]. Currently, they are seven documents that established to promote green development in Malaysia. They are national green technology policy, national policy on climate change, low carbon cities framework and assessment system, green neighbourhood planning guideline, green building index, green building index township tool and low carbon society scenarios. Each of these frameworks is looking at different element, strategy and spatial context of built environment (GBI Malaysia, 2014) [5].

2.3. Green Building Index

Green Building method are consisting of resources efficiency management such as water and materials, while limit the impact on human health and environment through building lifecycle, design, construction, operation, maintenance, and removal (Hoffer, 2015) [9]. The Green Building Index (GBI) emphasizes as green rating tool that encourage sustainability in the construction industry (Yusoff & Wen, 2014) [23]. GBI was developed by Green Building Index Sdn Bhd, a wholly-owned subsidiary of Malaysian Institute of Architects and Association of Consulting Engineers Malaysia. Green Building Index Sdn. Bhd. will appoint certifier as a first step to determine the GBI certification process towards building design. The assessment is based on the six main criteria namely energy efficiency, indoor environment quality, sustainable site planning and management, materials and resources, water efficiency and innovation. It can be diverse into three (3) categories of residential, non-residential and industrial. For each category, it has further divided into new construction (new) and retrofitting (existing). The buildings will be awarded one out from four types of ratings namely certificate, silver, gold and platinum depending on the scores received. The rating tool was created on 2009 and it has been revising and improves to include various types of buildings. Nowadays, there are lot properties getting interest in obtaining certification from GBI. The developers which are a main actor in sustainable development, assuming GBI certification will act as a good marketing tool in promoting their products to home buyers (GBI Malaysia, 2014) [5].

2.4. Cost implication of going green

In inception stage, if improper project management is being held, the developer will facing higher cost to implement green building (Joseph, 2013) [11]. Owners that including homeowners, developers and local government entities normally supporting environmentally building but doesn't understand about its implications in terms of cost. Research had shown that from a conventional building to achieving a building with GBI 'Certified' level rating currently comes with a cost, but there is sufficient evidence that constructing sustainable buildings make good business (Rehm & Ade, 2013) [17]. Cost is the most critical factors of property developers' decision making process. Green certification shall increases the project

costs associated with registration, application, design and construction, in return for lower operational costs and higher value of the building that aim to balance off the costs over the building's life-time (Luthra, 2015) [12]. GBI estimates a cost increase of between three to five percent depending on the level of certification to be achieved, this added cost is significant enough to persuade against a wide adoption of green certification by developers (Green Building Index, 2014) [5]. Developers or owners decide to construct a green building often based on corporate peer pressure, demonstration of stewardship of the environment, operational cost savings through energy reduction, reducing their carbon footprint or just because they want to "do the right thing" (Ahn et al., 2013) [1].

3. RESEARCH METHODOLOGY

The questionnaire given to the respondents are divided into four (4) parts which are Part A - Resident background; Part B - Awareness towards Sustainable Neighbourhood Planning and Design; Part C - Housing criteria needed towards Green Building Index (GBI) implementation and Part D - cost increases due towards GBI implementation. The estimate numbers of questionnaires that have been distributed to the respondent are about 225. The selections of respondents are based on area sampling and random sampling to the neighbourhood residential in Kuching Sarawak area as shown in Table 1. The reasons of this neighbourhood being selected was due to much similar types of houses, large populations in terms of respondents availability and respondents background in the neighbourhood area that having mixed of economical capability. In addition, the questionnaires also distributed to the offices such as Land and Survey Department (Kuching), Public Work Department (Kuching) and other offices in Kuching area to increase the number of respondents.

Location	Questionnaires Allocated (No)	Questionnaires Received (No)	% Success Return Rate
Taman Sri Wangi	25	22	73.3%
Taman Fitrah	25	14	56.0%
Taman Serira	25	6	24.0%
Taman Sejoli	25	9	36.0%
Kpg. Semariang Aman	25	21	84.0%
Taman Sukma	25	12	48.0%
BDC/Stampin/ Batu Kawa	25	16	64.0%
Perumahan Fasa 2	25	24	96.0%
Others	25	25	100.0%
	225	149	66.2%

Table 1 Location and respond rate of the respondents

The data that has been obtained through questionnaires were analysed by frequency, cumulative frequency, relative frequency and frequency percentage. Apparently, for questions that applied Likert scale was also analysed through average index analysis (mean). Based on the table above, the numbers of questionnaire successfully received are 149 from 225 numbers of respondents. The percentage of success return rate is 66.22%.

4. RESULTS AND DISCUSSION

4.1 Part A: Resident Background

The results data obtained for this part shows that frequency of both gender quite balance by 82 (male) and 67 (female) respectively. Besides that, the frequency percentage for both

genders was 55.03% (male) and 44.97% (female). The reasons of this questions being included as part of the resident background questions are to show that the output of the respondents of both gender are important to enhance their opinions towards this research. The data also shows that the frequency value for both marital status namely single and married are 29 (single) and 120 (married) respectively. Meanwhile the frequency percentages for both marital statuses are 19.46% (single) and 80.54% (married). The perceptions and behaviours of a respondent might differ by the marital status of a person due to the married person usually being little more responsible to the neighbourhood surroundings and be more matured in understanding the research questions. In addition, the results shows that the frequency was 12 (< 5 years), 22 (5-10 years), 32 (11-15 years), 40 (16-20 years) and 43 (> 20 years). The highest frequency was 43 (>20 years) and followed by 40 (16-20 years). The data shows that most of the respondents are staying for a longer time in their respective neighbourhood area. Thus, it's also shows that large amount of the respondents have a clear view about their neighbourhood surroundings for a reasonable duration of time.

4.2 Part B: Awareness towards Sustainable Neighbourhood and Design

These questions are related with the understanding and awareness of the residential towards sustainable neighbourhood planning and design. Sustainable neighbourhood planning can be describe as a conceptual of building planning that consider the needs of the sustainable development as stated in Malaysian National Policy. The data shows that highest frequency is 122 (agree). Based on the average index analysis (mean), the point was 3.966 which are located in between $3.50 \leq$ average index (I) < 4.50 that represent agree. This data shows that, most of the respondents which represent residential that living in the neighbourhood area have a good understanding towards the sustainable neighbourhood planning and design conceptual.

In Malaysia generally, public awareness and interests are rapidly increase in term of how buildings affect the environment, worker productivity and public health. The data obtained shows that the highest frequency obtained was 78 (disagree). Based on the average index analysis (mean), the point was 2.517 which are located in between $2.50 \leq$ average index (I) $<$ 3.50 that represent neutral. By this results shows that mostly in their neighbourhood area, the sustainable neighbourhood planning and design not fully establish and enforce for a reasonable time. By that, all necessary actions might be taken to increase the sustainable elements in the residential area.

Social elements can be describe as a person pursuit their aspiration through develops network and connectivity, membership of more formalized groups together with relationships of trust, reciprocity and exchanges. Thus, sustainability in built environment can be define as open space, neighbourhood landscape, river, natural ponds, canopy trees, water retaining lands, green area and other elements that deemed to be suited in the living area. Based on the data obtained shows that the highest frequency was 129 (agree) with cumulative percentage 91.95%. Based on the average index analysis (mean), the point was 4.027 which are located in between $3.50 \leq$ average index (I) < 4.50 that represent agree. It's shown that majority of the respondent agree that sustainable neighbourhood planning and design is important to acquire balance and achievement between economic, social and environment.

4.3 Part C: Housing criteria according to Green Building Index (GBI)

Green Building Index (GBI) index which consist of six elements such as energy efficiency, indoor environment quality, sustainable site planning and management, material and resources, water efficiency and innovation. The data shows that majority of the respondent choose energy efficiency together with sustainable planning and management as GBI criteria that shall be included in the housing construction by recording high frequency 131 and 130

respectively. Besides that, innovation as well as material and resources criteria also recorded frequency 81 and 75 correspondingly. The highest criteria which is energy efficiency can be describe as improving energy consumption by improving building arrangement, reducing solar heat transfer, encourage natural lighting, and enhance building services such as renewable energy, ensuring proper testing, commissioning and frequent maintenance. Meanwhile the second highest criteria, sustainable site planning and management can be describe as selecting suitable sites with planned access to public transportation, community services, open spaces and landscaping. It's also including proper construction management, storm water management, and dipping the strain of existing infrastructure capacity implementation.

On the other hand, the residential agree that the neighbourhood area should have GBI accreditation to benefit to residential, community and environment. GBI rating accreditation that consisting of platinum, gold, silver and certification were important to ensure the building that will be build or refurbish recognize as 'green building' by the government in term of materials used, planning, design and etc. Based on the average index analysis (mean), the point was 3.960 which are located in between $3.50 \leq$ average index (I) < 4.50 that represent agree. In addition, GBI based for housing projects are more beneficial compared to conventional construction. According to Davis Langdon Australia (2007), the advantages for building owners who owns a green home include; 1. Potential higher occupancy rates; 2. Higher future capital value; 3. Reduced risk of obsolescence; 4. Less need for refurbishment in the future; 5. Ability to command higher lease rates; 6. Higher demand from institutional investors; 7. Lower operating costs; 8. Mandatory for government tenants; 9. Lower tenant turnover; 10. Costs less to maintain and operate

4.4. Part D: Cost Increases towards GBI implementation

Cost is one of the main criteria of property developers in a decision making process. Green certification such as Green Building Index (GBI) increase the project costs due to registration, application, design and construction, thus in-return for low operational costs and upper value of respective building that intention to balance off the costs over the building life-time. Meanwhile, Green Building Index estimates a cost increase in range of three to five percent reliant on the level of certification to be reached, hence causing persuade against wide-ranging adoption of green certification by developers. Part D are determine to collect residential perception towards spending extra 10% from normal prices for houses that having GBI accreditation. The data obtained shows that, the highest frequency was 67 (disagree). It was followed by 48 (neutral) and 19 (agree) respectively. Based on the average index analysis (mean), the point was 2.530 which are located in between $2.50 \leq$ average index (I) < 3.50 that represent neutral. The reason for this is due to currently the price for conventional houses are high which resulted customers reaction became neutral to spend extra money for houses that having GBI accreditation.

Additionally, there are six (6) types of GBI criteria namely energy efficiency, indoor environment quality, sustainable planning and management, materials and resources, water efficiency and innovation. Majority the respondents were choosing energy efficiency together with sustainable planning and management as GBI criteria that shall be included in the housing construction by recording high frequency 131 and 130 respectively. Apart from that, innovation as well as material and resources criteria also recorded frequency 81 and 75 correspondingly. The implementation of green building is consisted of energy efficiency, indoor environment quality, sustainable planning and management, materials and resources, water efficiency and innovation also contributing on increasing the building costs.

The main purpose of sustainable housing is to enhance affordable housing that are durable and long lasting, cost effective to build & practical to maintain, use natural resources and materials efficiently based on their life-cycle environmental impacts, conserve water, reduces runoff and treats waste-on site, maximize energy conservation and efficiency, reduce building footprints, simplify building shapes and maximize space efficiency, optimize building orientation to integrate natural daylight and ventilation, healthy by eliminating toxic and harmful materials in facilities and surrounding environment, support transportation alternatives, reduce, reuse and recycle materials in all phases of construction and deconstruction, apply maintenance and operational practices that reduce or eliminate harmful effects on people and environment, and design for future flexibility, expansion and capable of safe and efficient building demolition **.** In this question, the data shows that majority of the respondents answered agree by recording the highest frequency of 97. Based on the average index analysis (mean), the point was 3.906 which are located in between $3.50 \leq$ average index (I) < 4.50 that represent agree. This results show that majority of the residential agree towards the implementation of GBI components in new housing project.

Research shows that even though from conventional building achieving GBI "certified" level comes with a costs, there is also a sufficient evidence that implementation of sustainable building will make a good business (Taylor, 2011). Consequently, the residential being asked on their perception towards assurances from the government, public agencies, developer and contractor are important to ensure the customers getting the best from minimum requirement of GBI housing projects based on what they are paying for. The data shows that most of the residential answered agree by scoring the highest frequency of 106. Based on the average index analysis (mean), the point was 4.121 which are located in between $3.50 \leq$ average index (I) < 4.50 that represent agree. The residential confidence to spend extra money for building such as houses that emphasizes GBI components will be increased once there are assurances of the quality and benefits from the government, public agencies, developer and contractor.

Finally, the resident were asked about their thought towards expenses on GBI houses when knowing clearly its advantages, policy, warranty and etc. Through the data being obtained shows that majority of the residential agree with this statement by recording the highest frequency by 113. In other hand, by referring to the average index analysis (mean), the point was 4.161 which are located in between $3.50 \leq$ average index (I) < 4.50 that represent agree. The support from the residential towards GBI implementation were important due to always been considered as "silent stake holder" with limited knowledge and power. If public stakeholder community becomes a needed requirement for any new proposed development, the public such as residential could gain a voice and potentially making changes for current development. Proper usage of building can ensure environmental benefits, hence education of the end users also should been included as part of Malaysia's strategy to implemented sustainability.

5. CONCLUSION

The vast majority of residential agree (3.966-average index analysis-mean) towards understanding and awareness of sustainable neighbourhood planning and design conceptual. However, the residential responded neutral (2.517- average index analysis-mean) regarding the current implementation of sustainable neighbourhood planning and design in their area. Besides that, most of the residential agree (4.027-average index analysis-mean) with statement sustainable neighbourhood were important to acquire balance and achievement between economic, social and environment. Lastly, majority of the residential agree (3.987-

average index analysis-mean) with suggestions sustainable planning and design should be implemented completely within the neighbourhood area.

In addition, the residential mostly agree (4.188 -average index analysis-mean) with the statement GBI for housing development should widely introduce and explain by the government, local authorities, CIDB and developer. In term of GBI criteria, majority of the residential ranked it based on sequence (frequency value in bracket) i) Energy efficiency (136), ii) Sustainable site planning and management (134), iii) Innovation (78), iv) Materials and resources (70), v) water efficiency (32) and lastly vi) Indoor environment quality (30). Residential responses related with the GBI accreditation towards its benefits to the community and environment shows that majority of them agree (3.960 – average index analysis-mean) with the statement. Furthermore, majority of the residential reaction was neutral (3.409 –average index analysis-mean) regarding GBI based for housing preferable compared to conventional construction.

Furthermore, the majority of the residential (customers) response was neutral (2.530-average index analysis-mean) regarding spending extra 10% from normal prices for houses that having GBI accreditation. In term of costs, GBI criteria that preferable to be included ranked as (frequency in bracket) i) Energy efficiency (131) ii) Sustainable site planning and management (130) iii) Innovation (81) iv) Materials and resources (75) and the last two (v&vi) Water efficiency and Indoor environment quality are equal (30) based on the majority responds. Besides that, majority of the residential agree (3.906-average index analysis-mean), GBI components shall be included in new housing project. Meanwhile, a vast majority of residential agrees (4.121-average index analysis-mean) with statement assurances from the government, public agencies, developer and contractor were important to ensure the customers getting the best from what they are paying for in GBI housing projects. Lastly, a large number of residential agree (4.161-average index analysis-mean) with statement that easy for them spending extra money on GBI houses when know clearly its advantages, policy, warranty and etc.

Basically, the outcome of this research can be used for future research regarding issues as construction industry acceptance and application towards sustainable neighbourhood planning and design in Kuching Sarawak, types of GBI components that preferable to be included in GBI housing project in Malaysia and also level of satisfaction of customers towards information given by contractor and supplier towards GBI components and construction. Finally, the information provided in this report can be guidance for future researchers to embark on further researches that related with sustainable neighbourhood planning and design together with Green Building Index (GBI) implementation. The use of any suggestion contained in this research can be used as rough guidelines for the direction of the next research.

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