A review on client’s perspective on selection of green building concept in construction industry

Amir Rasydan Nor Roslan¹, Nor Syamimi Samsudin², and Mazlina Zaira Mohammad¹*

¹School of Civil Engineering, College of Engineering, Universiti Teknologi MARA (UiTM) Shah Alam, 40450 Selangor, Malaysia
²Dept. of Built Environment Studies and Technology, Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, Perak Branch 32610 Seri Iskandar, Perak, Malaysia

Abstract. The growing role of sustainability in the construction industry must be considered in the entire lifecycle. Therefore, green building is an important factor in managing the cycle from its design and construction, through operation and maintenance until the demolition. Furthermore, a systematic literature review was performed. The perspective of clients is crucial since decisions made will influence the overall green design of the project. This study focused on the main criteria of current green building in construction, the advantages of the implementation of green building in the construction industry, and the selection of green building elements based on the client perspective. Most of the buildings are involved in waste reduction and use local resources. The green building should be developed due to save resources, decrease pollution and energy consumed reduction. The data collected mentioned that reluctance to adopt the new sustainable technologies is one of the client’s viewpoints in selecting green buildings compared to conventional buildings. Therefore, the discussion revealed and reviewed the data collected from the 12 previous research articles

1 Introduction

1.1 Research background

The International Panel on Climate Change (IPCC) has argued that gas emissions have a sufficient effect on the environment. Therefore, some companies are starting to cut carbon emissions to follow the recommendation from IPCC. However, green building structures and requirements are intended to improve energy quality and energy efficiency in construction activities and mitigate pollution and resources. [1]. Besides, green building practices will play a key role in making the construction industry sustainable [2]. According to the [2], he stated that the “green building practice” as a process of building and facilities in such a way as to mitigate resource use, reduce negative environmental effects and create safer conditions for occupants. Other than that, [3] noted that green buildings, often referred
to as those with naturally ventilated capacities, i.e. low-energy or free-run buildings, are vital to the future of scenarios for research construction and conservation of the environment. Studies have shown that green buildings minimise energy costs by about 30% of conventional buildings[4]. Green buildings are built to be safe for the environment and cost-effective. However, their start-up costs may be 1 percent to 5 percent greater than conventional buildings. [5] said that people contend that a green building increases the efficiency of the indoor atmosphere and improves the productivity of residents compared to conventional buildings. Research studies conclude that green buildings, primarily in the form of efficiency changes that can be converted into financial gains, would become widespread once their benefits for people are confirmed[6]. Therefore, this study aimed to focus on a review on client perspective on selection of green building concept in construction industry.

1.2 What is the client’s perspective on green building concept?

Many developers see the design of an environmentally sustainable building and adherence to the GBI (Green Building Index) standards as too expensive. As we all know, technological developments are expensive, as are environmentally friendly construction materials and the schedule and employees it takes to build a fully green building. Developers stuck in the simple terms gain mentality see faster and cheaper growth as the quickest way to profit and are unwilling to change their way of thinking and go the additional distance for green construction given government incentives. Knowledge of the standards for green products and sustainable design structures introduced in green buildings is still insufficient. Developers are required to involve green products and building systems consultants at a higher charge. Due to inadequate knowledge regarding green buildings, the probability of developers losing their certificates in green buildings. It may also incur an additional cost by correcting the structures or systems that do not comply with the required standards of green buildings. If there is no fair between contractor and clients about the distribution of benefits can be difficult to persuade the developer to establish the green concept. Developers must fork out the high price of green buildings, while residents enjoy almost all the green building benefits such as improved quality of the indoor environment and cost reductions in electricity and water. Moreover, the additional costs caused by the green building cannot be easily translated to the tenants [5]. According to [6], the widespread growth of green building and green construction is also delayed due to low levels of innovations among construction professionals such as architects, engineers, and contractors. So, the probability to create and maintain the current practices and resist changes will be decreased. Furthermore, there are a few challenges or problems with green building materials and products. The developers or users unfamiliar with green products will lead to a lack of confidence in the unproven nature of green products and materials. Next, the restricted availability of green products from the market and the increase of high prices that has been sold to the buyer to get green products where both will be added to the additional problems towards the green building [4]. The other problems identified in this research included the recovery of long-term period savings not reflected in the structure of the maintenance fee. It is an insufficient integrated work between all buildings and developers [4]. Other than that, lack of expressed interest from all parties is the main serious problem in the construction industry. This can be correlated to the high initial cost of implementing the green building that takes down the interesting things in the interest of the related parties in the construction. There are a few research questions that have been identified associated with this scope. Firstly, what are the main criteria for green building in the current construction industry? Secondly, does the implementation of the green building provide benefits to the surrounding? Thirdly, what are the main selection as clients based
on their perspectives on green building?. In response to these questions, this systematic literature reviewed the main criteria on current green building in construction, the advantages of implementation of green building in the construction industry and the selection of green building elements based on the client perspective.

2 Methodology

2.1 Framework of research methodology

Figure 1 shows the framework of the research methodology that be implemented in this report. Therefore, a review of client perspectives on the selection of green building concepts in the construction industry was determined based on the strategy of research to achieve three research questions as below.

Fig. 1. The framework of review process

Firstly, search Strategy Phase. A systematic search was conducted to identify relevant articles published that are commonly in Construction Industry. The large database used was Scopus and Web of Science. All the keywords that were filtered were more focusing on Green Building Concept in Construction Industry. The details of the search strategy with keywords including “civil engineering”, “green building”, “green construction”, and “Sustainable Construction”. The publication year was selected from 2016 to 2021, and all the articles were selected as open access while the document type was articles.
Secondly, Inclusion and Exclusion Criteria Phase. We included studies that satisfied the common areas that related to the research question. Then, the articles will be check whether they completely or partially meet the inclusion criteria or exclusion criteria. Studies were included based on the satisfied the following criteria: (1) the main criteria on current green building in construction; (2) the advantages on implementation of green building in the construction industry; (3) the selection of green building elements based on the client perspective.

Thirdly, Selection and Data Extraction Phase. After removing duplicates, all titles and abstracts were screened to identify the research that met the inclusion and exclusion criteria. Therefore, the selection of the articles was determined separately. Then, the comparability was checked by content reviewing a random sample from included and excluded articles. The exclusion articles were removed while the included articles were assessed where any differences or consensus were discussed. The data and information were gathered as well based on the three research questions. Therefore, the result of the articles is presented in Figure 2 based on a flowchart formed

3 Result and discussion

This paper has studied and performed a systematic literature review where the screening process was conducted, including three stages. The first stage was electronic searches in the web of science and Scopus. The second stage was briefing the articles' review titles and abstracts to filter the irrelevant articles, and the third stage was the content review of relevant articles. The Mixed Methods Appraisal Tool (MMAT) is a critical appraisal tool designed for the appraisal stage of the systematic mixed studies reviews, especially reviews that include qualitative, quantitative, and mixed-method studies[7]. Based on the screening result, 12 papers have been determined. This study also covers two types of clients, including the private and public sectors, where more focused on sustainable building development.

3.1 What are the main criteria for green building in the current construction industry?

There a few studies reviewed the related criteria of green building in the current industry. In the study from the Architecture, Engineering and Construction (AEC) industry, most of the buildings involved waste reduction and local resources. We found that a good environment can be achieved if the waste decreases and the waste is in the right place. As a consequence of feedback and openness for participants and the community, these criteria will lead to continuous progress. The use of local resources, such as materials or labour, helps to reduce transportation and to export costs[8]. The studies also varied criteria in terms of water, energy and materials. Net positive water and net-positive energy are both criteria in a green building used in those studies. According to the International Living Future Institute, all of the water required must be obtained either by collecting rainwater and any other natural closed-cycle water or by recycling the water that has been used in the building. Water should be filtered appropriately without the use of any chemicals. It is found that water from stormwater such as grey and black should enter the infiltration process where its will is treated and managed to produce a high quality of water. Net positive energy where energy efficiency focused on the design criteria by reducing overall energy needs such as building orientation. The research also found that all the built environment materials are replenishable and have zero bad impact on human and ecosystem health. Therefore, a few names of chemicals and materials that needed to be filtered before using it, including asbestos, cadmium, and others. In this case study, materials are fully durable and require
minimum maintenance for the construction of the building.[9]. It is also found one case study in Klang Valley where the survey was conducted through 100 questionnaires that were shared with the public in public hospital buildings and private hospital buildings. This study was conducted to develop a Quality Function Deployment concept that commonly focused on green hospital design. Therefore, the data collected indicate that safety design is the most highly regarded criteria in both hospitals. The criteria of increasing natural light and limiting the disruption from stormwater were rated as the least important to them [10].

3.2 Does the implementation of the green building provide benefits to the surrounding?

The implementation of the green building provides advantages to the consumer and surroundings that are totally supported by the result from previous research articles. The previous research studies from China described that green building should be developed due to a sustainable development strategy to save resources, decrease pollution, and reduce energy consumption [11]. Three studies from [12]–[14] defined that the green building can reduce the consumption of energy or reduction in electricity usage can be categorised as their advantages. However, two studies from [13], [14] also said that reducing resources in construction corresponds directly with the utility bill savings. It is agreed that energy and resources reduction are the highest advantages when someone applies green design concept in their construction. One of the studies conducted in Egypt where green design can removing the carbon dioxide and other gases while producing a good oxygen indoors and outdoors[9]. The plants in the public areas or surrounding the green building are the biological wastewater treatment system that processes the change of carbon dioxide to good oxygen in order to keep maintaining health in great condition. In this context, it is acknowledged that plants will undergo process photosynthesis around the building that provides good air in the form of good oxygen to the consumer surrounding. According to the studies [15], economic interest will increase due to integrating green building upstream and downstream industry chain stability. Therefore, the grown industrial chain will lead to formation of scale benefits green building industry. Thus, the incremental economic increased. Next, the survey studies from [10] described green building will provide natural ventilation, building orientation and increase healing environment. Other than that, green building very interesting due to decrease of toxic materials in construction industry. The green building also provide advantages by lowering material wastage and improved hauling during construction due to better project definition, lowering the cost and environmental impact of construction[13]. Lastly, it’s had been discussed those green buildings are great in providing benefits to the consumers or developers in the construction industry.

3.3 What are the main selection for clients based on their perspectives on green building?

The clients or developers commitment is the top priority that holds decisive power in the green building industry. They are the main role in producing or creating the accurate green design based on their perspectives. However, a few results from the studies show the selection of green building based on the view of point as a client during or after the construction. It was a study from China [16] by interviewing the clients or consumers from the public and private sector who were experienced in green housing construction and green housing transition. The clients said about the significant cost issues involved in the implementation of green housing development. Those cost issues happened in different stages, especially in the early stage, by mentioning specifics concerns such as material procurement, technologies or equipment, and green building label application. Therefore, it
was agreed that most of the clients were more concerned about cost economic when viewing the concept of green buildings. Next, the client’s view stated that they did not gain any advantages, especially monetary profits, without clearly seeing which parts of given benefits were achieved by adding green design on building[16]. Two studies estimated that the developers' lack of public acceptance of green building because of the low level of demands from the consumer[16], [17]. The developers or clients were adopting a ‘wait-and-watch mentality toward implementation in the construction industry[16]. According to members from the client and contractor groups, the absence of owner motivation is why so many design innovations fail after post-occupancy[18]. The owner or clients representatives interviewed partly accepted these criticisms but pointed out that they are unfamiliar with green operations due to their unrelated backgrounds[18]. The research studies from [17] in Cambodia were the empirical questionnaire survey sent to local construction experts to assess their depth of knowledge and understanding regarding the green building. The data collected mentioned that reluctance to adopt the new sustainable technologies is one of the client’s viewpoint in selecting green building compared to conventional building. For Malaysia, [19] revealed that clients highlighted a willingness to have material tested to make sure the material in fully green. The clients view on that point due to the manufacture of green products in Malaysia are totally young industry. Therefore, many green products are imported from others contry. Next, it was found that clients or developers frequently provide weak or partial definitions of expectations before the design and building of facilities begins[10]. Most of them commented about the quality issues, which are costly to fix it. In other circumstances, even when costs and specifications are satisfied, unexpected changes in expectations occur where the originally will defined. Lastly, it was concluded that the view of point in clients should be repaired in the side of positive things rather than negative things for the great future in order to become a developed country.

4 Conclusion and future perspective

Green Building practice is a process of building and facilities in such a way as to mitigate resource use, reduce negative environmental effects and create safer conditions for occupants [2]. The paper presented a systematic literature review. Paper from 2016 to 2021 where Client Perspective on Selection of Green Building Concept in Construction Industry were searched. This review research has revealed a few main criteria of the green building that the consumers have considered in the current industry where the waste reduction and use of local resources is the most priority. This paper also mentions the benefits of the green building that has been implemented. Most of the result shown in the discussion has totally made us gain more knowledge to apply it in our construction. In another context, the green building will give benefits by saving resources, decreasing pollution, and energy consumed reduction. However, this paper also provides the result main selection of green buildings based on the client’s perspective. The clients said about the significant cost issues that are involved in the implementation of green housing development. The clients or developers is the main priority when considering the implementation of green design. Therefore, this paper provides a review of the client perspective on selecting green building concepts to make future research use it as a reference to decide whether they should implement this kind of green design for the future. Future researchers can also analyse and examine this topic by suggesting green products to others that will fill the holes and limitations. Lastly, by all the counts and with proven results, it is no wonder that Abraham Lincoln was considered by many as America's first "green president". It has been introduced the green revolution since the 1960s.

There are a few of the future perspectives of green building implementation in the construction industry. Firstly, the government should provide initiatives to assist clients or
developers in developing green design in construction buildings, such as giving a bonus to the green developers. Secondly, the manufacturers should produce more green materials or items related to green buildings with affordable prices.

References

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