Recent Trends in Civil Engineering and Built Environment Vol. 4 No. 3 (2023) 447-456

RTCEBE

Homepage: http://publisher.uthm.edu.my/periodicals/index.php/rtcebe
e-ISSN :2773-5184

Study on the Challenges Factors in Implementing the Concept of Green Building in Wilayah Persekutuan Putrajaya

Fatin Nursyahira Bani[1], Sasitharan Nagapan[1]*

[1]Faculty of Civil Engineering and Built Environment,
Universiti Tun Hussein Onn Malaysia, Batu Pahat, 86400, MALAYSIA

* Associate Professor, Faculty of Civil Engineering and Built Environment,
Universiti Tun Hussein Onn Malaysia

DOI: https://doi.org/10.30880/rtcebe.2023.04.03.048
Received 06 January 2022; Accepted 15 May 2023; Available online 31 December 2023

Abstract: Concept of green building has been adapted to buildings in the Malaysian construction industries but there are many challenging issues in implementing green building projects in Malaysia. Therefore, the aim of this study is to identify the challenges factors in implementing the green building and to determine method to overcome in Malaysia. The research is using quantitative approach. The data has been collected using questionnaire survey. The questionnaires are distributed to 152 contractors in Wilayah Persekutuan Putrajaya. Respondents who successfully fill in the questionnaire was 63 contractors out of 152 of the targets. Response rate for the questionnaire was 41% only. The SPSS version 26 has been used to analyze the data acquired for this research. This study reveals and determine the challenges factors of practicing green building concept in construction industry. The collected data were analyzed using mean score and ranking methods. The three main challenge factors determined from the analysis were 'High construction costs' (mean score = 4.86), 'Unwillingness to pay additional costs' (mean score = 4.86) and 'Limited availability of new technologies' (mean score = 4.79). The top three methods to overcoming the challenges factors are 'Green building contractors receive financial support' (mean score = 4.83), 'Government needs to publish information and benefits on green building to generate market demand' (mean score = 4.83) and 'Get training and activities for more knowledge and abilities' (mean score = 4.76). Finally, this study able to create awareness amongst construction practitioners to enhance understanding about the challenges factors and the methods to overcomes the green building in construction industry.

Keywords: Green Building, Challenges Factors, Contractors, SPSS

**Corresponding author: sasitharan@uthm.edu.my*

1. Introduction

Malaysia's population is expected to increase from 25.2 million people in 2010 to 30.0 million by 2020. As a result, more people are migrating to metropolitan areas, and more energy will be required in the future. Green construction provides enormous potential for the country's development. Industries that are interested in and grow items connected to green technology might help local communities. Green building is a technique of construction that employs ecologically friendly procedures and maximizes resource use throughout the building's life cycle. It covers everything from the initial concept through the construction phase, as well as service, maintenance, rehabilitation, and demolition, as well as building materials selection and placement. Malaysia has had green buildings since 2005. This achievement is essential to encourage more property developers to be environmentally conscious and aware of the importance of sustainability. Eco-friendly building gives a greater advantage than typical dwellings. It also has the ability to look after the community [1]. Malaysia's Jasin Hospital achieved the highest grade (Platinum) in the US Green Building Council's Leadership in Energy and Environmental Design (LEED) accreditation (USGBC). Several green structures have been classified as silver, gold, or platinum. This knowledge needs to be shifted in an organized organization to a caring awareness in the area of green building. The government will continue to encourage developers to construct structures that meet GBI requirements. Through a range of events, the government will enhance community awareness of green technologies and green buildings. Malaysian [2]. The number of GBI-certified green buildings continues to rise year after year [3].

Contractors' primary worry in implementing the green building concept is the rise in value for contractors in Malaysia. This is due to factors such as excessive costs, lack of knowledge, materials, and technology, and lack of demand. The concern here is whether or not the contractor truly comprehends the notion of green construction. In the field of green building technology, Malaysian contractors lack the necessary skills, capacity, professional knowledge, and technology [4]. Effective and affordable energy consumption in a green building refers to the capacity to use sunshine as a lighting agent during the day and to limit the need of electricity-powered lights. Throughout the last three decades, Malaysia, like other governments, has played a critical part in promoting the importance of energy efficiency through a variety of efforts that include incentives, educational, and subsidies [5]. The level of knowledge and awareness among contractors impacts the use of green buildings in Malaysia. Contractors, on the other hand, have been resistant to green building applications due to high construction costs as a result of the market's poor demand for green buildings. It is one of the challenges to green building implementation in Malaysia [6]. As a result, demand for green buildings is decreasing, resulting in the continuation of Malaysia's environmental problems. Green technology refers to the creation of buildings in a way that is both environmentally friendly and economically beneficial. It is critical for all companies in the green building industry, including the government, to work together for mutual benefit rather than for individual gain. When coordination and integration are recognized, the expenses of running a project will be decreased, which will benefit everyone involved.

The goal of this research is to identify the challenges factors in implementing the concept of green building and to determine the ways to overcome them. The goal of this research is to look at the challenges factors in implementing the concept of green building and to figure out ways to overcome them. This study was done through a questionnaire because Malaysia is currently hit by the covid-19 epidemic. Wilayah Persekutuan Putrajaya has been chosen as the focus of this research. As a result, contractors in the Wilayah Persekutuan Putrajaya who have been registered with CIDB were selected in response. This study was done through a questionnaire because Malaysia is currently hit by the covid-19 epidemic. Wilayah Persekutuan Putrajaya has been chosen as the focus of this research. As a result, contractors in the Wilayah Persekutuan Putrajaya who have been registered with CIDB were selected in response.

2. Research Methodology

The term "research methodology" refers to the methods used to obtain information relevant to the study or to satisfy all of the study's requirements. The main topics include research design, samples, instruments, and data collection and analysis methods. In particular, study design can be approached in a variety of different ways, whether qualitative, quantitative, or mixed methodologies are used [7]. A

descriptive method and a quantitative approach are used in this study. Descriptive approaches, which entail explaining or displaying "the data obtained to determine which independent variables," can be widely used to evaluate data [8]. As a result, quantitative approaches will be used in this study to quantify data and infer evidence from the findings. Quantitative approaches rely on statistical analysis to draw conclusions or test hypotheses results of statistical evidence.

2.1 Sample of Study and Data Collection

The term population refers to a comprehensive group of people or objects to share similar interests and characteristics [9]. A sample is a selection of a population selected by researchers to be representative of a larger population. Due to time and cost constraints, it will be difficult to collect and study massive amounts of data if the researcher focuses solely on respondents from the entire population [10]. A sample, of a population chosen by researchers to be typical of a broader population. In this study, the research population is mainly contractors in Wilayah Persekutuan Putrajaya registered with CIDB. According to Krejcie and Morgan,152 contractors were included in the study's sample size. In addition, non-probability sampling approaches have been used in this study, which rely on sample facilities to select persons who are randomly available and easily accessible respondents from the population.

The research methodology is determined by planning the overall journey of the study from the beginning to the findings of the study results. The methodological level planning of this study is planning in terms of data collection, research approach, determination of research techniques and analytical techniques to be conducted. The approach of this study is an approach in terms of Case Studies. For data collection, study techniques and analysis techniques were determined. The research technique determined was the use of the questionnaire. Google Forms are used to develop online surveys and distributed to contractors in Wilayah Persekutuan Putrajaya using internet platforms such as phone calls, WhatsApp, and email to features that will make respondent data. The process of completing an online survey is significantly less than if it were distributed directly on a website [11]. Due to the current coronavirus pandemic afflicting the country, the time it takes to complete an online survey is substantially less than it would be if it were distributed directly on a website. The researcher monitors the online survey during the data collection process to ensure that the number of respondents who have completed the questionnaire has reached the necessary amount. The questionnaires' content was divided into three sections, which were related to the challenges factors in implementing the concept of green building among contractors.

2.2 Research Instrument

Investigation instrumentation refers to the assessment method developed to collect data on specific issues of interest in this study [12]. As previously indicated, quantitative research approaches were used in this study. In order to establish the study's eligibility, a survey questionnaire was employed as the primary source of data from the respondents. A Likert Scale to assign relevant questions in the survey questionnaire form. In general, the questionnaire was divided into three sections: section A, section B, and section C. The elements of the questionnaire survey form are as follows: Section A - Respondent’s background, Section B - To identify challenges factors in implementing the concept of green building, Section C - To determine methods in overcoming the challenges factors in implementing the concept of green building.

2.3 Data Analysis

Data analysis is done after data collection is carried out. From the planning of data analysis techniques, the production of analysis is implemented. For the analytical techniques used, the first technique is the Checklist Technique. A variety of software packages and tools, including Stata, R, and SPSS, were used to analyses quantitative data [13]. SPSS version 26 was used to analyses the data collected for this study. SPSS is widely used for academic and research purposes, and it can generate a wide range of data because this research study's demographic composition includes descriptive statistics such as frequency, percentage, and mean, descriptive statistics were used in this study [14] [15]. This

analysis can help summaries and explain the data by making it easy to understand and interpret [16]. An inferential analysis has also been used to examine this research study since it is concerned with the discovery of the relationship between the challenges of green construction and the development of green building concepts.

2.3.1 Reliability Test and Validity Test

A pilot study contributes to the refinement of data collecting strategies, both in terms of the data content and the technique to be followed. Cronbach's alpha is a measure of reliability, or how closely a collection of items is connected to one another. A high alpha value does not mean that the measure is one-dimensional. Additional analysis, in addition to checking for internal consistency, can be performed if you want to show proof that the scale in question is one dimensional. The rule of thumb for interpreting alpha for dichotomous questions in this study. The Cronbach's alpha calculated via SPSS is similar to that calculated manually. A Cronbach's Alpha value of 0.701 is categorized as an acceptable internal consistency.

On the other hand, a pilot study contributes to the refinement of data collecting strategies, both in terms of the data content and the technique to be followed. The purpose of a pilot study was to ensure that the research asked the proper questions about the study's objectives. After receiving feedback from respondents, the questions were analyzed, and improvements were made in accordance with the recommendations. Furthermore, it can improve the study's validity and the reliability.

2.3.2 Descriptive Statistic

Descriptive statistics, in other terms, were statistical representations of what was presented or what the data exposed in an understandable manner in a quantitative research study. The demographic composition of this research study includes descriptive statistics such as frequency, percentage, mean, median, mode, and standard deviation, descriptive statistics been used in this study (Kenton, 2019). The mean index, which is the descriptive statistical approach used to analyze the data. Various mean index ranges that score based on the data obtained will fall into various levels of agreement suited to the scale of the study.

3. Results and Analysis

The results and analysis from data collection in order to meet the research objectives of identifying the challenges factors in implementing the green building concept among contractors and determining methods for overcoming the challenges factors in implementing the green building concept. The survey of 152 contractors in Wilayah Persekutuan Putrajaya, Malaysia who were given questionnaires forms. Response rate for the questionnaire was 41% only. This is due to the pandemic that hit Malaysia causing many companies have to close down and cannot be contacted. The formula for calculating response rates, is to divide the number of useable replies returned by the total number of eligible in the sample chosen [17]. The formula for calculating response rate is as follows:

Response Rate = N of respondents / $\sum$ questionnaire distributed x 100%

Response rate = $63/152 \times 100\% = 41.44\% \approx 41\%$

3.1 Frequency and descriptive analysis

Quantitative test was used to analyze the data. For most issues, quantitative analysis involves numerical analysis, and SPSS software was used to examine the data. This analysis' findings are reported as frequency, percentage, and mean. Pie charts and bar graphs were used to display the research' findings.

3.1.1 Section A: Respondent's background

In this research, all the questionnaires were given to contractor in Wilayah Persekutuan Putrajaya using online survey. A total of 63 out of 152 questionnaires were collected at the end of the data collection.

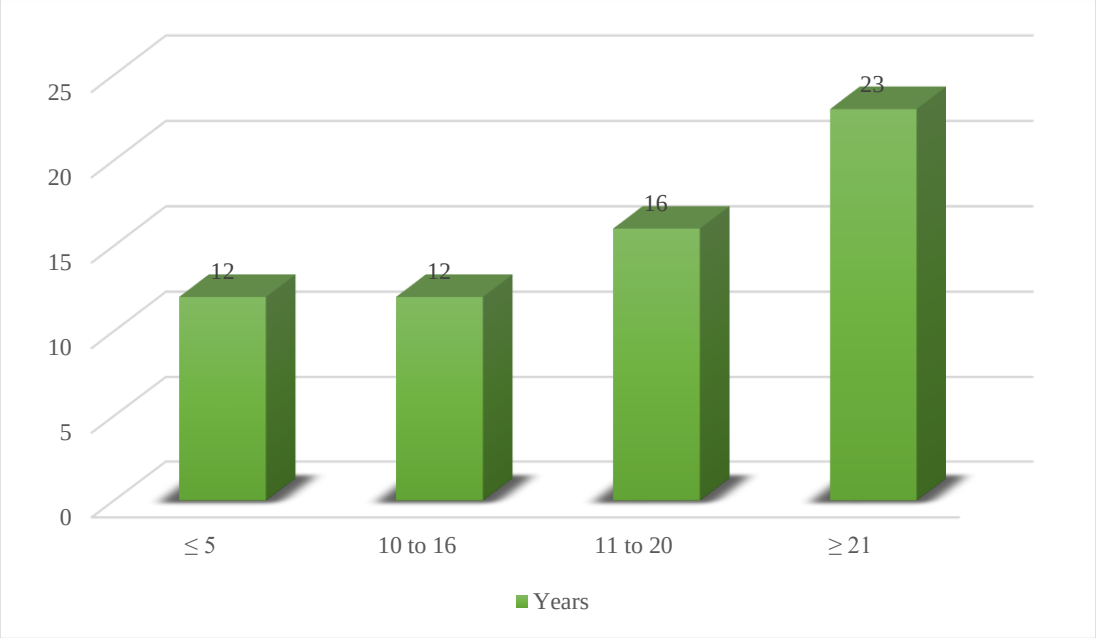

Figure 1: Number of respondent's company have been established

Figure 1 shows the number of years that contractor's company have been established in Wilayah Persekutuan Putrajaya. The graph above shows that majority of the contractor's companies have been established for more than 21 years and only 16 companies have been established from 11 to 20 years. Based on the bar chart above can also be seen less than 5 years and years 11 to 20 years have approximately the same number of 12 companies.

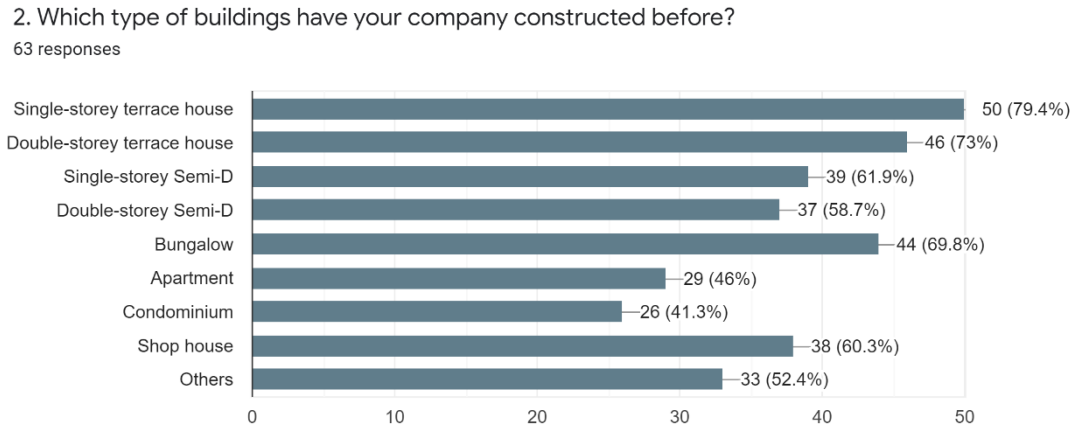

Figure 2: Number of the type of buildings have been respondent's company constructed

Figure 2 depicts the many sorts of buildings that the respondent company has previously constructed. The survey was completed by 63 contractors out of a total of 152. With 50 responses, single-story terrace houses were the most popular choice among the 63 responses, representing for the majority of the total. Following that, the two-story terrace house received 46 responses, indicating the responder company's second highest building type. As a result, the majority of contractor firms specialize in the building of one-storey and two-story terrace houses. According to the survey results, all responders representing 152 contractor businesses in the Federal Territory of Putrajaya had previously constructed green buildings.

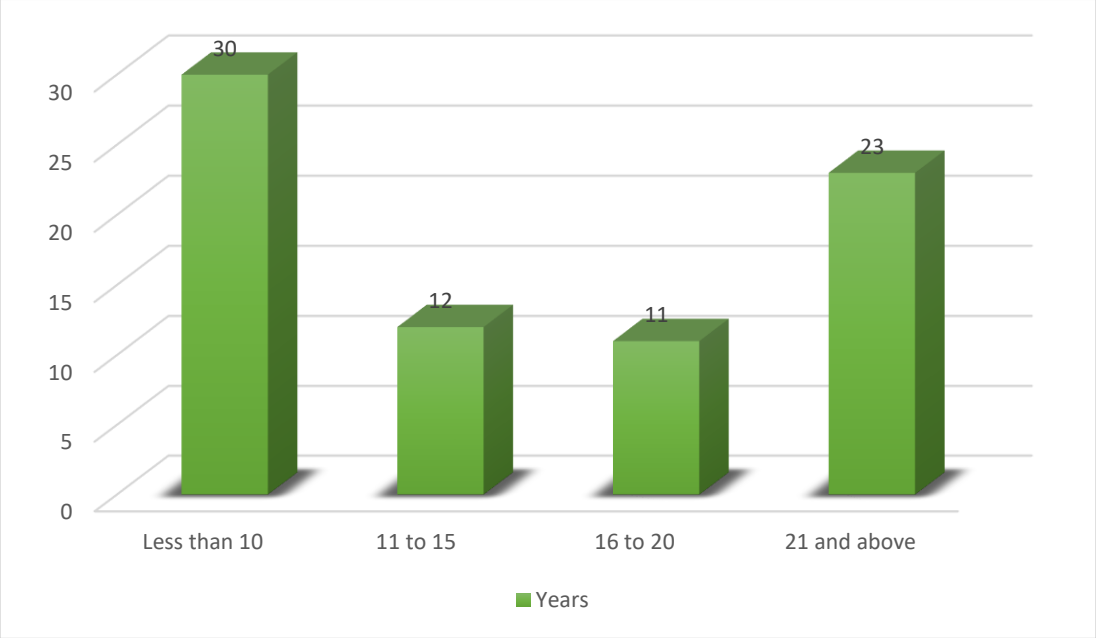

Figure 3: Number of respondent's company registered as G7 contractor

As for Figure 3, shows the number of respondent's company registered as G7 contractor in Wilayah Persekutuan Putrajaya. The graph above shows that majority of the contractor's companies have been registered as G7 contractors for less than 10 years which is 30 companies. 21 years and above recorded the second highest value of 23 companies have been registered. Total of 12 contractor's companies have been registered as G7 contractors between 11 to 15 years and 16 to 20 years where 23 companies have been registered.

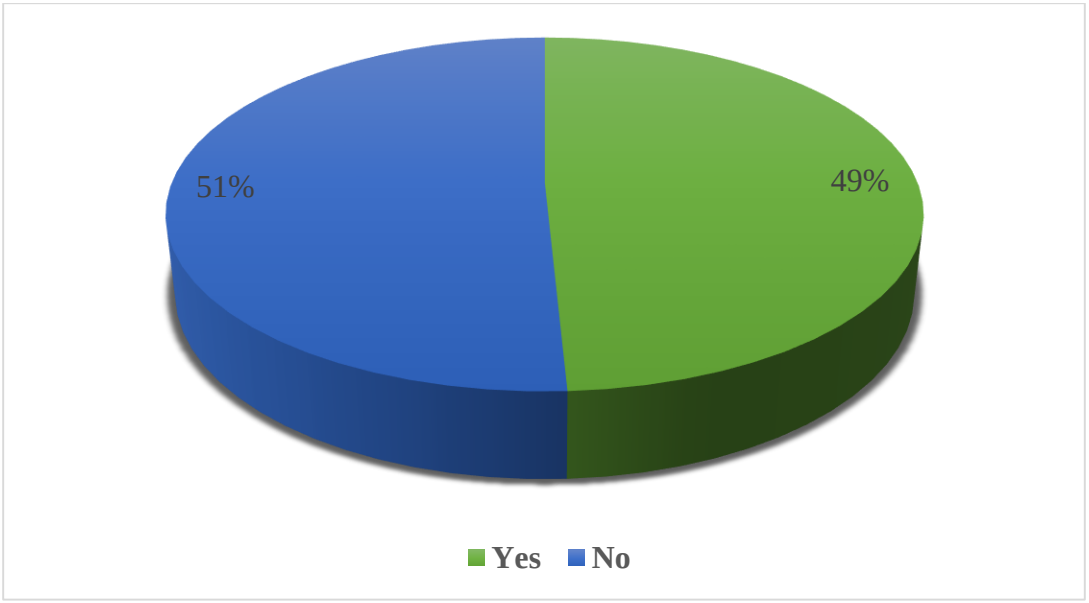

Figure 4: Number of respondent's company have been constructed green buildings

Figure 4 shows the companies that have been constructed green building. Results of the questionnaires shows that 51% of contractors in Wilayah Persekutuan Putrajaya have been construct green buildings. In other hand, only 49% of contractors have built green buildings throughout the time the company has been established.

3.1.2 Section B: To identify challenges factors in implementing the concept of green building.

This section is important to help the researcher in achieving the first objective of the study which is to identify challenges factors in implementing the concept of green building. The Likert Scale are used to set the related questions in the questionnaires.

Table 1: Descriptive Statistics for Challenges Factors in Implementing the Concept of Green Building

No.	Challenges Factors	Frequencies analysis					Mean	Level of agreement
		1	2	3	4	5		
i	Lack of awareness	0	2	7	24	30	4.29	Agree
		0.0%	3.2%	11.1%	39.7%	46.0%		
ii	Lack of encouragement from government	0	1	5	22	35	4.44	Agree
		0.0%	1.6%	7.9%	34.9%	55.6%		
iii	Lack of incentives from government	0	0	3	9	51	4.76	Strongly Agree
		0.0%	0.0%	4.8%	14.3%	81.0%		
iv	Poor access to information	0	1	6	26	30	4.35	Agree
		0.0%	1.6%	9.5%	41.3%	47.6%		
v	High construction costs	0	0	0	9	54	4.86	Strongly Agree
		0.0%	0.0%	0.0%	14.3%	85.7%		
vi	Unwillingness to pay additional costs	0	0	1	7	55	4.86	Strongly Agree
		0.0%	0.0%	1.6%	11.1%	87.3%		
vii	Low costumers demand	0	1	2	11	49	4.71	Strongly Agree
		0.0%	1.6%	3.2%	17.5%	77.8%		
viii	Limited availability of new technology	0	0	2	9	52	4.79	Strongly Agree
		0.0%	0.0%	3.2%	14.3%	82.5%		
ix	Limited access to green building	0	0	3	18	42	4.62	Strongly Agree
		0.0%	0.0%	4.8%	28.6%	66.7%		
x	Lack of workers that have green construction knowledge	0	0	5	20	38	4.52	Strongly Agree
		0.0%	0.0%	7.9%	31.7%	60.3%		
xi	Lack of workers that have green construction experience	0	0	2	10	51	4.78	Strongly Agree
		0.0%	0.0%	3.2%	15.9%	81.0%		

According to the calculation of the mean, contractors in Wilayah Persekutuan Putrajaya strongly agree that Lack of encouragement from government (4.4), Poor access to information (4.35), and Lack of awareness (4.29). Most of the respondents strongly agree with the High construction costs (4.86), Unwillingness to pay additional cost (4.86), Limited availability of new technology (4.79), Lack of workers that have green construction experience (4.78) Lack of incentives from government (4.76), Low costumers demand (4.71), Limited access to green building (4.62), Lack of workers that have green construction knowledge (4.52) were the challenges factors in implementing the concept of green building. The three main challenge factors determined from the analysis were ‘High construction costs’, ‘Unwillingness to pay additional costs’ and ‘Limited availability of new technologies’.

3.1.3 Section C: To determine methods in overcoming the challenges factors in implementing the concept of green building.

This section is important to analyzed and achieving the second objective of the study the methods in overcoming the challenges factors in implementing the concept of green building among the contractors especially in Wilayah Persekutuan Putrajaya.

Table 2: Descriptive Statistics for Method to Overcoming the Challenges Factors in Implementing the Concept of Green Building

No.	Challenges Factors	Frequencies analysis					Mean	Level of agreement
		1	2	3	4	5		
i	Green building contactors receive financial support	0	0	0	11	52	4.78	Strongly Agree
		0.0%	0.0%	0.0%	17.5%	82.5%		
ii	Get trainings and activities for more knowledge and abilities	0	0	0	15	48	4.76	Strongly Agree
		0.0%	0.0%	0.0%	23.8%	76.2%		
iii	Government encouragement in green building development	0	0	0	15	48	4.76	Strongly Agree
		0.0%	0.0%	0.0%	23.8%	76.2%		
iv	Government needs to publish the information and beneficial regarding green building to arise the market demand.	0	0	0	11	52	4.78	Strongly Agree
		0.0%	0.0%	0.0%	17.5%	82.5%		

Contractors in Wilayah Persekutuan Putrajaya strongly agree that green building contractors receive financial support (4.83), get trainings and activities for more knowledge and abilities (4.76), government encouragement in green building development (4.76), and government needs to publish the information, and beneficial regarding green building to arise the market demand (4.83) were the method to overcoming challenges factors in implementing the concept of green building. 'Green building contractors receive financial support' 'Government needs to publish information and benefits on green building to generate market demand' and 'Get training and activities for more knowledge and abilities' are the top three methods to overcoming the challenges factors. Therefore, most contractors are of the opinion that if all methods are implemented, the concept of green building construction in the Wilayah Persekutuan Putrajaya will increase for the next 10 years.

4. Conclusion

The conclusion reached is based on the study objectives' which are the challenging factors in implementing the green building concept and the method to overcome the challenge factors in Malaysia. Additional study on the challenge factors and methods for implementing the concept of green building in Malaysia may be undertaken more readily. The first objective of this study is to identify challenges in implementing the green building concept among contractors, and the second objective is to achieve methods in overcoming the challenges in implementing the green building concept among contractors in Wilayah Persekutuan Putrajaya. Both objectives must be met for the research to be completed. The green building concept poses a significant challenge for contractors in the Wilayah Persekutuan Putrajaya. Most of the respondents strongly agree with the High construction costs, Unwillingness to pay additional cost, and Lack of workers that have green construction experience. This is because several respondents agreed with all of the survey's challenge factors elements. The second objective is to identify the method to overcoming challenges factors in implementing the concept of green building. This objective was achieved through the analysis of data collected in the questionnaires survey forms that were sent out to contractors in Wilayah Persekutuan Putrajaya. According to the results from the questionnaires, a lot of method can overcome the challenge factors in implementing the concept of green building.

Acknowledgement

The authors would also like to thank the Faculty of Civil Engineering and Built Environmental, UniversitiTun Hussein Onn Malaysia for its support.

References

[1] KeTHHA (2018). Objektif Dasar Teknologi Hijau Negara. Retrieved on April 19, 2018, from http://www.kettha.gov.myAckoff, R. (1953). The Design of Social Research. Chicago: University of Chicago Press.

[2] Afiq Mohd Shah (2021, June 11). Hospital Jasin terima Anugerah Bangunan Hijau platinum, Utusan. Retrieved on May 25, 2021, from https://utusantv.com/2021/06/11/hospital-jasin-terima-anugerah-bangunan-hijau-platinum/

[3] Dass, F., (2013, November 27). Green building fever fast spreading in Malaysia. The New Straits Time Press (Malaysia). Retrieved from http://www.greenbuildingindex.org/

[4] Sim, Y.L., & Putuhena, F.J. (2015). Green building technology initiatives to achieve construction quality and environmental sustainability in the construction industry in Malaysia. Management of Environmental Quality: An International Journal, 26, 233-249.

[5] Dr Iskandar Hasan Tan Abdullah (2015, March 13). Teknologi Hijau Tingkat Kualiti Hidup, Pacu Ekonomi Negara, Berita Harian. Retrieved on May 13, 2021, from https://bit.ly/3g1iPkR

[6] Abidin, N. Z., Yusof, N., & Awang, H. (2012). A foresight into green housing industry in Malaysia. International Journal of Mechanical and Industrial Engineering, 6(7), 373-381.

[7] Grover, V. (2015). Research Approach: An overview.

[8] McCombes, S. (2019, May 15). Descriptive Research Design | Definition Method and examples.Retrieved from Scribbr Web site:https://www.scribbr.com/methodology/descriptive-research/

[9] Bhandari, P. (2020, May). Population vs sample: What's the difference? Retrieved from Scribbr Web site: https://www.scribbr.com/methodology/population-vs-sample/

[10] Beth Dawson, R. G. (2004). Basic and Clinical Biostatistics. Mcgraw-Hill

[11] Howard, C. (2019, August). Advantages and Disadvantages of Online Surveys. Retrieved from Cvent Web site: https://www.cvent.com/en/blog/events/advantages-disadvantages-online-surveys

[12] Connect, E. (2018, October 29). In CINAHL, What is Research Instrument. Retrieved from Ebsco Connect Web site: https://connect.ebsco.com/s/article/In-CINAHL-what-are-Research-Instruments?language=en_US

[13] Sewall, A. (2019, December). Stata vs. R vs. SPSS for Data Analysis. Retrieved from Publish Illinois Web site: http://publish.illinois.edu/commonsknowledge/2019/12/05/stata-vs-r-vs-spss-for-data-analysis/

[14] Arkkelin, D. (2014). Using SPSS to Understand Research and Data Analysis. ValpoScholar Publisher.

[15] Kenton, W. (2019, June). Descriptive Statistics. Retrieved from Investopedia Web site: http://investopedia.com/terms/d/descriptive_statistics.asp

[16] Zikmund, W. B., & Carr, J. G. (2010). Business Research Methods. Ohio, USA: South-Western Cougage Learning.

[17] Fincham, J. E. (2008). Response rates and responsiveness for surveys, standards, and the Journal. American journal of pharmaceutical education, 72(2).