

Factors Affecting Green Buildings Value: A Review

Chin Wen Ken, Ng Yee Ling, Wong Hong Ling, Nurul Arifah Zainudin, Siti Aishah Masrom, Mohd Shahril Abdul Rahman

Abstract— The concept of sustainability in real estate development has recently become one of the main concerns of the industry. As this will have an impact on market demand and supply, sustainability aspects—green building characteristics were shown to have an impact on property value. In order to confirm this, the present study examined the existing literature on factors affecting green buildings property value. Relevant literatures on the factors have been searched through academic databases. Content analysis was used to extract the attributes of green buildings and other factors affecting their value. Following the content analysis process, a conceptual framework for factors affecting the value of green buildings has been developed. This framework would provide an overview of the features of green buildings and other factors that have an impact on property values. Industry players, academics and policy makers may use this as input weather for investment, property development, further study, and policy making.

Index Terms—attributes, factors affecting, price, value, green, building, market value

1. INTRODUCTION

Property valuation can be known as the heart in the real estate industry. Valuation is the important process for the market transaction especially to value the types of property in real estate industry. Property value can be defined as the value that agreed by the seller and buyers according to the types of the property and the value of the property determined by the market value according to the demand and supply in economic theory. It may be higher or lower than the actual price depending on how the information given by the seller or buyer to buy or sell the property according to the condition of the property itself. Green building was introduced to have a sustainability development that focusing on the environment and development. There are several factors that have been reviewed in previous studies that show that there is a relationship between the value of the property and the green building. The relationship between sustainability and construction is important to the value of the property because it could have both positive and negative impacts on the development of the property market and the property market as a whole. Thus, this study aims to review on the attributes and the factors that affecting green buildings value. The remaining sections include Methods (Section 2), Findings (Section 3), Discussion (Section 4) and Conclusions and Recommendations (Section 5).

2. METHODS

In order to do that, a comprehensive search for the publications related to the factors affecting the value of green building was carried out. The databases searched include Google scholar, ScienceDirect, Scopus, Clarivate, and Crossref. For articles searching, the keywords that used were green building value, factors affecting green building value, price of green building, certificates of green building and market price green building. All data was qualitatively analyzed using content analysis. According to Krippendorff [16], content analysis is an analytical method for qualitative data. This method was chosen because all of the data collected was in the form of statements, explanations and

opinions and insights. Content analysis was used to draw conclusions from the data. These methods have also been used previously by researchers in this field of study, i.e. real estate [2], [3], [4], [5] and facility management [6], [7], [8], [9], [10], [11].

3. FINDINGS

After thorough review, literatures with redundancy, not related at all and deemed unsuitable were filtered out. There are altogether 20 journals' articles with publications related to the determinants of the green building value. The factors that influence the green building value extracted from around 20 articles which generated 24 factors in total as indicated in the following sections.

TABLE 1: FREQUENCY OF ARTICLES MENTIONING THE FACTORS THAT AFFECTING GREEN PROPERTY VALUE

No.	Factors (Author(s))	Frequency
1	Green building certification [2], [12], [13], [14], [15], [16], [17], [19], [20], [21], [22]	11
2	Green building features [13], [23]; [15], [24], [25], [19], [20], [26], [17]	9
3	Demographic Location [12], [24], [25], [20], [2], [17]	6
4	Indoor environmental quality [15], [27], [17], [28], [29], [22]	6
5	Reduction in site / source energy (energy saving) [15], [27], [2], [32], [29], [30]	6
6	Higher rental rate [25], [20], [26], [17], [20], [21]	6
7	Material Cost [12], [27], [2], [26], [31]	5
8	Eco-labeling (Green label) [16] [14], [15], [24], [28]	5
9	Green building certification level [14], [23] [2], [21]	4
10	Geographic neighbourhood [15], [27], [32], [17]	4
11	Quality of construction and material used [23], [30], [17]	3
12	Green consumerism [20], [32], [43]	3
13	Social and environmental benefits [32], [26], [29]	3
14	Corporate social responsibility [15], [27]	2
15	Government procurement policies [27], [28]	2
16	Invest Time and Cooperation [12]	1
17	Developer's profit and extra risks to deliver [23]	1
18	Size of the building [15]	1

• ¹⁻⁶Real Estate Department, Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia (UTM), Johor Bahru, Johor, Malaysia (Email - ⁶Corresponding author: mshahril.ar@utm.my)

19	Type of industry [18]	1
20	Housing purchase purpose [24]	1
21	High level of satisfaction [47]	1
22	Maintenance cost [19]	1
23	Green space [32]	1
24	Market competition and gentrification [27]	1

Based on Table 1, the factor Green Certification is supported by most of the articles among the journals found. There are 11 articles in total to support the factor of Green Certification in affecting the market value of the Green Building. Green Certification ranks the highest percentage of affecting the value of the Green Building. According to table 1, the green building features ranks the second place, supported by 9 articles in total. Based on the graphical results, the factors of demographic location, indoor environmental quality, reduction in site or energy saving and the higher rental rate share the same frequency of articles in supporting to the variable of the Green Building market value. Material cost and eco-labeling or green label is the fourth ranked percentage of agreement in affecting the property value of the green building. There are 10 articles (5 articles for each factor) in share the same point of view for influencing the property value of Green Building. The Green building certification level and the geographical neighborhood share the same frequency of articles which is 4 for each factor. Both of the factors ranked the in fifth place in terms of frequency. In addition, for the quality of construction and material use, green consumerism and social and environmental benefits, these factors rank the sixth. There are 9 articles elaborated on this factor in influencing the property price of green building with 3 articles for each factor respectively. The second least factor contribution to the value of the green buildings is the corporate social responsibility, government procurement policies and type of investors. Only 6 articles point out the factors. The factors are supported by 2 articles respectively. There are nine factors have the least contribution to the market value of green building; green building invest time and cooperation, developer's profit and extra risks to deliver, size of building, type of industry, housing purchase purpose, high level of satisfaction from the occupants, maintenance cost, green space, and market competition. The factors are supported by only one article as per the result of present study. It can be generally argued that the factors are less likely to affect the value of the green building or to have a lower impact on the value of the green property.

4. DISCUSSION

There are 15 factors affecting the value of green building quoted by at least 2 or more articles in our findings and is seen to be more influential and significant.

4.1 Green building certification

Firstly, the green building certification is the most influencing factor among the others as found in our analysis which brings a great increase in value to the green building itself. There are various bodies which provide such certification; hence it serves as a prestige and recognition of quality for the building. The 'certification' attribute has the highest frequency, meaning that the 'green building' label (See 4.8) may be the key driver of certified building rental premium [20].

4.2 Green building features

The next factor affecting the value of green buildings is the green buildings' features of [13], [23], [15], [24], [25], [19], [20], [26], [17]. There are several features or components certified under GBI. Except for solar photovoltaic, green roof and green living wall, some may not increase the value of the green building. Dastrup et al. [36] suggested that a photovoltaic solar house has a higher value than a photovoltaic solar-free house. Study by Ichihara and Cohen [37] indicated that a green-roofed apartment is rented 16.2% higher than a non-green-roofed apartment. Another factor contributing to the value increase in building is incorporation of green roof and green wall [37], [38]. The advantages of green roofing, which help mitigate the problem of storm water runoff, are also considered to improve green buildings value [37].

4.3 Demographic location

Demographic location has always been the main factor affecting property value; green building is not exceptional [12], [24], [25], [20], [2], [17]. Proximity to nearby facilities such as train station and crowd attraction areas will always affect demand for space or properties in such area which directly increases value of the property. If a certified green building stands in a good location and has a green certification, it can maintain both high occupancy rates and high sales costs.

4.4 Indoor environmental quality

The next factor is indoor environmental quality [15], [27], [17], [28], [29], [22]. Sound and productive occupants, as well as increased indoor quality, are the qualities of green building [26], [33]. These factors are always linked to increased productivity of employees. More companies are starting to invest in green building workspace for this very purpose. These buildings, of better environmental quality indoors, would encourage owners or tenants to purchase or rent them at a higher price or rental price. In addition, the complaint rate for indoor environmental quality green-certified hotels was about 19 percent lower than for non-green hotels, resulting in a noticeable 6.5 percent room premium [27].

4.5 Reduction in site / source energy (energy saving)

Energy savings bring financial benefits to users or owners, as they can save money from utility bills for water and electricity, which in the long run can actually pay off the initial installation costs and save even more. Kats et al. [34] argue that, in addition to improving health and productivity, the financial benefits of reduced energy and water consumption are 10 times higher than the additional construction costs required to meet the green design criteria. The result of this study showed that every \$1 reduction in the annual electricity bill could increase the market value of the house by \$20.73 [35]. The participation of conserved energy can therefore be observed in Madew [39] which reports a 60% decrease in the energy and water consumption of green buildings. He also points out that green buildings have a higher market value of 10% and a higher rental rate of 5% to 10%. Clearly, these factors will make a positive contribution to the value of green buildings [15], [27], [2], [32], [29], [30].

4.6 Higher rental rate

Designing green buildings for energy efficiency could result in residents paying higher green space rental costs. Reduced energy use from the point of view of the tenants is directly related to the tenants' costs of occupying green buildings. The

ability of green buildings to leverage higher rental rates due to a number of benefits accrued to them will also directly increase the value of the said building. This is because the property is in a position to generate more income than conventional buildings, which will attract many property investors, thereby generating market demand. Subsequently, Halim's [40] study in Malaysia found green office buildings attract higher rates per square foot and lower operating costs, respectively RM0.50-RM2.25 and RM0.164 per square foot. These show rental rate may affect green buildings value [25], [20], [26], [17], [20], [21].

4.7 Material Cost

Cost has always been closely linked to price and value Material Cost [12], [27], [2], [26], [31]. Developers will have to increase the price of green buildings if the cost of construction is higher than that of conventional buildings in order to maintain their profit margin. Installation of green components will incur higher construction costs, thus increasing the value of the green building's property. In Australia, a study conducted by Morris and Matthiesen [41] using the Green Star Rating and Sustainable Building Certification System found that construction costs for a five-star solution increased by about 3-5%.

4.8 Eco-labeling (Green label)

Some authors consider the first factor (see 4.1) as eco-labeling. There are studies show commercial building with an Energy Star certification will lease for around 3 percent more per square foot; the contrast in viable lease is evaluated to be almost 7 percent. The increase in the cost of the offer may be up to 16%. In smaller markets and districts, and in more remote parts of larger metropolitan areas, where area rents are lower, there appears to be more esteem on the label [15]. Thus, eco-labeling is one of the factors that affecting green buildings value as indicated in previous studies [16] [14], [15], [24], [28].

4.9 Green building certification level

Robinson et al. [42] confirmed that tenants were more willing to pay more for certified buildings. The cost increased by an additional 5 per cent with the introduction of a 6-Star non-ionic design solution. Weerasinghe et al. [12] found that the cost premium for green buildings was based on the different levels of green certification, i.e. BREEM, Green Star, LEED. They concluded that the cost premium increases with the level of certification. In short, the green building value has a positive relationship with the green certification level [14], [23] [2], [21]. This means that the higher the level of green building certification, the higher its value.

4.10 Geographic neighbourhood

Geographic neighborhoods also play an important role in influencing the value of green buildings [15], [27], [32], [17]. It is known that for green buildings, *ceteris paribus*, where the place premium is smaller, there is a higher relative premium [17]. That is, in smaller or lower-cost regions or in less expensive metropolitan areas, the percentage increase in rent or value of green buildings is systematically higher [17].

4.11 Quality of construction and material use

Environmentally friendly materials and recycled water have been shown to reduce property values by 0.05 and 0.2 per

cent per square meter respectively [28]. In addition, there is a reported skill deficiency in Malaysia in terms of energy building skills requirements [44]. These attributes are crucial because a satisfactory and sustainable building can never be built without proper design and construction. It is clear that a poorly built green building cannot have a high market value and vice-versa [23], [30], [17].

4.12 Green consumerism

Indeed, the growing trend of green consumerism is contributing to a change in the value of green buildings [20], [32], [43], [45]. Awareness of the importance of higher living standards and quality of life will lead more people to pursue a green lifestyle [43]. People who understand the benefits of a green building, either physically, psychologically or financially, and at the same time have financial capabilities will want to own one of them. If more demand is generated on the market, the value will also increase. In addition, Chau, Tse, and Chung [46] also reported that green housing residents were willing to pay more in order to enjoy green landscapes and facilities.

4.13 Social and environmental benefits

The social and environmental benefits of green buildings are one of the factors leading to a price increase [32], [26], [29]. Demand for green development is on the rise as environmental awareness among Malaysians increases. They believe green building not only saves energy and money, but also reduces the impact of climate change [22].

4.14 Corporate social responsibility

Corporate social responsibility is a driving force behind the demand for green buildings [18] and this could affect green buildings value [15], [27]. Increased demand will generate higher value for these buildings.

4.15 Government procurement policies

Government procurement policies will have a direct effect on the value of green buildings [27], [28]. Government monetary green tax incentives can attract companies to participate in green buildings as they can subsidize their cost burden resulting in positive financial benefits. This government action could reduce the prices of green building inputs through economies of scale and learning effects [27]. This will increase the supply of green buildings at a more reasonable price due to lower initial costs and an incentive to attract developers. Another possible policy would be to provide green property owners or occupants with a reduced tax or a total tax exemption that would generate more demand for green buildings.

4.16 Invest Time and Cooperation

Time to invest in green buildings has an indirect impact on the value of green buildings. As the green building differs from the design of the architecture, it takes the necessary cost and time to integrate the green building into a complete project. Cost and time taken increase the cost premium and increase the value of the green building. According to the graph, this factor is less likely to have a realistic effect on the value of the green building. Green buildings have been identified as requiring increased architectural and engineering design time, modeling costs and time to integrate green buildings into the completed project, where the cost premium for green buildings is increased [12].

4.17 Developer's profit and extra risks to deliver

The value of green building is affected by the developer's profit, and the extra risk to deliver is less likely to be strongly correlated. In other words, this factor is less likely to affect the value of green building value. In the case of green building, the price premium for homebuyers is higher than the developer's cost premium, mainly due to the developer's profit and extra risk to deliver for this green [23]. The high profit margin of the developer in the construction of green buildings is less likely to affect the price of green buildings. The Green Building Price Premium is found to be between 10% and 31%. The World Business Council reported a similar range of 11 to 28 per cent of the green building price premium [23]. This analysis has shown that there is a high difference between the price premium and the cost premium for green building, which means that the profit margin of the developer is the main factor.

4.18 Size of the building

The size of the building has less impact on the value of the green building. Rental is higher in a larger building with a square footage. In terms of the highest and best use of the building, the size of the building is not a significant variable that influences the value of the green building. Eichholtz et al. [15] stated that the rent for larger buildings is high, but rather small, in square feet.

4.19 Types of industry

The demand for green buildings among companies active in the refining and energy industries is higher [18]. They tend to rent green spaces in order to be compatible with the nature of the sector. Green construction value is driven by the demand for certain industries, such as finance, insurance and real estate. Differences in the cross-industry and the nature of the firms play a role in determining the value of the green building. However, this factor is less likely to have a significant impact on the value of the green building.

4.20 Housing purchase purpose

The purpose of the purchase of housing and the location of housing is said to have had a significant impact on the price of green buildings. The purpose of buying housing depends on the consumer's own perspective, with different consumers having their own motives to purchase buildings [24]. For example, if residents are more concerned about environmental quality, they are willing to pay a higher price premium on green buildings. Demand is indirectly lowering the price of green building as high as quality is assured. They're willing to pay more to live in a green environment. As a result, the value of green building is less affected by this factor.

4.21 High level of satisfaction

The high level of satisfaction with the green building leads to a change in the value of the green building [47]. The rationale for owning a green building is due to the satisfaction of energy efficiency at home. It brings long-term benefits that are satisfied by the owner of a green home. Satisfaction of the owners does not directly influence the price of the green building as the source of satisfaction stems from the nature of the green buildings.

4.22 Maintenance Cost

The use of environmentally friendly materials tends to increase maintenance costs [19]. Increased maintenance costs will increase the cost of green building construction. However, this is not a direct factor in the price of a green building.

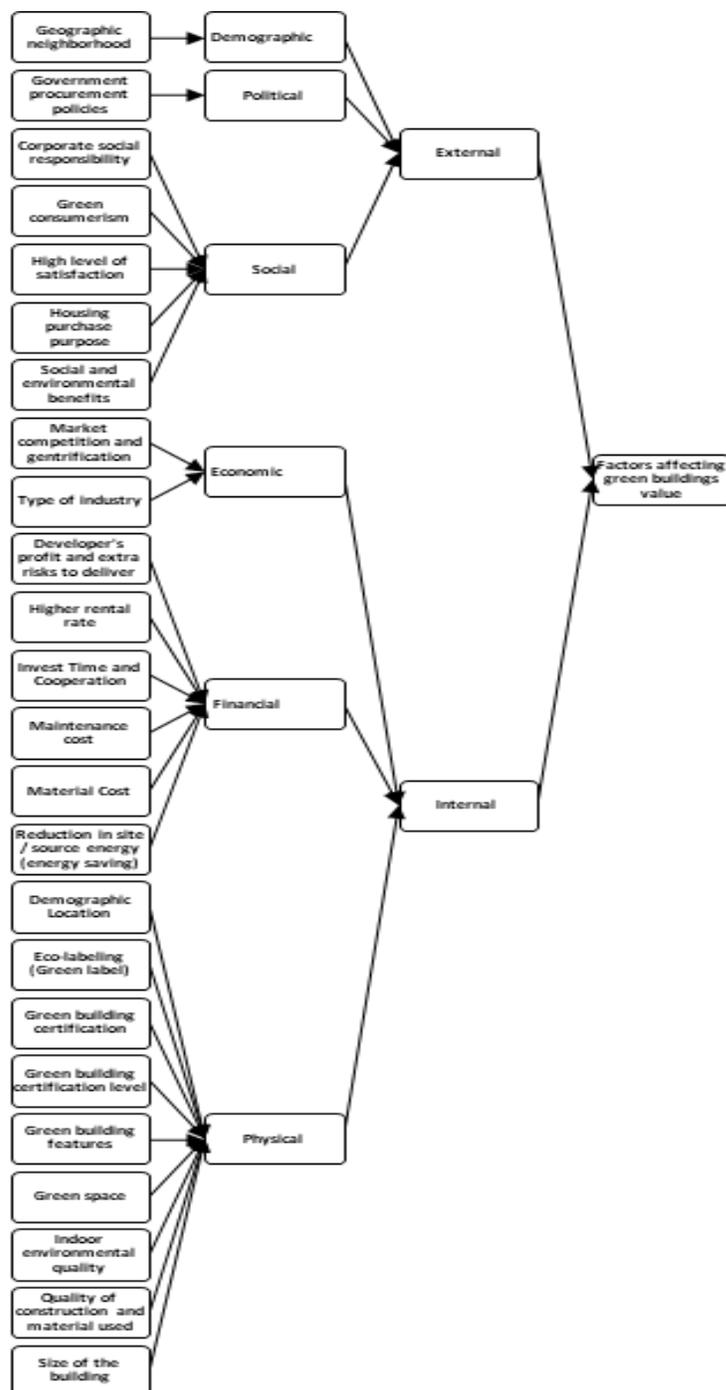


Figure 1 Conceptual framework of factors affecting the value of green buildings.

4.23 Green space

The green space element affects the value of the green building. Green space continues to bring indirect social, environmental and future benefits. Life-long benefits are the determinant of the value of the green building variable. The benefits of green building are to ensure the quality of life of green building residents [32]. As agreed by the authors, the effect of this factor on the value of green buildings is not

significant.

4.24 Market competition and gentrification

Lastly, the market condition is the least supported factor that affects green building value. There's competition and green gentrification on the market. Li Zhang [27] said it has been shown that the increase in supply of green buildings has a negative impact on the price of green property. This was because of competition from the market. Supply has a positive impact on residential buildings 'average rent and price, known as green gentrification.

5. CONCLUSION AND RECOMMENDATIONS

The value of the green building property has been influenced by many factors (24), all of which are discussed in this research paper. As a result, it can be concluded that there are two types of factors affecting the value of green buildings (internal and external)(see Fig. 1). Figure 1 is presented as a conceptual framework for factors that affect the value of green buildings. Overall, we have found that the factors have a strong relationship with the increase in the value of green buildings. However, different factors play different roles and affect the value of the property to varying degrees and to some extent. These factors should be extended or updated as the market is constantly changing. Awareness among people is, above all, the most important way to unite and pursue a more desirable environment.

ACKNOWLEDGMENT

We would like to express our appreciation to the Ministry of Education, Malaysia (MOE) and Universiti Teknologi Malaysia (UTM) for providing research grants and supporting this study (Fundamental Research Grant Scheme (FRGS)-Vot No.: R.J1300000.7852.5F163).

REFERENCES

- [1] Krippendorff, K. (2018). *Content analysis: An introduction to its methodology*. Sage publications.
- [2] Onuoha, I. J., Aliagha, G. U., & Rahman, M. S. A. (2018). Modelling the effects of green building incentives and green building skills on supply factors affecting green commercial property investment. *Renewable and Sustainable Energy Reviews*, 90, 814-823.
- [3] Haw Li Ping, Janet Jemes, Lim Kian Fung, Ngoo Pei Yin, Nur Aiza Binti Maidin, Mohd Shahril Abdul Rahman. 2019. Factors Affecting Commercial Property Value. *International Journal Of Scientific & Technology Research*, Vol. 8 Issue: 12, pp.840-846, DOI/ <http://www.ijstr.org/paper-references.php?ref=IJSTR-1219-26599>
- [4] Ying Li Yap, Mohd Shahril Abdul Rahman. 2019. Quality Management in Real Estate Industries. *International Journal Of Scientific & Technology Research*, Vol. 8 Issue: 12, pp.836-839 DOI/ <http://www.ijstr.org/paper-references.php?ref=IJSTR-1219-26590>
- [5] Chong, Alan Kim Wing, Abdul Hakim Mohammed, Mat Naim Abdullah, Mohd Shahril Abdul Rahman, (2019) "Maintenance prioritization – a review on factors and methods", *Journal of Facilities Management*, Vol. 17 Issue: 1, pp.18-39, doi.org/10.1108/JFM-11-2017-0058
- [6] Rahman, M. S. A., Ali, H. M., Sipan, I., & Mohammed, A. H. (2015a). Space utilization survey database for Higher Education Institutions. *The Role of Service in the Tourism & Hospitality Industry*, 175.
- [7] Awang, Mariah, Mohammad, A. H., Sapri, Maimunah., & Rahman, M. S. A. (2014a). Requisite facilities management competencies for sustainable development at higher education institutions. *Journal of Sustainability Science and Management*, 9(2), 71-89.
- [8] Awang, M., Mohammad, A. H., Sapri, M., Rahman, M. S. A., & Lah, N. M. I. N. (2014b). Measurement of Facility Management Competencies in Higher Education Institution. *Jurnal Teknologi*, 71(4).
- [9] Rahman, M. S. A., Ali, H. M., Sipan, I., & Mohammed, A. H. (2015b). Framework of the space utilization survey for Malaysian public Higher Education Institutions. *The Role of Service in the Tourism & Hospitality Industry*, 169.
- [10] Rahman, Mohd Shahril Abdul, Hishamuddin Mohd Ali, Ibrahim Sipan, Mariah Awang, and Abdul Hakim Mohammed. "Space Utilization Model For Higher Education Institutions." *Jurnal Teknologi* 75, no. 10 (2015c).
- [11] Rahman, M. S. A., Ali, H. M., Sipan, I., Awang, M., & Mohammed, A. H. (2015). Factors affecting the space utilisation rate of Malaysian public universities. *Jurnal Teknologi*, no. 10 (2015d).
- [12] Weerasinghe, A. S., & Ramachandra, T. (2018). Economic sustainability of green buildings: a comparative analysis of green vs non-green. *Built Environment Project and Asset Management*, 8(5), 528-543.
- [13] Mesthrige Jayantha, W., & Sze Man, W. (2013). Effect of green labelling on residential property price: a case study in Hong Kong. *Journal of Facilities Management*, 11(1), 31-51.
- [14] Jang, D. C., Kim, B., & Kim, S. H. (2018). The effect of green building certification on potential tenants' willingness to rent space in a building. *Journal of cleaner production*, 194, 645-655.
- [15] Eichholtz, P., Kok, N., & Quigley, J. M. (2010). Doing well by doing good? Green office buildings. *American Economic Review*, 100(5), 2492-2509.
- [16] Eichholtz, P., Nils, K., & Quigley, J. M. (2010). *Doing Well by Doing Good? Green Office Buildings. Program on housing and urban policy*. Working paper collection, April 2010. Berkeley: Institute of Business and Economic Research, University of California.
- [17] Chegut, A., Eichholtz, P., & Kok, N. (2014). Supply, demand and the value of green buildings. *Urban Studies*, 51(1), 22-43.
- [18] Eichholtz, P., Kok, N., & Quigley, J. M. (2009, August). Why Companies Rent Green: CSR And The Role Of Real Estate. In *Academy of Management Proceedings* (Vol. 2009, No. 1, pp. 1-6). Briarcliff Manor, NY 10510: Academy of Management.
- [19] Ab. Azis, S. S., Sipan, I., Sapri, M., Abdul Jalil, R., & Mohammad, I. S. (2017). The effect of green envelope components on green building value. *Property Management*, 35(2), 181-201.
- [20] Cajias, M., & Piazolo, D. (2013). Green performs better: energy efficiency and financial return on buildings. *Journal of Corporate Real Estate*, 15(1), 53-72.
- [21] Fuerst, F., & McAllister, P. (2011). Green noise or green value? Measuring the effects of environmental certification on office values. *Real estate economics*, 39(1), 45-69.

- [22] Aliagha, G. U., Hashim, M., Sanni, A. O., & Ali, K. N. (2013). Review of green building demand factors for Malaysia. *Journal of Energy Technologies and Policy*, 3(11), 471-478.
- [23] Portnov, B. A., Trop, T., Svechkina, A., Ofek, S., Akron, S., & Ghermandi, A. (2018). Factors affecting homebuyers' willingness to pay green building price premium: Evidence from a nationwide survey in Israel. *Building and Environment*, 137, 280-291.
- [24] Juan, Y. K., Hsu, Y. H., & Xie, X. (2017). Identifying customer behavioral factors and price premiums of green building purchasing. *Industrial Marketing Management*, 64, 36-43.
- [25] Tan, T. H. (2014). Satisfaction and motivation of homeowners towards green homes. *Social indicators research*, 116(3), 869-885.
- [26] Isa, M., Rahman, M. M. G. M. A., Sipan, I., & Hwa, T. K. (2013). Factors affecting green office building investment in Malaysia. *Procedia-Social and Behavioral Sciences*, 105, 138-148.
- [27] Zhang, L., Wu, J., & Liu, H. (2018). Turning green into gold: A review on the economics of green buildings. *Journal of cleaner production*, 172, 2234-2245.
- [28] Yoshida, J., & Sugiura, A. (2015). The effects of multiple green factors on condominium prices. *The Journal of Real Estate Finance and Economics*, 50(3), 412-437.
- [29] Thuraiya Mohamad, Noor Aileen Ibrahim, Asniza Hamimi Abdul Tharim, Nur Ain Ismail, Azurawati Zaidi. (2015). *Factors Influencing Buyers to Purchase Green Residential Property*. Academy of Language Studies, Universiti Teknologi MARA.
- [30] Dwaikat, L. N., & Ali, K. N. (2018). The economic benefits of a green building—Evidence from Malaysia. *Journal of Building engineering*, 18, 448-453.
- [31] Pitts, J. (2008). Green buildings: Valuation issues and perspectives. *The Appraisal Journal*, 76(2), 115.
- [32] Juaneé Cilliers, E., & Timmermans, W. (2013). Approaching value added planning in the green environment. *Journal of Place Management and Development*, 6(2), 144-154.
- [33] World Green Building Council (WorldGBC). (2013). <https://www.worldgbc.org/news-media/worldgbc-20122013-annual-report-now-available>
- [34] Kats, G. (2003). *Green building costs and financial benefits* (p. 1). Boston, MA: Massachusetts Technology Collaborative.
- [35] Johnson, R. C., & Kaserman, D. L. (1983). Housing market capitalization of energy-saving durable good investments. *Economic Inquiry*, 21(3), 374-386.
- [36] Dastrup, S. R., Zivin, J. G., Costa, D. L., & Kahn, M. E. (2012). Understanding the Solar Home price premium: Electricity generation and "Green" social status. *European Economic Review*, 56(5), 961-973.
- [37] Ichihara, K., & Cohen, J. P. (2011). New York City property values: what is the impact of green roofs on rental pricing?. *Letters in spatial and resource sciences*, 4(1), 21-30.
- [38] Gao, X., & Asami, Y. (2001). The external effects of local attributes on living environment in detached residential blocks in Tokyo. *Urban Studies*, 38(3), 487-505.
- [39] Madew, R. (2006). The dollars and sense of green buildings. *Green Building Council Australia*.
- [40] Halim, M. (2012). Economic issues on green office buildings in Malaysia. In *International Real Estate Research Symposium* (pp. 1-13).
- [41] Morris, P., & Matthiesen, L. F. (2007). Cost of green revisited: Re-examining the feasibility and cost impact of sustainable design in light of increased market adoption. Davis Langdon.
- [42] Robinson, S., Simons, R., Lee, E., & Kern, A. (2016). Demand for green buildings: Office tenants' stated willingness-to-pay for green features. *Journal of Real Estate Research*, 38(3), 423-452.
- [43] Gilg, A., Barr, S., & Ford, N. (2005). Green consumption or sustainable lifestyles? Identifying the sustainable consumer. *Futures*, 37(6), 481-504.
- [44] Aliagha, G. U., Goh, A., Abdullah, M. N., Jaafar, N. M., & Eluwa, S. E. (2015). Investigating skill gaps in green building skills for energy efficiency. In *Advanced Materials Research* (Vol. 1073, pp. 1282-1287). Trans Tech Publications.
- [45] Joachim, O. I., Kamarudin, N., Aliagha, G. U., & Ufere, K. J. (2015). Theoretical explanations of environmental motivations and expectations of clients on green building demand and investment. In *IOP Conference Series: Earth and Environmental Science* (Vol. 23, No. 1, p. 012010). IOP Publishing.
- [46] Chau, C. K., Tse, M. S., & Chung, K. Y. (2010). A choice experiment to estimate the effect of green experience on preferences and willingness-to-pay for green building attributes. *Building and Environment*, 45(11), 2553-2561.
- [47] Tan, T. H. (2014). Satisfaction and motivation of homeowners towards green homes. *Social indicators research*, 116(3), 869-885.