

WILLINGNESS TO PAY FOR GREEN BUILDINGS IN GHANA: THE IMPACT OF BENEFIT SENSITISATION.

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Abstract

Global discourse on sustainable construction has aroused great interest in the need for green building proliferation as a strategic means to reduce the environmental harms of conventional buildings. However, green building adoption remains laggard in Ghana as individuals are unwilling to pay extra for green buildings. Researchers have made many recommendations to enhance willingness to pay, recurrent amongst which is benefit sensitisation. However, the impact of benefit sensitisation, especially in the Ghanaian market, remained unproven and unquantified. This study provides clarity to the issue by investigating and quantifying the impact of an undertaken green building benefit sensitisation on the willingness to pay of 630 participants who were unaware of the individual-level benefits of green buildings. The study confirmed a significant impact of benefit sensitisation on willingness to pay for green buildings. After benefit sensitisation, respondents who were initially only willing to pay up to a 5% premium became willing to pay an average of 6 - 10% premium; with only 14.8% of respondents maintaining an unwillingness to pay extra for green buildings.

Keywords: Sustainability, Green building, Willingness to Pay, Benefit Sensitization, Ghana

1.0 Introduction

Global discourse on sustainable construction has aroused great interest in green buildings and the need for its proliferation as a strategic means to reduce the negative environmental impacts of construction while improving human comfort and health (Ofek and Portnov, 2020; World GBC Annual report, 2021). Green buildings are structures that are created using processes that are environmentally responsible and resource efficient throughout their life cycle from design, construction, operation, maintenance, renovation, to deconstruction (US EPA as cited by Sinha, Gupta and Kutnar, 2013; Hu, Geertman and Hooimeijer, 2014; Zalejska-Jonsson, 2014; Ofek and Portnov, 2020; Rosner, Amitay and Perlman, 2022). Green building is therefore the status of efforts to integrate sustainability in construction practices (Sinha, Gupta and Kutnar, 2013).

Green buildings are designed to exhibit a high level of environmental, economic and engineering performance including energy efficiency, improved indoor air quality, resource and material efficiency, and users' health and long-term productivity among others (Chatterjee, 2009; Retzlaff, 2009). Green construction is a great tool to facilitate growth while simultaneously reducing climate change impacts, hence the production of green buildings is an opportunity especially for developing countries to leapfrog to sustainable built environments (Tukker, 2005; World Green Building Council, Report, 2021). The importance of green buildings has warranted attention and increased efforts towards sustainable construction from governments and building experts globally (World Green Building Report, 2021).

Though green buildings have a significant positive impact on the environment and human health, green buildings are often more expensive than conventional buildings because green building price premium tends to cover extra costs such as investment in research and development, and more efficient, but more expensive, construction systems (Ofek and Portnov, 2020). Therefore, for green buildings to gain ubiquitous traction, consumers' must be willing to pay these additional costs.

However, as evident from the low demand for green buildings in Ghana (Darko, Chan, Gyamfi, *et al.*, 2017; Chan *et al.*, 2018; Darko and Chan, 2018; Darko *et al.*, 2018; Anzagira, Badu and Duah, 2019; Guribie *et al.*, 2021), Ghanaian consumers do not seem willing to bear the premium. Many recommendations have been made by researchers to enhance willingness to pay, chief amongst which is benefit sensitisation (Attaran and Celik, 2015; Ofek and Portnov,

2020; Takuh, Abang and Akinyemi, 2021). Studies on the impact of benefit sensitisation in Ghana have however shown varying results. Whereas research has observed a significant impact on green building adoption (Darko and Chan, 2018), another has shown an insignificant impact (Darko *et al.*, 2018).

This study seeks to provide clarity to the issue by investigating and quantifying the effect of benefit awareness on willingness to pay for green buildings. To the best of our knowledge, this study is the first in Ghana directly investigating this phenomenon and will provide reference for further green building studies and policy design. The cruciality of this study is further buttressed by the request of Anzagira, Badu and Duah (2019) for research geared towards the early proliferation of green buildings in Ghana.

2.0 Benefit Sensitisation and Willingness to Pay for Green Buildings

In many studies, a lack of individuals' awareness of green buildings has been highlighted as the most significant impediment to green building adoption (Mohamad Bohari *et al.*, 2016; Azeem *et al.*, 2017; Nguyen *et al.*, 2017; Guribie *et al.*, 2021). This lack of green building knowledge has also been found to constitute significant inertia to individuals' willingness to pay a green premium (Golbazi, Danaf and Aktas, 2020; Ofek and Portnov, 2020; Takuh, Abang and Akinyemi, 2021; He, Liu and Li, 2022). As Njo, Valentina and Basana (2021) put it, limited knowledge on green buildings contributes to individuals avoiding risks of purchasing or investing in green property.

Against this backdrop, studies have recommended and continue to recommend green building awareness creation as solution to enhancing individuals' willingness to pay for green buildings (Attaran and Celik, 2015; Ofek and Portnov, 2020; Takuh, Abang and Akinyemi, 2021; Lawluy, Ntim and Ahiadu, 2022), and ensuring green building proliferation (Zhang *et al.*, 2016; Darko, Chan, Ameyaw, *et al.*, 2017; Darko and Chan, 2018; Oyewole and Komolafe, 2018b; Abraham and Gundimeda, 2020; Oyewole, Komolafe and Gbadegesin, 2021; Takuh, Adeyemi and Bello, 2021). When awareness is created on green buildings, individuals will be more likely to pay a higher green building premium, thereby encouraging larger investments in green buildings (Oyewole and Komolafe, 2018a; Oyewole, Komolafe and Gbadegesin, 2021).

Yet, general green building awareness creation may not be enough to spur adoption as different contents of information provided during publicity have been found to have different impacts on willingness to pay (He, Liu and Li, 2022). Though information on environmental impact of green buildings has been found to enhance willingness to pay (Zhao *et al.*, 2015), many studies suggest personal benefits such as cost savings (Agyekum *et al.*, 2019; He, Liu and Li, 2022) and living comfort (Zhang *et al.*, 2016) to have the highest impact on willingness to pay (Zhang *et al.*, 2016; Agyekum *et al.*, 2019; Abraham and Gundimeda, 2020; He, Liu and Li, 2022). Thus, even if individuals are made aware of green buildings and their positive impacts on the environment, they may only be willing to pay a higher premium when this information translates into personal benefits such as lower water and electricity bills (Abraham and Gundimeda, 2020).

A few studies have investigated and quantified the impact of benefit awareness on willingness to pay for green buildings. In China, He, Liu and Li (2022) found most respondents willing to largely increase their willingness to pay for green buildings after being informed of the benefits of green buildings. In Israel, Ofek, Akron and Portnov (2018) found more benefit-informed consumers willing to pay about 30% more for green buildings than less informed consumers. In Pakistan, Khan, Thaheem and Ali (2020) prove that green building benefit awareness significantly increases willingness to pay for green buildings. Their study (Khan, Thaheem and Ali, 2020) found about 7% of respondents willing to pay more for green buildings upon being made aware of the benefits, in addition to the 63.7% of respondents who were already willing to pay more for green buildings. Based on these findings, it becomes clear that benefit sensitisation, a strategy that is already being adopted by Governments of developed countries (Darko and Chan, 2016), significantly influences willingness to pay a green premium and is urgently needed for the proliferation of green buildings in the developing world (Oyewole and Komolafe, 2018b).

In Ghana, many individuals are still oblivious to the benefits associated with green buildings (Darko *et al.*, 2018). Guribie *et al.* (2021) found this lack of green building knowledge to be the most significant hindrance to green building demand in Ghana. This is in line with the findings of Darko & Chan (2018) who found increasing publicity to be the most significant strategy to enhance green building adoption in Ghana.

To catalyse green building adoption, drawing from Rogers' diffusion of innovation theory, Guribie *et al.* (2021) call for better communication of the relative benefits of green buildings over conventional alternatives to the Ghanaian populace. Their recommendation (Guribie *et*

al., 2021) echoes Anzagira, Badu and Duah's (2019) direction that, a national green building awareness campaign should be undertaken to conscientize the Ghanaian populace about the benefits of building green and their roles in green building adoption. Anzagira, Badu and Duah's (2019) add that, green building sensitisation should commence at the basic levels of education through to tertiary institutions, so as to develop a green-oriented future generation.

There is however a discord between research on the impact green building benefit sensitisation will have in the Ghanaian market, as Darko et al. (2018) found no significant link between awareness and green building adoption. According to Darko et al. (2018), this finding might be due to their observation that government related factors are most important to promote green building adoption. Yet, this raises an unclarity that must be clarified by empirical evidence.

3.0 Methodology

This research adopted an exploratory research design to investigate the impact of green building benefit sensitisation on the willingness to pay a green premium in Ghana's property market.

The respondents for this study were sampled by distributing an online survey to as many willing respondents as possible across all regions of Ghana. To provide a demographic overview of responses, the first section enquired about respondents' age, gender, highest education level, income level, and region of residence. The next section focused on the willingness of respondents to pay a premium for green buildings by asking them how much premium they were willing to pay for a green building over a conventional building. The respondents were given seven (7) levels of premium to choose from – '*no premium*' to '*above 25%*'. Following this initial test of their willingness to pay a premium, respondents were presented with well-established benefits of green buildings and asked if they were already aware of them. These benefits being: "*A green building can save over 10 times the extra costs of building green by providing the following benefits: Lower electricity bills, lower water bills, lower maintenance costs, improved health, and improved productivity*" (Kats, 2003; Ries et al., 2006). Respondents who indicated that they were previously unaware of these benefits were then given the option of changing their earlier response on how much premium they are willing to pay for a green building.

The survey instrument was pilot-tested, and the necessary changes were made before the final survey. Respondents were assured of their anonymity and the confidentiality of their responses. Additionally, reminders were regularly sent to ensure an optimum response rate. While 1,872 viewed the questionnaire, only 1,227 responded. Two hundred and thirty-two of the responses were incomplete and thus removed from the final sample before the analysis. In order to test our hypothesis that benefit sensitisation impacts the willingness to pay a premium, only responses from individuals who had no prior knowledge of the stated benefits were selected for further analysis. In the end, six hundred and thirty (630) were sampled for further analysis. Table 1 presents the profiles of our final respondents.

Table 1: Profile of Respondents

Variable	Scale	Frequency	Percentage
Age	Below 20	17	2.7%
	20 - 25	181	28.7%
	26 – 30	185	29.4%
	31 – 35	78	12.4%
	36 – 40	44	7.0%
	41 – 45	47	7.5%
	46 – 50	28	4.4%
	51 – 55	23	3.7%
	56 – 60	12	1.9%
	Above 60	15	2.4%
Gender	Male	336	53.3%
	Female	294	46.7%
Education Level	Junior High School	3	0.5%
	Senior High School	53	8.4%
	BSc equivalent	411	65.4%
	MSc equivalent	142	22.6%
	PhD	21	3.3%
Monthly Income	No income	138	22.1%
	GH¢ 1 – GH¢ 1,499	128	17.5%
	GH¢ 1,500 – GH¢ 2,999	158	24.1%
	GH¢ 3,000 – GH¢ 4,499	75	13.8%
	GH¢ 4,500 – GH¢ 5,999	32	6.8%
	GH¢ 6,000 – GH¢ 7,499	26	5.4%
	GH¢ 7,500 – GH¢ 8,999	18	3.5%
	Above GH¢ 9,000	55	8.9%

Tests of reliability were performed before our final analysis, and Cronbach's alpha for the scales adopted for this study was 0.864. This alpha value was deemed acceptable in line with the extant literature, which establishes a value above 0.7 as proof of scale reliability (Li, Long and Chen, 2018)

4.0 Results and Discussion

Out of 995 complete responses, only 365 respondents (37%) were aware of the individual-level benefits of green buildings presented in the survey. This evidences the assertion by Darko et al. (2018) that many Ghanaians are still oblivious to the individual-level benefits associated with green buildings.

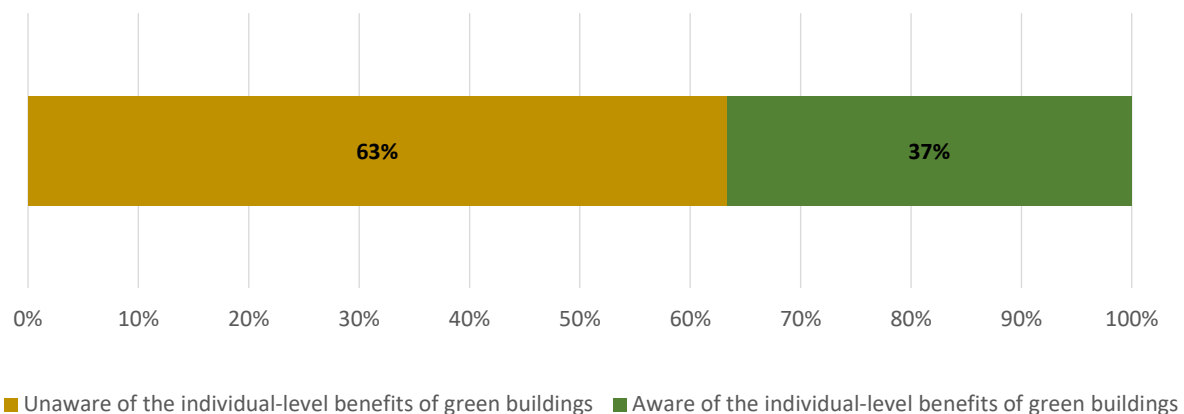


Figure 1: Awareness of individual-level green building benefits

Pre-sensitisation responses suggested a reluctance to pay high premiums for green buildings. Approximately a third of respondents (35.4%) were unwilling to pay any premium at all. The biggest proportion (36.6%) was willing to pay, albeit only up to 5% extra for a green building. Participants were more reluctant to pay a premium above 10%, with only 11.8% inclined to pay above 10% over a conventional building. On average, Ghanaians who are unaware of the cost-saving benefits of green buildings are willing to pay no more than 5% as a premium for green buildings. Compared to the global average cost surcharge of 7% incurred in building green (Hu and Skibniewski, 2021), the premium benefit-unaware Ghanaians are willing to pay is too low to sustain green building proliferation.

After the initial willingness of respondents to pay a premium was tested, the stated benefits of green buildings were presented. To gauge the impact of our sensitisation exercise,

respondents were then given the opportunity to change the premiums they would be willing to pay. The impact of benefit awareness was immediately apparent: the percentage who were unwilling to pay a premium dropped from 35.4% to 14.8%. The biggest proportion (32.2%) were still willing to pay up to 5%, even after benefit sensitisation. Beyond this point, benefit awareness saw a minor improvement in the proportion who were willing to pay a 6% - 10% premium (*from 16.2% to 19.8% of respondents*).

After previously highlighting a reluctance to pay premiums above 10% before sensitisation, we recorded a significant shift in attitude. As opposed to the 11.8% respondents who were willing to pay an above 10% premium prior to sensitisation, this proportion increased to 33.2% after they were educated on these benefits. Much like most past studies (Golbazi, Danaf and Aktas, 2020; Ofek and Portnov, 2020; Takuh, Abang and Akinyemi, 2021; He, Liu and Li, 2022), we found a direct correlation between knowledge of green buildings and the willingness to pay for them. The highest premium (above 25%) also saw increased levels of willingness, from 4.0% to 14.5%. Figure 2 graphically illustrates the premiums respondents were willing to pay before and after benefit sensitisation (This is further detailed in Table 2).

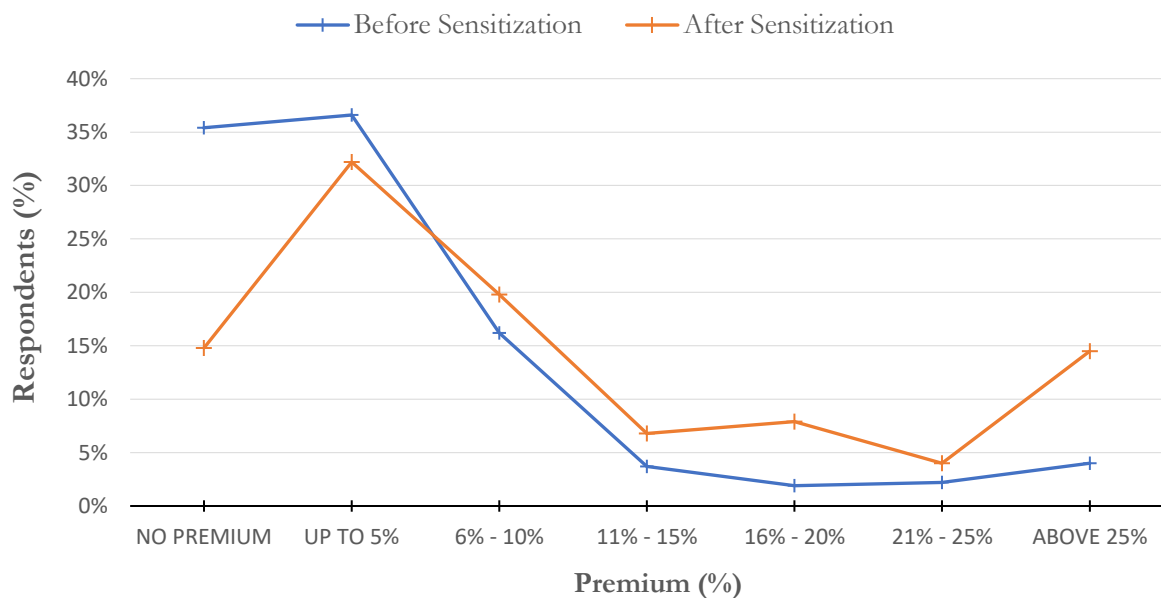


Figure 2: Willingness to Pay a Premium: Before and After Sensitisation

Additionally, we observed that benefit-aware Ghanaians were generally willing to pay higher premiums, at an average of 6% to 10%. The impact of sensitisation is made obvious by comparing the means pre- and post-sensitisation. Prior to sensitisation, unaware respondents were willing to pay an average of 2.23, represented by the range 'up to 5%' on our Likert scale.

Following sensitisation, the same respondents, now benefit-aware, were willing to pay on average 3.2, which represents the range '6% - 10%'.

Furthermore, based on the average cost surcharge of 7% incurred by building green (Hu and Skibniewski, 2021), the average willingness to pay of 6%-10% observed post sensitisation is sufficient to ensure green building proliferation. This highlights the significant role green building benefit sensitisation plays towards the proliferation of green buildings.

Table 2: Willingness to Pay a Premium: Before and After Sensitisation

<i>Premium Levels</i>	Before Sensitization		After Sensitization	
	<i>Frequency</i>	<i>Percent</i>	<i>Frequency</i>	<i>Percent</i>
Not willing to pay	222	35.4%	93	14.8%
Willing to pay up to 5%	230	36.6%	203	32.2%
Willing to pay 6% - 10%	102	16.2%	125	19.8%
Willing to pay 11% - 15%	23	3.7%	43	6.8%
Willing to pay 16% - 20%	12	1.9%	50	7.9%
Willing to pay 21% - 25%	14	2.2%	25	4.0%
Willing to pay above 25%	27	4.0%	91	14.5%

5.0 Conclusion

Low green-building benefit awareness has been identified as a significant factor inhibiting consumers' willingness to pay for green buildings (Golbazi, Danaf and Aktas, 2020; Ofek and Portnov, 2020; Takuh, Abang and Akinyemi, 2021; He, Liu and Li, 2022). In Ghana where there is a dearth of demand for green buildings (Djokoto, Dadzie and Ohemeng-Ababio, 2014), benefit sensitisation has been recommended as a solution to promoting individuals' willingness to adopt green buildings (Anzagira, Badu and Duah, 2019). Yet, the effect that such sensitisation would have on willingness to pay and green building adoption remained unclear and unevicenced.

To provide evidenced clarity, we undertook a green building benefit sensitisation experiment and measured the impact of said sensitisation on participants' willingness to pay for green buildings. Since we only sought the impact of benefit sensitisation on individuals who had no prior knowledge of the benefits of green buildings, the research filtered out 365 participants who were already aware of the individual-level benefits of green buildings from a total of 995 willing participants. This revealed our first finding: only 37% of respondents were aware of the individual-level benefits of green buildings. This finding agrees with the assertion by Darko

et al. (2018) that there exists a high number of Ghanaians without knowledge of green building benefits.

Next, the research found a significant increase in willingness to pay for green buildings post-sensitisation. After benefit sensitisation, respondents who were initially only willing to pay an average of up to a 5% premium became willing to pay an average of 6% - 10% premium; with only 14.8% of respondents maintaining an unwillingness to pay a green premium. This result heralds that benefit awareness of green buildings plays a crucial role to its wide-spread adoption by significantly augmenting the number of consumers willing to pay for green buildings.

The research further evidenced that, the impact of benefit sensitisation could be sufficient to spur the proliferation of green buildings in Ghana and as such warrants urgent attention and investment. This required attention should be manifested through policies and strategies geared towards green building benefit awareness campaigns. In this regard, the study provides a first point of action and reference frame for policy makers in Ghana and other African countries in the design and implementation of policies and measures towards green building benefit sensitisation as an efficient means of ensuring the sustainability of the built environment. Accordingly, the findings of this research also provide green building investors, developers, and other market stakeholders with valuable insight for tapping into as well as navigating the huge potential market for green buildings.

The significance of this study is further highlighted by its contribution to the inadequate body of literature on demand-side drivers of green building adoption in Sub-Saharan Africa (Anzagira, Badu and Duah, 2019; Guribie *et al.*, 2021; Oyewole, Komolafe and Gbadegesin, 2021). Additionally, the study is the first to evaluate the impact of benefit awareness on consumers' willingness to pay for green buildings in Ghana, therefore will serve as a grounding for further research.

This study has limitations worth stating with regard to the recruitment of the sample. By employing a non-probability sampling technique and an online survey distribution system, the results of this study may not be statistically generalisable to represent the entire Ghanaian population. The research however sought to overcome this limitation by adopting a large sample size. Furthermore, this possible generalisability limitation does not tarnish the validity of results as the study sought primarily to provide insight into an area not clearly defined, and not specifically to provide generalisable results.

References

- Abraham, P.S. and Gundimeda, H. (2020) 'Greening offices: Willingness to pay for green-certified office spaces in Bengaluru, India', *Environment, Development and Sustainability*, 22(3), pp. 1839–1857. Available at: <https://doi.org/10.1007/s10668-018-0265-1>.
- Agyekum, K. *et al.* (2019) 'Barriers to the adoption of green certification of buildings', *Journal of Engineering, Design and Technology*, 17(5), pp. 1035–1055. Available at: <https://doi.org/10.1108/JEDT-01-2019-0028>.
- Anzagira, L.F., Badu, E. and Duah, D. (2019) 'Towards an Uptake Framework for the Green Building Concept in Ghana: A Theoretical Review', *Resourceedings*, 2(1), p. 57. Available at: <https://doi.org/10.21625/resourceedings.v2i1.452>.
- Attaran, S. and Celik, B.G. (2015) 'Students' environmental responsibility and their willingness to pay for green buildings', *International Journal of Sustainability in Higher Education*, 16(3), pp. 327–340. Available at: <https://doi.org/10.1108/IJSHE-04-2013-0029>.
- Azeem, S. *et al.* (2017) 'Examining barriers and measures to promote the adoption of green building practices in Pakistan', *Smart and Sustainable Built Environment* [Preprint].
- Chan, A.P.C. *et al.* (2018) 'Critical barriers to green building technologies adoption in developing countries: The case of Ghana', *Journal of Cleaner Production*, 172, pp. 1067–1079. Available at: <https://doi.org/10.1016/j.jclepro.2017.10.235>.
- Chatterjee, A.K. (2009) Sustainable construction and green buildings on the foundation of building ecology, *The Indian ConCreTe Journal*.
- Darko, A., Chan, A.P.C., Gyamfi, S., *et al.* (2017) 'Driving forces for green building technologies adoption in the construction industry: Ghanaian perspective', *Building and Environment*, 125, pp. 206–215. Available at: <https://doi.org/10.1016/j.buildenv.2017.08.053>.
- Darko, A., Chan, A.P.C., Ameyaw, E.E., *et al.* (2017) 'Examining issues influencing green building technologies adoption: The United States green building experts' perspectives', *Energy and Buildings*, 144, pp. 320–332. Available at: <https://doi.org/10.1016/j.enbuild.2017.03.060>.
- Darko, A. *et al.* (2018) 'Influences of barriers, drivers, and promotion strategies on green building technologies adoption in developing countries: The Ghanaian case', *Journal of Cleaner Production*, 200, pp. 687–703. Available at: <https://doi.org/10.1016/j.jclepro.2018.07.318>.

- Darko, A. and Chan, A.P.C. (2016) 'Critical analysis of green building research trend in construction journals', *Habitat International*, 57, pp. 53–63.
- Darko, A. and Chan, A.P.C. (2018) 'Strategies to promote green building technologies adoption in developing countries: The case of Ghana', *Building and Environment*, 130(December 2017), pp. 74–84. Available at: <https://doi.org/10.1016/j.buildenv.2017.12.022>.
- Djokoto, S.D., Dadzie, J. and Ohemeng-Ababio, E. (2014) 'Barriers to sustainable construction in the Ghanaian construction industry: Consultants perspectives', *Journal of Sustainable Development*, 7(1), pp. 134–143. Available at: <https://doi.org/10.5539/jsd.v7n1p134>.
- Golbazi, M., Danaf, A. el and Aktas, C.B. (2020) 'Willingness to pay for green buildings: A survey on students' perception in higher education', *Energy and Buildings*, 216. Available at: <https://doi.org/10.1016/j.enbuild.2020.109956>.
- Guribie, F.L. *et al.* (2021) 'Demand for green building in Ghana: a conceptual modeling and empirical study of the impediments', *Construction Innovation*, ahead-of-print(ahead-of-print). Available at: <https://doi.org/10.1108/CI-11-2020-0180>.
- He, C., Liu, X. and Li, J. (2022) 'The influence of information on residents' green housing purchasing behavior: different information contents and providers'. Available at: <https://doi.org/10.21203/rs.3.rs-1563232/v1>.
- How green building is facilitating rapid sustainable growth in Africa | World Green Building Council* (no date). Available at: <https://www.worldgbc.org/news-media/how-green-building-facilitating-rapid-sustainable-growth-africa> (Accessed: 25 June 2022).
- Hu, H., Geertman, S. and Hooimeijer, P. (2014) 'The willingness to pay for green apartments: The case of Nanjing, China', *Urban Studies*, 51(16), pp. 3459–3478.
- Hu, M. and Skibniewski, M. (2021) 'Green Building Construction Cost Surcharge: An Overview', *Journal of Architectural Engineering*, 27(4), p. 04021034. Available at: [https://doi.org/10.1061/\(asce\)ae.1943-5568.0000506](https://doi.org/10.1061/(asce)ae.1943-5568.0000506).
- Kats, G. (2003) 'Green building costs and financial benefits', *Massachusetts Technology Collaborative*, pp. 2–5.
- Khan, R.A.J., Thaheem, M.J. and Ali, T.H. (2020) 'Are Pakistani homebuyers ready to adopt sustainable housing? An insight into their willingness to pay', *Energy Policy*, 143. Available at: <https://doi.org/10.1016/j.enpol.2020.111598>.
- Lawluy, Y.K., Ntim, K.O. and Ahiadu, A.A. (2022) 'Willingness to Pay for Green Buildings in Ghana: What are the Influencing Factors?', in *Unpublished Submission: Proceedings of the 21st African Real Estate Society (AFRES) Annual Conference, 6th September – 9th September*.

- Li, Q., Long, R. and Chen, H. (2018) 'Differences and influencing factors for Chinese urban resident willingness to pay for green housings: Evidence from five first-tier cities in China', *Applied energy*, 229, pp. 299–313.
- Mohamad Bohari, A.A. et al. (2016) 'Insights into the adoption of green construction in Malaysia: The drivers and challenges', in Proceedings of the 7th Asia-Pacific International Conference on Environment-Behaviour Studies [Environment-Behaviour Proceedings Journal, Volume 1, Issue 4]. e-International Publishing House (e-IPH), pp. 45–53.
- Nguyen, H.-T. et al. (2017) 'Will green building development take off? An exploratory study of barriers to green building in Vietnam', *Resources, Conservation and Recycling*, 127, pp. 8–20.
- Njo, A., Valentina, G. and Basana, S.R. (2021) 'Willingness to Pay for Green Apartments in Surabaya, Indonesia', *Journal of Sustainable Real Estate*, 13(1), pp. 48–63. Available at: <https://doi.org/10.1080/19498276.2022.2036427>.
- Ofek, S., Akron, S. and Portnov, B.A. (2018) 'Stimulating green construction by influencing the decision-making of main players', *Sustainable cities and society*, 40, pp. 165–173.
- Ofek, S. and Portnov, B.A. (2020) 'Differential effect of knowledge on stakeholders' willingness to pay green building price premium: Implications for cleaner production', *Journal of Cleaner Production*, 251. Available at: <https://doi.org/10.1016/j.jclepro.2019.119575>.
- Oyewole, M.O. and Komolafe, M.O. (2018a) 'Tenants Willingness to Pay for Green Features in Office Properties', *Nigerian Journal of Environmental Sciences and Technology*, 2(2), pp. 233–242. Available at: <https://doi.org/10.36263/nijest.2018.02.0073>.
- Oyewole, M.O. and Komolafe, M.O. (2018b) 'Users' preference for green features in office properties', *Property Management*, 36(4), pp. 374–388. Available at: <https://doi.org/10.1108/PM-03-2017-0016>.
- Oyewole, M.O., Komolafe, M.O. and Gbadegesin, J.T. (2021) 'Understanding stakeholders' opinion and willingness on the adoption of sustainable residential property features in a developing property market', *International Journal of Construction Management* [Preprint]. Available at: <https://doi.org/10.1080/15623599.2021.1874676>.
- Retzlaff, R.C. (2009) 'Green buildings and building assessment systems: A new area of interest for planners', *Journal of Planning Literature*, 24(1), pp. 3–21. Available at: <https://doi.org/10.1177/0885412209349589>.
- Ries, R. et al. (2006) 'The economic benefits of green buildings: A comprehensive case study', *Engineering Economist*, 51(3), pp. 259–295. Available at: <https://doi.org/10.1080/00137910600865469>.

- Rosner, Y., Amitay, Z. and Perlman, A. (2022) 'Consumer's attitude, socio-demographic variables and willingness to purchase green housing in Israel', *Environment, Development and Sustainability*, 24(4), pp. 5295–5316.
- Sinha, A., Gupta, R. and Kutnar, A. (2013) 'Sustainable development and green buildings', *Drvna industrija*, 64(1), pp. 45–53.
- Takuh, V.K., Abang, F.A. and Akinyemi, S.O. (2021) 'Effect of Satisfaction with Conventional Housing on Willingness to Pay for Green Buildings in Makurdi', *Path of Science*, 7(12), pp. 2024–2030. Available at: <https://doi.org/10.22178/pos.77-4>.
- Takuh, V.K., Adeyemi, A. and Bello, M.U. (2021) 'Willingness to Pay for Green Building Features in the Medium-Income Residential Market of Makurdi, Nigeria', *Path of Science*, 7(11), pp. 4036–4045. Available at: <https://doi.org/10.22178/pos.76-11>.
- Tukker, A. (2005) 'Leapfrogging into the future: Developing for sustainability', *International Journal of Innovation and Sustainable Development*, 1(1–2), pp. 65–84. Available at: <https://doi.org/10.1504/IJISD.2005.008087>.
- World GBC Annual report (2021) 'WHO WE ARE world green building council'. Available at: www.worldgbc.org.
- Zalejska-Jonsson, A. (2014) 'Stated WTP and rational WTP: Willingness to pay for green apartments in Sweden', *Sustainable Cities and Society*, 13, pp. 46–56.
- Zhang, L. *et al.* (2016) 'The role of public information in increasing homebuyers' willingness-to-pay for green housing: Evidence from Beijing', *Ecological Economics*, 129, pp. 40–49.
- Zhao, D.X. *et al.* (2015) 'Social problems of green buildings: From the humanistic needs to social acceptance', *Renewable and Sustainable Energy Reviews*, 51, pp. 1594–1609. Available at: <https://doi.org/10.1016/J.RSER.2015.07.072>.