

USERS' AWARENESS AND PERCEPTIONS OF GREEN BUILDING IN KENYA

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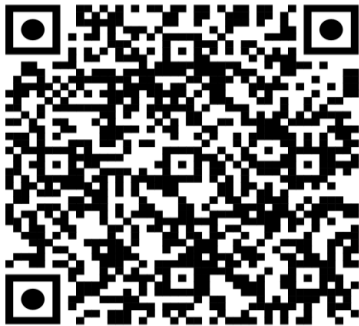
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Abstract

This study examined the users' awareness and perceptions to determine their awareness levels as it is crucial in increasing uptake of green buildings in Kenya. The study sample consisted of 22 randomly selected building users from 17 commercial buildings in Nairobi City County, Kenya. Using both descriptive (percentages, means) and inferential statistics (Principal Component Analysis, relative perception index) to analyse the data gathered. The findings revealed that the majority (63.6%) of the users were unaware of green buildings. In addition, the internet is the dominant channel through which awareness was acquired. Most respondents perceived green buildings as an environmental concept that was expensive to construct. Based on this study's findings, it was concluded that there was an urgent need to increase user awareness campaigns targeting green buildings' benefits. Green buildings' economic and social benefits should be lauded as much as the environmental ones. Such a move should involve all stakeholders, especially building industry investors.

Key Terms: Awareness, building users, perception, green building.

1.0 INTRODUCTION

Green buildings integrate strategies that consider the environment at every level of building construction. The main goal of green integration in buildings is to: protect users' health, improve their productivity, and achieve resource efficiency, thus reducing buildings' environmental impact (Amal & Kunal, 2021). The lack of sufficient information on the benefits of green buildings to its stakeholders is partly blamed for its low uptake in the building industry (Komolafe & Oyewole, 2018). Yet, the creation of green buildings has been alluded to as a strategy that provides immense benefits to its users and the environment. For instance, adopting green building strategies reduces cases of Sick Building Syndrome (SBS) and the rate of climate change. The number of buildings suffering SBS has increased, especially with the onset of Corona Virus pandemic, which has devastated the world (Mohammad et al., 2020). Findings have further established that availing information on green building locally to stakeholders would increase its uptake by informing decision-making (Mohanty, 2012). This was envisioned to catalyse the anticipated green uptake in Kenya and Africa at large. In such a circumstance, building stakeholders such as interior architects and building users play a crucial role in increasing green uptake. This was because interior architects are professionals mandated with prescribing and integrating green strategies in buildings (Nduka & Ogusnami, 2015), while users act as a market force. This was by demanding more green buildings and providing feedback on their performance through their experiences (Miosander et al., 2010).

Although past studies in the area have attempted to bridge the information gap mentioned in the paragraph above, many have not stressed the important role played by users' awareness/perception in promoting the uptake of green buildings. This was despite the importance played by users in demand for green buildings. The reviewed literature confirmed that numerous studies are mainly on the perceptions of users on comfort in green buildings (Johnson, 2019; Kaushik et al., 2020); Ghasem et al., 2019; Wan et al., 2018). The few studies that existed on users' perception and awareness of green buildings included (Brown et al., 2010; Ruqun 2016; Kamalofe & Oyewole 2018). For instance, Brown et al. (2010) examined users' knowledge and awareness of green features and systems in commercial buildings. It used online surveys involving six buildings based in the United Kingdom. Its findings revealed that users had low levels of knowledge and comfort on the performance of buildings (rating is 4.95 out of 9). In the United States of America, Ruqun (2016) assessed how green building designs communicate and affect awareness/perception among users. Ruqun's findings suggested that the building designs promoted user awareness although could not afford general knowledge on green building. Similarly, users' perceptions of green designs were experienced at different spatial scales.

On the other hand, Komolafe and Oyewole survey based in Nigeria examined levels, medium, perception, and awareness of 352 users of 176 buildings. It established that 24 per cent of the users were aware of the green concept via television as the main medium. In addition, the users perceived green buildings as linked to the environment and may be costly to build and manage. By examining the few studies on the area, it was evident that all were internationally based, thus lacking local information, especially on Kenya. Yet, local information is essential in advising and informing policy decision-making that is precise and relevant for an increased uptake of green in buildings. This study, therefore, filled in the gap by availing local information on users' perceptions and awareness of green buildings in Nairobi, Kenya. Not only are

the results of this study important in adding to the body of knowledge, but they are also vital in approaching awareness campaigns and effective marketing of green spaces in Kenya.

2.0 LITERATURE REVIEW

The building users are the immediate consumers of interior spaces and are not only the right stakeholders to give feedback on the space experience but are also the ones that create a demand for green buildings. Therefore, user awareness of the benefits of green buildings is key in increasing the uptake of green buildings (Waniko, 2014). Furthermore, Susilawati and Alsurf (2011) findings (in Nduka & Ogunsanmi, 2015) recommend that building stakeholders and the government make users awareness of green buildings a priority. The move would enlighten building users to set a demand for more green spaces, thus increasing its adoption in a country's building industry. In Stockholm, Sweden, Johnson (2019) surveyed users' opinions on satisfaction levels with the acoustic quality of both green and conventional buildings. Findings showed that the users of age 21 years and above rated acoustic quality are as high and were very satisfied with their buildings.

Furthermore, results show that their satisfaction with acoustic quality decreased with every perceived frequency of experiencing noise. In a Saudi Arabia-based study, Baird (2015) discovered that many building users lacked awareness of green buildings. It was also found that green rating tools lacked provision for recording users' feedback, i.e., expectations, experiences, and perceptions of the buildings. Yet, the best way to gauge a building's performance is by analysing users' opinions of it. Since users are the ones who regularly experience building spaces thus, do provide the right judgment of it. The study further revealed current rating tools to be only suitable for rating new buildings, emphasising technical performance such as energy and water efficiency.

In Sri-Lanka, Samarasinghe (2012) surveyed awareness of users on the green in homes, in addition to users' perceptions of living in green buildings. Using descriptive and inferential analysis, findings revealed that building/purchasing a green home depended on owners' awareness of green strategies, related health benefits, values attached to the environment, social-economic constrain and users' habits. In Indonesia at Jakarta and Banudng, a survey of 75 users from either conventional or green buildings was carried out on their perceptions of barriers to the implementation of green buildings. It was revealed that: burdensome implementation (59%), lack of supportive atmospheres (47%), resistance to change (36%), inadequate knowledge and information (34%), negligence (31%), high cost of green options (30%), insufficient supervision (21%), lack of awareness (18%), low availability of green products in the market (12%) and lack of building management participation were the perceived barriers (Wimalaa et al., 2016).

In Lagos Nigeria, Komolafe and Oyewole (2018) surveyed 352 office users of 176 properties to investigate levels, medium of awareness and perceptions of green building. Using descriptive analysis i.e., Measures of relative perception index it was found that only 23.6 per cent of the users were aware of green buildings and the dominant medium of awareness was, the television. The findings also reveal that most users perceived green buildings as an environmental aspect that costs more to build and operate. A South African longitudinal (6 months) study by Sharni (2014) used a mixed-method approach to explore the experiences and feelings of users in a green building. The study found that green buildings did not produce significantly better physical or psychological well-being, neither did it increase job satisfaction or perceived higher productivity. In Kenya, a survey was done by Langat (2015) on users' perceptions and

satisfaction with various IAQ elements in 5-LEED-Certified buildings. Inferential statistics were used to analyse correlation results showing that: thermal, lighting, acoustics, and hygiene/maintenance quality impacted most users' productivity. In contrast, furniture and workspace layout was only significant on the acoustic quality of the spaces.

From the studies reviewed above, it was apparent that few: Baird (2015); Komolafe and Oyewole (2018) focused specifically on users' awareness/perceptions of green building. The rest of the studies examined post-occupancy experiences inferred by measuring comfort and productivity. Notably, a large portion of the reviewed literature was largely internationally based. This implied that documentation of the local situation of awareness on green building among users in Nairobi, Kenya, is lacking. This study's findings, therefore, act to bridge the information gap identified by providing documented facts on users' awareness and perceptions of green building locally. This is important for informed decision-making to increase awareness among users and stir demand for more green buildings.

3.0 METHODOLOGY

This study involved a survey and, using simple random sampling, obtained data from a sample of 22 building users selected from 17 commercial buildings in Nairobi, Kenya. The study sample comprised males (12) and females (10) between 18-55 years old. The criteria for selecting users were those who spent at least eight hours working in the identified buildings. This is because they were presupposed to have vivid details of experiences of working in the buildings and would thus; provide valid perceptions for the study. The data collected from the sample users provided information on awareness of green and the perceived quality of building interiors. Inferential and descriptive statistics were employed in analysing the data; hence: frequency counts, percentages, mean and relative perception index were used. Specifically, frequency counts and percentages were employed on data related to green buildings' level and medium of awareness. While on the other hand, mean was used to analyse data concerning users' perceptions of green buildings. Next, users were asked to rank the variables measuring their perceptions on a five-point Likert scale to arrive at a viable conclusion. The Likert scale was calibrated 1-5, with one representing 'much less'; 2-'somewhat less'; 3-'about the same'; 4-'somewhat more' and 5-'much more'. Then using Principal Component Analysis to extract factor loadings, the ranking was achieved for each variable representing user perceptions identified. This enabled magnitude to be ascribed to each variable identified in users' perceptions of green buildings.

4.0 RESULTS AND FINDINGS

Demographics and Awareness of Building Users

To understand the building users' perceptions and thus their level of awareness on the green, their demographic details were as shown in table 1. It was important to provide demographic profiles of the respondents, as it created a background to better understand the outcomes and enhance reliability.

Table 1: Users' Demographics and Awareness of Green Buildings.

Item of Analysis	Gender	Age (years)	Education level	Awareness of green building	Channel of awareness
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	Male	Female	18-24	25-34	35-44	45-55	Secondary	College & above	Aware	Unaware	Television	Internet	Friend	Newspaper
Frequency	12	10	1	7	11	3	4	18	8	14	0	5	1	2
Percentage	54.5	45.5	4.5	31.8	50	13.6	18.2	81.8	36.4	63.6	0	62.5	12.5	25

In the sample population, most (54.5%) respondents were males, while 45.5% were females. Most of them were aged between 35-44 years, with a few (4.5%) between 18-24 years. Most (81.8%) of the users had a college education, yet a significant portion (63.6%) were unaware of green buildings. On the contrary, when the respondents were asked to gauge if the buildings they worked in were green or not, many (40.9%) perceived them as not, while 31.8% had no idea. Most users with awareness of green buildings acquired the information majorly (62.5%) through the internet. The other channels that enabled awareness of green buildings were newspapers (25%) and a word from a friend (12.5%), while television was mentioned by none (0%). These results implied that most building users were educated, yet, few were aware of the concept of green building, let alone its benefits for their well-being. Further, the internet seemed to be the most popular channel for acquiring awareness of the green, while word of mouth and television were the least popular.

Principal Component Analysis was used to extract the main perceptions to understand users' perception of green buildings compared to conventional ones. Then, users' perceptions and understanding of green buildings were ranked using factor loadings based on the extraction values. The ranking was in such a way that values closest to 1 were prioritised as users' critical perception of green buildings (this followed a similar consideration made in Komolafe and Oyewole 2018 study). The results were as indicated in Table 2.

Table 2: Users' Perception of Green Buildings in Comparison to Conventional Ones

Factor Loadings			
Perceptions of a green building	Initial	Extraction	Rank
a. Lowers environmental hazards	1.000	.871	5
b. Preserves natural resources, e.g. trees etc.	1.000	.916	1
c. Provides healthy building indoors.	1.000	.769	9
d. Construction cost is expensive	1.000	.892	3
e. Built with recycled material	1.000	.831	7
f. Reduces building maintenance costs.	1.000	.887	4
g. Creates convenient and comfortable interiors for working (reduced noise)	1.000	.897	2
h. Constructed using high-quality and durable materials	1.000	.795	8
i. Easy to maintain	1.000	.761	10
j. Its energy and water efficient	1.000	.836	6

The results in table 2 revealed three (3) main perceptions that describe/represent users' understanding of green buildings. Users understood green buildings as those that preserve natural resources (0.916) and create convenient and comfortable interiors (0.897) yet, are expensive to construct (0.892). Findings also showed that some descriptions did not fit as green according to the users/respondent. They included the 3(three) descriptions ranked last in the factor loadings. The descriptions were as a green building is easy to maintain (0.761), provides healthy indoors (0.769) and constructs using high-quality materials (0.795). Noticeably, the extraction values were close to 1, implying that the responses on indicators for most of the characteristics fell on the 4th point out of the 5 (five) points on a Likert scale, i.e., the option of 'some-what more'. It implies that users' perceptions of green buildings were balanced and not skewed towards a certain standpoint of sustainability. This finding proposes that users perceive most green building features correctly. Further, findings indicated that users perceived green buildings as expensive to construct and contributed less to their well-being/health.

Another important step in understanding the topic of study was to determine users' awareness and perceptions of the quality and conditions of the buildings they worked in. The results are recorded in table 3 after mean ranking was done to determine the most prevalent perceived condition. In cases where a tie occurred in the mean, a standard deviation with the lowest value took precedence.

Table 3: Users' Perceptions of their Building Conditions

Interior Conditions	N	Mean	Std. Deviation (SD)	Rank
Temperature too warm	22	1.18	2.039	3
Temperature too cold	22	1.73	2.164	2
Lighting too dim	22	3.91	1.998	1
Lighting too bright/glaring	22	.18	.395	7
Insufficient ventilation	22	.05	.213	9
Dusty air	22	.32	.477	5
Too little air movement	22	.23	.429	6
Air too dry	22	.09	.294	8
Air too humid	22	.32	.477	5
Distracting ambient noises	22	.05	.213	9
Unpleasant odour in the air.	22	.05	.213	9
Stale air	22	.45	.510	4

Findings identified the top three (3) conditions prevailing in the buildings as] perceived by users: lighting too dim (1), temperatures too cold (2) and temperatures too warm (3). The results confirmed the existence of some discomfort in the building conditions that may contribute to heightening/causing Sick Building Syndrome (SBS). In addition, the findings confirmed that users were fully aware of the quality of their building interiors. Although, most users were unaware that integrating green features would further improve the quality of their building environment.

This study's findings indicated that most of the building users were unaware (63.6%) of green buildings. The finding agrees with previous studies carried out by Baird (2015) in Saudi Arabia; Wimalaa et al. (2016) in Indonesia; Kamalofe and Oyewole (2018) in Nigeria; Samarasinghe (2012) in Sri Lanka, confirming low

awareness of green among building users. However, it is necessary to note that the earlier studies were based in developing and developed nations. Thus, countries' level of development may not necessarily influence the rate of awareness. In addition, users also had low levels of green awareness regardless of their education level. This is explained by the 81.8 per cent of the users who had a college education, yet few (36.4%) were aware of green buildings. The findings also revealed that although some users were aware of green buildings, they were not sure of their features. Therefore, they thought that for a building to pass as green, it must only have features enabling the use of solar energy. Yet, even building features that enable water efficiency are considered green, and a similar observation was recorded in Samarasinghe (2012). The findings, therefore, confirm the need to raise awareness of the features and benefits of green buildings. This is to help users appreciate the quality/healthy interiors created by green buildings and, in turn, set a demand for more of them. Hence, spur an increase in the development of greener buildings.

As much as this study illustrates the need to raise awareness of green buildings, it also identified the internet as a major channel of awareness. This finding contrast that of Kamalofe and Oyewole (2018), based in Nigeria, and that of Jamison (2008) in Washington, United States of America. In the mentioned studies, findings show that the main channel of green awareness was television. This meant that to effectively raise awareness on the green by reaching a wider audience of building users, it would be wise to spread the message through the internet and television. This is with the aim that if more users are aware of green, they will act as market agents to demand the delivery of more green buildings, as found by Miosander et al. (2010).

Another finding showed that users mainly perceived green buildings as preserving natural resources and creating convenient and comfortable working interiors but were expensive to construct. As observed, their perceptions fell into the three aspects of sustainability: the first described the environmental aspect, the second fitted the social aspect of healthy spaces, and the third expressed the economic aspect. It means that users' perceptions of the green building were balanced and not skewed towards a certain standpoint of sustainability. This finding concurs with Ibrahim (2019), implying that users' description of green was mostly of 'an environmentally friendly concept'. This could be advantageous when enhancing users' attitudes toward green buildings, ensuring their acceptance and demand for them. This finding is unlike that of Kamalofe and Oyewole (2018), where; users' perceptions were skewed toward the environmental aspect. This made the users perceive the green concept as Nigeria's government 'project', which may jeopardise their acceptance of it in future. Another user's perception was that green buildings were expensive to construct. This was a similar finding to Bond and Perrett (2012) in New Zealand and Kamalofe and Oyewole (2018) in Nigeria. It is, thus, necessary to note that the users had the correct perception of green buildings.

Lastly, it was found that users were aware of and keen on the quality of their buildings. This fact was confirmed by their ability to describe the discomfort experienced in those buildings. Majorly, complaints were on lighting being dim and temperatures being hot or too cold within. The descriptions also evidenced the existence of Sick Building Syndrome (SBS) to some degree, though users were unaware that integrating green in buildings curbs the condition. The finding is similar to those of Langat (2015), based in Kenya, and probably because they were all carried out in similar settings, i.e., Nairobi City.

5.0 CONCLUSION AND RECOMMENDATION

Conclusions: This study discovered low awareness of green buildings among users in Nairobi, Kenya. The common channel of awareness was the internet. Thus, exploiting the media to spread awareness of green buildings would be a viable venture as it has a broader audience/viewership consisting of users and investors. Furthermore, the users had a right and balanced perception of the concept of green and were also aware of the interior environmental quality of the buildings they worked in. It was therefore concluded that with more campaigns to raise user awareness of green buildings, there would be a demand increase for such spaces. This will result in healthier spaces, increased job productivity and well-being among building users. It was also noted that it is essential that awareness campaigns not only focus on creating awareness of the environmental benefits of green buildings but the economic benefits too. This attracts the interest of other users/stakeholders who are not necessarily environmentally conscious, for instance, interested in green building economic ventures.

Recommendations: The economic and social benefits of green buildings should be lauded as much as the environmental ones. Such a move should involve all stakeholders, especially building industry investors.

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