

ASSESSMENT OF THE EFFECTS OF PLANTS ON MARKET ENVIRONMENTS IN GARKI OF ABUJA AS AN AVENUE TO IMPROVE ARCHITECTURAL PRACTICES IN NIGERIA

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ABSTRACT: *The quality of architectural practices in Nigeria with regards to the use of plants for landscape in market buildings is not satisfactory when it is compared with international standards and this is a problem. To reduce this problem, a market in Garki in Abuja was studied with the aim of assessing the effects of plants in its environs, in order to generate guidelines from the research feedbacks to improve architectural practices with regards to the use of plants in the design of Nigerian markets. There are seven regional built-up markets under the control of Federal Capital Territory Markets Management Committee. Out of these markets, a market in Garki was studied via purposive sampling method. The instruments used for the collection of the primary data are questionnaires, focus group discussion and observation schedule. The secondary data were obtained from the review of relevant literature. Among the research findings are: most of the market buildings have no plants for landscape architecture; the use of personal electric power generators for artificial cooling and ventilation due to inadequate circulation of fresh air from plants in and around the market buildings causes fire outbreaks in the market. Among the generated guidelines are: it must be ensured by the Architects that all the market buildings should have plants for landscape architecture at the design stage; however, markets must have general electricity generator houses to minimise the use of personal electric power generators, in order to stop fire outbreaks as a result of their uses for artificial cooling and ventilation.*

KEYWORDS: architectural practices, environs, markets, nigeria, plants.

INTRODUCTION

Market environments are public places and authorised sites where people meet for business transactions; they are where almost all the basic human needs are sold in retails and wholesales (Chabbi-Chemrouk, 2007; Ngugi, 2015). The importance of markets in Nigeria cannot be over emphasised because of the various human needs in markets environments, especially in the Federal Capital Territory (FCT) of Nigeria where there are many markets and the large population of the FCT gave encouragement for the establishment of different markets in the territory (Federal Capital Development Authority of Nigeria, 2016). These markets are busy almost all the time with many people of different origins coming for business transactions. Vehicles that are loaded with goods of different kinds such as commercial fabrics; other portable properties, and agricultural products like, rice, beans, yam, tomatoes and fruits among others always come from the northern part of Nigeria to these markets where goods are sold. Similarly, different goods from the eastern, western and southern parts of the country are brought to these markets.

From the surrounding villages to FCT, products of agriculture like plantains, vegetables and fruits, animals for meat, and different goods are also brought to these markets. Consequently, in addition to other economic activities taking place in these markets, there is high volume of trade. Thus, the use of plants for conducive trading environments in markets is of paramount importance.

Plants help the environments in diverse ways. According to Missouri Botanical Garden (2009), one of the things that plants produce as they make food is oxygen gas, and this oxygen gas is an important part of the air to keep the cells and bodies alive when people breathe. According to Bonnefin (2016), in architecture, plants help to naturally cool and ventilate buildings via the oxygen gas. In addition, they help to mitigate air pollution by manipulating quantities of shrubs, trees, green roofs and green walls in building designs (Beth and Brad, 2008). Therefore, it became important that emphasis is given to the need to incorporate plants at the design stages of market buildings and their environs to improve architectural practices.

Lueth (2008) and Shen (2018) pointed out that architectural education is multi-disciplinary in nature and it often involves intensive practical exposures for effective architectural practices. According to Magaji and Ilyasu (2016), the quality of architectural education in Nigeria is low when it is compared with international standards. Thus, this has negative consequences on the architectural practices in Nigeria having consider the poor use of plants in market environments with resultant low satisfaction in terms of natural cooling and ventilation from plants (Agbonome and Abazuonu, 2014; John, 2017; Webmaster, 2014). Therefore, there is a need to improve the quality of architectural practices in Nigeria from the learning stage to the practical stage with regards to the incorporation of plants at the design stages of market buildings. However, this research was targeted to address only the practical stage of architecture, while the aspect of architectural education is recommended for future study.

To this end, this study aimed at assessing the effects of plants on market environments in Garki of Abuja, in order to generate guidelines from the research feedbacks to improve architectural practices with regards to the use of plants in the design of Nigerian markets. The objectives of this study are: to find out the levels of satisfaction of the sales people with regards to the comfort that is derived from the use of market buildings in terms of natural cooling and ventilation from plants; to investigate the levels of satisfaction of the buyers with regards to the comfort that is derived from the use of market buildings in terms of natural cooling and ventilation from plants; to ascertain the levels of the dependence of sales people on the use of electric power generators for artificial cooling and ventilation in the market; to assess the levels of the dependence of the sales people on the natural cooling and ventilation that are derived from plants in the market.

The study was conducted in Garki model market and the scope of the study is the entire internal environs of the market. Garki model market is located in the Federal Capital Territory (FCT) of Nigeria. The FCT of Nigeria is made up of six local councils; they are: the city of Abuja (Abuja Municipal Area Council), Abaji, Gwagwalada, Kuje, Bwari and Kwali (Satellite City Google Maps, 2016). Garki model market is found along

Samuel Ladoke Akintola Boulevard (off Karaye Street); it is situated in the central area of the Abuja Municipal Area Council of the FCT (Satellite Google Map Data, 2016).

METHODS AND PROCEDURES

The research utilised descriptive survey method, and thus quantitative and qualitative data were generated. According to the Federal Capital Development Authority (2016), there are seven regional built-up markets under the control of FCT Markets Management Committee; they are: Wuse market, Garki model market, Nyanya informal market, Gudu market, Kado market, Dei-dei regional and building material market, and Maitama farmers market. Out of these seven regional built-up markets, Garki model market is the only one that is located in the central area of the Abuja Municipal Area Council of the FCT of Nigeria (Satellite Google Map Data, 2016). In addition, Abuja Municipal Area Council of the FCT of Nigeria is one of the few purpose-built cities in Africa and it is the capital city of Nigeria (Murray, 2007; Nnodim, 2011). For these reasons, Garki model market was purposively selected for this study, so that this well located market in the central area of the Abuja Municipal Area Council of the FCT of Nigeria can be assessed with respect to the use of plants for its architectural design.

According to the managing company of Garki model market (Abuja Markets Management Limited, 2016), Garki model market is made up of 558 open stalls and 872 lock-up shops. Hence, by adding up the numbers of open stalls and lock-up shops in the market, it mathematically means that there are 1,430 sales points in Garki model market. Thus, systematic method of sampling was adopted because of the large size of the market for the study of the selected buildings; questionnaires were distributed to the sales people and buyers. This means that a questionnaire was given to one sales person and one buyer in the 1st selected sales point and the distribution of the questionnaires continued at the intervals of 5th sales points throughout the whole exercise in this market. Thus, by doing this with respect to the existing 1,430 sales points in this market, it mathematically means that 287 sales points were studied in this market. The 287 sales points selected for the distribution of the questionnaires are slightly above 20% of the total number of sales points in the market and this in turn has made the sample size to be acceptable because according to Prashant and Supriya (2010), Steve (2011); Suresh and Chandrashekara (2012), 20% sample size of the population of the study is a good recommended sample size. In essence, a total of 287 questionnaires were administered to both sales people and buyers in the market.

Other instruments used to collect the primary research data are direct observation schedule and discussions. The direct observations of the selected buildings were made with regards to the general use of plants around the market buildings. The actual standard number of participants in focus group for a research is 10 to 12 (Masadeh, 2012; Morgan, Gibbs, Maxwell and Britten, 2002). Hence, by rationalising this immediate statement, five number of focus group discussions that are made up of 10 participants (sales people) were organised in the market by randomly getting one participant from some of the selected buildings. The secondary data were gotten from the review of academic materials that are relevant to this study. Tables and photographs were used to present the data.

RESULTS AND DISCUSSION

In this section, the use of plants in relation to the market environments, and the levels of satisfaction of the market users with respect to the buildings in terms of ventilation derived from plants were discussed.

Use of Plants in Relation to the Market Environments

According to Missouri Botanical Garden (2009), one of the things that plants produce as they make food is oxygen gas, and this oxygen gas is an important part of the air to keep the cells and bodies alive when people breathe. However, it was observed that 85% of the market buildings that were studied have no plants for landscape architecture. This implies that most of the market buildings that were studied have no plants for landscape architecture and by this, there is insufficient oxygen gas for human use. It was observed that even the access road to the market has no plants for landscape architecture to maximise natural cooling and ventilation in the market environment. Hence, by considering 1,430 sales points in the market (Abuja Markets Management Limited, 2016), this implies that fresh air from plants is insufficient in the market environment where many people gather at the same time for business transaction. Plate I shows the buildings in the market without plants for landscape architecture.



Plate I: Buildings in the Market without Plants for Landscape Architecture (Source: Researchers' Field Work, 2021).

Also, some of the participants of focus group discussion revealed that there is no adequate fresh air circulation in and around the market buildings especially during the heat season, and this problem has encouraged the use of personal electric power generators for artificial cooling and ventilation when there are no public electric power supply. The participants of the focus group discussion further revealed that the use of electric power

generators in the market for artificial cooling and ventilation due to inadequate use of plants for landscape architecture is one of the causes of fire outbreaks in the market. The participants of the focus group discussion also showed that during the heat season, the air from the natural ventilation is always very hot and even though the traders put on fans, after some times the blowing air from the fans gets very hot because of the absence of plants (trees) to bring fresh air into the shops.

It was noticed that absence of plants such as trees in most areas of the market to serve as sun shading devices and where the sales people can stay for relaxation when there are no customers to sell goods has resulted to the use of umbrella stands in front of market buildings as sun shading devices. They stay under the umbrella stands to relax and receive fresh air in the afternoon when there are no customers for them to conduct business transactions, especially during the intense sunshine. These are considered as illegal additional designs and building attachments, and they can increase the rate of spread of fire when it breaks out in the market because umbrellas are not resistant to fire. Plate II shows a market building with umbrella stands in its front.



Plate II: Market Building with Umbrella Stands in its Front
Researchers' Field Work, 2021).

(Source:

Levels of Satisfaction of the Market Users with Respect to the Buildings in Terms of Ventilation Derived from Plants

Out of 287 questionnaires administered to the sales people in the market, 1.4% of the sales people responded that they are very satisfied with the market buildings in terms of the ventilation derived from plants. This means that this set of people have very sufficient trees for natural ventilation around their shops. 4.5% of the sales people responded that they are satisfied with the market buildings in terms of the ventilation derived from plants. This means that this set of people have sufficient trees for natural ventilation around their shops. 17.1% of the sales people responded that they are neither satisfied

nor dissatisfied with the market buildings in terms of the ventilation derived from plants. This means that the trees for the natural ventilation around the shops of this set of people are at average level. 35.2% of the sales people responded that they are dissatisfied with the market buildings in terms of the ventilation derived from plants. This means that this set of people do not have sufficient trees for natural ventilation around their shops. 41.8% of the sales people responded that they are very dissatisfied with the market buildings in terms of the ventilation derived from plants. This means that this set of people have very few or no trees for natural ventilation around their shops. Table 1 shows the levels of satisfaction of the sales people with respect to the market buildings in terms of ventilation derived from plants.

Table 1: Levels of Satisfaction of the Sales People with Respect to the Market Buildings in Terms of Ventilation Derived from Plants.

Response (Level of Satisfaction)	Frequency	Percent
Very satisfied	4	1.4
Satisfied	13	4.5
Neither satisfied nor dissatisfied	49	17.1
Dissatisfied	101	35.2
Very dissatisfied	120	41.8
Total	287	100.0

Source: Researchers' Field Work, 2021.

Out of 287 questionnaires administered to the buyers in the market, 1.1% of the buyers responded that they are very satisfied with the market buildings in terms of the ventilation derived from plants. This means that this set of people have very sufficient trees for natural ventilation around the shops. 3.1% of the buyers responded that they are satisfied with the market buildings in terms of the ventilation derived from plants. This means that this set of people have sufficient trees for natural ventilation around the shops. 13.9% of the buyers responded that they are neither satisfied nor dissatisfied with the market buildings in terms of the ventilation derived from plants. This means that the trees for the natural ventilation around the shops in the location of this set of people are at average level. 34.5% of the buyers responded that they are dissatisfied with the market buildings in terms of the ventilation derived from plants. This means that this set of people do not have sufficient trees for natural ventilation around the shops. 47.4% of the buyers responded that they are very dissatisfied with the market buildings in terms of the ventilation derived from plants. This means that this set of people have very few or no trees for natural ventilation around the shops. Table 2 shows the levels of satisfaction of the buyers with respect to the market buildings in terms of ventilation derived from plants.

Table 2: Levels of Satisfaction of the Buyers with Respect to the Market Buildings in Terms of Ventilation Derived from Plants.

Response (Level of Satisfaction)	Frequency	Percent
Very satisfied	3	1.1
Satisfied	9	3.1
Neither satisfied nor dissatisfied	40	13.9
Dissatisfied	99	34.5
Very dissatisfied	136	47.4
Total	287	100.0

Source: Researchers' Field Work, 2021.

CONCLUSION AND RECOMMENDATIONS

The importance of plants for natural cooling and ventilation in relation to the market buildings were over viewed. One of the things that plants produce as they make food is oxygen gas, and this oxygen gas is an important part of air to keep the cells and bodies alive when people breathe. In architecture, plants help to naturally cool and ventilate buildings via the oxygen gas. To this end, the study aimed at assessing the effects of plants on market environments in Garki of Abuja, in order to generate guidelines from the research feedbacks to improve architectural practices with regards to the use of plants in the design of Nigerian markets.

The research findings showed that: most of the market buildings have no plants for landscape architecture and by this, there is insufficient oxygen gas for human use; the access road to the market has no plants for landscape architecture to maximise natural cooling and ventilation in the market environment; the use of personal electric power generators for artificial cooling and ventilation due to inadequate circulation of fresh air from plants in and around the market buildings when there are no public electric power supply causes fire outbreaks in the market; during the heat season, the air from the natural ventilation is always very hot and even though the traders put on fans, after some times the blowing air from the fans gets very hot because of the absence of plants (trees) to bring fresh air into the shops.

Other research findings are: absence of plants such as trees in most areas of the market to serve as sun shading devices and where the sales people can stay for relaxation when there are no customers to sell goods has resulted to the use of umbrella stands in front of market buildings as sun shading devices, and they can increase the rate of spread of fire when it breaks out in the market because umbrellas are not resistant to fire; very few number of the market users are very satisfied with the market buildings in terms of the ventilation derived from plants, and most of the market users are very dissatisfied with the market buildings in terms of the ventilation derived from plants. Therefore, the following guidelines are generated to improve architectural practices with regards to the use of plants in the design of Nigerian markets:

1. It must be ensured by the Architects that all the market buildings have plants (trees) for landscape architecture at the design stages, so that sufficient oxygen gas or fresh air for human use can be made available, and to also serve as sun shading devices.

2. The Architects must also ensure the satisfaction of all the market users through appropriate use of plants for landscape architecture during the construction of markets.
3. It should be ensured by the Architects that the access roads to the markets have plants (trees) for landscape architecture to maximise natural cooling and ventilation in the market environments.
4. Markets must have general electricity generator houses to minimise the use of personal electric power generators when there are no public electric power supply, in order to stop fire outbreaks as a result of their uses for artificial cooling and ventilation.
5. Having ensured by the Architects that there are adequate plants (trees) in the markets, the management authority of markets should also ensure that the use of umbrella stands in front of market buildings as sun shading devices are stopped to reduce the rate of spread of fire in case it breaks out.

This study did not consider the different types of plants and their spacing around the market buildings to aid natural ventilation and cooling; this is a gap in knowledge. Therefore, in subsequent research of this kind, this gap should be filled.

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