USING ENVIRONMENTAL QUALITY INDICATORS TO IDENTIFY PRIORITIES FOR MARKET SPACE UPGRADING IN ILE-IFE, NIGERIA

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A B S T R A C T

The use of limited financial and human resources on specific environmental upgrading programmes is frequently pressed upon city planners and elected officials. The best way to prioritise these investments is not to rely on the officials' judgment and hunches. According to this study, the best way to identify priority programmes is through Traders' Importance Index (TII) and Traders' Satisfaction Index (TSI), which measure the importance traders attached to environmental amenities and the satisfaction they derived from them.Using stratified random sampling, a structured questionnaire was used to collect data for the study. For each of the 26 indicators of environmental quality, TII and TSI were assessed. The study suggests that, while the provision of facilities connected to indicators with higher TII but lower TSI should be given priority, it is important to determine and address the factors that may be causing traders to express low TII and TSI on a particular set of sensitive facilities.

Keywords: Market Space, Traders Importance Index, Traders' Satisfaction Index, Environmental Quality Indicator, Upgrading

Introduction

The term "environmental quality" (EQ) is used to describe the relationship between various factors that either positively or negatively affect the quality of the environment (Elarianeet al., 2013; Faisal & Shaker, 2017). RIVM (2002) defined EQ as an essential part of the wider concept of ―quality of life‖, the basic qualities, such as health and safety in combination with aspects like coziness and attractiveness. It is the overall view of a place and the constituent components, that is, natural resources, infrastructure, open space, constructed environment, amenities in the physical environment, and nature all have unique qualities (Kamp et al., 2003).

An important way to assess urban EQ is to use indicators. In the literature on measuring urban EQ, there are two categories of indicators: objective and subjective. Both

indicators, as noted by Cummins (2000), are crucial to gaining understanding of the link between people and their environments. The physical (external) characteristics or observable conditions of an environment are called objective indicators. These characteristics or conditions are typically obtained from secondary data and include things like the availability of health care, education, crime, recreational opportunities, housing, demographic and socioeconomic information, independence, social functioning, economic stability, physical health and functioning, and privacy (Aminsalehi, 2008; Costanza, 2008; Adetunjiet al., 2018). The trademark of the objective criteria is that they are founded on factual, quantifiable information as opposed to on people's subjective interpretations of their social surroundings. The objective indicators are, therefore, connected to factors of socio- economic or environment.

Contrarily, subjective measure or indicator permits us to learn about a person's contentment or wellness, as well as about the things they value (Kamp et al., 2003). The ability to analyse both the overall environmental quality and the many domains that include i t , including neighborhood, housing, social connection, environment, health, employment, and the family, among others, is a significant advantage of the subjective measure (Santana et al., 2018; Krishnan & Firoz, 2020; Javanbakhtet al., 2021). Kamp et al. (2003) in their study noted that a combination of the two approaches is desirable.

The application of both subjective and objective indicators in the specific context of environmental quality has drawn more and more attention from academic disciplines. Recent developments in a number of fields, such as epidemiology (Orruet al., 2018; Bettiet al., 2020); quality of life (Liao et al., 2015); and housing economics, have used both objective and subjective measures (Berezanskyet al., 2010). However, not much work exists on the use of objective and subjective indicators in measuring environmental quality of an urban space, like market. The perspective of using both objective and subjective measures of environmental quality of this particular aspect of urban space can allow for sustainable development.

Market space refers to a broad range of organisations, procedures, social structures, and infrastructure that enable traders to exchange their lab our, commodities, and services for money with consumers (Zakariyaet al., 2016). It can also be defined as an authorised space with or without buildings used for economic activities, whereby the buyers and sellers converge at specified locations and time or at a time set within a certain interval (Fakere&Fadamiro,

2012). Thus, in all culture, the market plays a significant role in people's daily lives.

Generally, market is significant to people's social, economic, religious, cultural and political lives (Agoola, 2021). However, the socio-economic sustainability of the space is at stake, especially in Nigeria, due to serious environmental problems, such as congestion, inadequate water supply, water and air pollution, solid waste generation, inadequate or non-functional sanitary facilities, among others, that are prevalent (Abejegahet al. 2013; Ebnaet al. 2013;

Daramolaet al, 2017; Taiwo & Fajoye, 2022). For instance, it has been noted that the sanitary situations of market spaces in Nigerian urban centres are not particularly clean due to the prevalence of open defecation and micturition in available open spaces (Daramolaet al, 2017). Taiwo and Fajoye (2022) opined that the contamination of the environment as a result of these heinous behaviours contributes to environmental degradation. The unsanitary conditions could be attributable to gross scantiness of environmental facilities, such as public toilets, water supply, waste disposal amenities, among others (Lade et al., 2012; Ekong, 2013). According to Fakere and Fadamiro (2012), these environmental issues might lead to the development of infectious illnesses with a high potential that, if unaddressed, would reach epidemic proportions. Thus, the market is a form of space in Nigeria's urban landscape that requires a lot of attention in upgrading exercise.

The upgrading programme is a workable choice for improving the market space' s environmental quality and, inadvertently, the quality of life of the traders who use it. The identification of programmes that would satisfy the needs and aspirations of traders should not be reliant on the guesswork and instinct of elected officials so as to make sure the activity attains its intended goals.

It is a widespread habit, particularly in global south, for the government officials to devote people's funds in developmental projects that they have launched instinctively without taking the goals and requirements of the target audience into consideration. There are examples of upgrading projects that previous State and Local Governments started without including the public. Public funds invested in renovation projects in a number of such instances have had little to no success because they were founded on erroneous priorities.

The selection of initiatives that should be prioritized is an all-inclusive and wide-ranging decision-making process. Considering the opinions of several people and groups with diverse interests on the significance given to and satisfaction derived from various indicators of the quality of the environment is one of the most important methods for doing this. There are enough

examples to show that the practice of using environmental indicator assessments from the general public as input for environmental improvement is essential for identifying the most important advancements that will best serve the demands of the general public (Senlier, Yiediz & Aktas, 2009; Boroushaki & Malczewski, 2010; San Cristobal Mateo, 2012). Each individual is given the opportunity to assign a certain number of scores or weights to every identified environmental quality indicator when doing the evaluation. When organized in order of magnitude, the cumulative view stated on each indication tells, for example, which of these indicators is thought to be the most essential overall.

According to Wang et al. (2009), the aforementioned method belongs to the family of multi-criteria analyses. In response to the requirement for the development of techniques for evaluating alternatives to environmentally sensitive projects, families of multi- criteria models have been developed in a number of a reasearch (Grzeskowiak et al., 2003; Barton et al., 2010; Marttunenet al., 2013; Kara & Akçit, 2021; Beinat, 2021). The studies mentioned above are all focused on developed nations. In the developing nations of the world, this method of decision-making has not been frequently used (Afon, 2006). Therefore, the goal of this work is to construct some particular types of multi-criteria urban environmental decision-making models, known as Traders' Importance Index (TII) and Traders' Satisfaction Index (TSI), that are suitable for emerging nations. City planners and elected representatives who are pressurized to make the best use of limited human and financial resources could use the data to pinpoint priority projects that really reflect the needs and ambitions of urban space users, especially traders in market spaces. The study is focused on market spaces in Ile-Ife, Nigeria.

Methodology

The study area is Ile-Ife, which is an important town in South western Nigeria. The city is regarded as the cradle of Yoruba people and the centre of civilization. It is located between Latitudes 7°28′N and 7°45′N and Longitudes 4°30′E and 4°34′E. Ile-Ife has a population of about 501,952 (Ajala & Olayiwola, 2013). The town consists of four Local Government Areas (LGAs), namely: Ife Central, Ife East, Ife North and Ife South. Ile-Ife has a number of markets, ranging in size from small to large.

Among the largest of the markets in the town were Oja-Ife, Olubuse, ItaAkogun, Bonfo, Arubidi, Urban day, Better Life, Akarabata, Odo- Ogbe, Apollo and Olorunsogo. However, Odo-Ogbe, and Olorunsogo markets were chosen for this investigation. Besides the fact that the markets were among the largest, they were also selected because

they served the function of local and metropolitan marketplaces. Goods sold in the markets included food and finished products, such as cassava flakes, grains, tubers, frozen foods, yam flour, shoes, electronics, bags, plastics; imported shoes, clothing and bags, kitchen utensils, provisions, among others. The markets were characterised with lack of drainage system, inadequate parking spaces, and overcrowding, as well as their poor road conditions, run-down stores, insufficient supply of power and water, lack of fire services, poor sanitation facilities, poor waste disposal system, and so on.

The main focus of this study was to determine how satisfied the traders were with a few identified indicators— social, economic and environmental attributes— that represent their actual needs. This measurement is carried out by the analysis of information obtained through a structured questionnaire. In administering the questionnaire, preliminary survey was first conducted. It was shown that Odo-Ogbe and Olorunsogo markets had 3360 shops. The first shop sampled was chosen at random. The following units of inquiry were chosen uniformly at intervals of every 10th shop. Respondents were given questionnaires to complete by trained research assistants. Where the chosen respondent was illiterate, the trained research assistant provided interpretation, and the responses were recorded on the questionnaire in the appropriate manner. Thus, a total of 336 traders were surveyed from the markets.

In this study, twenty-six (26) environmental quality indicators were utilized. The traders were requested to rate each of the indicators using Likert's scale of very important, important, just important, not important and not at all important. Weight values of 5, 4, 3, 2, and 1 were given to these ratings throughout the analysis. The TII for every indicator was gotten by dividing the total of the weight value (TWV) by the total number of traders. The TWV is the summation of the result of the multiplication of the numbers of responses to every indicator and the weight value assigned to each rating (see Taiwoet al. 2022). Also calculated was the mean of the TII distribution, which was obtained by dividing SWV by the total respondents that rated each indicator. This procedure was also used in obtaining indices on the satisfaction traders derived from the environmental attributes, with some necessary modifications.

Results

The level of importance traders attached to every identified environmental quality indicator and the satisfaction they derived from them are presented in Table1. As shown in the table, availability of electricity supply was the indicator with the highest TII (4.74), while absence of air pollution was with the least TII of 1.89. This implied that traders attached high level of importance to

availability of electricity supply, but considered absence of air pollution not to be important. The TII mean for the study area was 3.79. Other indicators, such as clean and healthy environment, quality and reliability of services and facilities provided by government, availability of water supply and proximity to health care facilities, had their TII higher than the study area's mean. The respective TII of these indicators were 4.56, 4.52, and 4.44 each (in that order). The TII of thirteen (13) indicators were higher than the study area's average of 3.79 (See Table 1).

Besides absence of air pollution, four other indicators with the least in importance as identified by the traders were: police service in this market, fire service, safety in the market and absence of water pollution. The TII of these indicators were 3.48, 3.44, 3.41 and 2.07, respectively. This implied that the indicators were least considered by traders as important in the markets. The low level of importance attached to the indicators could mean that the traders were enjoying those services or they did not attach importance to their safety and services that could guarantee their security.

Table 1: Importance traders attached to and satisfaction derived from environmental quality indicators in the markets

Indicator	TII	(TII-TII Mean)	Indicator	TSI	(TSI-TSI Mean)
Availability of electricity supply	4.74	0.95	Interpersonal relationship exists among Traders	4.67	1.17
Clean and healthy environment	4.56	0.77	Proximity to healthcare facilities	4.52	1.02
Quality and reliability of services and facilities provided by government	4.52	0.73	Physical condition of stalls/shops	4.12	0.62
Availability of water supply	4.44	0.65	Good condition of roads	4.10	0.60
Proximity to healthcare facilities	4.44	0.65	The support I get from other people	4.05	0.55
The support I get from other people	4.44	0.65	Proximity to recreation facilities	3.98	0.48
Availability of open spaces	4.15	0.36	Fire service	3.98	0.48
Access to public toilets	4.11	0.32	Availability of water supply	3.90	0.40
Physical condition of stalls/shops	4.07	0.28	Economic opportunities	3.90	0.40
The quality of goods I sell in this market	3.93	0.14	Noise pollution	3.83	0.33
Proximity to religious centre	3.93	0.14	Availability of open spaces	3.74	0.24
Access to waste disposal facility	3.85	0.06	Proximity to place of residence	3.71	0.21
Good road network	3.81	0.02	Sense of belonging in this market	3.69	0.19
Good condition of roads	3.78	-0.01	The quality of goods I sell in this market	3.67	0.17
Proximity to place of residence	3.74	-0.05	Proximity to religious centre	3.67	0.17
Proximity to recreation facilities	3.70	-0.09	Good road network	3.57	0.07
Interpersonal relationship exists among traders	3.70	-0.09	Safety in the market	3.55	0.05
General maintenance of this market	3.63	-0.16	Access to public toilets	3.43	-0.07
Economic opportunities	3.59	-0.20	Access to waste disposal facility	3.43	-0.07
Noise pollution	3.59	-0.20	Clean and healthy environment	3.40	-0.10
Sense of belonging in this market	3.52	-0.27	General maintenance of this market	3.36	-0.14
Police service in this market	3.48	-0.31	Availability of electricity supply	3.24	-0.26
Fire service	3.44	-0.35	Quality and reliability of services and facilities provided by government	3.07	-0.43
Safety in the market	3.41	-0.38	Police service in this market	2.98	-0.52
Absence of water pollution	2.07	-1.72	Absence of water pollution	1.88	-1.62
Absence of air pollution	1.89	-1.90	Absence of air pollution	1.83	-1.67
	98.53			93.27	
TII Mean	3.79		TSI Mean	3.50	

Source: Authors' field work

To determine the difference between the traders' needs and the quantity and quality of environmental attributes that may fulfill those needs and aspirations, the TSI was calculated for each variable. This is also presented in Table 1. The indicator with the highest TSI

(4.67) was interpersonal relationship exists among traders. This suggested that traders' interpersonal relationships with one another were quite positive. The deviation of the highest TSI about this mean was 1.17. Among other indicators that traders were satisfied with were: proximity to health care facilities, physical condition of stalls/shops, good condition of roads and the support I get from other people. The TSI of these indicators were 4.52, 4.12, 4.10 and 4.05, respectively. From Table 1, the environmental quality indicator with the least TSI was absence of air pollution (1.83). The deviation of this indicator about the mean of TSI was -1.67. Four other indicators with negative deviations about the mean of TSI were absence of water pollution, police service in this market, quality and reliability of services and facilities provided by government and availability of electricity supply. Their respective TSI were 1.88, 2.98,

3.07 and 3.24.

The level of importance attached to and the satisfaction derived from the environmental quality indicators can be more appreciated through their polarization using the deviations about the means of TII and TSI. To achieve this, the twenty-six (26) indicators were polarized into four groups. These were:

Group A: this group comprised indicators with positive deviation about the mean of TII, but with negative deviation around the mean of TSI (Table 2). These indicators were considered as very key to the survival of the users. The indicators represented facilities that were highly important to the traders in determining their environmental quality and socio- economic sustainability. However, the current levels of the services and facilities were not satisfactory. These indicators were availability of electricity supply, clean and healthy environment, access to public toilets, access to waste disposal facility, quality and reliability of services and facilities provided by government. Their deviations around the mean of TII were 0.95, 0.77, 0.32, 0.06 and 0.73, respectively. The respective deviations about the TSI mean were -0.26, -0.10, -0.07, -0.07 and -0.43.

Group B: indicators in this second group were with positive deviation about the mean of both TII and TSI. Environmental facilities and services in this group were considered to be of some importance to the traders. Additionally, satisfaction was derived from the associated facilities and services. Indicators in this grouping were availability of water supply, proximity to health care facilities, the support I get from other people, availability of open spaces, physical condition of stalls/shops, the quality of goods I sell in this market, proximity to religious centre and good road network. Their deviations around the means of TII and TSI were 0.65 and 0.40, respectively; 0.65 and 1.02; 0.65 and 0.55; 0.36 and 0.24; 0.28 and 0.62; 0.14 and 0.17; 0.14 and 0.17; and 0.02 and 0.07. Indeed, the

deviation around the mean of the TSI of each of proximity to health care facilities , physical condition of stalls/shops, the quality of goods I sell in this market, proximity to religious centre and good road network was higher than their respective TII. This implied that facilities associated with these indicators were available both in quantity and quality that highly pleased the traders. For instance, virtually every road was reasonably interconnected such that goods and services were easily transported to different sections of the markets. Easy access to health care facilities and religious centre was also ensured because of their closeness to the markets. However, there was a significant difference between the deviations about the means of TII and TSI for such indicators as availability of water supply, the support I get from other people and availability of open spaces. This shows that environmental factors in the markets need to be improved in order to increase traders' happiness.

Table 2: Grouping of indicators based on deviation around the means of TII and TSI for markets

INDICATORS	Deviation about mean of TII	Deviation about mean of TSI	Group
Availability of electricity supply	+0.95	-0.26	A
Clean and healthy environment	+0.77	-0.10	
Access to public toilets	+0.32	-0.07	
Access to waste disposal facility	+0.06	-0.07	
Quality and reliability of services and facilities provided by government	+0.73	-0.43	
Availability of water supply	+0.65	+0.40	B
Proximity to healthcare facilities	+0.65	+1.02	
The support I get from other people	+0.65	+0.55	
Availability of open spaces	+0.36	+0.24	
Physical condition of stalls/shops	+0.28	+0.62	
The quality of goods I sell in this market	+0.14	+0.17	
Proximity to religious centre	+0.14	+0.17	
Good road network	+0.02	+0.07	
Good condition of roads	-0.01	+0.60	C
Proximity to recreation facilities	-0.09	+0.48	
Fire service	-0.35	+0.48	
Economic opportunities	-0.20	+0.40	
Noise pollution	-0.20	+0.33	
Proximity to place of residence	-0.05	+0.21	
Sense of belonging in this market	-0.27	+0.19	
Interpersonal relationship exists among traders	-0.09	+1.17	
Safety in the market	-0.38	+0.05	
General maintenance of this market	-0.16	-0.14	D
Police service in this market	-0.31	-0.52	
Absence of water pollution	-1.72	-1.62	
Absence of air pollution	-1.90	-1.67	

Source: Authors' field work

Group C: the third group consisted of indicators with negative deviations about mean of TII, but positive deviation about the mean of TSI. The indicators were not too important to the environmental quality of traders but were highly satisfactory to them. Variables in this category included good condition of roads, proximity to recreation facilities, fire service, economic opportunities, absence noise pollution and proximity to place of residence. Others were sense of belonging in this market, interpersonal relationship exists among traders and safety in the market. Some of these indications were components that had assimilated into the sociocultural lives of the market traders. Since these were likely to form part of their daily living, they were not considered by traders as important; however, a level of satisfaction was derived from the interaction.

Group D: the last group had indicators with negative deviations around both TII and TSI means. These indicators were general maintenance of this market, with deviations of -0.16 (around the mean of TII) and -0.14 (around the mean TSI); police service in this market (-0.31 and -0.52); absence of water pollution (-1.72 and -1.62); and absence of air pollution (-1.90 and -1.67). The amenities associated with these indicators were those that were either not seen to have any bearing in determining the environmental quality or for which there was a suitable replacement or, in a similar way, the satisfaction with the services that were already provided to them was equally low. There were no police posts in any of the markets, for instance, yet traders were not affected too much by this because there were police stations within a reasonable distance outside the markets. Additionally, most of the traders hired security guards to protect their stores.

Implications and conclusion

The study is particularly interested in two of the aforementioned four groupings. First is group A, with indicators that were of positive and negative deviations around the means of TII and TSI, respectively. These comprised indicators that were highly s i g ni fi cant in influencing traders' environmental quality and socio-economic sustainability, but grossly inadequate.

To ensure effective upgrading that would improve the environmental conditions of the traders in the markets, attention must be focused on adequate electricity supply, clean and healthy environment, provision of public toilets and waste disposal facility, quality and reliable services and facilities. These accurately represent the environmental issues of the market spaces at the time of data collection. Thus, upgrading works of var y ing magnitudes are required to rescue the environmental situations of the study area. Facilities for sensitive matters, like environmental sanitation, must be offered in adequate numbers and maintained in good

condition. This will significantly help in addressing the situations of indiscriminate dumping of waste, open urination and defecation in drains and spaces within the markets. It is incumbent on the local governments to buy electric power transformers under conditions that will be decided upon by the power distribution company and the local governments in order to ensure adequate power supply in the markets. In addition, the market users must be made to understand the importance of early bill payment, notifying appropriate authorities as soon as possible when electrical poles are destroyed and the necessity to stop damaging the equipment that provides power. It is also essential to provide traders and other market users with environmental education, like safe refuse disposal practices, so as to create market spaces that are clean and healthy to operate in.

Group B is the second group of significant interest, containing indicators with positive deviations around both TII and TSI means. These indicators can further be polarized into two: those that have fairly high deviations about the mean of TSI and indicators that have fairly low positive deviations about the mean of TSI. Included in the first category were indicators, such as good road network and physical condition of stalls/shops. It is suggested that roads must be maintained so that their interconnectivity will not be obstructed and, thus, reduce traders' satisfaction. Displaying of wares along the roads and on-street parking of vehicles should be prohibited. This is because these activities make it extremely difficult for vehicles to access different sections of the markets for loading and off- loading of goods.

On indicators that had fairly low positive deviations about the mean of TSI, like availability of water supply and availability of open spaces, it is suggested that frantic efforts should be made to improve them so as to increase traders' satisfaction. The local authorities must construct submersible pumps and boreholes in the markets so that water may be pumped from the wells to overhead storage tanks. To supply water to all shops, pipeline networks might be connected to the overhead tanks. Initial funding for such a project might come from the World Bank, Urban Development Bank, or other cooperating organizations. However, adequate financial planning and ways to recover expenses from the traders must be developed. Involvement of the traders in local government operations will be made possible by this.

The open spaces within the markets need to be maintained physically to enhance traders' satisfaction. Most open spaces had been turned into havens of unhygienic practices, like dumping of refuse, open urination and defecation. These practices are dependent on effective open space utilization literacy. Thus,

campaign to raise market users' awareness about proper use of available open spaces is essential in achieving open space sustainability. Billboards and banners placed in the market areas will help spread the word about this initiative.

Whereas this paper maintains that the above two groups of indicators in the study area must be pursued based on suggested priorities, other areas where traders had been satisfied and contented should not be allowed to weaken or depreciate. The enjoyment that traders derive from their relationships with one another should not be allowed to sever as that is the foundation of African communal life. Even the indicators that were regarded to be of low priority by traders in the determination of the quality of the environment, like safety in the market, should not be sabotaged or incapacitated considering the high level of insecurity in the country.

It is similarly crucial to make a brief observation regarding the fourth identified group of environmental quality indicators. Concerns should be raised over the negative deviations around the means of both the TII and the TSI for significant environmental indicators, such as general maintenance of the markets. That traders were not happy about the general maintenance of the markets suggests that there is the possibility of the traders using their hard-earned resources to carry out general maintenance of the markets, which could be affecting their profit margin. Thus, it is suggested that traders should be required to provide only minor maintenance while major repairs be done by the local and state governments or through loans to traders after a careful study. If the loan option is considered, it may have to be paid out through Cooperative Societies for easy retrieval. This will not only ensure that loans can be repaid quickly, but it will also entice traders to join the societies and instill as aving culture in them. The governments are advised to provide the first funding for the revolving loan.

The TII and TSI are practical and simple-to-use tools for determining priority projects when upgrading is to occur either in industrialized or emerging countries. In cases where all the four types of variables have been identified, efforts must be made to pinpoint the causes of traders' low satisfaction ratings while simultaneously dismissing some critical environmental amenities as unimportant. This is essential because it could suggest that environmental education is equally as important as providing physical amenities.

Conflict of Interest Statement

The authors have no conflict of interest to declare.

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