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Walking experience in mixed use developments in Lagos, Nigeria

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Abstract

Mixed use development serves as an important tool in tackling the very many challenges caused by urbanisation. Furthermore, it provides the city with some sort of architectural identity by infusing the culture, and socio economic characteristics of the people into it. The modern day transitioning into mixed use development have become a viable way of efficiently maximising land use and improving the overall sustainability of the environment. One of the goals of mixed-use developments is to ensure pleasant pedestrian experiences. However very few studies have focused on the experiences of pedestrians in these mixed use developments. This paper presents findings from a survey aimed at investigating pedestrian experience at various urban crosswalks and facilities in mixed use developments in Marina, Lagos State, Nigeria. The study investigated the influence of walkability features on walking experience and how walking experience influence the satisfaction of occupants of mixed use developments in Marina, Lagos, Nigeria. The methodology employed is the questionnaire survey approach with data analysed using frequency distribution, mean ranking and categorical regression analyses. The findings of the study suggest that new designs of this type of buildings should take into consideration the distance between adjacent buildings in order to ensure that the pedestrians are able to have a pleasant experience. Furthermore, there is need to provide for lighting features to enhance pedestrian experience. The place of pedestrian walk designs with the shortest routes and non-slip surfaces in enhancing occupants' satisfaction were also highlighted.

Keywords

Mixed use developments, Pedestrian experiences, Pedestrian satisfaction, Walkability, Walking experience.

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1. Introduction

Mixed use development has been regarded as one of the vital tools to ensure sustainable development (Lee et al., 2013). This is because it creates an avenue for multiple use of land for different functions. Mixed use developments have the goal of altering the existing pattern of urban growth to prevent urban sprawl (Herndon, 2011). According to Bahadure and Kotharkar (2015), it entails the co-existence of more than one type of land-use function such as the use of land for residential, commercial, recreational, and educational purposes in a specific area. Therefore, the construction of mixed use developments has the potential to create socio-economic benefits for a community.

Striebig et al. (2016) noted that one social benefit of mixed use areas is the decreased dependency on cars, which can lead to less traffic congestion and lower greenhouse gas emissions. This is not only beneficial for the environment, but a more pleasant experience overall for everyone involved. This calls for a pedestrian-friendly environment which encourages residents to have more active travels (Larco et al., 2012).

Despite the numerous benefits and the need for the establishment of mixed use developments to ensure sustainable development, most of these buildings are designed without taking into consideration users' perception, thereby, leading to poor experiences for the users. Lee et al. (2013) noted that most of mixed use developments are often associated with high noise levels and unorganised space layouts, all culminating into an unpleasant pedestrian experience. However, Herndon (2011); and Nared and Lamovšek (2015) suggested that mixed use developments are meant to attract pedestrians to the streets. In fact, this is necessary for urban vibrancy (Jurkovič, 2014). As such, pedestrian circulation is one design element that is vital for the success of mixed use developments. There has however been little or no empirical research on pedestrians' perception of mixed use development in Nigeria, to inform the design process. Therefore, this study aims at empirically investigating pedestrian experience in mixed use developments in Lagos, Nigeria with a view to facilitating the improvement of the designs of these sites and enhancing pedestrian experience. The study answered two questions: (1) which pedestrian features influence walking experience in mixed use developments? (2) How does pedestrian experience influence the satisfaction of the occupants of the mixed use developments in Lagos, Nigeria? This study is justified on the need to identify the site features that influence walking experience to inform the design of future similar developments. Mixed use developments always aim at enhancing pedestrian experience. Very few studies have however investigated the influence of pedestrian experience on the satisfaction of occupants of those developments. The second justification is therefore based on the need to contribute to literature on pedestrian experience and occupants' satisfaction, especially in relation to mixed use developments. A study of this nature is important to architects and urban designers, as it will inform future designs of similar developments. The study will also provide the much needed empirical data to inform review of planning and development standards for mixed use buildings.

2. Literature review

Historic cities have been said to be mixed use in nature and developed spontaneously. In fact, Raman and Roy (2019) asserted that mixed land use is the natural pattern of human settlement. With the advent of the industrial era, municipalities began to zone buildings. Mixed use developments as we know them today are however a reinvention, as intended mixtures of complimentary land uses (Niemera, 2007). Wardner (2014) noted that mixed land uses were advocated as a strategy to mitigate the limitations of zoning and segregation; and realise sustainability and smart growth goals. Mixed land uses have been categorised in two different ways by Raman and Roy (2019). The first is the planned/ unplanned mixed land uses; while the second is composite/ tonal/ zonal mixed land uses. The settlements that develop spontaneously mixed land uses are referred to as unplanned. These are predominantly in core city areas, sprawls and fast-growing settlements. The planned mixed

land uses often develop through densification and urban renewal attempts of government. While composite mixed land uses have no predominant land use, the tonal mixed land use have a predominant land use, and the zonal mixed land use make deliberate zones with specific predominant land uses. The planned mixed land use development is the focus of this paper.

Raman and Roy (2019) described mixed use developments as real estate developments that have more than one land use. Such developments are further characterised by integration of components, such that pedestrian connections are uninterrupted. These developments conform to a coherent plan, contain elements or work, play and live; and have amenities to mitigate traffic and sprawl. As such, mixed use developments are designed to reduce reliance on automobiles. In addition to decreased dependency on cars in mixed-use developments, (Striebig et al., 2016) the sharing of community space, such as parks and plazas for different purposes provides an opportunity for more interaction among residents, thereby, strengthening social ties throughout the community. This also translates into economic benefits, as Bahadure and Kotharkar (2015) opined that a community with mixed land-use promotes a high level of economic activity, therefore, providing sources of income especially for dwellers in the community. Whitherspoon et al. (1976) defined the concept of mixed use development as the development of a particular area with many significant revenue producing outlets such as retail, offices, residential, and entertainment among others. These spaces are well planned and mutually supporting.

A number of studies exist on mixed-use developments. For instance, Lee et al. (2013) examined the environmental characteristics and roles of intermediary spaces in mixed use complexes in Korea. In another study, Li et al. (2016) explored users' satisfaction towards transit-oriented development (TOD) around Banqiao station in China. The findings of the paper indicate that residents are generally contented with a 10 minute walk distance to mixed use complexes or stores. The regression analysis revealed that land use, transportation and high density development are significantly related to resident satisfaction. Similarly, Bahadure and Kotharkar (2015) conducted household survey to evaluate factors relating to trip length, travel mode, satisfaction, pollution, safety and social interaction to develop a sustainability index. This index was then correlated to land-use mix measure to identify the relationship. The major finding of the paper is that neighbourhoods with high and moderate land-use mix are sustainable with travel behaviour, with the correlation level as high as 88 percent. Very little study has however been conducted on the perception of residents of mixed use developments in Lagos, Nigeria.

The modern day transitioning into mixed use development has become a viable way of efficiently maximising land use and improving the overall sustainability of the environment. This system has been adopted by urban planners around the globe to resolve issues relating to land availability and use, overcrowding, site design, transportation, safety and zoning. African communities historically developed with mixed land use. Globalization and industrialisation however led to the zoning or industrial areas away from residential areas. The current drive for mixed use development emanated from the need for more effective use of space particularly in city centres, hinged on the high value of land in those centres. As such, gentrification and urban renewal redevelopments in city centres have led to the pulling down of old structures in city centres and their replacement by mixed use buildings. In Nigeria, according to Baba et al. (2015), mixed use developments have been driven by population growth, infrastructural implementation, need for multifunctional precincts in city centres and efficient land use.

Anecdotal evidence suggests that pedestrians often have to compete for space with vehicles in mixed use developments. Risser et al. (2006) noted that pedestrian experience and urban mobility can be enhanced by wider walkways, improved lighting and interconnected pedestrian paths. These are related to site planning and individual satisfaction

preference. For a country like Nigeria, the issue is more pronounced given the high level of rural-urban migration and most especially the total population of the country. Rural-urban migration and population issues place a lot of pressure on the limited land resources and infrastructure in the country.

As earlier stated, one of the characteristics of mixed use developments is that it is pedestrian-oriented. This implies that the infrastructure for pedestrians will be a consideration in planned mixed use developments. This is because environmental variables have been found to influence the propensity of individuals to walk (Karim and Azmi, 2013; Zakaria and Ujang, 2015).In recent years, there has been an increase in studies on walkability and walking experience in neighbouhoods (Cambra and Moura, 2020, Jeong et al., 2018). According to Karim and Azmi (2013) and Zakariaand Ujang (2015) walkability connotes residents' perception of design features in neighbourhoods that enhance pedestrian comfort and safety. These include traffic and crime safety, street connectivity, land-use mix, and infrastructure for walking. These features can influence the walking experience of residents. Walking experience is important in the functioning of neighbourhoods. The assessment of experience has been said to be important in vital in realising user-centred designs (Kari, 2016). Walking experience describes the impression left on a person as a result of walking. The measures of walking experience vary in literature.

Good walking experience, according to Karim and Azmi (2013) can be achieved by improving convenience, safety and pleasure. Safety and convenience were also captured in the meta-analysis of previous qualitative studies by Dadpour, Pakzad and Khankeh (2016) and a survey carried out by Kari (2016). In addition however, these authors identified environmental aesthetics and social relations as themes that influence walking.

Hess et al. (1999) investigated the relationship between site design and pedestrian travel in mixed-use, medium density environment. These authors investigated variables such as street systems, sidewalks, route length and route directions, Hess et al. found that short, safe and direct pedestrian routes encourage pedestrian activities in those environments. This was similar to the findings of Zakaria and Ujang (2015). Of these however, Zakaria and Ujang (2015) noted that connectivity and accessibility were the most important criteria for pedestrian comfort. Shriver (1997) also noted that long distances inhibit the choice to walk. To achieve the goal of sustainability mixed use developments need to encourage walking. Other pedestrian infrastructures highlighted by Shriver include street lights, crosswalks, planting strips and terrain of walkways.

Studies have suggested that the perception of features of the walking environment may vary by respondents' demographic characteristics. For instance, Kari (2016) found that female respondents assessed statements on walking environment lower than their male counterparts in a study of Otaniemi Campus, Finland. Kari also found that respondents aged above 35 years rated safety lower than their peers below that age did.

The empirical study conducted by Zakaria and Ujang (2015) in Malaysia suggest that satisfaction of residents with pedestrian facilities may be acceptable whether or not walkways are provided. In the case of Kaula Lumpur investigated, a part of the street is turned into walkways by pedestrians.

Lagos, Nigeria presents an interesting case. Lagos has been one of the major commercial cities of Nigeria for generations. Despite the fact that it is no longer the capital city, it has remained the premier city in terms of size, dynamism, economy, finance and culture. The Lagos Strategic Development Plan seeks to build upon this legacy and help drive Lagos to greater heights. Metropolitan Lagos is classified as a Megacity by virtue of its population size of 18 million (2012 estimate). With an overall State population of over 20 million in 2012, Lagos State is expected to grow by further 7 million by 2025.

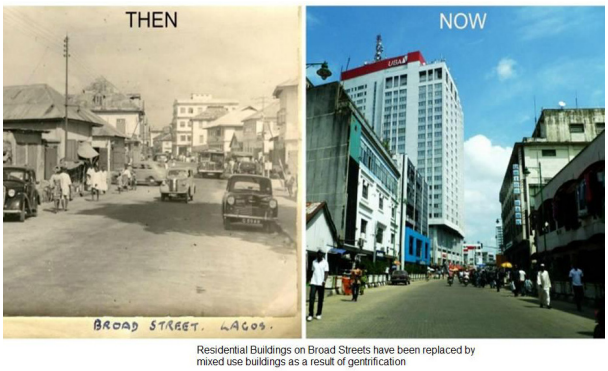

Figure 1. *The transformation in Broad Street, Marina, Lagos (Source: MyNewsArena, 2017).*

Figure 2. *Marina, Lagos, Nigeria (TVC News, 2017).*

Figure 3. *Marina, Lagos, Nigeria, showing central car park (Source: Google Maps, 2020a).*

This could make Lagos City the largest megacity in Africa. Whilst the metropolitan area of Lagos dominates Lagos State, It is important to recognise that the State has important rural areas with agriculture as the dominant activity as well as large tracts of inland water. Lagos has, in the past, been described as a failed city because of the extreme levels of poverty, poor safety and security, inadequate infrastructure, including bad roads and electricity, weak social services and a polluted and vulnerable environment. Whilst many of these problems remain in some form, there have been considerable improvements, as the state is coming up with re-densification schemes, particularly in trade centres like Marina.

The reasons for choosing Marina is that it is the hub of commercial activities in Lagos Island as many company has their headquarters situated there and as such there is high influx of people daily. The Marina area is the corporate central business district of Lagos, Nigeria. The earlier residential areas were fast converted into mixed use towers (Figure 1). The land use zones in Marina are recreational, residential, administrative, commercial and few industrial zones. Currently, Marina hosts a number of corporate offices buildings including banks, real estate consultancy firms, and electrical appliances manufacturing companies; as well as several retail and wholesale stores. In recent years, the Lagos State Government has also been executing an urban regeneration programme. The focus of this programme include the revitalization of the Lagos Island central business district; the development of the Marina city and upgrading the derelict residential areas (Abosede, 2006). Marina, Lagos is in Lagos Island, which has a population of 209,437. Persons in the area are often clients, store owners, employees of corporate offices, and sometimes worshippers in the religious buildings in the area. There were also a few who reside in the area. Currently, the Marina area of Lagos has several mixed-use buildings of varying heights (Figures 2 and 3). The case of Marina is that of expansion of already built-up area to accommodate more activities. Many buildings that were originally residential have been partly or fully converted into complexes, commercial shops, stores and ware houses although the upper floors are still for residential purposes.

The area is surrounded by a ring road and large centralised car parks. The layout of the area is shown in Figure 4.

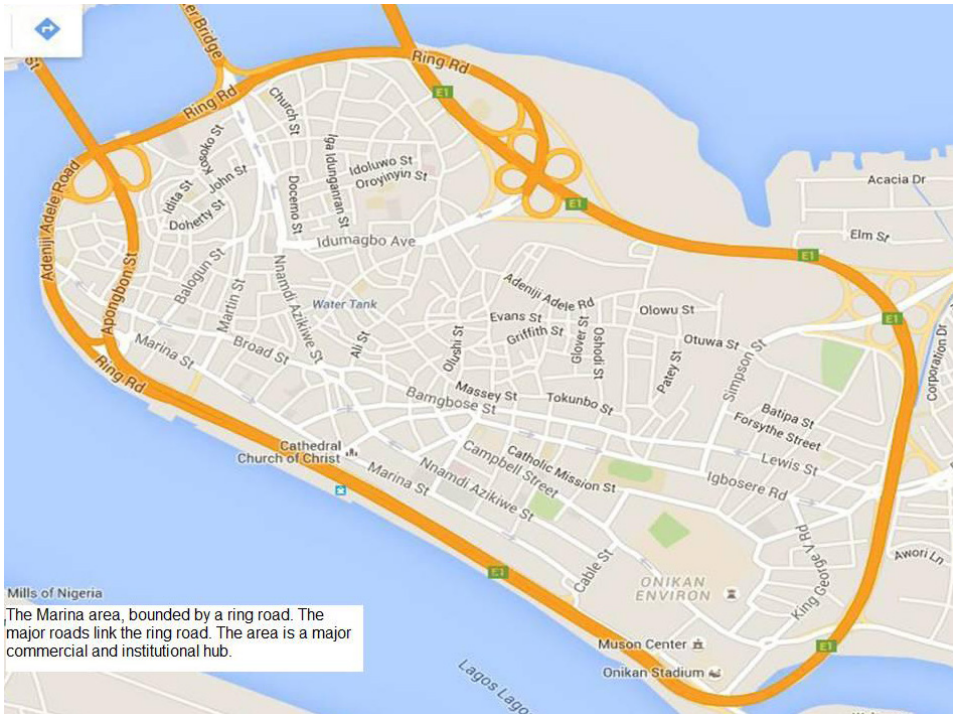

Figure 4. *Map of Marina, Lagos, Nigeria (Source: Google Map, 2020b).*

3. Methodology

The study adopted the survey method. Copies of administered questionnaire were used to obtain information on the perception of users of mixed use developments in Marina, Lagos state. The copies of questionnaire were administered to pedestrians in the area between March and May 2019. These copies were administered between the hours of 7:00-9:30am and 2:00-5:30pm, when pedestrian movement is at its peak as persons commute to and from work. The researchers worked with five research assistants. The questions were posed to the respondents while the researchers and other research assistants filled in the responses on copies of paper questionnaire. Sometimes the respondents walked on. There were however, respondents who waited to give the 5-7 minutes required to fill the questionnaire. Such respondents filled the copies of questionnaire personally. The survey covered Broad, Marina, Balogun, Nnamdi Azikiwe, Igbosere, Idumagbo, Simpson, Bamgbose, Catholic Mission and Martins Streets (Figure 4). The questionnaire had three sections: the first section was used to capture the general information of the respondents; the second section comprised questions in relation to the site pedestrian features and walking experience; and the third section was used to determine occupants' satisfaction with mixed use developments. The variables used to gather data on site pedestrian features and experience were adapted from the work of Cervero and Kockelman (1997); Hess et al. (1997) and Evans (2014). Variables used in assessing pedestrian experience were comfortability of walkways, safety, rowdiness, traffic jam, ease of way-finding, and lengthiness of walkways. For site pedestrian features, variables investigated include lighting, route directness, location of shops relative to sidewalks, walkway shelter, distance between buildings, and organisation of car parks for walkability. Only mixed use developments in Marina, Lagos, Nigeria were investigated. Issues of site pedestrian features and walking experience may however vary with culture and climate. In addition, building codes differ with countries.

A total number of 130 copies of questionnaire were distributed based on the simple random sampling technique and only 105 were suitable for analysis, indicating a response rate of 80.7 percent. The data were analysed with the use of frequency distribution, mean ranking and categorical regression analyses.

4. Results

Table 1 presents the general information of the variables of the study. From the Table, it can be observed that a larger proportion of the respondents are between the ages of 31-40 years representing 41.9 percent of the total respondents. In addition to this, more than half of the respondents are married and male comprising of 52.4 percent and 56.2 percent respectively of the respondents. It can also be observed that a larger percentage of the respondents had completed their tertiary education, while the lowest proportion had no formal education. In relation to occupation, most of the respondents were employees (representing 41.9 percent), followed by self-employed individuals (representing 33.3 percent), students; and "others" category (representing 13.3 percent and 11.4 percent, respectively). On the type of accommodation occupied in the mixed use development, 24.8 percent of the respondents were in residential facilities, 62 percent in office facilities, 11.4 percent in shops/ commercial facilities, and 4.8 percent in other types of facilities, which included warehouses and other ancillary facilities. Table 1 also reveals that37.1percent of the occupants had been in the area for between 6 and10 years.

Respondents were asked to rate the site pedestrian features in terms of their impact on the walkability in the mixed use development. Table 2 presents the results of the data gathered on the perceptions of pedestrians on the site features of mixed use development that impact on their movement. The results suggest that the most influential are the distances between adjacent buildings, as well as presence of lighting features on, and directness of pedestrian routes as these were ranked high in terms of impact on walkability. The site features that least impact on the residents movements are sheltering of pedestrian routes and the location of shops either by sidewalks or on the ground floor of the buildings (Figures 5 and 6). The low rating of sheltering of pedestrian walks may be due to the fact most of the walkways were not sheltered. On the experiences of pedestrians (Table 3), the respondents mostly agreed that although way-finding is easy and pedestrian walks are safe, their strongest impression is that there are often traffic jams on the streets.

Kruskal Wallis tests were carried out to find out if the respondents perception of site features varied with their age,

Table 1. *Respondents' profile.*

	Variables	Percent
Age Range	20 years or less	11.4
	21-30 years	24.8
	31-40 years	41.9
	41-50 years	15.2
	51-60 years	2.9
	60 years and above	3.8
Gender	Male	56.2
	Female	43.8
Marital status	Single	38.1
	Married	52.4
	Widowed	6.7
	Divorced	2.9
Educational Qualification	No formal education	12.4
	Primary school	17.1
	Secondary school	21.9
	Tertiary	48.6
Occupation	Student	13.3
	Employees	41.9
	Self employed	33.3
	Others	11.4
Type of accommodation occupied in the mixed use development	Residential	24.8
	Office	59.0
	Shop	11.4
	Others	4.8
Length of Residence	Less than 5 years	33.3
	6-10 years	37.1
	11-15 years	10.5
	More than 15 years	19.0

gender, educational qualification, type of accommodation occupied, length of residence, and occupation. The respondents did not vary significantly in their perception of site features based on their gender, marital status and type of accommodation occupied. They however varied significantly in their perception of these features based on their ages, educational qualification, occupation and length of residence. The perception of organisation of carparks varied with the ages (Chi Squared λ = 22.115, degree of freedom df = 5, p = 0.000) and educational qualifications of the respondents (λ = 10.101, df = 3, p = 0.018). Respondents who were younger than the age of 20 years as well as those with educational qualifications lower than tertiary had higher median scores on their perception of the influence of organisation of car parks on walkability. Location of shops on the ground floor also varied with their ages (λ = 29.943, df = 5, p = 0.000) and educational qualifications (λ = 9.775, df = 3, p = 0.021) of the respondents. Respondents who were over the age of 40 years and those that had tertiary education had higher median scores on their perception of the influence of location of shops on ground floors of buildings. The respondents' perception of influence of sheltered walkways on walkability varied significantly with their educational qualification (λ = 9.383, df = 3, p = 0.025), and length of residence (λ = 8.927, df = 3, p = 0.030). Respondents with no formal education as well as those who had stayed in the area for more 10 years had higher median scores on their perception of this site feature. Students, employees, and those in private businesses had higher median scores on their perception of directness of the route (λ = 10.764, df = 3, p = 0.013) than those in other occupation groups.

The perception of the pedestrians on their experiences on the pedestrian walks in the mixed use developments also varied with their ages, educational qualification, and their length of residence. The perception of crowdiness (λ = 17.556, df = 5, p = 0.004), ease of wayfinding (λ = 12.185, df = 5, p = 0.032) and traffic jam (λ = 11.881, df = 5, p = 0.036) on the pedestrian walkways varied significantly with the ages of the respondents. The experience of crowdiness and ease of wayfinding was highest among respondents, who were aged below 21 years, while the experience of traffic jam was perceived highest among those who were aged above 40 years. The respondents also varied significantly in the perception of crowdiness based on their educational qualification (λ = 33.343, df = 3, p = 0.000). Interestingly, those without formal education had the highest median score on the perception of crowdiness. The length of residence is also another respondents' profile that defined how they perceived their experience of wayfinding (λ = 7.978, df = 3, p = 0.046) and safety (λ = 7.858, df = 3, p = 0.049). While respondents that rated wayfinding in the neighbourhood higher had stayed in the area for more than 10 years, those who with residency more than 15 years rated their experience of safety lowest. The respondents did not vary significantly in their experiences based on their gender, marital status and occupation.

To assess the impact of site pedestrian features on walking experience of the occupants of mixed use developments, regression analyses were carried out. Each of the variables used in assessing walking experience were entered as dependent variables in different regression analyses, while the variables used in measuring perception of site pedestrian features were entered as independent variables. The results of the regression analyses revealed the site pedestrian features that influenced different aspects of walking experience and these are pre-

Table 2. *Site pedestrian features that impact on walkability in mixed use developments.*

	Mean	Std. Deviation
Distances between adjacent buildings	3.79	.987
Lighting features on pedestrian routes	3.63	1.361
Directness pedestrian routes	3.51	1.233
Organisation of car parks	3.30	1.232
Location of shops on or close to sidewalk	2.87	1.294
Location of shops on ground floor of buildings	2.67	1.268
Sheltered pedestrian walks	2.16	1.395

Table 3. *Walking experience in mixed use developments.*

	Mean	Std. Deviation
Traffic jams often take place on streets in the neighbourhood	3.69	1.235
It is easy for a pedestrian to find his/her way around	3.65	1.315
The pedestrian routes are safe	3.65	1.177
Pedestrian routes are often crowded	3.48	1.186
Pedestrian routes are unnecessarily long	3.31	1.086
The pedestrian walks are slippery and uncomfortable	2.51	1.367

Figure 5. *A view of Broad Street adjacent showing pedestrian walks (Source: Field work).*

Figure 6. *A view of some of the store front (Source: Field work).*

sented in Table 4. The experience of traffic jam as perceived by the respondents was significantly influenced by the location of shops on ground floors of buildings (beta β = 0.501, p < 0.05), directness of pedestrian routes (β = 0.481, p < 0.05) and the sheltering of pedestrian walks (β = 0.158, p < 0.05). Most of the respondents who agreed that they experience traffic jams on the streets of the mixed use developments identified location of shops on the ground floor of mixed use developments, directness of pedestrian paths and sheltering of pedestrian walks as features that impact their movement. The location of shops on ground floors of buildings (β = -0.369, p < 0.05) or on/close to sidewalks (β = -0.245, p < 0.05) influence the perception of slipperiness/comfortability of walkways. This is in addition to distances between adjacent buildings (β = 0.335, p < 0.05). The perception of safety of pedestrians was significantly influenced by the distance between adjacent buildings (β = 0.494, p < 0.05) and presence of light features on pedestrian routes (β = 0.309, p < 0.05). As may be expected, the presence of light features on pedestrian routes (β = 0.354, p < 0.05) also influenced the perception of the length of pedestrian routes. The site pedestrian features that significantly influence the perception of ease of way-finding were distance between adjacent buildings (β = 0.268, p < 0.05), directness of pedestrian routes (β = -0.343, p < 0.05) and availability of light features on pedestrian walks (β = 0.493, p < 0.05). None of the site features influenced the perception of rowdiness of the pedestrian routes.

The overall occupants' satisfaction of the respondents was investigated. Table 5 shows that a little less than half (47.6%) of the respondents are satisfied with the mixed use developments that they occupied. This suggests that the residents are not so satisfied with the developments.

To investigate the relationship between occupants' satisfaction and pedestrian experience, a categorical regression analysis was carried out. The level of satisfaction of the occupants was entered as a dependent variable, while the six variables used in measuring pedestrian experience were entered as independent variables. The results (Table 6) show that pedestrian experience accounted for 31.6% of the variance in occupants' satisfaction with mixed use developments (R2 = 0.316, F = 2.973, p = 0.001). Only two

Table 4. *Categorical regression coefficients of the influence of site pedestrian features on walking experience.*

	Standardised Beta					
	Traffic jams often take place on streets in the neighbourhood	The pedestrian walks are slippery and uncomfortable	The pedestrian routes are safe	Pedestrian routes are unnecessarily long	Pedestrian routes are often crowded	It is easy for a pedestrian to find his/her way around
F	5.064**	4.059**	3.157**	3.954**	1.097	3.555**
R square	0.46	0.425	0.347	0.381	0.073	0.410
Distances between adjacent buildings	-.156	.335**	.494**	.205	-.141	.268*
Location of shops on or close to sidewalk	-.297	-.245*	-.150	.278	-.062	-.195
Organisation of car parks	-.150	.186	-.159	-.144	.096	-.124
Location of shops on ground floor of buildings	.501**	-.369**	-.167	-.154	-.083	.175
Directness of pedestrian routes	.481**	.185	-.205	.147	-.125	-.343**
Lighting features on pedestrian routes	-.121	.254	.309*	.354**	.119	.493**
Sheltered pedestrian walks	.158**	.312*	.209	.193	-.006	.300

*p< 05, **p<0.01

of the pedestrian experience variables however account for this variance. The variables are the perception of slipperiness and discomfort experienced on the pedestrian routes ($\beta = -0.393$, $p < 0.05$) and the distance to be covered when using the pedestrian routes ($\beta = -0.212$, $p < 0.05$). The results reveal that the more slippery and uncomfortable the respondents indicated the pedestrian routes are, the less satisfied they were with the mixed use developments. Lower occupants' satisfaction was also recorded with respondents who strongly rated the pedestrian routes as unnecessarily long. A greater effect size was however recorded with the effect of the slipperiness and discomfort experienced by pedestrians on their satisfaction with the mixed-use developments where they are occupants.

Table 5. *Occupants' satisfaction with mixed use developments.*

	Percentage
Not satisfied at all	10.5
Not satisfied	22.9
Undecided	19.0
Satisfied	33.3
Highly satisfied	14.3
Total	100.0

Table 6. *Categorical regression coefficients on the influence pedestrian experience on user satisfaction with mixed use developments.*

	Standardized Coefficients		df	F	Sig.
	Beta	Bootstrap (1000) Estimate of Std. Error			
Traffic jams often take place on streets in the neighbourhood	.317	.243	2	1.699	.189
The pedestrian walks are slippery and uncomfortable	-.393	.144	3	7.494	.000
The pedestrian routes are safe	.130	.202	3	.411	.745
Pedestrian routes are unnecessarily long	-.212	.122	3	3.037	.033
Pedestrian routes are often crowded	-.225	.156	2	2.072	.132
It is easy for a pedestrian to find his/her way around	-.123	.234	1	.278	.599
F = 2.973, p = 0.001					
R square = 0.316					

5. Discussions

Mixed use developments, according to Lee et al. (2013), creates an avenue for multiple uses of land. This study was carried out in neighbourhoods in Marina, Lagos, with shops, offices, schools, residences, religious houses and warehouses. An important goal of mixed use developments, according to Striebig et al. (2016) is providing a pedestrian-oriented environment. The way pedestrians view such environments therefore become important. As noted by Bahadure and Kotharkar (2015) and Larco et al. (2012), the designs of mixed use developments influence the travel behaviours of pedestrians. In an earlier study, Shriver (1997) as well as Hess et al (1999) had found that walkability is influenced by short and direct routes, streetlights, cross-walks, planting strips and terrain of walkways. Crosswalks and planting strips were not provided in the neighbourhoods studied. However streetlights as well as direct walkways were rated high in this study as features that impact walkability.

The findings of this study probably points to the need to separate vehicular traffic from pedestrian routes in mixed use developments. Although the area investigated has a centralised car park, respondents agreed that traffic jams on the streets is the most significant perception of the neighbourhood in terms of walking experience. Safety and way finding were found to be important criteria for good walking experience. This appears to be in line with the findings of previous study by Karim and Azmi (2013), which highlighted the importance of safety in enhancing pedestrian experience. In addition to this criteria for good experience however, this study found that negative experience also arise from traffic jam, as earlier mentioned; length and slipperiness of walkways, as well as crowded walkways. The crowded nature was however found to be a function of the width of the walkways or their non-availability.

Kari (2016) had found in a study of a campus in Finland that male and female respondents varied in their perception of safety in the walking environment. This study found that perceptions of site features as well as experiences of respondents also varied with their socio-economic characteristics. However in this study, respondents did not vary significantly in their perceptions of the walkability features and their experiences based on gender and marital status. They however varied in their perceptions of these subjects based on their ages and educational qualifications. This suggests a need to consider age- and

educational qualification-related preferences in the planning of such mixed use developments.

Certain site pedestrian features were found to influence walking experience in the mixed use developments investigated. The same result had been found in the study by Zakaria and Ujang (2015). In this study, however, the organisation of car parks did not influence the experience of the pedestrians in any way. A close look at the mixed use developments reveal that the car parks were mostly located away from pedestrian routes (Figures 3 and 7). The experience of crowdedness of pedestrian routes was not also influenced by any pedestrian features. Further studies would be required to identify the factors that influence the crowdedness that is often observed on pedestrian routes in mixed use developments (Figure 5). One explanation however may be the absence of defined walkways in some areas and the undersized nature of the ones that were available. The findings of the study also corroborate the fact that improved lighting is necessary for enhanced pedestrian experience (Risser et al., 2006).

It is interesting to note that location of shops close to walks and on ground floors of the mixed use developments negatively predicted the slipperiness and discomfort experienced on sidewalks. This suggests that having these shops by the pedestrian walkways may have improved the maintenance of those walkways. This can be explained by the fact that shop owners in the often take the surrounding areas as part of their territory, when it comes to daily cleaning and maintenance of their shops.

Li et al. (2016) noted that transportation is related to the satisfaction of residents of a version of mixed use development called the transit oriented development. In this case, the occupants' perceptions of traffic jam in the neighbourhood, which is related to transportation, did not significantly influence their satisfaction. The quality and the length of the pedestrian walks in the mixed use developments however influenced the occupants' satisfaction. Short distances have been said to encourage walking and cycling (Rogatka & Ramos Ribeiro 2015). Pedestrian walks are landscape features, which Lee, Kim and Moon (2013) suggested will influence the satisfaction of occupants of mixed use developments with intermediary spaces. One would however note that although studies (Risser et al. 2006) have linked safety and comfort of pedestrian paths to satisfaction, only comfort of pedestrian paths have been found to influence the satisfaction of pedestrians in this study.

Figure 7. *A view of Marina Road showing the existing car park (Source: Field work).*

6. Conclusion

This study set out to investigate the walking experience of pedestrians in a mixed use development area in Marina, Lagos, Nigeria. The study was premised on the fact that there has been little or no empirical research on pedestrians' perception of mixed use development in Nigeria, to inform the design process. The study identified the features that influence walkability in the mixed use development. It also assessed pedestrian experience and examined the relationship between the presence of walkability features and pedestrian experience. The influence of pedestrian experience on residential satisfaction was also investigated.

This study has provided evidence that on the features in the mixed use developments that influence walking experience and also indicate that walking experience significantly influence user satisfaction. Several studies on user satisfaction have considered other variables apart from site pedestrian features. The fact that site pedestrian features accounted for about 30 per cent of the variance in user satisfaction highlights

its importance, indicating that further studies on user satisfaction in mixed-use developments should take these into consideration. The findings therefore provides a cue that pedestrian experience may be one of the missing links in occupants' satisfaction studies, especially in mixed use developments.

The findings of the study have implications for design and policy. The findings suggest the need for future designs to address the issue of distances between buildings as well as lighting features on pedestrian walks as these impacted the most on pedestrian experiences. The exact distances between buildings may however be the subject of further studies.

Since issues of site and experience for pedestrian may vary with culture and climate, further studies may investigate pedestrian experiences in other contexts. This will establish the limit of generalisability of findings of research.

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