Livability Correlates of High Rise Buildings in Eti-Osa Local Government Area, Lagos, Nigeria

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ABSTRACT: *Owing to the continuous compaction of cities and mega cities through indiscriminate proliferation of high-rise buildings, this research investigates the livability correlates of high-rise buildings in Eti-Osa. Nearest Neighbour Analysis was used to explain the spatial pattern of the high rise buildings. Chi square was used to explain the spatial variation in land uses within high-rise buildings. Independent two-sample t-test was used to explain the spatial variation in livability. Principal component variant of factor analysis was used to generate linear composites of Relative Livability Quality Index (RLQI) while Multiple Linear Regression Analysis was used to explain the relationship between the incidence of high-rise buildings and the RLQI of the study area. High-rise buildings were clustered in the area ($R_n = 0.622$). There is spatial variation in land use within high-rise buildings ($p = 0.000$). Livability is moderately high in the study area with basic facility index of 57.8%, cost of living (88.9%), property value (86.1%), sense of safety (80.0%) and neighbourhood quality (62%). There is no spatial variation in residential livability quality ($T = 0.880$, $p = 0.400$). There is a reliable relationship between the incidence of high-rise buildings and residents' livability ($R = 0.797$; $p = 0.036$). The study concludes that high-rise buildings have a high propensity to increase livability due to the proximity of facilities it offers. Thus, environmentally friendly green building approach to high-rise buildings and strict enforcement of development control laws was recommended.*
KEYWORDS: High-rise building, High-rise uses and livability, skyscrapers, Nigeria

INTRODUCTION

Unprecedented urbanization is greatly transforming the spatial pattern of urban cityscape worldwide bringing in its wake series of urban problems including: human and vehicular congestion; housing shortage, transportation problem, problem of waste, increased energy consumption, increased ecological footprint and inefficiency of urban infrastructures (Olotuah and Ajenifuja, 2007). The consequential space needs to accommodate and satisfy the urbanization borne multiple developments have become unrealistic due to the relative fixity of land. This had led to fierce competition among various land uses and users; leading to a gradual shift from horizontal to vertical expansion of cities. Cities thus assume a compact city development mostly at the center of large cities and major commercial hubs. Accentuated by the noncompliance to height zoning as provided in the Revised Ikoyi-Victoria Island Model City Plan of 2013-2033; we have continued to witness the construction of 'skyscrapers', mega sky scrapers, condominiums, etcetera, which aggregates very many uses on a small space.

The nexus between high-rise buildings and urban livability cannot be spurious. The concentration of high-rise buildings in an urban space has a high tendency of multiplying effects on the livability of residents of such places. Optimal use of height within buildings and the resulting high density of high-rise buildings should grow in the direction of social, economic and environmental welfare of city residents so as to improve quality of life in these areas (Hayati and Sayadi 2011). Thus, high-rise development and its corresponding environmental implications should be considered simultaneously to be able to remove or reduce adverse effects as well as accelerate the positive effects on sustainable urban development (Rahbar, 2002).

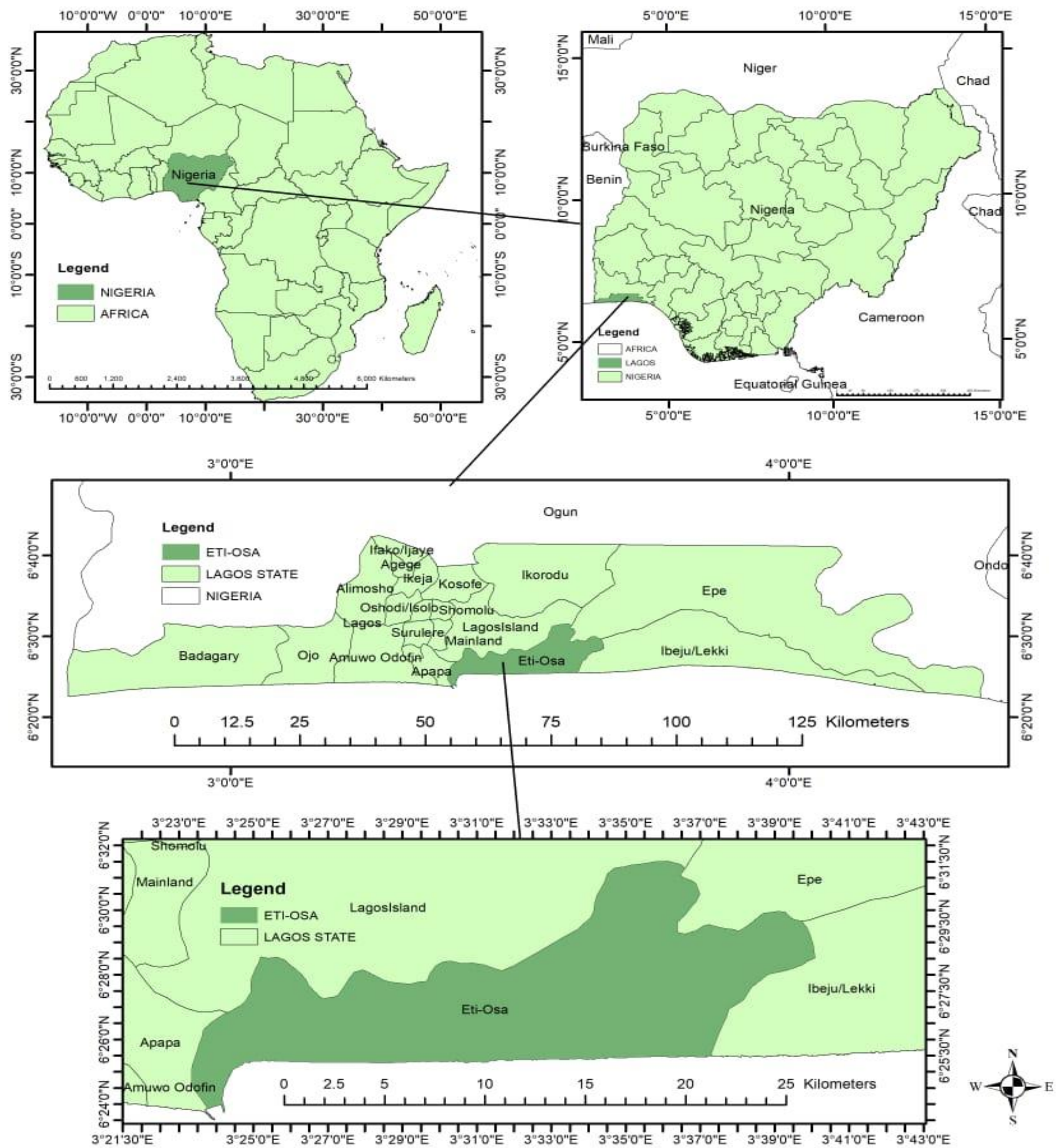
High-rise buildings are not supposed to be contrary to the principles of sustainable development if and only if efficient planning system is put in place. Environmental sustainability is achievable with high incidence of high rise buildings as the case is with New York City and Shanghai where high-rise buildings have been adopted to preserve the natural environment resources but not without prices to be paid before and alongside its development. Achieving a sustainable high-rise development is apparently dependent on conscious and cautious urban planning; an adequate and efficient control of economic, human and technological resources crafted in an efficient planning and design strategies (Nkem, 2014). The intensification of high-rise buildings in an urban space without corresponding appropriate planning efforts could lead to environmental degradation and consequently unlivability of communities.

Scholars have had to brick with the characteristics of city components and their livability dimensions. The livability dimensions of urban greenery (Adeyemi, 2014) has been researched; issues on high rise buildings and its linkages with quality of urban life have also been witnessed in recent times (Smith and Coull, 1991; Masoud, 1997; Rahbar, 2002; Abu Ghazallah, 2007; Ali and Aksamija, 2008; Hayati and Sayadi 2011; Von Klemperer, 2015 and Mehaffy 2015). Despite all of these studies, the connections between high-rise buildings and residential livability have remained apparent. Where and when authors were interested in high-rise buildings, the depth of empirical work was low. The applicability of earlier research outcomes in developed countries with varied livability index can be misleading and unreliable for developing nations like Nigeria. It is against this backdrop that this research becomes imperative.

Much more still need to be known on how high density living impacts urban livability. Do areas of high concentration of High-rise buildings exhibit peculiar characteristics that require peculiar town planning approach especially in a moderately poor economy like Nigeria?, What are the direct and indirect effects of High-rise buildings?, Do we need more high-rises in the 21st century and why?, Should there be a limit to the height of buildings and where in the cities? And lastly if the development of high rise buildings is unavoidable in this century, what are the challenges that are likely to occur and how can these challenges be taken care of. Answers to these questions shaped the tenets of this research. To this end, the study analyses the livability correlates of high rise buildings in Eti-Osa Local Government Area; with a view to proffering policy options to developing a sustainable urbanization etched in high rise buildings

The Study Area

Eti-Osa is one of the 20 local government areas in Lagos state and is located on Lagos Island. The sister cities (Ikoyi-Obalende and Victoria Island) are located in the South Eastern part of Lagos State within latitudes 40^0 and 50^0N. The latitudinal location of Victoria Island, Ikoyi-Obalende and its environs enjoy the characteristics of the West African monsoonal climate, marked by distinct seasonal shift in the wind pattern. The mass of water around the town is believed to have also influenced the pattern of growth on Victoria Island and the adjoining development. With an area of 181sq.km, Eti-Osa has a population density of 1567.9 per sq.km. As of April 2011, the population of Eti-Osa local government area was over 3million people (INEC, 2011). With a land area of 24.47733sq., the population of Ikoyi-Obalende-Victoria Island was estimated at 827,847 as at 2002 and further projected to reach 1,639,708 by year 2016 and 2,801,051 by year 2033, assuming an annual population growth rate of 3.25% (Lagos State Water Corporation, 2002).



Government Area within Lagos State
Source: Digitized from Google Earth, (2022).

Issues on High-rise buildings

Gleaning through the literature, most researches on high rise development were done in the visual environment while those that are empirical picked few high rises as case studies (Nkem, 2014; Tohumcu and Çakmaklı, 2015). The methodological approach to studying high rise buildings in the past works left an area for improvement such as the necessary assessment of land uses within high rise buildings and the impact of high rise buildings on available public utilities and infrastructures. The assessment of residents' opinion on the functionality of the high rises and corresponding impacts on economic, social and environmental environments was also done to examine the livability of the area. This research therefore covers the ground of empirical investigations that are intrinsic to urban or spatial planners understanding. This will arm urban designers' thought on the cities in three dimensions and make both the problems and solutions of the city real.

Among the beneficial sides of high rise building enlisted in the study is ability to accommodate more people, prevent encroachment of suburbs, reduction of travel time and cost as well as improving urban fabric. On the negative side, high rise building could be death traps if not well managed, block road views and sunlight, destroy skyline and even places pressure on basic infrastructures and facilities. The measure emphasized in this study, for integrating cities and high rise buildings is effective urban planning using suitable design strategies that would result to community development and sustainable use of environmental resources.

METHODOLOGY

The study relied on both the primary and secondary data. Geo-spatial data was generated using both the hand-held GPS and google-earth Rasta imagery. Four Local Council Development Areas (LCDAs) in the local government area: Iru Victoria Island, Ikoyi Obalende, Eti-Osa East and Eti-Osa West was the sample frame. Ikoyi-Obalende and Iru Victoria Island LCDAs were randomly selected and were decentralized into 12 segments. A total of 107 (50%) of the 214 urban blocks sampled pro-rata from each of these segments were randomly selected using the quadrant method. Of the total buildings in a block, 20% was sampled. In all, a questionnaire was administered to a total of 557 residents.

Chi square was used to explain the difference in land use within high rise buildings across the spatial units. Independent two-samples T-test was also used to explain variation in livability within and between the LCDAs. Principal component variant of factor analysis was used to generate linear composites of Relative Livability Quality Index (RLQI). Regression analysis was used to explain the relationship between the incidence of high-rise buildings and the Relative Livability Quality Index of the study area.

Relative Livability Quality Index (RLQI). This is defined as the overall conditions that contribute to the perfect state of wellbeing of residents. Livability refers to residents'

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assessment of the neighbourhood as it aids everyday activities. It was obtained by weighing the ordinal ranking of the residents assessment of public utilities, ease of transportation, absence of nuisance, safety, economic prosperity among others; using the scale of 4: 4 = strongly adequate, 3 = adequate, 2=fairly adequate and 1 = not adequate Using this ranking style, the maximum point obtainable was calculated thus: MS= Nx4,

Where MS= maximum score obtainable

N= total number of respondents;

4= Highest rank

OS=∑ (1+2+3+4)/MS; Where OS= Score obtained. The points obtained by each of the variables were compared with the maximum point obtainable to determine how adequate they really are.

DISCUSSIONS AND FINDINGS

This section begins with a discussion on the presence of high-rise buildings in the area. This pictures the extent to which high rise buildings have developed and the tendencies of its further development. Further to this is the discussion on incidence and spatial distribution of high-rise buildings; the residents' perceived livability of the area using variables that are not spurious to the connections with high rise buildings. The study goes further to investigate the relationship between incidence of high-rise buildings and livability in the study area.

Incidence and Spatial Distribution of High-Rise Buildings

The incidence and spatial distribution of high rise buildings was assessed by a direct enumeration of high rise buildings on each of the sampled blocks. Thus, tall building density index (TBDI) for each segment; the percentage of each land use within high rise buildings; the building height index (BHI) and the intensity of different human activities in high rise buildings were obtained for the two sampled LCDAs.

Table 4.1: Incidence and Spatial Distribution of High Rise Buildings

Segment	Victoria Island					Ikoyi-Obalende							Total Mean
	1	2	3	4	5	6	7	8	9	10	11	12	
% Residential	8.1	1.8	4.8	2.9	0	1.1	6.1	6.6	1.7	2.6	9.2	9.6	54.4
%Commercial	3.5	10.3	3.8	2.9	2.0	0.9	2.8	1.1	0.4	0.7	0.9	0.2	29.4
%Mixed use	0.6	0	0.6	0.6	0	0	0.4	0	0	0	0.2	0	2.2
%Public	0.4	0.9	0.2	0.7	0	0.6	0.2	0	0	0	0	0	2.9
%Quasi- public	1.1	0.6	0.6	0.4	0.2	1.3	0	0	0	0	0	0.7	4.8
%Under construction	0.6	0.2	0.2	0.9	0.7	0	0.2	0.2	0	0.6	1.3	0	4.8
%Abandoned	0	0.4	0.7	0.2	0	0	0	0	0	0	0	0.2	1.5
% 5-10floors	11.6	12.3	9.2	6.8	2.0	3.9	9.0	36	6.6	3.5	9.2	9.0	84.9
% 11-15 floors	2.0	1.8	1.5	1.3	0.9	0	0.6	1.1	0.2	0.4	2.2	1.5	13.4
% 16-20floors	0.6	0	0	0	0	0	0	0.2	0	0	0	0	0.7
% 21& above	0	0	0	0.6	0	0	0	0	0	0	0.2	0.2	0.9
BHI	8.8	8.1	7.6	8.7	9.1	8.1	7.3	9.4	8.6	8.1	10.3	8.6	-
Shopping index	0.51	0.27	0.24	0.36	0.17	0.15	0.32	0.26	0.09	0.15	0.13	0.36	0.25
Living index	0.24	0.24	0.13	0.08	0.03	0.14	0.22	0.23	0.15	0.14	0.15	0.29	0.17
Socializing index	0.46	0.23	0.22	0.27	0.09	0.11	0.17	0.21	0.07	0.12	0.12	0.22	0.20
Seeking medical care index	0.28	0.10	0.12	0.11	0.06	0.12	0.17	0.19	0.04	0.15	0.14	0.20	0.14
Booking hotel index	0.49	0.23	0.18	0.250. 12	0.12	0.12	0.21	0.22	0.07	0.12	0.12	0.26	0.21
Schooling index	0.11	0.05	0.06	0.07	0	0.08	0.08	0.12	0.03	0.04	0.06	0.10	0.07
% aware of tall bldg presence	15.7	8.0	7.8	8.2	4.2	4.6	8.6	6.6	2.7	4.7	4.9	10.9	86.9
Mean % tall bldg.	21.0	38.7	26.4	17.9	17.8	15.4	18.8	18.5	5.7	13.0	34.9	26.1	
TBDI	0.000 123	0.000 186	0.000 117	0.000 079	0.00 0 049	0.000 074	0.000 091	0.000 098	0.000 021	0.000 055	0.000 102	0.000 165	
Nearest Neighbour Analysis	R_n = 0.877					R_n = 0.613							

Source: Author’s Computation (2022).

The incidence of high-rise building is high in both sampled LCDAs (table 4.1). A tall building is close to 86.9% of the respondents. However, the density of high rise buildings is relatively higher in Victoria Island (24.4%) compared to Ikoyi Obalende (19.6%) though Ikoyi is larger in terms of land mass. The result of nearest neighbour analysis also showed that high rise buildings are clustered in the study area (R_n = 0.622) showing a greater clustering in Ikoyi (0.613) compared to VI (0.877). The clustering pattern of high rise in both cities implies that high rise buildings are present in specific areas of the cities and are almost always clustered wherever they are. Thus, spatial planners should be interested in the probable consequences of this clustering pattern as it might pose threats to available public infrastructures. The livability implication of this compact development style is that travel cost and stress in commuting are greatly reduced.

Most high rise buildings are between 5-10 floors (84.9%) while only 13.4% are between 11 and 15 floors. This implies that the high rise buildings are relatively of medium rise, though higher buildings are anticipated in the future because of the high cost of land and high rental values in the study area. Another indicator of this fact is that, most high rise buildings in the study area are concreted at the top, advertising the space at the top for further development. Thus, there is still high propensity that buildings would double and triple in height as vertical expansion cannot be avoided in the area.

Overall, more tall buildings (54.4%) are used for residential purpose. More people (78.4%) live in tall buildings in Ikoyi Obalende LCDA. The next most popular use in tall building was commercial (44.4%) in Victoria Island (VI). The dominance of commercial high rises in VI attract more vehicular and human traffic and consequently noise and air pollution to the area especially during day time or working hours for varied trip purposes. On the other hand, the dominance of residential high rises in Ikoyi (78.4%) suggests that the area still retained its colonial era characteristics as a high class residential area though building use conversion is becoming prevalent as 75.8 % of the respondents attested to this. The dominance of residential tall buildings in Ikoyi might be linked to higher incidence of larger plot sizes ( ) that affords landscaping and tree planting. Land uses within tall buildings assumed a disparate pattern (X^2 = 296.025, p value = 0.000). In essence, all kinds of land uses may be found in any tall building and land use composition within them are not very similar.

Shopping with an index 0.25 is the most significant use within tall buildings while schooling with an index of 0.07 is the least. This high intensity of shopping means that traffic congestion, noise and air pollution from vehicle engines and overstretching of road facilities should be expected as shopping malls would attract more trips to the area. Hence, should commercial high rise buildings double in number and or height in the study area, there would be great deficiency in the transport system, waste management and severe air pollution.

Livability Appraisal

Livability was appraised by assessing the adequacy of basic infrastructures and other environmental components such as neighbourhood greening, parking facilities, job opportunity, cost of living, property value, sense of safety, walkability, among others. These were presented on table 4.2

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Table 4.2: Livability Appraisal

Segment	Victoria Island					Ikoyi-Obalende							Mean Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Pipe borne water	210	99	90	138	48	38	108	71	30	37	62	130	74.9
Health care facilities	210	111	93	134	55	65	136	85	34	54	58	151	83.3
Drainage systems	203	127	112	154	65	81	137	99	36	69	38	170	90.0
Electricity	175	121	85	112	55	71	125	98	43	63	66	145	87.3
Parking facilities	215	140	121	133	82	81	193	104	51	69	58	194	107.1
Recreation facilities	192	124	102	141	61	83	128	96	38	64	59	153	88.7
Street lighting	249	156	131	165	83	92	184	104	49	84	90	202	115
Neighboorhood greening	184	111	99	117	78	64	138	77	35	62	73	178	89.6
Pedestrian walkways	222	134	123	107	73	84	162	97	43	77	71	185	102.7
Waste management	140	106	58	115	59	72	121	90	32	53	59	155	83.1

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Ease of traffic flow	131	87	72	83	50	64	119	65	30	71	62	127	76.9
Social interaction	310	167	164	163	71	93	236	169	59	108	110	237	144.6
Job opportunity	365	206	189	209	101	113	266	171	67	277	99	292	292
Cost of living	428	223	224	179	106	143	294	190	83	132	130	308	308
Neighbourhood quality	287	176	156	148	65	87	204	125	48	86	82	189	189
Crime	150	77	83	82	34	54	134	81	27	52	44	100	100
Sense of safety	374	220	194	187	113	141	256	189	86	147	122	298	298
Walkability	220	113	141	129	85	98	137	149	80	127	126	265	265
Property value	423	216	203	208	105	132	284	175	70	135	118	293	293
Building use conversion	381	211	183	196	95	102	267	168	76	115	94	263	263
Total	253.5	146.3	131.2	145	74.2	87.9	181.5	115.3	50.6	94.1	81.1	201.8	

Source: Author's Computation (2022).

The cost of living appears to be the most important livability variable in the study scoring 308 points overall. Followed closely by sense of safety (298) and property value (293) and not far from this is job opportunity (292). This connotes that economic opportunities rank highest among the reasons residents consider an area; especially around high-rise buildings, livable. Opportunities to walk in safely (265) and the flexibility of converting the use in building to one considered more suitable at any due time (263) were also considered important. Next to economic opportunities are the social interaction opportunities. When livability is desired in an area therefore, the maximization of economic opportunities should take the priority in design. Fostering of social connection should be given the next priority by the designer through the kinds of facilities proffered including the arrangement of same. Of note in this study is the parking facility (107.1) and traffic pattern. Residents considered the quality of other kinds of facilities such as electricity, pipe borne water, recreation facilities, health facilities and sewerage among others basic.

Health care facilities are more adequate in Victoria Island (120.3). Neigbourhood greening adequacy scored 62.4% and 63.0% of the utmost point obtainable in Victoria Island and Ikoyi Obalende respectively while recreation facilities adequacy scored 62.0% and 59.3% of the maximum points obtainable in Victoria Island and Ikoyi Obalende respectively. Pedestrian walkway adequacy scored 64.1% and 65.1% of the highest point obtainable in Victoria Island and Ikoyi Obalende respectively; parking facilities adequacy scored 69.1% and 72.4% % of the highest point obtainable in Victoria Island and Ikoyi Obalende respectively. In sum, the adequacy of public facilities and basic amenities in the study area could be described as average (57.8% of the maximum score obtainable). In sum, there is no spatial difference in the livability of the study area ($T = 0.880$, $p = 0.400$)

The availability and efficiency of basic amenities is one of the reasons that attract high income earners to the study area; however these infrastructures have been overstretched over time due to the unplanned population surge witnessed in the area, consequently decreasing the livability of the area. With the current high rise development in the study area and the identified lopsidedness in available infrastructures and utilities, the need for a regulatory law on the construction and location of high rises is imperative to improve the functionality of the area. Also, if no action is taken now to improve the efficiency of the infrastructures, continued densification of high rises in the area is capable of creating more environmental problems soon.

i. **Relationship Between Incidence of High-Rise Buildings and Livability in the Study Area**

Factor analyses of a 34 variable data set produced 2 linear composites, one out of which was named Relative Livability Quality Index (RLQI) and the other considered residual. This factor (RLQI) extracts 80.5% of the total variance of data set. The variables relating to incidence of high rise buildings were standardized to be amenable to parametric tests. Thus, only variables of livability were factor analyzed. These three variables of incidence of high rise buildings were considered independent variables while RLQI was considered dependent. The regression model summary was used to explain the relationships between the linear composites of incidence of high rise buildings and residents' livability on table 4.3.

Table 4.3: The Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.797[a]	.636	.499	.70771121

ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	6.993	3	2.331	4.654	.036[b]
Residual	4.007	8	.501		
Total	11.000	11			

The Model

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	1.856	2.384		.779	.459
RITBI	.042	.019	.977	2.254	.054
BHI	-0.376	.270	-.306	-1.393	.201
TBDI	-5649.005	9236.121	-.266	-.612	.558

a, b. Predictors: (Constant), RITB, BHI, TBDI
c. Dependent Variable: RLQI

KEY - RLQI= Relative Livability Quality Index, RITBI= Relative Incidence of High-rise buildings Index, BHI=Building Height Index and TBDI=Tall Building Density Index

The relationship between the relative incidence of high rise buildings and residents' livability is momentous ($p = 0.036$, $F = 4.654$). The discrepancies in Relative Livability Quality Index may be attributed to a magnitude change in relative incidence of high rise buildings ($R = 0.797$). To determine the weight of each of the components of Relative Incidence of High Rise Buildings, reference is made to their components as shown on table 4.3. Using the standardized beta coefficients, the constant 'a' would disappear and the regression equation would take this form:
$Y= a+ b_1 x_1 + b_2x_2 + b_3x_3.$

$Y (RLQI) = 0.977x_1 - 0.266x_2 - 0.306x_3.$

This implies that the regression coefficients for factors 1, 2 and 3 (RITBI, BHI & TBDI) as shown on table 4.3 are 0.977, -0.266 and -0.306 correspondingly and also indicates that factor 1 (RITBI) has the highest effect on the residents' Relative Livability Quality Index. With P values of 0.054, 0.201 and 0.558, only RITB has a reliable relationship with the Relative Livability Quality Index which is statistically significant. Though, the other two components of incidence of high rise buildings (BHI and TBDI) are important but not statistically significant.

The result of regression coefficients also implies that for one unit change in RITBI, the relative residents' livability will change with a unit of 0.977; for one unit change in High rise building density index (TBDI), relative residents' livability will reduce by a unit of 0.266 while a unit change in building height index (BHI) will cause a corresponding reduction of 0.306 in residents' livability index. Thus there is a relationship between residents' livability and Relative Incidence of Tall Buildings; Tall Building Density and Building Height Index. Hence, uncoordinated construction of high rises could destroy the city fabric and degenerate livability. The impacts of tall building densification and high skyline are only sparingly felt as at now. However, there is a high tendency that with continued increase in height and concentration of high-rise buildings in the study area, livability problems would escalate.

If high rise buildings are well planned from inception and located in appropriate places in the city centre, they impact existing infrastructures positively. They also improve the proximity of activities centers thereby reducing transportation cost and time, energy consumption and consequently the usability and livability of the area. High-rise buildings offer the opportunity to create space on the ground level for public uses. However, high-rise buildings should be adequately spaced to improve livability. Another environmental impact of high-rise buildings is that they have the potential to create ample access to sunlight and wind if well organized. Building height limit is also essential to avoid distortion in the city skyline; the maximum height buildings in specified areas could reach should be well spelt out. Though, the impacts of tall building densification and high skyline are only sparingly felt as at now. However, there is a high tendency that with continued increase in height and concentration of high-rise buildings in the study area, livability problems would escalate. For instance, a unit change in BHI and TBDI will cause livability to reduce with a unit of 0.306 and 0.266 respectively.

Contributions and Implications for Planning Knowledge

Cities are actually in three dimensions, though planners are apt to think of it only in two dimensions. There are latent problems of the city that would only be understood and well tackled if the third dimension of the city is put in full consideration. High rise building pictures the localizing three-dimensional urbanization in an already urbanized city. Various professionals in the built environment who are builders of cities are continuously refashioning the city form for their peculiar reasons with no end result, only a continuous succession of phases; hence, only a partial control can be expressed over structure and growth of the city (Lynch, 1960 and Akindele, 2010). This consequently leads to surreal city changes that render the city less functional.

The consequences of localizing high skyline need to be mirrored through city livability to suggest to us options that are available for smooth gravitation in city growth. The onus of physical planning involves lots of economic variables and variety of environmental settings that are constantly changing, creating diverse circumstances and situations that limits the production of universal solutions (Achi, 2004). Planning and Planners should therefore be as dynamic as the "change challenge" confronting the organization of buildings in space by manipulating the environment responsively (Akindele, 2010). This research provides empirical facts on the impacts of the surge in high rise development on the livability of our cities.

Towards More Livable Communities

The spatial distribution of high rise developments was clustered in both LCDAs which indicated that there are high incidences of noncompliance to height zoning as provided in the Revised Ikoyi-Victoria Island Model City Plan of 2013-2033. Thus, the law enforcers (town planners) under this jurisdiction should monitor the development of high-rise buildings more strictly and enforce developers to comply. This will also ensure that the concentration of high rise buildings would not overstretch existing basic facilities and amenities. Negative environmental impacts of high-rise buildings should be curbed through the adoption of intelligent and integrated buildings. Eco-friendly high-rise buildings should also be encouraged.

'Best Practices' from around the world in terms of desirable heights of buildings and organization in city centres should be adopted. Public-private partnership in the provision of basic neighborhood infrastructures should be encouraged. New tools should be developed for planners to assess infrastructural system capacity with current and future city population. The research work has established that there is a reasonable relationship between clustering of high rise buildings and residents' livability. It also concludes that high density living can be adopted as a strategy to manage the carbon footprint and energy dependency within city centres in light of continued urbanization and conurbation of cities.

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