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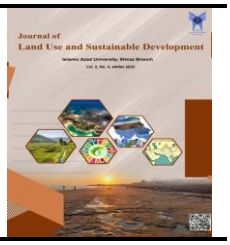

Original Research Article

Location Decision Variables Determining the Choice of Site For the Establishment of Commercial Bank Branches In Onitsha, South-East Nigeria

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Abstract

Background and Objectives: This study identified the factors that most likely determine the choice of sites for the establishment of commercial bank branches in Onitsha in South-East Nigeria. Underlying this aim was the objective of evaluating the extent to which specific indicators of each location decision variable avail an explanation of the variation in the choice of location among these commercial banks.

Methods: The study adopted exploratory survey research design, leading to the deployment of quantitative analysis of dataset collected from survey questionnaires administered to a census count of 24 commercial banks in Onitsha. Randomness and normality tests were performed on the 5-point Likert scale data for the examined indicators. Descriptive data analysis for the indicators featured the calculation of weighted mean score and standard deviation, while the six hypotheses postulated in the study were tested using Kruskal Wallis *H* statistic.

Findings: Pursuant to the test of the six hypotheses posed in the study, the five likely determinants of the choice of site for commercial bank branch in Onitsha, Nigeria include competitive advantage, operating cost, infrastructure, attractive land elements, and proximity to customers; while banks' compliance with government regulations did not feature as a significant location decision variable.

Conclusion: The results suggest that commercial banks in Onitsha, Nigeria exercise economically viable site selection for the establishment of their branches, based on specific indicators that underlie the leading location decision variables or determinants namely competitive advantage, operating cost, infrastructure, attractive land elements, and proximity to customers.

Running Title: Determinants of commercial bank site location

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
30	2	3

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Introduction

Notwithstanding the trajectory of customer attraction to electronic banking that facilitates banking transactions and services outside the corporate banking premises using existing and emerging tools of information and communications technology (ICT) in response to national and global reforms in the financial sector, the physical presence of commercial banks had remained sacrosanct in most developing economies. Accounting for this has been the competitive drive to address market needs created by service provision gaps of other conventional, mobile and ubiquitous financial services firms (Acha, 2008; Nwankwo and Agbo, 2021).

The physical presence of commercial banks might be instantiated using location/site selection activity. Among the expert tools deployed for this activity is the multi-criteria evaluation (Cebi and Zeren, 2008; Perez-Benitez *et al*., 2021), a dimension of which involves identifying an array of factors that might influence location decisions alongside their associated indicators, which when subject to descriptive and statistical inferential statistical analyses, would help to furnish objective answers to the question of branch location posed by banks.

Featured under competitive advantage are indicators, comprising the Exchange of information, Customer switch benefits, Innovation, and skilled and affordable labour. The incorporation of the first indicator being exchange of information is traceable to Boschma (2005), who averred that the decision of firms to locate side by side tends to foster the exchange of knowledge and information. In succession is Customer switch benefits. Although bank location decisions had been driven by the maintenance of existing customer base (Lord and Wright, 1981), the recent prevalence of inter-bank transactions enables a bank the possibility of offering services to customers of other competing banks, leading to customer switch between banks on the basis of attractive transaction costs (Adeyinka *et al*., 2022). Customer switch benefit is however different from cannibalization, wherein a particular bank branch permanently takes over and books the customer of an adjoining bank (Balogun and Ogbeide, 2020). Nevertheless, many customers in Nigeria are comfortable having accounts with multiple banks. Contributing to debates on the indicators of location decisions of firms, Rosenthal and Strange (2006), cited instances of agglomeration of innovative firms. The choice of bank location is arguably influenced by technological innovation, which further drives operational efficiency and competition associated with bank agglomeration (Avetisyan, 2023; Brevoort and Wolken, 2009; Okeahalam, 2009). Among these technological innovations include smart phone-enabled mobile banking Apps, internet banking facility, and portable self-service teller machines available within the bank premises to assist customers without a mobile banking App on their phones among others. The fourth indicator being skilled and affordable labour was featured in this study following the arguments adduced by Akin and Seyfettinoğlu (2022), McQuaid *et al* (2003), and O'Sullivan (2012) to its significance, especially among agglomerating banks. This discourse dovetails to the proposition of the first null hypothesis:

H_{01}: There is no variation among the indicators of competitive advantage

Featured under infrastructure variable are indicators namely availability of modes of transport, availability of reliable utilities, and the availability of parking facilities. Studies have indicated that business location decisions have been influenced by the level of available transport facilities and reliable urban infrastructure/utilities (Lucky and Georgewill, 2024), as well as ample parking facilities, especially for banks (Cabello, 2019). Although McQuaid *et al* (2003) averred that the nexus between infrastructure provision and business location decision had been obscure, evidence in literature in recent times has affirmed infrastructure availability as one of the principal factors affecting location decision-making in developing countries (Frick and Rodríguez-Pose, 2023). Featured among the infrastructure needs of banks is an efficient security response system designed to proactively combat heist attempts (Ojedokun and Mijinyawa, 2022). Fallout from these reviews is the evaluation of the extent to which

the three indicators of Infrastructure explain the variation in the choice of location among banks in the study area. Hence the proposition of the second null hypothesis:

H_{02}: There is no variation among the indicators of infrastructure.

To corroborate infrastructure availability as a decision variable is the evaluation of the indicators of banking operating costs. Okeahalam (2009) identified labour cost as featuring among the factors that influence the number and location of bank branches. In addition, McQuaid *et al* (2003) provided empirical evidence to indicate the impact of changes in transport- and infrastructure costs on business location decisions. Similarly, Musa *et al* (2015) avowed the significance of these two factors, stressing that infrastructural decay in Nigeria has increased the cost of banking operations comprising electricity and transportation of sensitive items including currency notes. It is on this note that the study evaluated the extent to which the three indicators namely cost of labour, transport, and utilities explain the variation in the choice of location among banks operating in Onitsha; hence, the proposition of the third null hypothesis:

H_{03}: There is no variation among the indicators of operating costs

Among the attractive land elements in Fig. 1 that were evaluated in connection with this tudy are size of land, type of plot available, and the quality of ambience. Common land parcel sizes in Nigeria include 30 m × 30 m (900 m^2), which is considered to be a standard plot (Villa Afrika, 2020). Other variations include 18 m × 30 m (540 m^2) and 15 m × 30 m (648 m^2) being half a standard plot (Villa Afrika, 2020). The Federal Housing Authority (FHA) in a policy statement reiterated that banks typically require minimum land parcels in the range of 1,000 m^2 to 2,000 m^2 for their branches (FHA, 2024). Contrary to that standard, it was observed that banks located in high density commercial zones of Nigeria (as in the case of Onitsha) operate their branches on parcels sizes of at least 500 m^2 (Mixta Africa, 2024). In spite of all these specifications, Balogun and Ogbeide (2020) reported no correlation between bank location decision and the size of available land. In corroboration, however, nothing is known regarding the influence of these categories of land parcels on banks' location decision. The third indicator is the character and atmosphere of a place (ambience). To buttress on this indicator, Okeahalam (2009) reiterated that banks tend to favour the attractiveness of urban areas compared to the rural landscape. Even within urban areas, most banks have favoured the selection of sites near market centres and institutional buildings owing to high levels of population density, pedestrian traffic, and commercial activities (Balogun and Ogbeide, 2020). Sequel to a review of these existing studies and the theorizations surrounding these indicators is a proposition of the fourth null hypothesis:

H_{04}: There is no variation among the indicators of attractive land elements.

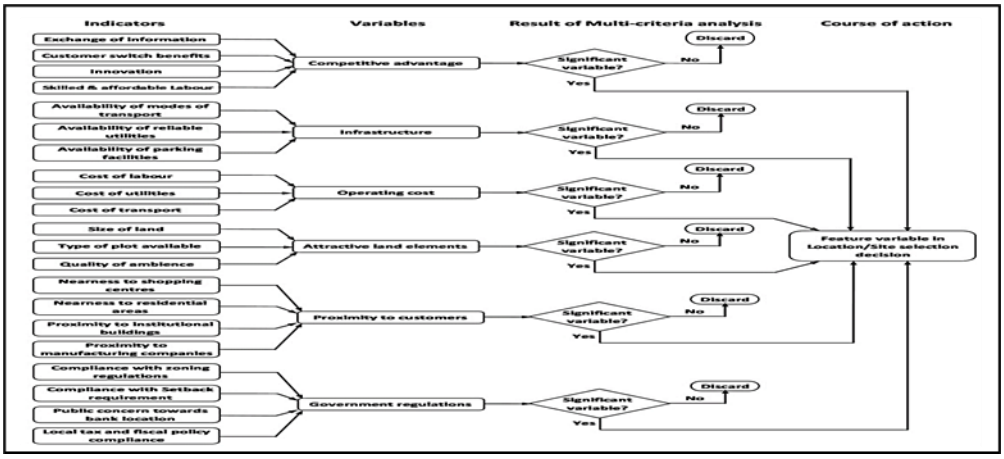

Figure 1: Conceptual foundation of the study

Inference from geospatial analysis indicates that banks consider proximity to customers when scouting for branch location sites (Balogun and Ogbeide, 2020). Associated with this variable are indicators namely proximity (nearness) to shopping centres, residential areas, institutional buildings, and manufacturing companies/industries respectively. Studies credited to Balogun and Ogbeide (2020) and Cabello (2019) indicated how choice of site for banking activity could be influenced by proximity to shopping centres. In another similar study, Ergungor (2010) unraveled the significant benefits accruing to residents within a neighbourhood as a result of the physical presence of banking facilities. Beside these findings, Balogun and Ogbeide (2020) further found that banks favour location of their branches near institutional buildings, being the third indicator. Although the theory of agglomeration economies have favoured the co-location of manufacturing and service-oriented industries (Colin, 2022), not much has been explored regarding the extent to which proximity to manufacturing companies/industries might likely attract the location of commercial banks to a given area. Nonetheless, Hegerty (2016) suggested that banks tend to avoid location decision in sub-urban industrial layouts with dominance of low-income residents owing to incidences of poor competitiveness and marginally high crime rates. Given the city characteristics of Onitsha in Nigeria, and the rich road transport network that transverse most neighbourhoods as featured in Fig. 2, this study has chosen proximity to manufacturing companies as the fourth likely indicators, sequel to which the fifth null hypothesis was proposed:

H_{05}: There is no variation among the indicators of bank proximity to customers.

On a general note, Cabello (2019) had indicated compliance with governmental regulations to feature among the determinants of bank location decision. Although zoning and building setbacks constitute the spatial planning standards instituted by the government to ensure compliance by all developers including banks, evidence of such standards are available online as featured by FHA (2024), as well as those in the official gazette of the Anambra State Ministry of Lands. However, little is known regarding the extent to which banks' compliance with these zoning laws and building regulations (setbacks) might influence their location decision. In a study credited to Dauda and Lee (2016), it was found that only a small proportion of bank customers exercised preference for increased branch network; implying that there is less public concern towards bank location decision in Nigeria. The question now is, if there is less public concern towards bank location decision at the national level, could similar conclusion be reached at the city level, being Onitsha? A study credited to Musa *et al* (2015) identified local tax and fiscal policy compliance as factors considered by banks in their expansion policy, one of which is the establishment of new branches. It is on the account of these studies and their accompanying insights that the sixth null hypothesis was proposed:

H_{06}: There is no variation among the indicators of government regulations

In acknowledgement of these baseline studies pertaining to location decisions of banks and related financial services providers, this study featured, within the context of a city in a developing country, the perspective of non-parametric analysis of the indicators that underlie specific determinants for the location and establishment of bank branches, so that the significant location decision variables could be identified.

This study adopted the exploratory dimension of survey research design with the intention of gaining deep insight into the factors accounting for variation in/determining the choice of site for commercial banks in Onitsha, Nigeria. It entailed the deployment of quantitative methods to analyze data collected in connection with survey questionnaire administered to the census count of 24 commercial banks in the study area. These questionnaires were completed by the operations/premises managers of these banks. Onitsha, located in Anambra State, Nigeria is located within the bounds of latitude 6° 05' 00" and 6° 09' 30" North of the Equator and longitude 6° 45' 36" and 6° 50' 00" East of the Greenwich meridian as featured in Fig. 2. It has

for many decades, served as one of the prominent commerce-oriented cities of South-Eastern Nigeria.

Among the prominent landmarks in Onitsha include the First and second Niger Bridges, New Market Road, Iweka Road, Oguta Road, the Army Day Secondary School, the Onitsha-Owerri Road, and the four neighbourhoods of Fegge, Odakpu, Woliwo, and Okpoko.

The overarching question that this study has put forward to address is posed as follows: What are the location decision variables likely to determine the choice of site for the establishment of commercial bank branch in Onitsha Nigeria? Hence, this study aims to identify the factors that will likely determine the choice of sites for the establishment of commercial bank branches in Onitsha, Nigeria. Associated with this aim is the objective of evaluating the extent to which the indicators attributed to each location decision variable avails an explanation of the variation in the choice of location among banks operating in the study area.

As indicated in the conceptual diagram in Fig. 1, the observed variables for this study include competitive advantage, infrastructure, operating cost, attractive land elements, proximity to customers, and government regulations. Associated with each of these variables are array of indicators, which is hypothesized to influence these variables or likely determinants of bank location decision or site selection.

There are existing studies affirming or downplaying the significance of these indicators in Fig 1. Attempt has been made to review each of them under the ambit of their containing variable proposed in this study.

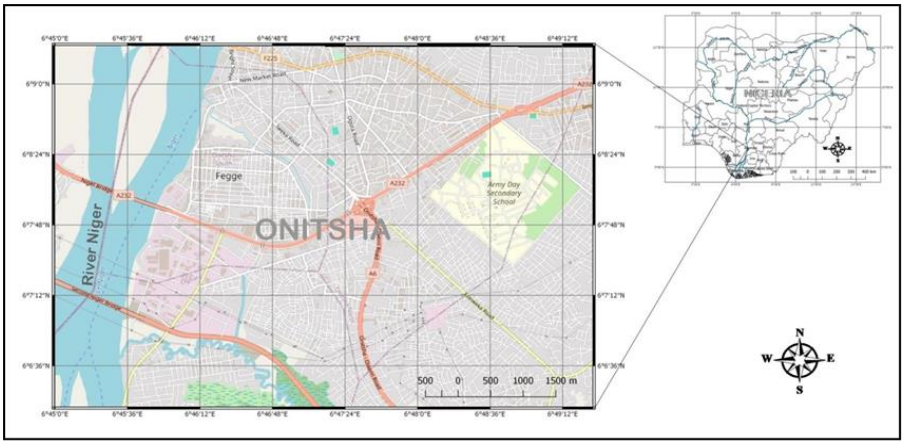

Figure 2: Street Map of Onitsha and its Environs
Source: Open Street Map (2025) at https://www.openstreetmap.org/export#map=14/6.12647/6.79410

Onitsha is a hub of commerce in South-East Nigeria. Particularly, the famous Onitsha market is home to a variety of goods and services, which have attracted merchants and traders from all over Nigeria. Supporting this trade activities are the services rendered by financial institutions, and in recent times, mobile and online financial services providers.

Materials and Methods

During the first quarter of the year 2025 (January to March 2025), survey questionnaire was used to elicit responses from the operational managers or in some special cases, the in-house premises/property managers of these banks, who in most cases have been involved in site acquisition contracts. They were administered with structured questionnaires constituting a multiple grid of questions designed to capture the perception of these commercial banks regarding their choice of bank premises location and the drivers for such location/land use decisions in tandem with Fig 1.

Featured in Table 1 are operational variables, indicators and data specification for the study.

$$|Z| = \frac{R - \overline{X}_R}{S_R} \qquad (1)$$

All the data associated with the indicators in Table 1 were gathered using study questionnaires. The retrieved responses and

associated Likert Scales for each indicator include 1 = "No likelihood", 2 = "Minimal likelihood", 3 = "Average likelihood", 4 = "Strong likelihood", and 5 = "Very strong likelihood".

Prior to descriptive statistical analysis and the Kruskal-Wallis *H* Test featured in the study, two diagnostic tests namely the Wald-Wolfowitz runs test, Jarque-Bera normality test were performed on the collected survey data. The Wald-Wolfowitz runs test was conducted on the 21 groups of indicators featured in Table 1, in order to ascertain the randomness of responses elicited from the commercial banks in the study area, and justify the deployment of further inferential tests. The runs test was instantiated using equation 1: Where $|\boldsymbol{Z}|$ is the calculated normal score, R is the number of observed runs in a sequence of response, $\overline{X}_R$ is the expected number of runs in the array of responses, and S_R is the standard deviation of the number of runs. Given 5% level of significance, the hypothesis for the non-randomness of responses for each indicator in Table 1 shall be accepted where $p < 0.05$, otherwise it is rejected where $p > 0.05$.

Table 1: Operational variables, indicators and data specification

S/N	Variable	Indicators[1.]	
		Indicator name	Symbol
1	Competitive advantage	Exchange of information	EOI
		Customer switch benefits	CSB
		Innovation	INV
		Skilled and affordable labour	SAL
2	Operating cost	Cost of labour	COL
		Cost of utilities	COU
		Cost of transport	COT
3	Infrastructure	Availability of modes of transport	TRN
		Availability of reliable utilities	UTL
		Availability of parking facilities	PKF
4	Attractive land elements	Size of land	SOL
		Type of plot available	PLT
		Quality of ambience	AMB
5	Proximity to customers	Proximity to shopping centres	XSC
		Proximity to residential areas	XRA
		Proximity to institutional buildings	XIB
		Proximity to manufacturing companies	XMC
6	Government regulations	Compliance with zoning regulations	ZON
		Compliance with Setback requirement	SBR
		Public concern towards bank location	PUB
		Local tax and fiscal policy compliance	LTX

Note: 1. All indicators were measured using (Ordinal) Likert Scale in the range 1 to 5

Furthermore, the Jarque-Bera (JB) normality test was conducted to determine the alignment or otherwise of data for indicators in Table 1 with the Gaussian/normal distribution. This test was conducted using the following embedded function in Gretl® software, expressed in equation 2 as:

$$\text{JB Stat} \approx \chi^2 = n\left(\frac{S^2}{6} + \frac{(K-3)^2}{24}\right) \qquad (2)$$

Where for each indicator in Table 1, n = number of observations, S = skewness of sample data, and K = kurtosis of sample data. The Jarque-Bera (JB) statistic is an approximation of the Chi-square (χ^2) statistic with $n - 1$ degrees of freedom (Brooks and Tsolacos, 2010) such that at 5% level of significance, the null hypothesis affirming the normality of data is accepted (rejected) where the right-tailed probability of the χ^2 statistic is in the range of $p > 0.05$ ($p < 0.05$).

A selection of descriptive statistical tools were used to analyze the responses availed by the survey questionnaire respondents. First was

the weighted mean score featured in the KyPlot® software package that performed the Kruskal-Wallis *H* test. For the 5-point Likert scale associated with the responses to questions in the survey questionnaire, the weighted mean score ($\overline{X}_W$) was computed using equation 3.

$$\overline{X}_W = \frac{\sum f_i w_i}{\sum f_i} = \frac{5(f_5)+4(f_4)+3(f_3)+2(f_2)+1(f_1)}{f_5+f_4+f_3+f_2+f_1} \qquad (3)$$

Where the assigned weighted of 1 to 5 are attributed to the responses ranging from "Very strong likelihood" to "No likelihood", and the frequencies of $f_i \rightarrow f_5$ to f_1 are attributed to the number of respondents that selected the associated answer option to a given weight in the range 5 to 1.

Table 2: Interpretation framework for the weighted mean score

Likert Scale	Range of weighted Mean score ($\overline{X}_W$)	Interpretation of mean score based on Questionnaire response
5	$4.50 \leq \overline{X}_W \leq 5.00$	Very strong likelihood
4	$3.50 \leq \overline{X}_W \leq 4.49$	Strong likelihood
3	$2.50 \leq \overline{X}_W \leq 3.49$	Average likelihood
2	$1.50 \leq \overline{X}_W \leq 2.49$	Minimal likelihood
1	$1.00 \leq \overline{X}_W \leq 1.49$	No likelihood

Source: Author's specification (2025)

Table 2 was devised to provide an interpretation framework to the calculated range of weighted mean using the corresponding Likert Scale for specific response. the standard deviation from the weighted mean responses, *s* was used to measure the degree of cluster or dispersion of the weighted mean score attributed to each indicator in Table 1. This statistic was calculated using equation 4 as follows:

$$s = \sqrt{\frac{1}{n-1}\left(\sum f_i w_i^2 - \frac{\left(\sum f_i w_i\right)^2}{n}\right)} \qquad (4)$$

Where *n* and f_i retain their original definitions as in equation 3, while the assigned weights, w_i remains 5 to 1 as featured in the calculation of the mean score. Hence, a higher (lower) value of standard deviation indicates higher degree of dispersion (cluster) of observations from (around) the mean score.

The trajectory of analysis from the indicator level to the variable level was instantiated using the calculation of the group mean. This measure was aimed at determining the average score that shall drive the ranking of the location decision variables. The group mean ($G_{\overline{X}}$) as featured in the Kruskal-Wallis *H* tests in KyPlot® package was calculated using equation 5:

$$G_{\overline{X}} = \frac{(\overline{X}w)_i}{n_i} = \frac{(\overline{X}w)_1 + (\overline{X}w)_2 + \ldots\ldots + (\overline{X}w)_n}{n_i} \qquad (5)$$

Where for each variable, $(\overline{X}_W)$ represents instance of mean score for an indicator, and n_i = the total number of indicators that make up a particular observed variable. the factors determining the choice of location among the sample of banks in Onitsha were ranked in descending order of group mean, such that the factor (location decision variable) with the highest group mean was ranked first, while the ranking of subsequent variables was done based on descending order of group means.

The Kruskal-Wallis *H* statistic was used to test at α = 0.05, the divergence (variation) or convergence in the distribution of indicators of each location variable, so that inference could be drawn regarding the extent to which a variation in the choice of site for commercial banks in Onitsha could be attributed to specific

factors (location decision variable). Equation 6 features the Kruskal-Wallis *H* statistic computed using KyPlot® package:

$$H \approx \chi^2 = \frac{H'}{1-CF} = \left(\frac{12}{n_T(n_T+1)} \bullet \sum_{j=1}^{k} \frac{R_j^2}{n_j} \right) - 3(n_T+1) \Big/ 1 - \left(\frac{\sum(t^3-t)}{n_T(n_T+1)(n_T-1)} \right) \quad (6)$$

Where k = the number of each indicator, j = sample of respondents, n_j = the frequency associated with sample j, $n_T = \sum_{j=1}^{k} n_j$ = the total observations across all the samples, and R_j is the sum of the ranks in sample j, and t connotes the number of ties in each ranked value. Since degrees of freedom = k -1, and α = 0.05, the null hypothesis that there is no variation among the indicators of a specific location variable shall be accepted (rejected) where $p > 0.05$ ($p < 0.05$). Associated with the Kruskal-Wallis *H* test was the calculation of the effect size of the test, η^2 (eta squared) using equation 7:

$$\eta^2 = SS_{effect} / SS_{total} \quad (7)$$

Where eta-squared in equation 7 is the quotient of the sum of squares of the effect (SS_{effect}) and the sum of squares for the total observation (SS_{total}). According to the University of Cambridge (2009), the effect size for a typical inferential test above is avowed to be small when $0.01 < \eta^2 < 0.06$, medium when $0.06 \leq \eta^2 < 0.14$, and large when $\eta^2 \geq 0.14$. Besides inferential statistical test, the Kruskal-Wallis H test featured in this study as a multi-criteria evaluation tool for the factors that determined location decisions of bank branches.

Results and Discussion

The Wald-Wolfowitz runs test

It was observed from the first parameter in Table 3 that all the indicators associated with each specific location decision variable among commercial banks in Onitsha exhibited randomness at $p > 0.05$. Consequently, inferential statistical analysis was deployed for the purpose of assessing the extent to which each location decision variable for commercial banks in the study area can be attributed to their respective indicators.

The Jarque-Bera Normality Test

The second test parameter featured in Table 3 is the *p*-value arising from the Jarque-Bera normality test conducted across the indicators of specific location decision variable among commercial banks in Onitsha. It was observed that the data for 12 out of the 21 cases of the indicators were normally distributed at $p > 0.05$. However, the data for 9 out of the 21 indicators associated with bank location decision variables in the study area did not exhibit features of a normal distribution at $p < 0.05$. The inconsistency in the pattern and distribution of data, and cases of deviations from the Gaussian/normal probability distribution had informed the relaxation of the normality assumption for this study, so that Kruskal-Wallis *H* statistic, being an alternative non-parametric statistical test in lieu of the One-Way Analysis of Variance (ANOVA) as averred by Field (2009) was adopted.

Weighted mean score and standard deviation of the indicators

First, the competitive advantage variable comprises four indicators as featured in Table 3. Among these indicators, the Exchange of information (EOI) ($\overline{X}_W$ = 4.71, s = 0.75), and Customer switch benefits (CSB) ($\overline{X}_W$ = 4.63, s = 0.82) exhibited very strong likelihood of influencing the competitive advantage of banks in Onitsha. In close ranks with these aforementioned indicators are Innovation (INV) ($\overline{X}_W$ = 3.96, s = 1.12) and Skilled and affordable Labour (SAL) ($\overline{X}_W$ = 3.92, s = 1.25), both of which exhibited strong likelihood of influencing the competitive advantage considered by banks in their location decisions

Table 3: Diagnostic, Descriptive and Inferential statistical tests

S/N	Variables	Indicator Symbol	*p*-value		Descriptive Statistics				Kruskall-Wallis test		
			Runs Test[1]	*JB* Test[2]	Mean Score	Std. Dev	Group mean	Rank	H-Stat	p-value[3]	Effect size (η2)
1	Competitive advantage	EOI	0.363	0.000	4.71	0.75	4.30	1	15.60	0.001	0.140
		CSB	0.117	0.000	4.63	0.82					
		INV	0.777	0.102	3.96	1.12					
		SAL	0.766	0.096	3.92	1.25					
2	Operating cost	COL	0.310	0.907	3.63	1.01	4.07	2	9.93	0.007	0.110
		COU	0.431	0.173	4.50	0.66					
		COT	0.943	0.297	4.08	0.97					
3	Infrastructure	TRN	0.897	0.000	4.67	0.92	3.97	3	24.02	0.000	0.320
		UTL	0.068	0.788	3.04	1.23					
		PKF	0.835	0.001	4.21	1.06					
4	Attractive land elements	SOL	1.000	0.136	4.58	0.58	3.94	4	11.94	0.003	0.140
		PLT	0.806	0.627	3.42	1.25					
		AMB	0.937	0.202	3.83	1.31					
5	Proximity to customers	XSC	0.516	0.001	4.83	0.38	3.40	5	75.43	0.000	0.790
		XRA	0.943	0.678	4.38	0.58					
		XIB	0.091	0.322	3.04	0.86					
		XMC	0.787	0.001	1.33	0.70					
6	Government Regulations	ZON	0.431	0.249	1.46	0.59	1.31	6	3.36	0.340	0.004
		SBR	1.000	0.000	1.25	0.53					
		PUB	1.000	0.001	1.33	0.64					
		LTX	0.305	0.016	1.21	0.41					

Source: Processed and analyzed data (2025)

Notes

1. For the Runs Test, data is randomly distributed at $p > 0.05$;
2. For the Jarque-Bera (*JB* Test), data is normally distributed at $p > 0.05$
3. Kruskall-Wallis *H* Test for Location decision variable is significant at $p < 0.05$

Second is the operating cost variable, which comprises three indicators as featured in Table 3. Among these indicators, the cost of utilities (COU) ($\overline{X}_W = 4.50$, $s = 0.66$) was found to exhibit very strong likelihood of influencing the operating costs of commercial banks. This is followed by cost of transport (COT) ($\overline{X}_W = 4.08$, $s = 0.97$) and the cost of labour (COL) ($\overline{X}_W = 3.63$, $s = 1.01$) which were both found to exhibit strong likelihood of influencing the operating cost variable of commercial banks' location decisions in the study area. the third variable in Table 3, being Infrastructure is characterized by three indicators. Among these indicators, the availability of modes of transport (TRN) appears to exert very strong influence on the infrastructural consideration of bank location decision in the study area ($\overline{X}_W = 4.67$, $s = 0.92$). This is followed by the availability of parking facilities (PKF), which exerts strong likelihood of influencing infrastructural consideration of these banks ($\overline{X}_W = 4.21$, $s = 1.06$). The availability of reliable utilities (UTL), however exhibited average likelihood of influencing the infrastructural consideration of the commercial banks ($\overline{X}_W = 3.04$, $s = 1.23$), probably because the availability of public transportation in the study area does not put so much pressure on banks to prioritize the provision of parking space.

The fourth variable is the attractive land elements, which comprises three indicators. Among these indicators in Table 3, size of land (SOL) ($\overline{X}_W = 4.58$, $s = 0.58$) was found to exhibit very strong likelihood of influencing the land requirements of commercial banks for their location decision. This is followed by the quality of ambience (AMB) ($\overline{X}_W = 3.83$, $s = 1.31$), which exerts strong likelihood of influencing the land requirement variable of banks' location decision.

The type of plot available for acquisition by commercial banks (PLT) was found to exhibit average likelihood of influencing the attractive land elements required by commercial banks for their operations in Onitsha ($\overline{X}_W = 3.42$, $s = 1.25$). The rationale for this result might be traced to the flexibility exhibited by most banks in developing their corporate branch

offices in tandem with the compact size of land parcels available for acquisition, bearing in mind the nature of land use and urban congestions at Onitsha.

Accompanying the fifth variable (proximity to customers) in Table 3 are four indicators. Among these indicators, the proximity of banks to shopping centres (XSC) was found to exhibit very strong likelihood of influencing the overall customer proximity consideration of banks in Onitsha ($\overline{X}_w$ = 4.83, s = 0.38). This might be highly correlated to customer access to a variety of payment channels in defiance of network glitches associated with mobile and ubiquitous banking channels that have inconvenienced a lot of traders and bank customers in recent times. Furthermore, proximity to residential areas (XRA) is another indicator considered by the responding banks in Onitsha as exhibiting a strong likelihood of influencing their consideration of locating where they might have ample proximity to customers ($\overline{X}_w$ = 4.38, *s* = 0.58). This is in view of the comfort and convenience that customers tend to enjoy following the location of banks within their residential neighbourhood; as that would enable them have easy access to customer care services at their beck and call, without incurring exorbitant commuting costs. Proximity to institutional buildings (XIB) was found to exhibit average likelihood of influencing bank's consideration of proximity to customers ($\overline{X}_w$ = 3.04, *s* = 0.86), whereas proximity to manufacturing companies (XMC) did not exhibit any likelihood of influencing the customer proximity factor of bank location in the study area ($\overline{X}_w$ = 1.33, *s* = 0.70). These results imply that commercial banks in Onitsha have accorded more importance to proximity of their branches to commercial and residential areas contrary to industries and institutional buildings. the sixth variable being a consideration of government regulations featured four associated indicators in Table 3. All the indicators notably Compliance with zoning regulations (ZON), Compliance with Setback requirement (SBR), Public concern towards bank location (PUB), and Local tax and fiscal policy compliance (LTX) were not found to exhibit any likelihood of influencing these banks' consideration of government regulations when establishing their branches in Onitsha (1.21 ≤ $\overline{X}_w$ ≤ 1.46; and 0.41 ≤ *s* ≤ 0.59).

The order of location decision variables

On the basis of group means as indicated in Table 3, the six location decision variables for commercial banks in Onitsha in the order of their influence include Competitive advantage ($G_{\overline{X}}$ = 4.30, Rank = 1st), Operating cost ($G_{\overline{X}}$ = 4.07, Rank = 2nd), Infrastructure ($G_{\overline{X}}$ = 3.97, Rank = 3rd), Attractive land elements ($G_{\overline{X}}$ = 3.94, Rank = 4th), Proximity to customers ($G_{\overline{X}}$ = 3.40, Rank = 5th), and Government regulations ($G_{\overline{X}}$ = 1.31, Rank = 6th). However, the analysis of these group means did not provided any meaningful information regarding the extent to which a variation in the choice of site for commercial banks in Onitsha could be attributed to each observed variable. Hence, the next sub-section addressed this phenomenon using the Kruskal-Wallis *H* test statistic.

The Kruskal-Wallis H Tests of hypotheses

Within the framework of *k* - 1 degrees of freedom, and the hypothesized level of significance, α = 0.05 in Table 3, the right-tailed Kruskal-Wallis *H* test as approximated by Chi-square distribution (χ^2) supported the rejection of null hypotheses of no variation among the indicators of Competitive advantage ($\chi^2(3)$ = 15.601, *p* = 0.001), Operating cost ($\chi^2(2)$ = 9.927, *p* = 0.007), Infrastructure ($\chi^2(2)$ = 24.022, *p* = 0.000), Attractive land elements ($\chi^2(2)$ = 11.935, *p* = 0.003), and Proximity to customers ($\chi^2(3)$ = 75.431, *p* = 0.000). It could be inferred that the choice of location among commercial banks in Onitsha is attributed to the five factors namely competitive advantage, operating cost, infrastructure, attractive land elements, and proximity to customers. a medium effect size was found to be associated with the Kruskal-Wallis *H* tests for operating cost variable (η^2 = 0.110). This implies that for the indicators of this location variable, a moderate magnitude of difference was observed across their mean scores. On the other hand, large effect sizes were found to be associated with the Kruskal-Wallis *H* tests for competitive advantage (η^2 = 0.140), infrastructure (η^2 = 0.320), attractive

land elements (η^2 = 0.140), and proximity to customers (η^2 = 0.790). In other words, for the indicators of these four location variables, a large magnitude of difference was observed across their mean scores to affirm the rejection of the null hypothesis.

Furthermore, the Kruskal-Wallis *H* test supported the acceptance of null hypotheses of no variation among the indicators of government regulations ($\chi^2(3)$ = 0.340, p = 0.340). It could be inferred that the variation in the choice of location among commercial banks in Onitsha could not be attributed to a consideration of government regulations. In tandem with the Kruskal-Wallis *H* test, a small effect size (η^2 = 0.004) was calculated for this variable, implying that a small magnitude of difference was observed among the mean scores of the indicators of government regulations in affirmation of the accepted null hypothesis.

Discussion of results

At $p < 0.05$, the test of the first hypothesis did not provide any statistical evidence to avow the absence of a variation among the indicators of competitive advantage namely Exchange of information, Customer switch benefits, Innovation, and Skilled and affordable labour. In other words, the null hypothesis H_{01} was rejected, leading to the inference that there is a variation among the indicators of competitive advantage. Consequently, competitive advantage features as one of the location decision variables for bank branches in the study area. This result aligns with similar studies credited to Avetisyan (2023), Brevoort and Wolken (2009), and Okeahalam (2009) regarding competition arising from bank agglomeration.

Test of the second hypothesis further featured statistical evidence for its rejection at $p < 0.05$. In other words, the test result provided sufficient grounds for the acceptance of the alternative hypothesis, leading to inference regarding a variation among the indicators of infrastructure as a location decision variable for bank branch in Onitsha. These indicators are recalled to include the availability of modes of transport, availability of reliable utilities, and availability of parking facilities respectively. Therefore, infrastructure features as one of the location decision variables for bank branches in the study area. Aligned with this finding is a similar study where Frick and Rodríguez-Pose (2023) avowed the importance of infrastructure availability to location decision-making in developing countries. test of the third hypothesis featured statistical evidence for its rejection at $p < 0.05$; so that inference was drawn regarding a variation among the indicators of operating costs namely costs of-labour, utilities, and transport respectively. Consequently, operating costs features among the location decision variables for bank branches in the study area. This result aligns with similar study where Musa *et al* (2015) found cost of banking operations to have been linked to deteriorating infrastructure.

At $p < 0.05$, the test of the fourth hypothesis featured statistical evidence for its rejection; so that the acceptance of the alternative hypothesis implies that there is a variation among the indicators of attractive land elements, notably size of land, type of plot available, and quality of ambience respectively. Therefore, attractive land elements featured among the location decision variables for bank branches in the study area. This finding is in consonance with similar studies which affirmed banks' preference for lands in urban locations (Okeahalam, 2009), and commercial centres (Balogun and Ogbeide, 2020) respectively.

Test of the fifth hypothesis featured statistical evidence for its rejection at $p < 0.05$; so that inference was drawn regarding the variation among the indicators of bank proximity to customers namely proximity to shopping centres, residential areas, institutional buildings, and manufacturing companies respectively. Consequently, bank proximity to customers features among the location decision variables for bank branches in the study area. In the first instance, this result aligns with similar study where banks were found to consider proximity to customers when scouting for branch location sites (Balogun and Ogbeide, 2020). Associated with this finding is the preference for bank branch locations in commercial and residential neighbourhoods (Cabello, 2019; Ergungor,

2010). Secondly, this result has reaffirmed agglomeration economies, which Colin (2022) avowed to have influenced the co-location of manufacturing and service-oriented industries such as banks.

At $p > 0.05$, the test of the sixth hypothesis featured statistical evidence for its acceptance; implying that there is no variation among the indicators of government regulations being drivers for the choice of site for bank branch location in Onitsha. These indicators include compliance with zoning regulations and setback requirement, public concern towards bank location, and compliance with local tax and fiscal policy respectively. Consequently, compliance with governmental regulations did not feature among the location decision variables for bank branches in the study area. This finding is contrary to the results of similar studies where compliance with governmental regulations (Cabello, 2019) and local tax and fiscal policy (Musa *et al*., 2015) featured among the determinants of bank location decision. Notwithstanding, result from test of the sixth hypothesis affirmed less public concern towards increased bank branch network as featured by Dauda and Lee (2016).

Conclusion

This study identified the factors that most likely determine the choice of sites for the establishment of commercial bank branches in Onitsha, Nigeria. The five factors likely to determine the choice of location among commercial banks in Onitsha, Nigeria were found to include competitive advantage, operating cost, infrastructure, attractive land elements, and proximity to customers. Although compliance with government regulations did not feature as a significant location decision variable for commercial bank branch in the study area, banks' compliance with this decision variable and its indicators is required to avert breach of the Law.

The physical presence of commercial banks is required to address the inter-banking service provision gaps created by other conventional and mobile financial services providers. Besides the physical establishment of bank branches, it is recommenced that similar factors should inform the distribution of Automated Teller Machines (ATMs) across commercial centres and thoroughfares in Onitsha. a significant contribution to knowledge featured in this study is the multi-criteria analysis dimension that was accorded the indicators and variables likely to determine the location and choice of site for the establishment of corporate branches of commercial banks, contrary to a holistic dimension of analyzing a location decision variable without considering its underlying drivers. a limitation with this study is its reliance on closed-ended survey instrumentation which did not give the respondents ample opportunity to identify and evaluate specific decision variables outside the realm of existing literature that might have determined their choice of bank branch location. Future studies should feature the use of survey instruments with open-ended response, capable of availing respondents with the opportunity of identifying and evaluating location decision variables that might fall outside the realm of existing literature. Secondly, further research on this subject should explore the use of factor analysis to unravel underlying latent constructs that explain the degree of association among the location decision variables.

Author Contributions

G. C. Umekesiobi, being the sole and corresponding author is responsible for the entire content of this article encompassing the conception of the topic, review of related literature, development of the methodology and survey designs instrument, as well as data analysis and interpretation of the results.

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Conflict Of Interest

The author declares that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the author.

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☑ **Negative AI Statement**

The author declares that AI tools or services were not used nor applied during the preparation of this work.

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