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ANALYSIS OF COMMERCIAL REAL ESTATE DEVELOPMENT CHARACTERISTICS IN ILORIN

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ABSTRACT

Purpose: *The study assessed characteristics of commercial real estate development in Ilorin with a view to understanding how structural, locational, infrastructural and environmental conditions differed across commercial property types in Ilorin.*
Methodology: *The study analysed 251 retuned responses from Real Estate Developers' Association of Nigeria, REDAN. The responses were analysed using descriptive and inferential statistics, such as mean score (five-point likert scale), ANOVA and Chi-square.*
Findings: *The result revealed that, commercial real estate development are highly heterogeneous in their physical characteristics, particularly building size. Hotels have the largest structures and retail outlets have the highest average age, hotels also have the highest average number of floors. ANOVA results reveal statistically significant differences in building size ($F = 482.341$, $p < 0.001$), number of floors ($F = 58.087$, $p < 0.001$), and property age ($F = 87.084$, $p < 0.001$) across the commercial real estate groups. The Chi-square analysis indicates that commercial real estate type is significantly associated with several physical, neighbourhood and infrastructural characteristics.*
Research Implications and Limitations: *The study is limited to commercial real estate developments (Offices, Retail outlets, Shopping Malls and Hotels), different characteristics and untimely completion of development.*
Originality: *The study provides that demographic differences in commercial real estate characteristics determined the vertical and horizontal formation of timely completion of the real estate project*

Keywords: Real Estate, Commercial properties, Development, ANOVA, Chi-square

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1.0 INTRODUCTION

Real estate is the physical land and appurtenances affixed to the land structures as immobile and tangible. It includes tangible components such as land, all things that are natural part of land, such as trees and minerals, and all things that are attached to land by people such as buildings and site improvements (Umeh, 2020). Real estate is one of the very important factors for country's economy and it is an interesting field of research both at macro and micro levels (Ayeni & Adamu, 2018). On the macro level, the real estate is closely connected with finance and real sector of economic development (Wang, 2003). On the micro level, real estate is connected to individual investment options. In developed countries for instance, real estate is used for investment portfolio diversification, with closer connection with the stock market, and investment portfolio information (Ifediora & Nwosu, 2021). Real estate is principally classified into residential, industrial, agricultural, recreation and commercial real estate. Commercial real estate being the focus of the study comprises of offices spaces, retail outlets/shops shopping malls and hotels.

According to Abdulmalik and Udoekanem (2022), commercial real estate development plays a crucial role in determining urban economies, influencing job opportunities, infrastructural development and investment decisions, driven by population expansion, urbanization and growing market dynamics. Daniel, Ezeanah and Mordecai (2022) examine commercial real estate types including offices, retail shops, and mixed-use developments, the study highlights adaptive reuse and redevelopment of obsolete buildings in relation to sustainability. Abdulmalik and Udoekanem (2022), highlighted how urban growth and market dynamics have influenced property values over time, this study is important to transformation and growth of Ilorin city.

As a result of crucial roles play by Commercial real estate developments as discussed earlier, it is also important to bring to fore that, Commercial real estate developments encompass all forms of financial commitment into development and redevelopment of land and landed property for the purpose of business-oriented activities and services with returns which may be either periodic income or outright sale for capital gain (Jens, 2017). Development in real estate also involves acquiring land, buildings and other similar estate assets in order to derive from them rents or other annual income. (Chamber, Spaenjers & Steiner 2021). Commercial real estate development takes different forms, sizes, ownership and financing. In term of form, commercial real estate comprises of new development, re-development and refurbishment or converted. In term of size, it comprises of largest urban landscape, high-rise buildings with varying number of floors and parking facilities.

Therefore, several defining characteristics have shaped commercial real estate development in Ilorin, as urbanization has been a primary driver, with over 50% of Nigeria's population residing in urban areas by 2018, a figure projected to rise beyond 51% by 2025 (World Bank Group, 2023). This demographic change has intensified demand for commercial spaces such as office buildings, shopping malls, retail outlets and hotels. However, regulatory and legal bottlenecks that set limit to sizes, vertical and horizontal projections, neighborhood quality, locational characteristics, infrastructure and environmental sustainability characteristics have continued to serve as indicators of timely completion of commercial real estate development.

It is against this background that this study examines the characteristics of commercial real estate development in Ilorin with a view to identifying the differences in characteristics of commercial property types such as offices, retail outlets, shopping malls and hotels. The study therefore tests for hypothesis which states that commercial real estate characteristics are not significantly differed across commercial property types in Ilorin, this therefore formed the basis up which this study is hinged.

2.0 REVIEW OF LITERATURE

Several studies on the characteristics of commercial real estate development have come up with diverse findings over the years. Wahab, Mamman and Nuhu (2021) examined the interest rate on real estate finance among other non-financial factor on real estate development in Abuja Nigeria. The study utilized secondary information on interest rate on real estate finance from registered estate surveying firms, quantity surveying firm and federal mortgage bank of Nigeria respectively. The study employed t-test statistics to determine the significant of connection between the variables and result revealed interest rate on real estate finance significantly influence the trend in commercial real estate development. Yigit (2023) examined the real estate development trend and financial reflection in Istanbul. The study employed descriptive method of data analysis. The result revealed that real estate development trend in Istanbul is affected by risks in business, management, financing, politics, inflation, liquidity and interest rates.

Aliyu and Agava (2025) investigates a key regulatory characteristic of commercial real estate development in Ilorin Metropolis setback compliance and its economic implications. Utilizing a quantitative methodology, data were collected from 53 purposively selected commercial properties across districts subject to setback enforcement. The research examined changes in rental values relative to property size before and after compliance, employing a simple linear regression model to assess the relationship. Although the model yielded a modest explanatory power ($R^2 = 0.149$), statistical significance (ANOVA $p = 0.004$) and absence of autocorrelation (Durbin-Watson = 2.567) affirmed its analytical validity. The findings revealed that, properties complying to setback regulations experienced significant increases in market value, driven by better aesthetics, improved accessibility, and greater customer patronage. The study identifies setback enforcement as a defining characteristic of commercial real estate development in Ilorin, contributing to both urban orderliness and economic viability. It recommends continuous regulatory enforcement and public sensitization to foster compliance, thereby supporting sustainable urban growth within the study period.

Abdulmalik and Udoekanem (2022) investigated the variation in commercial real estate rental values within Ilorin, Nigeria, with focus on commercial buildings. The research delineated the study area into three distinct commercial zones and employed a purposive sampling technique to collect primary data from occupiers of commercial buildings and practicing Estate Surveyors. Structured questionnaires were used as the instrument for data collection. The study employed Analysis of Variance (ANOVA), evaluate rental value disparities across the zones which reveals a statistically significant variation in rental values ($F = 16.70809$, $p \leq 0.05$). In addition, the rental index indicated a consistent upward trend in rental values over the study period, this implied that safety, building visibility, lease terms and location are key factors contributing to rental variations with Relative Importance Index (RII) scores of 0.97, 0.93, and 0.88, respectively. The findings highlight the importance of these variables in influencing rental outcomes and suggest that investors should integrate them into their investment strategies when targeting commercial buildings in Ilorin's different commercial zones.

Aniagolu, Obodo and Ewurum (2018) studied an assessment of commercial real estate performance as an investment option in Nnewi, Anambra State, Nigeria. The study employed descriptive mean score. The study noted that since Nnewi started developing as a major industrial and commercial hub in Anambra State traders, industrialists and merchants see it as a haven adding that they experienced sharp increase in population. It noted that since Nnewi was considered safe there was corresponding demand for shops, offices, warehouses and other commercial properties needed to accommodate the expansion of the town and the ever-increasing demand for products of business units in the town.
Ifediora and Nwosu (2021) examined the pattern of real estate development in Awka Anambra State. The study employed analysis of variance to examine the significant of difference in the pattern of real estate development in Ziks Avenue and Expressway of Awka metropolis. The result revealed that there is a significant difference in the pattern of real estate development in the Ziks Avenue and Expressway

of Awka metropolis. The study further discovered that the real estate sector within the Awka capital city is private sector driven, an emerging one and that the state of supporting infrastructure is not commensurate with the pace of real estate development in the study area.

Sule, Abdulmumin, and Osu (2023) examined the causes and effects of abandoned building projects in the Abuja Municipal Area Council (AMAC) of the FCT. The researchers administered questionnaires to 110 construction professionals and obtained 88 responses, representing an 80% response rate. Their analysis using the Relative Importance Index identified significant causes and effects of project abandonment. The study provides locally relevant evidence that abandoned buildings constitute a recognised construction and development problem in Abuja. For commercial real estate research, the findings support recording the period since construction stopped and distinguishing between temporary inactivity and prolonged abandonment. The study's reported results, however, should not be interpreted as establishing a universal duration threshold for classifying a project as abandoned.

Adedeji (2016) likewise identified inadequate working capital, importation of materials and equipment, instability in governance, contract type, civil conflict, and unexpected geological conditions among factors associated with the abandonment of public building projects in Abuja. These findings suggest that the location, construction environment, accessibility of materials, and exposure to external risks should be considered when describing uncompleted commercial property.

The reviewed literature provides useful evidence on building abandonment, construction delays, funding constraints, and incomplete construction contracts in Nigeria. However, most of the studies focus on general building projects, public-sector developments, or construction project management rather than the specific characteristics of uncompleted commercial real estate investments. For example, Adedeji (2016) focused on public building projects in Abuja and Sule et al. (2023) examined abandoned building projects in AMAC, although their findings provide relevant evidence, they do not establish whether uncompleted commercial properties differ systematically according to their intended use, location, stage of completion, ownership, investment value, or potential rental income. Consequently, further empirical research is justified to identify and classify uncompleted commercial developments using physical inspection, property records, photographs, interviews with property professionals, and information on project financing and construction history. Such research could establish the relative prevalence of different characteristics and determine which factors distinguish temporarily stalled commercial projects from persistently abandoned ones.

3.0 METHODOLOGY

The study utilized a survey research as a scientific method of investigating characteristics of commercial real estate development in Ilorin metropolis. The population comprised members Real Estate Developers' Association of Nigeria (REDAN) The study analysed 251 retuned responses from 256 REDAN members. The responses were analysed using both descriptive and inferential statistics. The descriptive statistics comprised mean (Arithmetic), mean score analysis and crosstabulation while inferential statistics such as ANOVA and Chi-square.

Mean was employed to determine the average building size, number of floor and age which were measured on continuous scale.

Mean score: based on the ordinal scale, they employed mean score to determine the average score of the condition of specific-characteristics of commercial properties such as design, building quality, parking, neighbourhood quality, landscaping, accessibility, proximity, drainage, security, fire safety, energy efficiency, green/open space and climate resilience.

Analysis of Variance (ANOVA): This was employed to determine the significant difference in building size, number of floor and age characteristics of commercial real estate development.

Chi-square Test: this was used to test if the condition of design, building quality, parking, neighbourhood quality, landscaping, accessibility, proximity, drainage, security, fire safety, energy efficiency, green/open space and climate resilience are differed across the commercial property types in Ilorin, Kwara state.

4.0 RESULTS AND DISCUSSIONS

The result of demographic information is presented in table 1. Descriptive statistics of the respondents' demographic and professional characteristics**,** based on 251 respondents**.** The of demographic distribution shows that the study had a total of 251 respondents**.** The respondents were classified according to gender, age, educational qualification, professional qualification, and years of experience in commercial real estate development.

The results in Table 1 indicate that 231 respondents (92.0%) were male, while 20 respondents (8.0%) were female. This demonstrates a substantial male dominance among the respondents, with males constituting more than nine-tenths of the sample. The result may suggest that the professional/development-related population from which the respondents were drawn is predominantly male. The age distribution shows that the largest proportion of respondents, 151 (60.0%)**,** were between 36 and 45 years. This was followed by respondents aged 46–55 years**,** numbering 75 (30.0%)**,** while 25 respondents (10.0%) were aged 56 years and above. No respondents were recorded in the 18–25 or 26–35 age categories. Thus, the respondents were generally middle-aged and older, indicating that the sample largely consisted of individuals who were likely to have substantial professional and practical experience.

Table 1 Showing Demographic Information of Respondents

Demographic Information		Response	%
Gender	Male	231	92.0
	Female	20	8.0
	Total	251	100
Age Group	18yrs-25yrs	-	-
	26yrs -35yrs	-	-
	36yrs-45yrs	151	60.0
	46yrs-55yrs	75	30.0
	56yrs and above	25	10.0
	Total	251	100
Educational Qualifications	ND		
	HND/Bsc/B.tech	211	84.1
	Master	21	8.40
	PhD	19	7.6
	Total	251	100
Professional Qualifications	MNIVS	11	4.4
	CORBON	90	35.8
	COREN	110	43.8
	ARCON	28	11.2
	TOPREC	12	4.8
	Total	251	100
Years of Experience in Development	Less than 5 years	-	-
	5 – 10 years	-	-
	11 – 15 years	100	39.8
	16 – 20 years	130	51.8
	above 20 years	21	8.4

	Total	251	100

Source: Field Survey, 2026

The hotel category has the largest average building size (2,119.35sqm), followed by shopping malls (904.58sqm), retail outlets (599.57sqm), and offices (259.89sqm) as presented in Table 2. This indicates that building size varies considerably according to commercial real estate type. The overall standard deviation of 594.54sqm is relatively large compared with the overall mean of 768.46sqm, suggesting substantial heterogeneity in building sizes within the sample. In number of floors, the overall mean is approximately 2 floors, with a standard deviation of 0.89. The observed commercial real estate ranges from 1 to 4 floors. This suggests that hotels tend to be more vertically developed, while retail outlets tend to have fewer floors. The relatively small overall standard deviation indicates that the number of floors is less variable than building size.

In the age of the commercial real estate, the overall mean age is 14.87 years, with a standard deviation of 6.47 years, while the development ranged from 2 to 27 years old. This indicates that retail outlets and shopping malls are generally older than offices and hotels in the sample. Hotels have the lowest mean age, suggesting that the hotel real estate development represented in the sample are relatively newer. By implication, commercial real estate development is highly heterogeneous in their physical characteristics, particularly building size. Hotels have the largest structures and retail outlets have the highest average age, while hotels have the highest average number of floors.

Table 2 Building Size, Number of Floors and Age Characteristics

Commercial Properties		N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
building size (sqm)	Office	57	259.8947	83.59462	11.07238	150.00	400.00
	Retail Outlet	115	599.5652	167.59596	15.62840	300.00	890.00
	shopping Mall	48	904.5833	103.46051	14.93324	450.00	1000.00
	Hotels	31	2119.3548	541.24508	97.21049	1200.00	3000.00
	Total	251	768.4622	594.54035	37.52705	150.00	3000.00
Number of floor	Office	57	2.7895	.79590	.10542	2.00	4.00
	Retail Outlet	115	1.7565	.65683	.06125	1.00	3.00
	shopping Mall	48	2.5625	.68125	.09833	1.00	4.00
	Hotels	31	3.2903	.52874	.09497	2.00	4.00
	Total	251	2.3347	.88519	.05587	1.00	4.00
Age	Office	57	10.0175	5.47230	.72482	2.00	25.00
	Retail Outlet	115	18.3304	3.98401	.37151	3.00	27.00
	shopping Mall	48	17.8333	3.68050	.53123	11.00	23.00
	Hotels	31	6.3871	5.64315	1.01354	3.00	23.00
	Total	251	14.8725	6.46527	.40808	2.00	27.00

Source: Field survey, 2026

Result of ANOVA is presented in table 3. The ANOVA produced an F-value of 482.341 with $p = 0.000$. Since $p < 0.05$, the null hypothesis that the group means are equal is rejected. This indicates that building size differs significantly among the groups. The relatively high F-statistic also suggests substantial between-group variation compared with within-group variation. Building size is an important characteristic for distinguishing the different commercial real estate groups and could potentially contribute to differences in property value or market performance.

The result for number of floors gives an F-value of 58.087 and $p = 0.000$. This is statistically significant at the 5% level. Therefore, the groups differ significantly in their average number of floors. This suggests that the vertical scale/intensity of commercial real development varies considerably between the real estate groups. The ANOVA result for age shows an F-value of 87.084 and $p = 0.000$. Thus, there is a statistically significant difference in the age of commercial real estate between the groups.

This indicates that, development age is not distributed equally across the groups, suggesting differences in the maturity or development period of the commercial real estate.
Overall, the ANOVA results demonstrate that building size, number of floors, and property age all vary significantly between the groups ($p < 0.05$)**.** Consequently, these variables can be regarded as important distinguishing characteristics of the commercial real estate investigated. The result of post-hoc test (Tuskey test) to determine the commercial real estate type that comprised the bulk of the difference in building size, number of floors and real estate age is represented in Table 3

Table 3 Analysis of Variance in Building Sizes, Floors and Age Characteristics of Commercial Real Estate Development

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
building size	Between Groups	75484669.998	3	25161556.666	482.341	.000
	Within Groups	12884888.393	247	52165.540		
	Total	88369558.390	250			
Number of floor	Between Groups	81.033	3	27.011	58.087	.000
	Within Groups	114.856	247	.465		
	Total	195.888	250			
Age	Between Groups	5371.473	3	1790.491	87.084	.000
	Within Groups	5078.447	247	20.561		
	Total	10449.920	250			

Source: Field survey, 2026

The result of post-hoc test using HSD is presented in table 4. Result revealed that, the observed negative mean differences indicate that the first commercial real estate type has a smaller mean building size than the second commercial real estate type. For example, the office–retail comparison has a mean difference of −339.67, meaning that the mean building size for offices is approximately 339.67 units smaller than that of retail outlets. The 95% confidence interval (−438.07, −241.27) does not include zero, confirming the significant difference. The largest difference is between offices and hotels (−1,859.46). Thus, hotels have substantially larger buildings than offices in the sample. Building size differs significantly among every pair of commercial real estate type. This is strong evidence that building size is an important characteristic distinguishing office, retail outlets, shopping malls and hotels.

The Bonferroni results show that most pairs differ significantly, Office and Retail outlet at a significant mean difference (1.033, $p < 0.001$); Office and Hotel at a significant mean difference (−0.501, $p = 0.007$), Retail outlet and shopping mall at a significant mean difference (−0.806, $p < 0.001$); Retail outlet and Hotel at a mean difference (−1.534, $p < 0.001$) and shopping mall and Hotel at a significant mean difference (−0.728, $p < 0.001$). But there is one important exception to one pair which is the only non-significant comparison that is the office and shopping mall with mean difference (M=0.227, $p = 0.543$). Because $p > 0.05$, there is no statistically significant difference in the mean number of floors between offices and shopping malls. The confidence interval (−0.5823, 0.1283) also crosses zero.
The number of floors differs significantly between most commercial real estate types, except between offices and shopping malls. The office–retail comparison indicates that offices are approximately 8.31 years younger than retail outlets, assuming age is measured in years. The office–hotel comparison has a positive difference of 3.63, indicating that offices are approximately 3.63 years older than hotels. The retail outlet–shopping mall comparison is not significant (mean difference = 0.497, $p = 1.000$). Therefore, there is no evidence of a meaningful difference in average commercial real estate age between retail outlets and shopping malls. The largest difference occurs between retail outlets and hotels, at approximately 11.94 years, with $p < 0.001$.

Building size demonstrates the strongest differentiation: every commercial real estate type differs significantly from every other commercial real estate type. Number of floors also demonstrates substantial differences, although offices and shopping malls have statistically similar mean numbers of floors. Age differs significantly among most commercial real estate types, but retail outlets and shopping malls have statistically similar mean ages.

By implication, following the significant ANOVA results, a Bonferroni post-hoc test was conducted to identify the specific commercial real estate types that differ significantly in terms of building size, number of floors and property age. The results indicate substantial differences among the commercial property types. For building size, all six pairwise comparisons were statistically significant at the 5% level ($p < 0.001$). Offices differed significantly from retail outlets, shopping malls and hotels, with mean differences of −339.67, −644.69 and −1,859.46, respectively. Similarly, retail outlets differed significantly from shopping malls (−305.02) and hotels (−1,519.79), while shopping malls also differed significantly from hotels (−1,214.77). These findings demonstrate that building size varies considerably across all four commercial real estate development types.

For number of floors, five of the six pairwise comparisons were statistically significant. Significant differences were observed between offices and retail outlets (mean difference = 1.03, $p < 0.001$), offices and hotels (−0.50, $p = 0.007$), retail outlets and shopping malls (−0.81, $p < 0.001$), retail outlets and hotels (−1.53, $p < 0.001$), and shopping malls and hotels (−0.73, $p < 0.001$). However, the difference between offices and shopping malls was not statistically significant (mean difference = 0.23, $p = 0.543$). This suggests that offices and shopping malls have comparable average numbers of floors, whereas the other property-type combinations differ significantly.

For property age, five of the six pairwise comparisons were statistically significant. Significant differences occurred between offices and retail outlets (−8.31 years, $p < 0.001$), offices and shopping malls (−7.82 years, $p < 0.001$), offices and hotels (3.63 years, $p = 0.002$), retail outlets and hotels (11.94 years, $p < 0.001$), and shopping malls and hotels (11.45 years, $p < 0.001$). However, the difference between retail outlets and shopping malls was not statistically significant (0.50 years, $p = 1.000$).

Overall, the Bonferroni post-hoc results confirm that the commercial real estate types differ significantly in their physical characteristics. Building size shows the most consistent differentiation, with significant differences between every pair of property type. Number of floors and property age also demonstrate significant differences across most commercial real estate type combinations, with offices and shopping malls showing similar floor levels and retail outlets and shopping malls showing similar property ages. These findings reinforce the conclusion that commercial real estate types exhibit distinct physical characteristics within the study area.

Table 4 Post-Hoc Test (Tuskey Test) of Honesty Significance Difference (HSD)

Multiple Comparisons

Dependent Variable		(I) Commercial Real Estate Type	(J) Commercial Real Estate Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
building size	Bonferroni	Office	Retail Outlet	-339.67048*	36.99727	.000	-438.0712	-241.2697
			shopping Mall	-644.68860*	44.74335	.000	-763.6914	-525.6858
			Hotels	-1859.46010*	50.97003	.000	-1995.0239	-1723.8964
		Retail Outlet	Office	339.67048*	36.99727	.000	241.2697	438.0712
			shopping Mall	-305.01812*	39.24787	.000	-409.4047	-200.6315
			Hotels	-1519.78962*	46.22091	.000	-1642.7222	-1396.8570
		shopping Mall	Office	644.68860*	44.74335	.000	525.6858	763.6914
			Retail Outlet	305.01812*	39.24787	.000	200.6315	409.4047
			Hotels	-1214.77151*	52.62643	.000	-1354.7407	-1074.8023
		Hotels	Office	1859.46010*	50.97003	.000	1723.8964	1995.0239
			Retail Outlet	1519.78962*	46.22091	.000	1396.8570	1642.7222
			shopping Mall	1214.77151*	52.62643	.000	1074.8023	1354.7407
Number of floor	Bonferroni	Office	Retail Outlet	1.03295*	.11046	.000	.7392	1.3267
			shopping Mall	.22697	.13359	.543	-.1283	.5823
			Hotels	-.50085*	.15218	.007	-.9056	-.0961
		Retail Outlet	Office	-1.03295*	.11046	.000	-1.3267	-.7392
			shopping Mall	-.80598*	.11718	.000	-1.1176	-.4943
			Hotels	-1.53380*	.13800	.000	-1.9008	-1.1668
		shopping Mall	Office	-.22697	.13359	.543	-.5823	.1283
			Retail Outlet	.80598*	.11718	.000	.4943	1.1176
			Hotels	-.72782*	.15712	.000	-1.1457	-.3099
		Hotels	Office	.50085*	.15218	.007	.0961	.9056
			Retail Outlet	1.53380*	.13800	.000	1.1668	1.9008
			shopping Mall	.72782*	.15712	.000	.3099	1.1457
Age	Bonferroni	Office	Retail Outlet	-8.31289*	.73451	.000	-10.2664	-6.3593
			shopping Mall	-7.81579*	.88829	.000	-10.1783	-5.4532
			Hotels	3.63045*	1.01191	.002	.9391	6.3218
		Retail Outlet	Office	8.31289*	.73451	.000	6.3593	10.2664
			shopping Mall	.49710	.77919	1.000	-1.5753	2.5695
			Hotels	11.94334*	.91762	.000	9.5028	14.3839
		shopping Mall	Office	7.81579*	.88829	.000	5.4532	10.1783
			Retail Outlet	-.49710	.77919	1.000	-2.5695	1.5753
			Hotels	11.44624*	1.04479	.000	8.6674	14.2250
		Hotels	Office	-3.63045*	1.01191	.002	-6.3218	-.9391
			Retail Outlet	-11.94334*	.91762	.000	-14.3839	-9.5028
			shopping Mall	-11.44624*	1.04479	.000	-14.2250	-8.6674

*. The mean difference is significant at the 0.05 level.

The Table 5 reports a chi-square value of 48.627 with p = 0.000. Therefore, there is a statistically significant relationship between design quality and commercial real estate type. The distribution shows that the good-design category accounts for the overwhelming majority of observations. It also shows that retail outlets constitute the largest proportion of the sample overall. Also, commercial real estate development classified as poor or fair in design are disproportionately represented among hotels while very-good design observations are relatively few. Thus, this implies that design quality varies according to the type of commercial real estate development**.**

Building quality also has a statistically significant association with property type, with chi-square (χ^2 = 49.722 and p = 0.000**)**. The results show that most properties fall within the good-quality category. Retail outlets account for a substantial proportion of these good-quality real estate, while hotels are more represented among the poor and fair categories. Therefore, the evidence implies that building quality differs significantly across commercial real estate types**.**

The parking-space result gives a chi-square statistic **(**χ^2 = 42.170 and p = 0.000**),** indicating a statistically significant relationship between parking provision/quality and commercial real estate type**.** Most observations fall within the good category, with retail outlets making up a particularly large share. The poorer parking categories are disproportionately associated with hotels. This implies that parking provision is an important characteristic differentiating commercial real estate types**.**

The Chi-square test for neighbourhood quality produces **(**χ^2 = 44.307 and p = 0.000**).** Hence, there is a statistically significant association between neighbourhood quality and commercial real estate type**.** Most properties are located in neighbourhoods classified as good quality**,** while poor and fair neighbourhood-quality observations occur much less frequently. The result indicates that the quality of the surrounding neighbourhood varies significantly according to the type of commercial real estate development.

The landscaping result gives a chi-square statistic (χ^2 = 79.827 and p = 0.000). This indicates a highly significant association between landscaping quality and commercial real estate type. The distribution is particularly noteworthy as poor landscaping observations are entirely associated with hotels; Fair landscaping observations are also entirely associated with hotels; Very-good landscaping observations are entirely associated with offices; and most observations are classified as having good landscaping. Thus, landscaping appears to be one of the strongest characteristics differentiating the commercial real estate types in the dataset.

Table 5 Structural Characteristics of Commercial Real Estate Development

Structural Characteristics			Commercial Real Estate Development Type						
			Office	Retail Outlet	shopping Mall	Hotels	Total	Mean	Chi-sq.(p-value)
Design	Poor	Count (%)	0(0.0)	0(0.0%)	0(0.0)	4(100.0)	4(100.0)	3.9522	48.627(0.000)
	Fair	Count (%)	3(42.9)	0(0.0%)	0(0.0)	4(57.1)	7(100.)		
	Good	Count (%)	53(22.4)	113(47.7)	48(20.3)	23(9.70)	237(100)		
	very good	Count (%)	1(33.3)	2(66.7)	0(0.00)	0(0.00)	3(100)		
	Total	Count (%)	57(22.7)	115(45.8)	48(19.1)	31(12.4)	251(100)		
Building quality:	Poor	Count (%)	2(33.3)	0(0.0)	0(00)	4(66.7)	6(100)	3.9363	49.722[a](0.000)
	Fair	Count (%)	1(20)	0(0.0)	0(0.0)	4(80)	5(100)		
	Good	Count (%)	54(22.6)	115(48.1)	48(20.1)	22(9.2)	239(100)		
	Very Good	Count (%)	0(0.0)	0(0.0%)	0(0.0%)	1(100)	1(100.0)		
	Total	Count (%)	57(22.7)	115(45.8)	48(19.1)	31(12.4)	251(100)		
Parking space:	Poor	Count (%)	2(33.3)	0(0.0)	0(0.0)	4(66.7)	6(100)	3.9442	42.17(0.000)
	Fair	Count (%)	1(25.0)	0(0.0)	0(0.0)	4(75.0)	4(100)		
	Good	Count (%)	25(21.8)	115(48.1)	48(20.1)	2410)	2(100)		
	Very Good	Count (%)	2(100)	0(0.0)	0(0.0)	(0(0.0)	2(100)		
	Total	Count (%)	(57(22.7)	115(45.8)	48(19.1)	31(12.4)	251(100)		
Neighbourhood	Poor	Count (%)	3(33.3)	0(0.0)	0(0.0)	6(66.7)	9(100)	3.9163	44.307[a](0.000)
Quality	Fair	Count (%)	3(50.0)	0(0.0)	0(0.0)	3(50.0)	6(100)		
	Good	Count (%)	50(21.5)	113(48.5)	48(20.6)	22(9.4)	233(100)		
	Very Good	Count (%)	1(33.3)	2(66.7)	0(0.0)	0(0.0)	3(100)		
	Total	Count (%)	57(22.7)	115(45.8)	48(19.1)	31(12.4)	251(100)		
Landscaping:	Poor	Count (%)	0(0.0)	0(0.0)	0(0.0)	6(100)	(100.0)	3.9562	79.827[a](0.000)
	Fair	Count (%)	0(0.0)	0(0.0)	0(0.0)	3(100)	3(100)		
	Good	Count (%)	53(22.3)	115(48.3)	48(20.2)	22(9.2)	238(100)		
	Very Good	Count (%)	4(100)	0(0.0)	0(0.0)	0(0.0)	4(100)		
	Total	Count (%)	57(100)	115(45.8)	48(19.1)	31(12.4)	251(100)		

Source: Field survey, 2026

The result of accessibility, proximity and traffic characteristics of commercial real estate development is presented in Table 6. The accessibility result is given ($\chi^2 = 0.406$, $p = 0.999$). Since $p > 0.05$, the relationship is not statistically significant. Approximately 61.4% of all properties have high accessibility, and the proportions are remarkably similar across offices (61.4%), retail outlets (61.7%), shopping malls (62.5%) and hotels (58.1%). By implication**,** although most commercial real estate has high accessibility, accessibility does not significantly differ by commercial real estate type.

Proximity has chi-square statistics ($\chi^2 = 2.745$, $p = 0.996$), which is not statistically significant. A very high proportion of commercial real estate development **(**80.9%**)** have high proximity, with similarly high percentages for offices, retail outlets, shopping malls and hotels. By implication**,** Proximity is generally high across the study area but does not have a statistically significant association with commercial real estate type.

Traffic congestion is different. The result is chi-square statistics (at $\chi^2 = 20.217$, $p = 0.003$)**,** is statistically significant at the 5% level. Overall**,** 63.7% of properties experience high traffic congestion. Shopping malls have the highest proportion of high congestion (81.3%), followed by offices (71.9%) and retail outlets (59.1%), while hotels have the lowest proportion (38.7%). By implication, traffic congestion is significantly associated with commercial real estate type. Shopping malls and offices appear more concentrated in locations experiencing high congestion, while hotels have a comparatively lower proportion.

Table 6 Locational Characteristics of Commercial Real Estate Development

Locational Characteristics			Commercial Real Estate Development Type				Total		
			Office	Retail Outlet	shopping Mall	Hotels		Mean	Chi-sq.(p-value)
Accessibility	Low	Count (%)	10(17.5)	20(17.4)	8(16.7)	5(16.1)	43(17.1)	2.4422	.406[a](0.999)
	Medium	Count (%)	12(21.1)	24(20.9)	10(20.8)	8(25.8)	54(21.5)		
	High	Count (%)	35(61.4)	71(61.7)	30(62.5)	18(58.1)	154(61.4)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		
Proximity	Low	Count (%)	3(5.3)	8(7.0)	3(6.3)	2(6.5)	16(6.4)	2.7450	.642[a] (0.996)
	Medium	Count (%)	6(10.5)	16(13.9)	6(12.5)	412.9%	32(12.7)		
	High	Count (%)	48(84.2)	91(79.1)	39(81.3)	25(80.6)	203(80.9)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		
Traffic congestion	Low	Count (%)	4(7.0)	11(9.6)	0(0.0)	6(19.4)	21(8.4)	2.5538	20.217[a](0.003)
	Medium	Count (%)	12(21.1)	36(31.3)	9(18.8)	13(41.9)	70(27.9)		
	High	Count (%)	41(71.9)	68(59.1)	39(81.3)	12(38.7)	160(63.7)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		

Source: Field survey, 2026

The infrastructural characteristic of commercial real estate development is presented in Table 7 Public electricity has a significant association with commercial real estate type **(**$\chi^2 = 23.608$, $p < 0.001$**).** Overall, 57.0% of commercial real estate development have access to public electricity. Offices have the highest proportion with access (78.9%), followed by retail outlets (58.3%), shopping malls (45.8%) and hotels (29.0%). By implication**,** access to public electricity varies significantly according to commercial real estate type. Offices appear to have considerably better access than hotels in the sample. Public water supply also shows a significant relationship with commercial real estate type ($\chi^2 = 25.857$, $p < 0.001$). Only 45.0% of the commercial real estate development have public water supply. Offices have the highest access (71.9%), while shopping malls have the lowest (25.0%). By implication, public

water availability differs significantly across commercial real estate types and represents an important infrastructural characteristic.

Drainage has $\chi^2 = 0.475$, $p = 0.924$**,** which is not statistically significant. The distribution is relatively similar across the four real estate types, with approximately two-thirds of commercial real estate development falling into the "no" category. By implication, there is no statistically significant evidence that drainage characteristics differ according to commercial real estate type.
Security has $\chi^2 = 5.782$, $p = 0.123$. Since $p > 0.05$, the relationship is not statistically significant**.** By implication, Security characteristics do not differ significantly among offices, retail outlets, shopping malls and hotels based on this analysis.

Fire safety has $\chi^2 = 0.994$, $p = 0.803$, which is also not statistically significant. Approximately 73.7% of the observations fall into the "no" category, with fairly similar distributions across the four commercial real estate types. By implication, fire-safety characteristics do not show a statistically significant association with commercial real estate type in the sample.

Table 7 Infrastructural Characteristics of Commercial Real Estate Development

Infrastructural Characteristics			Commercial Real Estate Development Type				Total		
			office	Retail Outlet	shopping Mall	Hotels		Mean	Chi-sq.(p-value)
Public Electricity	Yes	Count (%)	45(78.9)	67(58.3)	22(45.8)	9(29.0)	143(57.0)	1.4303	23.608[a] (0.000)
	No	Count (%)	12(21.1)	48(41.7)	26(54.2)	26(71.0)	108(43.0)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		
Water (public main)	Yes	Count (%)	41(71.9)	49(42.6)	12(25.0)	11(35.5)	113(45.0)	1.5498	25.857[a](0.000)
	No	Count (%)	16(28.1)	66(57.4)	38(75.0)	20(64.5)	138(55.0)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		
Drainage	Low	Count (%)	18(31.6)	40(34.8)	18(37.5)	10(32.3)	86(34.3)	1.6574	.475[a](.924)
	No	Count (%)	39(68.4)	75(65.2)	30(62.5)	21(67.7)	165(65.7)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		
Security	Low	Count (%)	29(50.9)	38(33.0)	17(35.4)	10(32.3)	94(37.5)	1.6255	5.782[a](0.123)
	No	Count (%)	28(49.1)	77(67.0)	31(64.6)	21(67.7)	157(62.5)		
	Total	Count (%)	57(100)	115(100)	48(100)	38(100)	251(100)		
Fire-safety	Low	Count (%)	13(22.8)	31(27.0)	12(25.0)	10(32.3)	66(26.3)	1.7371	.994[a](0.803)
	No	Count (%)	44(77.2)	84(73.0)	36(75.0)	21(67.7)	185(73.7)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		

Source**:** Field survey, 2026

The result of environmental sustainability characteristics of commercial real estate development is presented in Table 8. Energy efficiency has $\chi^2 = 0.498$, $p = 0.919$, indicating no statistically significant

association with commercial property type. The distribution is very similar across all four property types, with approximately 78.9% of properties in the "no" category. By implication, Energy-efficiency characteristics do not significantly distinguish offices, retail outlets, shopping malls and hotels in this dataset.

Green/open space produces $\chi^2 = 0.566$, $p = 0.904$, which is not significant. The distribution is almost evenly divided overall: 49.0% low and 51.0% no**.** By implication, there is no statistically significant relationship between green/open-space characteristics and commercial real estate type.
Climate resilience gives $\chi^2 = 1.721$, $p = 0.979$**,** which is also not statistically significant. Overall, 72.1% fall into the "no" category, with broadly similar distributions among offices, retail outlets, shopping malls and hotels. By implication, climate-resilience characteristics do not significantly differ according to commercial real estate type.

Table 8 Environmental Sustainability Characteristics of Commercial Real Estate Development

Environmental Sustainability			Commercial Real Estate Development Type				Total		
			office	Retail Outlet	shopping Mall	Hotels		Mean	Chi-sq.(p-value)
Energy efficiency	Low	Count (%)	12(21.1)	23(20.0)	10(20.8)	8(25.8)	53(21.1)	1.7888	.498[a](0.919)
	No	Count (%)	45(78.9)	92(80.0)	38(79.2)	23(74.2)	198(78.9)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		
Green/open space	Low	Count (%)	30(52.6)	55(47.8)	24(50.0)	14(45.2)	123(49.0)	1.5100	.566[a](.904)
	No	Count (%)	27(47.4)	60(52.2)	24(50.0)	17(54.8)	128(51.0)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		
Climate resilience	Low	Count (%)	17(29.8)	31(27.0)	13(27.1)	9(29.0)	70(27.9)	1.7211	.192[a](0.979)
	No	Count (%)	40(70.2)	84(73.0)	35(72.9)	22(71.0)	181(72.1)		
	Total	Count (%)	57(100)	115(100)	48(100)	31(100)	251(100)		

Source: Field survey, 2026

The analysis of Table 9. demonstrates that commercial property type is significantly associated with ten characteristics: building size, number of floors, age, Design; Building quality; Parking space; Neighbourhood quality; Landscaping; Traffic congestion; Public electricity; Public water. Only building size number of floors and age were measured on continuous scale and other were measured on ordinal and nominal scales.

The ANOVA produced an F-value of 482.341 with $p = 0.000$**.** Since $p < 0.05$, the null hypothesis that the group means are equal is rejected. This indicates that building size differs significantly among the groups**.** The relatively high F-statistic also suggests substantial between-group variation compared with within-group variation. Building size is an important characteristic for distinguishing the different commercial property groups and could potentially contribute to differences in property value or market performance.

The result for number of floors gives an F-value of 58.087 and $p = 0.000$. This is statistically significant at the 5% level. Therefore, the groups differ significantly in their average number of floors**.** This

suggests that the vertical scale/intensity of commercial development varies considerably between the property groups. The ANOVA result for age shows an F-value of 87.084 and p = 0.000**.** Thus, there is a statistically significant difference in the age of properties between the groups. This indicates that property age is not distributed equally across the groups, suggesting differences in the maturity or development period of the commercial properties.

Overall, the ANOVA results demonstrate that building size, number of floors, and property age all vary significantly between the groups ($p < 0.05$)**.** Consequently, these variables can be regarded as important distinguishing characteristics of the commercial properties investigated

Table 9 Hypothesis Testing Results

Characteristic	Statistical Test	Statistics	p-value	Significant	Status
Building size	ANOVA	F = 482.341	<0.001	Significant	Reject null Hypothesis
Number of floors	ANOVA	F = 58.087	<0.001	Significant	Reject null Hypothesis
Age	ANOVA	F = 87.084	<0.001	Significant	Reject null Hypothesis
Design	Chi-square	$\chi^2 = 48.627$	<0.001	Significant	Reject null Hypothesis
Building quality	Chi-square	$\chi^2 = 49.722$	<0.001	Significant	Reject null Hypothesis
Parking space	Chi-square	$\chi^2 = 42.170$	<0.001	Significant	Reject null Hypothesis
Neighbourhood quality	Chi-square	$\chi^2 = 44.307$	<0.001	Significant	Reject null Hypothesis
Landscaping	Chi-square	$\chi^2 = 79.827$	<0.001	Significant	Reject null Hypothesis
Design	Chi-square	$\chi^2 = 48.627$	<0.001	Significant	Reject null Hypothesis
Building quality	Chi-square	$\chi^2 = 49.722$	<0.001	Significant	Reject null Hypothesis
Parking space	Chi-square	$\chi^2 = 42.170$	<0.001	Significant	Reject null Hypothesis
Neighbourhood quality	Chi-square	$\chi^2 = 44.307$	<0.001	Significant	Reject null Hypothesis
Landscaping	Chi-square	$\chi^2 = 79.827$	<0.001	Significant	Reject null Hypothesis
Accessibility	Chi-square	$\chi^2 = 0.406$	0.999	Insignificant	Accept null Hypothesis
Proximity	Chi-square	$\chi^2 = 2.745$	0.996	Insignificant	Accept null Hypothesis
Traffic congestion	Chi-square	$\chi^2 = 20.217$	0.003	Significant	Reject null Hypothesis
Public electricity	Chi-square	$\chi^2 = 23.608$	<0.001	Significant	Reject null Hypothesis
Public water	Chi-square	$\chi^2 = 25.857$	<0.001	Significant	Reject null Hypothesis
Drainage	Chi-square	$\chi^2 = 0.475$	0.924	Insignificant	Accept null Hypothesis
Security	Chi-square	$\chi^2 = 5.782$	0.123	Insignificant	Accept null Hypothesis
Fire safety	Chi-square	$\chi^2 = 0.994$	0.803	Insignificant	Accept null Hypothesis
Energy efficiency	Chi-square	$\chi^2 = 0.498$	0.919	Insignificant	Accept null Hypothesis
Green/open space	Chi-square	$\chi^2 = 0.566$	0.904	Insignificant	Accept null Hypothesis
Climate resilience	Chi-square	$\chi^2 = 1.721$	0.979	Insignificant	Accept null Hypothesis

Source: Field Survey, 2026

5.0 DISCUSSION OF FINDINGS AND CONCLUSION

Commercial real estate development is highly heterogeneous in their physical characteristics**,** particularly building size. Hotels have the largest structures and retail outlets have the highest average age, while hotels have the highest average number of floors. The results demonstrate that building size,

number of floors, and real estate development age, all vary significantly. These findings reinforce the conclusion that commercial real estate types exhibit distinct physical characteristics within the study area. Landscaping appears to be one of the strongest characteristics differentiating the commercial real estate types in the dataset. Traffic congestion is significantly associated with commercial real estate type. Shopping malls and offices appear more concentrated in locations experiencing high congestion, while hotels have a comparatively lower proportion. Security characteristics do not differ significantly among offices, retail outlets, shopping malls and hotels based on this analysis. Climate-resilience characteristics do not significantly differ according to commercial real estate type.

The findings suggest that the characteristics of commercial real estate development are influenced more strongly by property-specific attributes and selected neighbourhood and infrastructural conditions than environmental sustainability variables examined in the study, and this finding is line with Smersh et al., (2011) property-specific attributes such as regulations and neighbourhood infrastructure influenced commercial property development. The study therefore concludes that commercial properties are heterogeneous in their physical, functional and environmental characteristics and, these attributes are statistically differed across property types except accessibility, proximity, drainage, security, fire safety, energy efficiency, green/open space and climate resilience which showed no significant difference across the property types.

REFERENCES

Abdulmalik, F. B. & Udoekanem, N. B. (2022). Commercial Real Estate Rental Variation in Ilorin Metropolis, *Journal of Geomatics and Environmental Research*, 8(1), 81-91 https://doi:10.5198/jtlu.2023.2297

Adedeji, D. S. (2016). An evaluation of the environmental factors that lead to abandonment of public building projects in the Federal Capital Territory, Abuja [*Master's dissertation, Ahmadu Bello University, Zaria]. University repository record*

Aliyu, Y. B. & Agava, H.Y. (2025). Assessing the Impact of Setback Enforcement on Commercial Property Values in Ilorin Metropolis, *Journal of Geomatics and Environmental Research*, 8(1), 81-91

Aniagolu, C. O., Obodo, M. C. & Ewurum, N. I. (2018). An Assessment of Commercial Real Estate Performance as an Investment Option in Nnewi, Anambra State, Nigeria**.** *International Journal of Innovation Engineering and Science Research,* 2(1), 41- 53

Appraisal Institute (2001). *Real Property Valuation and Personal Property Valuation*. Chicago,

Ayeni, E. & Adamu, M.K. (2018). Property Investment Trust: A Vehicle For Real Estate Development In Nigeria. *African Journal of Economics and Sustainable Development* 1(1), 2018 (63-69)

Chamber, D., Spaenjers C., & Steiner, E. (2021). The Rate of Return on Real Estate: Long-Run Micro Level. *The Review of Financial Studies,* 34(8), 3572-3607

Chen, J. (2021). The Influence of Fiscal and Financial Policies on Upgrading of Regional Industrial Structure. *Open Access Library Journal.* (8) e7648

Ifediora, C. O. & Nwosu, C. C. (2021). Factors that influence the pattern of real estate development in Awka Anambra State. *International Journal of Research and Scientific Innovation (IJRSI)* 8(12), 136-143

Jens, M., E. (2017). What is commercial property? *IFC- National Bank of Belgium Workshop on "Data needs and Statistics compilation for macro prudential analysis"*, 1-4. Brussels, Brussels,

Belgium: Irving Fisher Committee on Central Bank Statistics. Bank For International Settlements.

Smersh, G., Smith, M. & Schwartz A. (2003). Factors Affecting Residential Property Development Patterns. *Journal of Real Estate Research,* (25)1, 61-76 https://doi.org/10.1080/10835547.2003.12091104

Sule, J., Abdulmumin, M., & Sabo Osu, A. (2023). Views of specialists on abandoned building project in FCT—Abuja, Nigeria. Journal of Civil, Construction and Environmental Engineering, 8(3), 42–48. https://doi.org/10.11648/j.jccee.20230803.11

Umeh, O. (2020). Forecasting Performance of Commercial Property Investments in Lagos Metropolis. *Journal of African Real Estate Research,* 5(2), 59-74 https://doi:10.15641/jarer.v5i2.915

Wahab, M. B., Mamman, M., & Nuhu, S. R. (2021). Factors Affecting Private Housing Development in Abuja, Nigeria. *Journal of Contemporary Research in the Built Environment*, (5) 1–2, 96–105

Wang, P. (2003). A Frequency Domain Analysis of Common Cycles in Property and Related Sectors*; The Journal of Real Estate Research,* 25(3) 325-337 https://doi:10.1080/10835547.2003.12091116

Wang, Y. & Levinson, D. (2023). Access Based Land Value Appreciation for Assessing Project

World Bank Group. (2023). *Urbanization and development in Nigeria*. Washington, DC.

Yigit, P. (2023). Real Estate Development Processes and Its Financial Reflection on The Housing Market. *International Journal of Recent Research in Civil and Mechanical Engineering*, 10(1), 21-37