

African Journal of Built Environment Research

Volume 5
Issue 1
April 2021

ISSN 2414-0236



African Journal of Built Environment Research (AJOBER)

Volume 5, Issue 1

April 2021

EDITORIAL

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ISSN 2414-0236

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JOURNAL INFORMATION

African Journal of Built Environment Research

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The journal's mission is to encourage, publish and promote quality research relating to the built environment on the African continent.

The academic leadership for the journal is provided by a team of academics drawn from around the world. The editorial board comprises of African-based academics and others based outside of the African continent. Members of the editorial board work together to ensure that all papers accepted and published in the journal match up reasonably to the standard in other international journals in the field.

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The African Journal of Built Environment Research exists to publish original research articles relating to the built environment on the African continent. The journal invites original research papers from authors in all academic disciplines linked with the built environment including the following academic fields or departments that can be found in our higher education institutions on the continent:

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- Civil and Environmental Engineering
- Construction Management
- Construction Science
- Estate Management / Real Estate
- Project Management
- Quantity Surveying / Construction Economics
- Surveying and Geoinformatics
- Urban and Regional Planning

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EDITORIAL

This is our first Issue of the African Journal of Built Environment Research (AJOPER) for 2021. We have five interesting papers and they all contain useful insights and some contribution to current knowledge. We would like to thank all the 18 authors of the five papers published in this Issue.

The first paper by Chiwuzie *et al.* discusses the impact of changing macroeconomic variables on rental values of residential properties. In other words, to what extent are local rental values influence by external changes in macroeconomic indicators? This is an important question particularly in context of the current uncertain global economic environment ravaged by the ongoing COVID-19 pandemic. By correlating local property values in Ede against macroeconomic indicators in Nigeria sourced from the database of the National Bureau of Statistics and Central Bank of Nigeria, the authors found a strong positive relationship between macroeconomic indicators and rental values of residential properties. In particular, they find that exchange rate and gross domestic product (GDP) had significant positive influences on rental values, while the lending and inflation rates exhibited insignificant positive and negative influences respectively on rental values. The main contribution of this study lies in providing insight into the way that changes in macroeconomic indicators influences local residential property values.

In the second paper, Ekung *et al.* examine the impact of claims on long term client-contractor relationships. In other words, to what extent is there a relationship between the claims culture or behaviour of a contractor and the willingness of a client to engage with them again in future projects? The data from 200 architects, engineers and quantity surveyors in Nigeria indicated that frequent claims weaken client-contractor relationship ties and the willingness to engage in future projects. the implication for clients is the need to ensure complete and clear definition of the project requirements to minimize changes leading to claims. For contractors, the key implication is to ensure good project legal management to build trust and good relations with clients to increase the likelihood of repeat relationships.

The third paper by Asigri *et al.* examines the fire safety design attributes of 42 students' housing facilities in one tertiary institution in Ghana and uses it as a basis to develop generic fire safety design attributes for student housing facilities. The main contribution of this study is that it provides empirical fire safety design attributes for designers of student accommodation facilities.

The fourth paper by Abubakar *et al.* discussed the changing nature of skills and competencies required for employment opportunities in the construction industry. This requires a corresponding response in the way that academic programmes are designed for the built environment professions. While employers would have their own view on the skills and competencies required of graduates of built environment programmes, this study examined the perception of 136 final year students across six different built environment programmes on the key skills and competencies needed to increase the prospects of employability in the construction industry. The research also investigated the extent to which the students believed they possessed such skills and competencies. The students indicated that self-confidence, qualitative reasoning and self-awareness were the most relevant competencies for their employability in the construction industry. However, self-confidence, time consciousness and collaboration skills were found to be the skills and competencies they believed they had mostly acquired while studying on their programmes. This reveals a gap which should be addressed in curriculum design. It would also be useful to compare the expectations of students with the skills and competencies that employers actually require from them.

In the fifth and final paper in this Issue, Bello *et al.* examined the nature of return on urban property investments using data from 420 properties in Abuja, Nigeria. The result showed a constant yield range for the properties examined although there were variations in risk and return of the different property types. The return on most property types did not correspond with their risks.

We would like to conclude by acknowledging and thanking the reviewers of the papers in this Issue. The expert work of our reviewers plays an important role in sustaining the peer review

process which is a fundamental principle for scientific publishing. We thank you for your time and expert reviews.

The Editors
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CHANGING MACROECONOMIC INDICATORS AND THE RENTAL VALUES OF RESIDENTIAL PROPERTIES IN EDE, NIGERIA

Augustina Chiwuzie¹, Daniel Ibrahim Dabara², Olusegun Joseph Omotehinshe³, Edith Mbagwu Prince⁴ and EleOjo Grace Aiyepada⁵

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There has been a growing concern in prefiguring the role of macroeconomic indicators in property market operations. This study investigated the performance of the residential property market in Ede, with a view to explore the influence of macroeconomic indicators on rental values. Thus, the study analysed residential properties' rentals in Ede; and assessed the relationship between macroeconomic indicators and residential properties' rentals. The study employed primary and secondary data for the period 2002 -2019. The primary data comprised annual rental values for five residential property types; obtained through structured questionnaires administered on landlords in the study area. The secondary data comprising macroeconomic indicators in Nigeria were sourced from the database of the National Bureau of Statistics and Central Bank of Nigeria. Descriptive and inferential statistics were employed in the data analysis. The results revealed a continuous increase in rentals of the five types of residential properties studied. Rental growth rates in the residential property market exhibited random fluctuations with a mean annual growth rates of 15.78%, 15.82%, 15.30%, 18.19% and 19.12% for tenement room, studio room, one-bedroom, two-bedroom and three-bedroom flats, respectively. However, the mean of annual rental growth rate across the considered residential property types was not significantly different at 0.05 level; $F(4, 80) = 0.307$ $p = .872$. Furthermore, there was a very strong positive relationship (0.984) between macroeconomic indicators and rental values of residential properties. Exchange rate and gross domestic product (GDP) had significant positive influences on rental values (p -value = .000 and 0.001, respectively), while the lending and inflation rates exhibited insignificant positive and negative influences, respectively on rental values. The implication of this study is the presence of feedback relationships between GDP and rental value and between exchange rates and rental values of residential properties which, suggests that these variables are determined contemporaneously.

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Keywords: macroeconomic indicators, performance, real estate investment, rental growth, trend

INTRODUCTION

All over the globe, the success of real estate investments is considered very critical due to the vital role it plays in the socio-economic development of countries. The residential property, a sub-sector of real estate investment, remains a critical asset that guarantees adequate housing provision to nations. The value of housing in man's welfare has recently demonstrated with the ongoing COVID-19 pandemic. Residential property became the first line of defence against the ravaging COVID-19 (many governments have imposed stringent restrictions on outdoor activities to protect people from and curtail the spread of the virus). Investments in residential properties are increasingly popular in Nigeria and all over the world. Given the significant role that residential property wealth appears to play in the overall economy, demand for residential units has continued to exceed the supply. In urban centres, "more than 90% of residents patronise privately owned properties, thereby heating up the demand side" (Olukolajo et al., 2015, p. 42). The size and scale of the housing market, therefore, makes it an appealing and worthwhile sector for many investors. Income flow is, therefore, of importance to property investors and also the economic policymakers. Rental income is the fundamental parameter investors use for appraising real estate investment viability (Boon & Higgins, 2007). Activities in the residential segment of the real estate sector have continued to soar considerably in most urban centres, primarily due to rising demand. Hence, the need to study the trends in rental values of residential properties as well as elements affecting rentals in the housing market.

Radzewicz (2013) posited that the housing market is ever changing, resulting from influences of the market players' actions, in addition to other proximate factors. Influences on the property market could be economic or non-economic, and these factors affect rental values either negatively or positively. Samy (2015) observed that over time, performance of housing investment has been assessed based on non-economic features, which include location, neighbourhood and physical/structural features. However, Olatunji et al., (2017) stressed that the property investment market is a critical part of the nation's economic market, hence, the need to study economic elements and its influences on the property investment market. More so, the imperativeness of improved performance in the property investment market necessitated consideration of more than non-economic factors (Olatunji et al., 2017). Hence, the growing interest in modelling the impact of macroeconomic elements in property investment market operations.

According to Ezeokoli et al. (2019), macroeconomic factors are the leading indicators that portends the present-day trends in the economy. Ezeokoli et al. further posited that macroeconomic indicators have no direct nexus with the

investment; nonetheless, they shape the conduct of such investment. Macroeconomic indicators comprise GDP, money supply, inflation, interest and exchange rates, level of employment and unemployment, trade balance, among others. Fischer (1993) studied housing market as an integral part of a country's economy and disclosed the presence of reverse inference on one another. Therefore, the existence of a reverse linkage between the housing market and the macroeconomy, infers that whatever affects the economy also affects the property market and vice versa. Thus, a time of economic volatility results in disequilibrium in the housing market (Dehesh & Pugh 1998). Changes in rental values are expected in the property market. Radzewicz et al. (2011) asserted that even the least of change might have a multiplier effects on other elements of the property market system, thus revising the relationships and dependencies ensuing in the market. On the other hand, Lynn (2007), proffered that when one-element alters, there is always a ripple consequence, which in turn significantly impacts on the economy.

Results of empirical studies from different localities ascertained that macroeconomic indicators are closely linked with property prices, rentals and returns. However, these studies reported varying directions of the relationship between the variables and also, different degrees of influence. Some of such studies include Brooks and Tsolacos (1999), De Wit and Van Dijk (2003), Eldelstine and Tsang (2007), Karoki (2013), Miregi and Obere (2014), Olatunji et al. (2017). Specific findings from above studies notwithstanding, these researches established an existing relationship between the economy and property investment market; and that the influences of the economy affect the contribution of the property sector to national economic development. The effects of the macroeconomic indices on rental values of property investment have been the primary source of debate among real estate investors. Ezeokoli et al. (2019) asserted that property investors generally, have frights concerning the safety of their investments. The investors' fear is amplified by the dearth of information in Africa and other emerging property markets. As a result of the information gap, investors in many African countries cannot effectively price and manage risks in the property market. This study will contribute to the debate on the role of macroeconomic indicators in property market operations. The results of this study will be beneficial to real estate investors and professionals in Africa and other continents, by advancing a better understanding of how the residential property market relates to the macroeconomic indicators. Hence, this study investigates the performance of the residential property market in Ede, with a view to exploring the influence of macroeconomic indicators on the rental values. Specifically, the study analysed residential properties' rentals in Ede; and assessed the relationship between macroeconomic indicators and residential properties' rentals. This paper is structured as follows: the introductory part is followed by a brief review of the related literature on the subject matter. The next section presents the methodology adopted for the study, after which the results and their discussion were presented; the paper closes with a concluding remark.

LITERATURE REVIEW

Results of empirical studies conducted both in developed and developing countries have shown the existence of relationship between real property market's growth and macroeconomic indicators. Changes in property rentals are influenced by macroeconomic variables, such as interest, inflation, GDP, inflation, monetary policy, employment, and unemployment rates. In developed countries, Giussani et al. (1992) related office rentals across European cities and the economic activity using the cross-section and time-series analysis. The study employed annual data for the period 1983 - 1991 to analyse the relationship between fluctuations in office rents and economic activity. The results revealed that gross domestic product (GDP) is the main determinant of office rents in Europe. In a similar study conducted between 1982 and 1993, D'Arcy et al. (1994) found that office rents across twelve European cities were determined by Gross Domestic Product (GDP) and unemployment rates. Equally, in Brooks and Tsolacos (1999), the effect of economic and financial factors on property return in the U.K was evaluated using multi-equation regression analysis. The study employed quarterly data for the period 1985 – 1998. The findings revealed unexpected inflation has lagged effect (with a noticeable negative influence) on property return, while short term interest rates were found to exert negative shock on property return.

De Wit and Van Dijk (2003) examined the outcomes of the effect of economic growth and the interplay of demand supply forces on direct real estate return on a macro level. Results of the regression analysis revealed that GDP and inflation rate have positive impact on the prices of direct real property whereas the unemployment rate had a significant negative relationship with a capital appraisal. Eldelstine and Tsang (2007) also employed quarterly data between 1988 and 2003 to study the impact of macroeconomic indicators on the residential property market in the United States. The findings indicated that the U.S housing market was significantly impacted by employment and interest rate. Apergis (2003) also reported that employment rate had a significant positive impact on real estate performance. Relatedly, Wei and Morley (2012) investigated the extent to which macroeconomic indicators interacted with property return in the US market. Findings from the study revealed that changes in property return were significantly influenced by interest rate. This result is consistent with findings in earlier researches such as Joshi (2006), Sari et al. (2007) and Schalck and Antipa (2009).

In Kenya, Karoki (2013) assessed the determinants of residential real estate prices and found housing price to be negatively correlated with interest rates; and positively correlated with GDP and level of the money supply. Interest rate had the most significant influence on house prices. Nzalu (2013) also examined indicators such as GDP growth, interest rate, inflation rates and population growth as determinants of real estate growth. Findings from the research revealed that GDP is the most significant determinant of real estate growth in Kenya. Besides, changes in interest rate and inflation were also observed to have significantly contributed to the growth of real estate. Likewise, Miregi and Obere (2014) reviewed the influence of four selected market fundamental indicators on property values using monthly time series for the period between

January 2001 and December 2013. The study adopted the unrestricted vector autoregressive (VAR) model for data analysis. The VAR estimate results showed a property price that is reliant on its lagged values. Inflation and interest rates were found to have insignificant lagged positive and negative influence on property price, while none of building cost and stock prices explained the existing property values. The study concluded that property pricing trend in Kenya is not fundamentally supported, at least by the inflation rate, interest rate, stock prices and building cost. Bioreri (2015) explored the effect of exchange rate among other macroeconomic variables on the performance of real estate performance. The study utilised quarterly data between 2000 and 2014 obtained from 42,180 registered real estate firms. Data collected was analysed using OLS. Results from the study revealed that exchange rate had a coefficient of 0.192 and p-value of 0.422. This suggests that exchange rate was not a significant determinant of real estate performance and as such, was not an essential factor. Bioreri however, acknowledged that in theory, exchange rate influences the operations of property sector because of its information content to the stakeholders.

In Nigeria, Ojetunde (2013) examined the relationship existing between the housing market and macroeconomic variables employing yearly figures for the period between 1984 and 2011. The result of the multi-equation regression adopted for data analysis revealed that GDP, inflation, exchange rate and interest rates had a long-term relationship with housing rents in Nigeria. In addition to this, the finding suggested that GDP and exchange had significant positive effect on residential rents and predicted 31.4% of the changes in house rent. On the other hand, the interest rate was found to have a significant negative effect on house rents while inflation rate had a negative but not significant correlation with residential property rents. Ojetunde concluded that in the Nigerian context, house rents had strong and positive correlation with GDP and exchange rates.

Udoekanem et al. (2015) examined the drivers of office rents in three districts of Abuja, Nigeria. The study utilised single-equation regression to analyse the link between macroeconomic indicators and office rentals from 2001 to 2012. The study found that macroeconomic indicators explained the office property rental variations in the selected districts. GDP and vacancy rate were the primary predictors of office rents in the districts. Findings in Udoekanem et al. also revealed that though inflation rate granger causes rent fluctuations in the study areas, there was evidence that inflation rate does not have a significant influence on rental values of office property in the entire districts.

Olatunji et al. (2017) using residential property total returns index data, and time-series data for annual macroeconomic indices evaluated the influence of macroeconomic variables on Abuja housing market. The study utilised sales and lettings evidences spanning between 2001 and 2015. A representative sample size of 286 and 436 was quantitatively determined from sample frames of 429 transactions of sales and 1213 lettings respectively. The result revealed that macroeconomic variables had a long-run relationship with housing returns. Further, the result showed that variation in property returns across seven housing markets were significantly impacted by macroeconomic

variables. The study concluded that the GDP, exchange rate, inflation, interest rate and employment rate had a significant impact on housing return in Abuja, Nigeria. This result of a significant positive impact of GDP on house rents is consistent with that reported in Chiwuzie et al. (2019).

Elile et al. (2019) investigated the individual effects of inflation, exchange rate, and GDP on the performance of property investment in Nigeria. The research utilised a quantitative research method and utilised secondary data for a period of 37 years (1980- 2017). OLS multiple regression with a lagged dependent variable model was used to analyse data collected. The results revealed that inflation and GDP each had a significant positive influence on property sector growth, while the exchange rate exhibited a significant negative influence on property sector operation. Likewise, Awa et al. (2019) examined the global determinants of direct real estate investment returns in Nigeria. Data for the study were sourced from practising estate surveyors and valuers in Abuja, Lagos and Port-Harcourt. Findings from the study revealed GDP, unemployment rate, inflation, exchange rate and tax rate as the dominant global factors that determine direct real property investment returns in Nigeria.

Previous studies had proven the effect of macroeconomic indicators (GDP, inflation and interest rates among others) on rental values and prices of the real estate investments. However, there are divergent and contradictory results on the direction of the relationship between the selected macroeconomic indicators and property investments as well as the explanatory influence of each macroeconomic indicator on property investments. Also, most of the research were carried out in developed economies. Although, similar studies were carried out in some African countries including Nigeria, no study has related macroeconomic variables to the residential property market in the study area currently investigated. This has created a gap to be filled. This study considered the dominant housing categories in the study area and Nigeria macroeconomic variables that are highly unstable, including GDP, exchange, inflation and lending rates.

RESEARCH METHODS

This study utilised annual rental data of five residential property categories. The residential properties in Ede Town were categorised on the basis of numbers of rooms and ancillary facilities. The categories of residential property used for this study include tenement rooms (consisting single rooms with common toilet and kitchen); studio apartment also known as "one-room self-contained" is a room attached with toilet and kitchen; one-bedroom flat (a bedroom and living room attached with kitchen and toilet); two and three-bedroom flats respectively. Dabara et al. (2018) observed that the above-mentioned housing categories are predominant in the study area. Hence, their consideration in the current study. The data on rental values for the period 2002 - 2019 was obtained through structured questionnaires administered on landlords in the study area. The choice of the study period was premised on data availability. Preliminary investigations revealed that rental data of

residential properties covering the study period were not readily available in estate firms. However, the authors were able to source data from landlords who rented out their residential property within the study period.

The sample size for this research was estimated using Cochran (1977) recommendation for an infinite population. Thus, a total of three hundred and eighty-five (385) copies of questionnaire were distributed to the respondents through random sampling. Out of this, two hundred and eighty-seven (287) copies of questionnaire were returned indicating a 74.5% response rate. The secondary data comprising macroeconomic indicators in Nigeria for the period 2002 - 2019 was obtained from the database of the Central Bank of Nigeria and National Bureau of Statistics. The consideration of macroeconomic indicators in this research was based on the conjecture that price trends in housing market is correlated with occurrences in the real and financial economy. The macroeconomic indicators considered in this study include the GDP, exchange, inflation and lending rates. These macroeconomic indicators were selected because they have been the critical indicators studied by previous authors concerning property investment alternatives like commercial and residential properties.

Furthermore, the annual rental values of residential properties in Ede were analysed and evaluated against the selected macroeconomic variables prevailing in Nigeria. Data collected were presented in tables and charts. ANOVA was employed to analyse growth in rentals of the five house categories studied. A multiple regression model, on the other hand, was employed to determine the interrelationship between macroeconomic indicators and house rentals and also demonstrate the influence of the selected macroeconomic indicators on house rents. Pallant (2011) suggested that a multiple regression model permits a complex assessment of the interrelation amongst variables. The multiple regression model is an extension of the linear model that include several independent variables using the same theory. Thus, the interrelationship between the dependent and independent variables could be defined as:

$$Y = a + b_1X_1 + b_2X_2 + \dots + b_nX_n + e \quad i$$

Where:

Y = House rent

a = Constant

X₁ - X_n = the independent variables (macroeconomic indicators)

b₁ - b_n = beta coefficient of the independent variable which measures the amount of the variation in Y associated with a unit change in X

e = the error term assumed to be associated with the variables.

RESULTS

This segment presents the results of data analysis. The section was organised to present the trends in residential rents in Ede Town during the period between 2002 and 2019; and the relationship between macroeconomic indicators and residential rents.

Residential rents in Ede, 2002 - 2019

The rental data of the five house categories for the period between 2002 and 2019 were supplied by the respondents in both prime and non-prime areas in Ede. The annual rental data were averaged to provide an overall image of the rental housing market in Ede. The average annual rents of the five dominant house categories studied were converted to a series of index numbers using 2002 as the base year. The results are displayed in Table 1.

Table 1: Indexes of Residential properties' rents in Ede between 2002 and 2019 (2002=100)

Year	Tenement room	Studio room	One-bedroom flat	Two-bedroom flat	Three-bedroom flat
2002	100.0	100.0	100.0	100.0	100.0
2003	150.0	140.0	135.4	142.9	142.9
2004	158.3	153.3	141.6	160.8	171.4
2005	200.0	180.0	143.9	178.7	200.0
2006	208.3	186.7	156.3	205.5	257.1
2007	225.0	206.7	200.0	250.2	314.2
2008	229.2	226.7	218.0	277.0	357.0
2009	250.0	233.3	239.6	303.8	399.9
2010	275.0	260.0	291.7	357.4	485.6
2011	300.0	280.0	312.6	428.9	542.8
2012	333.4	333.3	427.2	500.4	685.6
2013	458.4	500.0	521.0	679.1	928.4
2014	604.3	600.0	583.5	768.5	1114.0
2015	750.1	766.7	750.2	1215.3	1285.5
2016	916.8	900.0	833.6	1340.4	1542.6
2017	958.5	933.3	875.2	1376.1	1642.6
2018	1000.0	1000.0	916.7	1464.2	1742.8
2019	1083.3	1066.7	979.2	1535.7	1857.1

Source: Analysis of surveyed data, 2020

Table 1 displayed rental indexes of the five residential property types between 2002 and 2019. It can be seen that during the period under review, rental values of three-bedroom flats increased by 1857.1% as against 1535.7% by the two-bedroom flat. While the one-bedroom flat increased by 979.2%, tenement room and studio room increased by 1083.3% and 1066.7% respectively. There was a continuous increase in house rents in the study area. Trends in rental indexes of the five residential property categories were demonstrated in Figure 1. All five residential property types maintained upward trends, indicating a consistent and steady increase from 2002 to 2019. Furthermore, the series of rental index numbers developed for the various residential property types were subsequently used to compute their respective annual growth rates. The results were presented in Table 2.

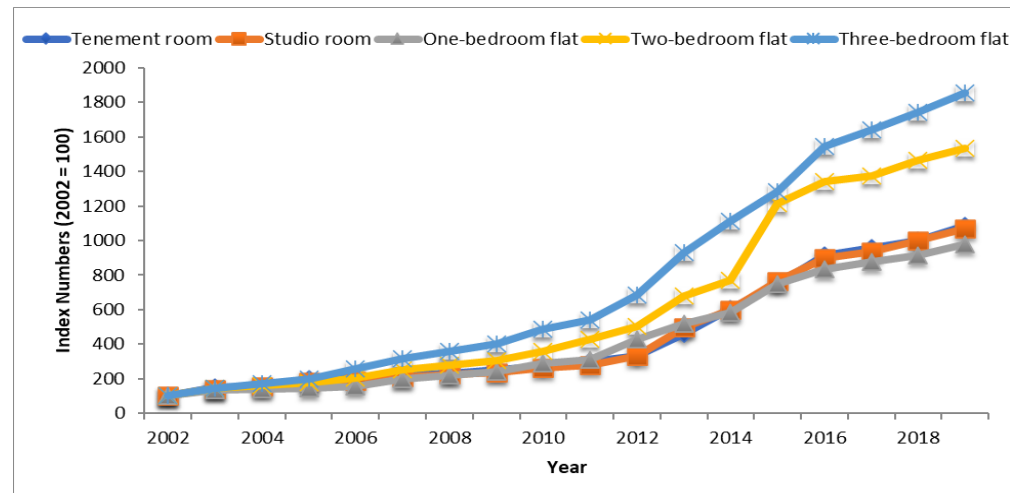


Fig. 1: Trends of Average Rents of Residential Properties in Ede, 2002 - 2019.

Table 2: Yearly growth rates of residential properties' rents in Ede, 2002 -2019

Year	Tenement room	Studio room	1-bedroom flat	2-bedroom flat	3-bedroom flat
2002	-	-	-	-	-
2003	50.00	40.00	35.42	42.85	42.85
2004	5.56	9.50	4.62	12.50	20.00
2005	26.31	17.39	10.29	11.11	16.67
2006	4.17	3.70	7.14	15.00	28.57
2007	8.00	10.71	28.00	21.74	22.22
2008	1.85	9.68	9.38	10.71	13.36
2009	9.09	2.94	9.52	9.68	12.00
2010	10.00	11.43	21.74	17.64	21.43
2011	9.09	7.69	7.14	20.00	11.76
2012	11.11	19.05	36.67	16.67	26.32
2013	37.50	50.00	21.95	35.71	35.42
2014	31.82	20.00	12.00	13.16	20.00
2015	24.14	27.78	28.57	58.14	15.38
2016	22.22	21.74	11.11	10.29	20.00
2017	4.55	3.57	5.00	2.67	6.48
2018	4.45	7.14	4.76	6.49	6.09
2019	8.33	6.67	6.82	4.88	6.56
Mean	15.78	15.82	15.30	18.19	19.12
Std. Dev.	13.85	13.16	11.02	14.56	10.10

Source: Analysis of survey data, 2020.

Table 2 showed that the rents of various house categories increased every year. The growth rates however, differ throughout the study period and from one house category to the another. The annual growth rates ranged between 1.58% and 58.14% during the period studied. This result indicated that rental growth rates in the residential property market exhibited random fluctuations. Table 2 further revealed that during the study period, the mean of the annual growth rates for tenement room, studio room, one-bedroom, two-bedroom and three-bedroom flats were 15.78%, 15.82%, 15.30%, 18.19% and 19.12%, respectively. This further implies that the mean of annual growth rates differs from one residential property category to the other. But how significant are the

differences? The answer to the above question was explored using a one-way analysis of variance and the result presented in Table 3.

Table 3: Result of ANOVA for yearly rental growth rates of residential properties

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	196.761	4	49.190	.307	.872
Within Groups	12811.946	80	160.149		
Total	13008.706	84			

Source: Analysis of survey data 2020

Table 3 presents the result of test of significant difference in the mean annual rental growth rates among the five housing categories. It can be inferred from Table 3 that $F(4, 80) = 0.307$ with p value = $.872 > .05$. Thus, we can conclude that there is no significant difference in the mean scores of annual rental growth rates across the considered house types. The mean plot is shown in Figure 2.

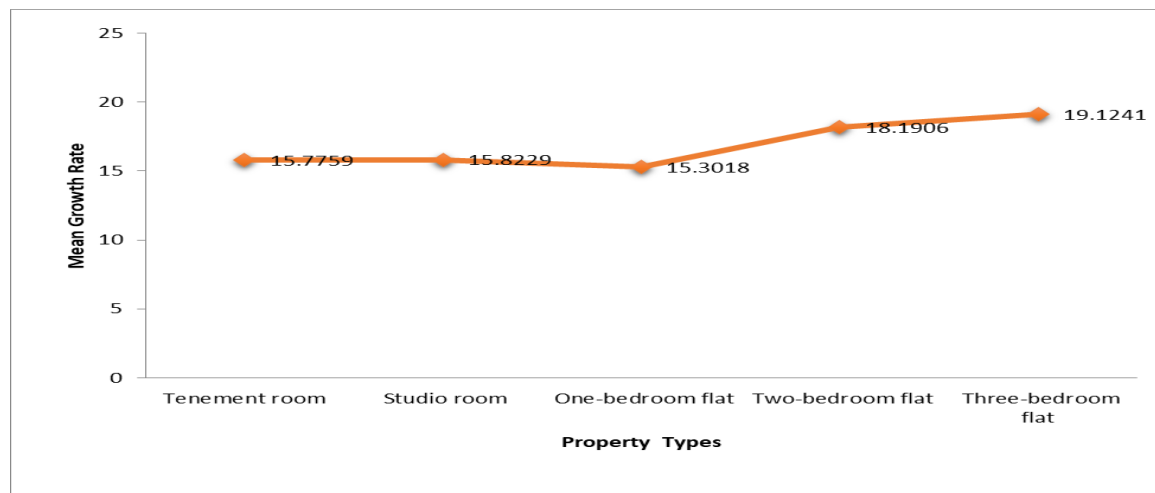


Fig. 2: Mean plot of yearly rental growth rates of residential properties in Ede, 2002 - 2019.

Relationship between macroeconomic indicators and residential properties' rent

Data on the selected Nigerian macroeconomic indicators and residential properties' rent in Ede were analysed to determine the relationship between the two variables. The sample period covers 2002 to 2019 with a total of 18 observations. Summary of descriptive statistics of the variables used in this assessment was presented in Table 4. The results in Table 4 offer some understanding on the nature of the dataset in the form of means, standard deviations, minimum and maximum values. Table 5 showed the results of the multiple regression model employed to determine the influence of each selected predictors (macroeconomic indicators) on the house rent within the period studied. Analysis of the relationship between the two variables was done in two folds. First was on the overall residential properties (Table 5), which gave a general relationship between macroeconomic indicators and rental values of residential properties. The second analysis was to reveal the relationship between macroeconomic indicators and rental values of individual residential property types (Table 6).

Table 4: Summary of descriptive statistics of variables.

Variable	Description	Mean	Std. Dev.	Min.	Max.
Rent	Nominal house rents	26778.89	20923.32	4560.00	64200.00
Lending rate	Short term - lending rate (%)	17.65	2.23	15.14	24.77
Exchange rate	Exchange rates of Nigerian Naira to 1 USD	176.59	67.46	118.55	307.00
Inflation rate	Inflation rates (%)	11.92	3.27	5.38	17.86
GDP	Real Gross Domestic Product (in Billions of Naira)	53386.13	14625.77	28957.71	71333.92

Source: Analysis of survey data 2020

Table 5: Regression analysis of macroeconomic indicators and rental values

Variables	Beta	Std. Error	T	Sig.
Lending rate	.053	15.587	.779	.450
Exchange rate	.639	.986	7.051	.000*
Inflation rate	-.063	9.789	-1.075	.302
GDP growth rate	.439	.004	4.198	.001*

R = .984

R² = .969

F = 101.52

Sig. = .000

Source: Analysis of survey data 2020.

Table 5 presented an overall relationship between macroeconomic indicators and the residential property market in Ede. The result revealed a correlation coefficient (R) of 0.984 which equals to a 98.4% relationship. This suggests the existence of a very strong positive relationship between macroeconomic indicators and rentals of residential properties. Moreover, the result showed a coefficient of determination (R²) of 0.969, implying that about 96.9% variation in rental values in Ede residential property market is caused by the selected macroeconomic indicators (Lending rate, Exchange rate, Inflation rate and GDP). In comparison, 3.1% variance may be explained by other variables not incorporated in the model. Also, the regression model produced an F-test of 101.52 and probability value of $0.000 < 0.05$. The result of the F-test implies that the regression model was significant in forecasting the relationship between rental values of residential properties and the explanatory variables; and a good fit for the data. Additionally, the beta value in Table 5 demonstrates the degree of influence of individual macroeconomic variable to fluctuations in rental value of residential properties. The result revealed that exchange rate and GDP were positively correlated with house rents. A unit change in exchange rate will produce a 63.9% variation in residential properties' rental values, while a unit change in GDP will result in a 43.9% change in the dependent variable. Thus, exchange rate and GDP (with p-value $< .05$) were the macroeconomic factors that significantly influence house rents in Ede. On the contrary, lending and inflation rates exhibited insignificant positive and negative influences, respectively, with rental values.

Furthermore, an attempt was made in this study to analyse the relationship between the selected macroeconomic indicators and rents of each of the five residential property categories earlier identified. This analysis was to assess the respective influences of the macroeconomic variables to fluctuations in the rents of the individual residential property types. The results were shown in Table 6.

Table 6: Regression of macroeconomic indicators and rent (by residential property types)

Residential property types	Variables	Coefficients	Std. Error	t	Sig.	R	R ²
Tenement room	Lending rate	.014	12.861	.187	.855	.980	.960
	Exchange rate	.738	.814	7.164	.000*		
	Inflation rate	-.063	8.077	-.944	.362		
	GDP	.309	.003	2.599	.022*		
Studio room	Lending rate	.038	13.751	.464	.650	.977	.955
	Exchange rate	.704	.870	6.483	.000*		
	Inflation rate	-.071	8.636	-1.020	.327		
	GDP	.355	.004	2.833	.014*		
1-bedroom flat	Lending rate	.076	10.343	1.122	.282	.985	.970
	Exchange rate	.572	.654	6.385	.000*		
	Inflation rate	-.052	6.496	-.901	.384		
	GDP	.520	.003	5.031	.000*		
2-bedroom flat	Lending rate	.057	20.433	.724	.482	.979	.958
	Exchange rate	.668	1.293	6.358	.000*		
	Inflation rate	-.059	12.833	-.864	.403		
	GDP	.405	.005	3.337	.005*		
3-bedroom flat	Lending rate	.053	18.630	.867	.402	.987	.967
	Exchange rate	.606	1.179	7.433	.000*		
	Inflation rate	-.067	11.700	-1.279	.223		
	GDP	.447	.005	5.067	.000*		

Source: Analysis of survey data 2020

Table 6 showed that a strong relationship exists between the considered macroeconomic indicators and rents across all residential property types as established by their respective correlation coefficient (R). Besides, exchange rate and GDP growth had significant influences on rental values for all the residential property types. Conversely, lending and inflation rates showed insignificant positive and negative correlations, respectively, with rental values across the five property types.

Moreover, the corresponding coefficient of determination (R²) revealed that the selected macroeconomic indicators explained 96.60% deviation in rents of tenement properties in the house market in Ede. Additionally, exchange and GDP growth had significant influences on the rental values of tenement category. Hence, a unit rise in exchange rate will translate to a 0.738 rise in tenement rents in Ede, while a unit rise in GDP growth will translate to a 0.309 rise in tenement rents in the study area.

For studio apartments, 95.5% variation in rents of studio apartment in Ede is caused by the selected macroeconomic indicators. Besides, exchange and GDP growth had significant influences on rental values of studio apartments. Therefore, a unit rise in exchange rate will translate to a 0.704 rise in studio apartment rents in Ede, while a unit rise in GDP growth will translate to a 0.355 rise in studio apartment rents in the study area.

For one-bedroom apartments, 97.0% variation in one-bedroom apartment rents is caused by the selected macroeconomic indicators. More so, exchange and GDP growth had significant influences on the rental values of one-bedroom apartments. Accordingly, a unit rise in exchange rate will result to a 0.572 rise in one-bedroom apartments rents in Ede, while a unit rise in GDP growth will lead to a 0.520 rise in one-bedroom apartments' rents in the study area.

For two-bedroom flats, 95.8% variation in rents of two-bedroom flats is caused by the selected macroeconomic indicators. Besides, exchange and GDP growth had significant influences on the rental values of two-bedroom flats. Hence, a unit rise in exchange rate will yield a 0.668 rise in the rent of two-bedroom flats in Ede, while a unit rise in GDP growth will yield a 0.405 rise in the rent of two-bedroom flats in the study area.

For three-bedroom flats, 96.7% variation in three-bedroom flats rents is caused by the selected macroeconomic indicators. Also, exchange and GDP growth had significant influences on the rental values of three-bedroom flats. Consequently, a unit rise in exchange rate will translate to a 0.606 rise in rents of three-bedroom flats, while a unit rise in GDP growth will translate to a 0.447 rise in the rent of three-bedroom flats in the study area.

DISCUSSION

All the five residential property types studied maintained upward rental trends, indicating a consistent and steady increase in rental levels from 2002 to 2019. These results are congruent to the findings in Dabara et al. (2018). This consistent increase in house rents in the study area has been attributed to the increased economic activities in Ede Town, which created upward pressure on the demand for residential properties (Chiwuzie et al., 2019). Furthermore, the outcome of the multiple regression analysis revealed that exchange rate and GDP (with the p-value of .000 and .001, respectively) were the macroeconomic indicators that significantly influence house rents in Ede. This finding is consistent with the results in Ojetunde (2013), Udoekanem et al. (2015), Olatunji et al. (2017) and Chiwuzie et al. (2019). GDP and exchange rates in this study have demonstrated to be useful demand-side indicators in the house market. The result of this study showed that the correlation between GDP and rental value of the residential property was positive with a coefficient of .439, at a statistically significant level of 1%. This result suggests that as GDP rose by a percentage, rental values of residential property increased by about .439%. There is no doubt that GDP as an economic variable, plays a significant role in determining rental income in the residential property market, along with the forces demand and supply. GDP is an economic status, which represents the monetary price for goods and services that a country

produced in a particular time. A rise in GDP, consequently, translates to a rise in the wealth and standard of living of the citizenry. Increase in real GDP would lead to about more people being properly employed, improvement in income levels of the population, which in turn heightens the demand for real property and rentals of fundamental real property such as the house. Therefore, GDP tend to exercise certain level of influence on residential property market. Obviously because, increased GDP results in reasonable economic empowerment for the citizens, the increase in their disposable income will enable them to afford high rents.

Also, the result shows that exchange rate relates positively with a coefficient of .639 to the rental value of the residential property at a statistically significant level of 1%. This result implies that a percentage increase in exchange rate produced a 0.64% increase in residential properties' rent. This result could be interpreted to mean that exchange rate was a significant determinant of residential rents. The entrance of the exchange rate in the model of macroeconomic indicators and rental value of the residential property could be based on the purchase and importation of building materials for the construction of real properties. Exchange rate plays a critical role in many countries, including Nigeria, where some building materials or parts of the material ingredients required for the manufacture of building materials are being imported. When currency rates in a given country depreciate as a result of increased exchange rates, the costs of importation will be high. More money will be paid by such country for imported goods such as building materials and building material ingredients. Increased prices of building materials have been linked to rising residential properties' rents. Ihuah (2015) asserted that increasing prices of building materials inflates the building construction cost, which is invariably passed as rent, leading to rising rents on residential properties

On the other hand, inflation and lending rates were found to have insignificant influences on house rent. This result agrees with findings in Miregi & Obere (2014). De Wit & Van Dijk (2003) earlier found that inflation has a positive effect on the values of direct real estate investment. Contrary to the assertion in De Wit & Van Dijk, this study demonstrates otherwise for residential properties. Inflation rate was observed to have a negative correlation of -0.063 with house rent. This result suggests that a percentage rise in inflation rate translated to about -.063 percentage decline in rental values in the study area during the period reviewed. In theory, an inflationary environment results in more money being required to pay for little commodity, including real property. Therefore, the volume of available money will influence how much households will expend on property acquisition. The operations of the real property market generally depend on price mechanism; the forces of demand and supply determine property prices/rentals. According to the law of demand and supply, all thing being equal, the prices/rentals of a property will increase when the demand is higher than the supply and vice versa. Thus, increases in rental values of properties are ascribed to increased demand and lower supply. The existence of inflation could further reduce demand for the real property below the supply resulting in decreased rental values of properties. This theory

identifies inflation explicitly as having a negative relationship with rental values. Although in this study, inflation rates related negatively with rental values with a p-value of .302 suggesting that the relationship was not statistically significant. This insignificant relationship could be interpreted to mean that inflation rate did not have a significant influence on house rent in Ede housing market and as such, it is not a meaningful indicator. This result is congruent with the findings of Ojetunde (2013) and Udoekanem et al. (2015) but disagrees with findings of Olatunji et al. (2017). However, these conflicting results are not surprising as studies such as Bello (2005) and Dabara (2014, 2015) have recognised that real property investments in Nigeria are not an all-time hedge against inflation. The result of this study further revealed that lending rate had an insignificant positive relationship with house rent in the study area. This result conforms with the findings of Ojetunde (2013) and Miregi and Obere (2014). Nevertheless, the finding on the lending rate in this current study is not congruent with the studies of Eldelstine and Tsang (2007), Wei and Morley (2012), and Olatunji et al. (2017) who identified lending rates as a significant determinant. The inconsistency in the findings regarding the influence of inflation and lending rates on direct real estate investments could be credited to several factors, which include variations in geographical locations, property markets, timeframes, macroeconomic conditions, among others.

CONCLUSION

The goal of this study was to investigate the operation of the residential property market in Ede, with a view to exploring the influence of macroeconomic indicators on rental values. To this end, the annual rent of residential properties in Ede were analysed and evaluated against the selected macroeconomic indicators (GDP, Exchange, Inflation and Lending rates) employing ANOVA and multiple regression model. The result revealed that rental values of all property types maintained upward trends during the period studied; besides, it was found that rental growth rates in the residential property market exhibited random fluctuations with a mean annual growth rate of 15.78%, 15.82%, 15.30%, 18.19% and 19.12% for tenement room, studio room, one-bedroom, two-bedroom and three-bedroom flats, respectively. However, there was no significant difference in the mean of annual rental growth rate across the house categories studied ($F(4, 80) = 0.307$ $p = .872 > .05$). The results also revealed a very strong positive relationship (0.984) between the considered macroeconomic indicators and rental values of residential properties; the selected macroeconomic indicators explained about 96.9% variation in rental values in Ede residential property market. Exchange rate and GDP (with $p = 0.000$ and 0.001 respectively) were found to significantly influence rental values in the residential property market in Ede. On the other hand, lending rate and inflation rate exhibited insignificant positive and negative influences, respectively, with rental values. The implication of this study is the presence of feedback relationships between GDP and rental value and between exchange rates and rental values of residential

properties, which suggest that these variables are determined contemporaneously.

The results of this study will be beneficial to investors and other stakeholders in the African property markets in particular and other real estate markets in the global investment space. Empirical evidence of the significant macroeconomic indicators of rental movements will guide them in making informed investment decisions. Meanwhile, basic rental determinants are known to vary from one location to another. A reliable housing market assessment to get latest pointers that impact rental changes in specific locations at any given time requires accurate statistics on macroeconomic indicators in these locations. To this end, this study recommends that the Central Bank of Nigeria and the National Bureau of Statistics should consider the publication of statistics on macroeconomic indicators for individual states. Macroeconomic statistics of individual states will ensure the determination of critical indicators for house rent movement that reflect the housing markets in a specific locality.

The present study cannot be said to be without any limitations. First, the study is focused on selected macroeconomic indicators and their influences on rental values of residential property investments in Ede, Nigeria. However, there is absence of a well-documented rental data in the study area. Also, other macroeconomic variables such as employment rate, unemployment rate and monetary policy rate were not explored. Further studies that integrate these macroeconomic variables are recommended.

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CLAIMS CULTURE AND CLIENT-CONTRACTORS' WILLINGNESS TO ENGAGE IN FUTURE PROJECTS: A MULTIVARIATE ANALYSIS

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Inter-parties' relationships in construction contracts are laden with relational problems. The lifecycle of a typical relationship in the traditional procurement framework model is one-off. Stakeholders' willingness to engage in the future based on past contract exchange characteristics such as contract claims also vary. Limited research, however, reports on the relationship between the exchanges characteristics in past projects and the parties' willingness to engage in the future. This study determined the influence of claims culture on client-contractors' willingness to engage in future projects. The objectives evaluated the prevalent claims, the relationship ties, and the correlation between claims and clients-contractors' relationships. Survey data from 200 architects, engineers, and quantity surveyors in Southeast, Nigeria was analysed using multivariate approaches. The results showed payments and measurements, variations, errors and omissions, direct changes, and fluctuation claims are frequent. Projects with high claims also developed less interaction, exchange, longevity, relationship atmosphere, mutual orientation, and dependence towards a future relationship. The implication suggests frequent claims weaken client-contractors relationship ties and the willingness to engage in future projects. Lowering claims culture in projects would therefore promote parties' willingness to recreate past relationships in the future. Contracting parties need to increase their level of adaptations to improve exchange satisfaction, and relationship ties to suppress adversarial behaviours by applying relational norms to claims management.

Keywords: adversarial behaviour, claims culture, clients, contractors, contractual relationship

INTRODUCTION

Construction projects connect several parties such as contractors, suppliers, and sub-contractors (Gadde and Dubois, 2012). The activities of these parties interlaced to generate inputs toward meeting the demand for projects directly or in conjunction with other sectors (Berk and Biçen, 2018). The networks of

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relationships tend to extend with time into the future, because of the growing interests to maximise the efficiencies of the contracting organisations. However, the extension of relationship ties to future projects seems not to benefit the relational status within the traditional contracting framework (Nikinosheri and Staxang, 2016; Oaikhenana and Ekung, 2018). Nurturing contractual relationships between parties and their linkages in traditional project setups, therefore, follow bespoke practices defined by the prevailing contract norms and governance frameworks.

Over the years, researchers have verified that a healthy relationship between contracting parties influences firm success and project performance (Read, 2004; Ford et al., 2011; Lu et al., 2016). Ford et al. (2011), after a review of practices within the manufacturing sector, capped it is impossible for organisations to perform without their respective relationships. However, the strength of business relationships require continuous assessment, embedding within contractual provisions and incentives to reward performance (Jefferies et al., 2006). The relationship between contracting parties that benefits successful projects and organisational performance is rooted in cooperation, respect, and support over the project lifecycle (Read, 2004). These relationship elements however elude the traditional project systems, rather, the deviant to these norms exist. The prevalent relationship practice in traditional procurement setups is point-to-point, limits cooperative dealings (Isatto and Formoso, 2011), and adopts temporary relational exchange mechanics (Ekung and Lashinde, 2016). Contractual relationship within the traditional project framework, therefore, aligns with the models of economic transaction laden with opportunism and bounded rationality. This study operationalised the transactional contract attributes into construction contracts to situate claims behaviour within opportunism. The high affinity of construction contracts to dispute behaviours also instruct parties' dissatisfactions with project outcomes. Disputes, therefore, vitiate the relationship ingredients for continuous business performance by limiting the client's level of satisfaction in completed projects (Lee et al., 2014).

Claims are the outcome of the conditions created mainly in the planning phase of contracts for which buffers in resources are allocated (Read, 2004). It arises directly out of parties' actions and in-actions that lead to the additional expense of construction resources not originally planned by the contractor (Banwo, 2017). Construction claims result in disputes and disputes are unhealthy occurrence that affects relationship ties between parties (Manuel, 2015, Bakhary et al., 2016). Shapiro (2007) linked over 90% of the problems encountered in construction projects lifecycle to claims and the trend has continued to grow at an unsettling degree (Bakhary et al., 2016; Global Construction Disputes Survey, 2018). Even though claims behaviours have several other implications, Olarewaju and Anavhe (2014) distinguished the termination of the project relationship temporarily through litigation, arbitration, and suspension and permanently, through abandonment. Most project relationships between the contracting parties (clients and contractors) terminate with disputes arising from construction claims (Global Construction Disputes Survey, CIDR, 2018). The willingness of parties to engage in the

future is, therefore low due to past relationship performance. The study is imperative to decimating dispute occurrences in traditional project setups that develop from claims cases and their disparaging consequences on relationship performance. Despite the scope of a contract detailing permitted within the purview of the traditional procurement framework, it is evidence that claims are but common occurrences (CIDR, 2018). The contractual relationship in one project infrequently progresses into another project (one-off), and parties tend to disagree on the willingness to continue a future relationship (Lu et al., 2016). Lim and Loosemore (2017) showed that projects' internal occurrences could instruct relationship performance. Claims as internal project exchange features are, therefore, likely associated with relationship failure. The contractors use claims to outstrip the client by breaching implicit commitment for extra gains and expose the contractual relationship to vicious clashes (Ning, 2018; Zhang et al., 2018).

Even though the use of past performance in contractors' selection demonstrates laggardness to engage non-performing firms, few studies examined whether claim related disputes in past projects contributed to the decision (Baiden et al., 2018). The prevalent assumptions in past studies tackled the relationship factors between the main contractor and the sub-contractor (Okunola, 2015; Tawalare and Reddy, 2018). Despite the volume of studies on contractual claims and relationships, the dearth of a prescriptive compass to evaluate the sources of tensions in client-main contractor relationships is seminal (Rahmani, 2016). Amidst the escalating dispute profile of the global construction industry (CIDR, 2018), limited studies examine how client and contractors organisations relate to post-disputes. This research, therefore, investigated whether claims management-related problems between the client and main contractor influence the party's willingness to develop future project relationships using multivariate analysis. The research explored the effects of problems created by opportunism and evasive behaviour in multiple exchanges. The knowledge of the implications of claims behaviour on contracting business continuity would drive proper management of construction claims to minimise disputes. The correlation between the frequency of claims and relationship ties also reveals the critical areas where refinements could improve relational problems in traditional project systems. The research further espoused the effect of dissatisfaction with project outcomes on future contractual relationships.

Claim culture and frequency of construction claims

Cartlidge (2012) described claim as a 'method of paying back the contractor for proven loss and expense that is not recovered in any other way'. Lu et al. (2019) expressed an understanding, which suggests, contractual claims arise where contractors request additional payments over and above initially agreed payment for work done under the general terms and conditions of the contract. However, the predominant consensus in the literature conceptualises claims, as the request for recompense for the loss of expense or time incurred by a contractor that was not part of the originally agreed contract by parties. The claim culture defines the attributes that characterise activities associated with claims planning and management (Rooke et al., 2003). Rooke et al. (2004)

identified two dimensions of claims culture: proactive (claims created during the tender stage) and reactive (claims during the project execution phase) using ethnographic research in the UK. Al Subaie (2012) and Bajere et al. (2017) developed types of claims into four categories: change, delays, extra works, and contractual claims, while Castri (2000) classified claims as technical, economic, and financial claims.

The studies on the frequency of claims adopted differing metrics. Hadikusumo and Tobgay (2015) determined the frequency of claims by calculating the number of times each type of claim occurred in a project. Ujene and Edike (2016) determined the frequency of claims using respondents' perception ranking and the actual cost of claims. Moura and Teixeira (2007) adopted the amount paid to determine the frequency of claims in their study. This study examined the frequency of claims using 13 events with a view to unravelling their contributions to relational problems between clients and contractors in the construction industry (Table 1).

Table 1: Variables for the frequency of claims

Code	Claims	1	2	3	4	5
VFC1	Termination of contracts	x				x
VFC2	Measurement and payment	x				
VFC3	Acceleration	x		X		x
VFC4	Suspension of works	x				
VFC5	Force majeure	x			x	
VFC6	Delays	x		x		x
VFC7	Errors and omissions	x			x	
VFC8	Direct changes	x				
VFC9	Variations claims				x	x
VFC10	Fluctuation and cost escalation claims		x			
VFC11	Claims for penalty		x			
VFC12	Disruption claims			x		x
VFC13	Inflation and the exchange rate			x		

1 = Moura and Teixeira (2007), 2 = Mbakwe et al. (2015), 3 = Castri (2000), 4 = Hadikusumo and Tobgay (2015), and 5 = Ujene and Edike (2016)

CLIENT-CONTRACTOR'S RELATIONSHIP

The prevalent contractual relationship in the construction industry revolves around the adversarial practice. The adversarial relationship is governed by the supremacy of distrust and the threat of a lawsuit (Rahmani, 2016). It develops towards an arms-length relationship that is conventional with construction industry practice (Jonsson, 2008). It refers to point-to-point relationships developed from priced-based selection mechanisms (Gadde and Dubois, 2012). Jonsson (2008) characterised the arms-length relationships based on the pattern of negotiation between parties. The focus is on the lowest price hence, the relationship is competitive, win-lose, and opportunistic. Baiden et al. (2018) attested to the fierce contractual relationship between contracting parties using data from the survey of stakeholders in the Ghanaian construction industry. Another study involving Canadian case studies, Blois et al. (2010) showed that temporary project management organisation experience fragile relationships and lacked the structured mechanisms to address

communication management problems. Maro and Mnyigumbi (2019) studied contractual relationships in joint ventures in Tanzania to reveal that the prevalent relationship was point-to-point. In sum, the relationships in the construction industry consist of a hierarchical governance model seen in the design and build; a market governance model exhibited in traditional procurement framework, and hybrid collaborative relationship practices in a relational contractual framework (Rahmani, 2016).

Gadde and Dubios (2010) discussed six ingredients for long-term relationships including longevity, adaptations, dependence, interactions, relationship atmosphere, and mutual orientation. Longevity arises from loyalty, trust, commitment, and social bond. Adaptation describes collective and integrated solutions to improve overall performance. Dependence ensures interdependency in settling complex technical issues. Interaction enhances visible interactions between parties that direct future and current states of affairs. Relationship atmosphere relates today with the future by smoothing conflicts caused by contradictive interests of parties, while mutual orientation is created by frequent interaction adaptation. In addition, Ford et al. (2011) emphasised that the strength and durability of firms' relationships are dependent on the level of adaptation. Adaptations are the degree of investment made by parties in the exchange relationship to sustain it, or the commitment to maintain the relationship (Tamminen and Saarinen, 2013). Three types of adaptations are distinguished (Tamminen and Saarinen, 2013): technical, administrative, and knowledge-based adaptations. Technical adaptation connects inputs flow into the exchange (product) to enhance the efficiency of operations. Construction projects are information-intensive ventures, therefore administrative adaptation seeks to advance the integration of the various relationship loops that improve diverse information exchange such as tender, notices/instruction, and financial statements (Lu et al., 2019). Knowledge-based adaptation is concerned with the development of implicit project experiences into long-term learning protocol that aids the relationship interface (Tan et al., 2017). The dimensions of relevant applicable information exchange mechanics and their influence on construction project interface management practice exists (Ekung and Lashinde, 2016; Ekung and Lashinde, 2018). Seven ingredients for building a beneficial relationship, which can obliterate adversarial tendencies underscore effective client and contractor continued relationship beyond a project (Table 2).

THEORETICAL FRAMEWORK

Client-contractors' interaction is a developing knowledge domain in the construction industry. Several theories support the analysis of inter-party/firm relationships in construction researches notably, transaction cost theory and industrial network approach. However, this study notes that inter-firm relationship in existing studies largely considered contractor-subcontractor relationship (Brahm and Tarzijan, 2014) and the relationship between contractors and suppliers networks (Bemelmans et al., 2012). However, Transaction Cost Economics (TCE) is more consistent in explaining the state of relationship and forecasts variations in the relationships under the influence

of extraneous conditions such as claims. More importantly, TCE accounts for why firms/parties and organisations elect to deal with one another in several models determined by market variables, hierarchical relationships, and or hybrid relationships in isolated project environments (Mokhlesian, 2014). TCE analysed the relationship between vertically integrated partners (client-contractors), to explain the coordination in the construction supply chain because most linkages that unite the firm are contractual (Yahaya and Oyediran, 2019).

Table 2: Indicators of Effective Contractual Relationship

S/N	Relationship Dimensions	High-involvement relationship	Sources
1	Longevity	Frequent and loyal business exchange in the long term	Gadde and Dubois (2010)
2	Dependence	Dependencies between organisations through settlements of technical complexities	Gadde and Dubois (2010)
3	Relationship atmosphere	Cooperative factors facilitating conflict caused by contradictive interests of the parties	Gadde and Dubois (2010)
4	Mutual orientation	Generated by frequent interaction and adaptation, enhance the interdependence relationship development	Gadde and Dubois (2010)
5	Interaction	How mutually oriented the intentions and interpretations of parties in the contract relationship is conveyed	Ford <i>et al.</i> (2011)
6	Exchange	The satisfaction with product (buildings), services, money, interpersonal relationship (sociality) and information	Tamminen and Saarinen (2013)
7	Adaptation	Level of commitment by parties to maintain relationships	Lynn <i>et al.</i> (1992)

Transaction cost theory becomes imperative in clients-contractors' discuss because of the governance problem in contractual relationships. Notable relationship problems are those developed from point-to-point and their associated impact on cooperative dealings. TCE posits that certain cost exists that are significant to firms' operation and survival in the market, reducing these costs portray vantage opportunity for continuity (Li *et al.*, 2013). Since claims are contingent on the inability to predict certain events with specificity, inherent opportunism, therefore, necessitates transaction costs that create the adversarial relationship experienced by parties. TCE argues that the frequency of certain transactions is essential feature that govern relationship structure based on their overall transaction costs. The implication for practice is that contractual problems that increase the transaction costs will form the basis for rationality in future contracts. Therefore, the relational performance of one project is a precursor to future performance. Claims, therefore, exhibit the essential characteristics of transactions addressed in the transaction economics model. Claims are strongly uncertain, opportunistic, and lack mutual adjustment to overcome their effects on the project and their parties.

The contractor-client relationship in the traditional procurement framework suits the hierarchical governance model. The hierarchical relationship seeks to

safeguard specific assets (partners) using detailed complex contracts, opportunism, and hostage-taking (Mokhlesian, 2014). Relationship governance within the construction sector in this model develops on transactional terms mainly. Opportunities, however, exist for strategic long-term orientation even in the governance model relationship (Madhok, 2002). This view portrays that effectual relationship governance and improved relationship performance are possible within the transactional-traditional contract framework (Oaikhena and Ekung, 2018). TCE also clarifies that the redress and cost control mechanisms ex-ante in the classical (transactional) contract is incomplete thereby imposing the need for post-ante evaluation and monitoring of contractor's performance; this disposition supports the claim culture. TCE does not importantly address interrelatedness in multiple exchanges; rather it focuses on problems created by opportunism and evasive behaviour (such as claims). This means that TCE does not explain how firms relate or should relate but importantly address how the outcome of governance choices and their structures affect firms' specific attributes (Wever et al., 2010).

Contractual claims are a set of the most important triggers of relational problems based on strong affiliation to construction disputes (Manuel, 2015, Bakhary et al., 2015; Bakhary et al. 2016; CIDR, 2018). Disputes weaken the relationship ties prerequisite for continuous business performance by limiting the client's level of satisfaction in completed projects (Lee et al., 2014). Ninety percent of the problems encountered in construction project lifecycle are claims related (Shapiro, 2007). Claims also trigger cost, time overrun, and incidental disputes (Chaphalkar and Iyer, 2014). Fluctuation claims alone accounted for 97 percent of cost overrun in public building projects in South-South, Nigeria (Anjiba and Adu, 2018), while a causal relationship exists between construction risks and claims (Kumar et al., 2017). Claims induce stress on the vastly confrontational relationship between client and main contractor and demands-resources additional, to previously agreed contractual terms (Banwo, 2017). Claims-related disputes have both temporary and permanent effects in project implementation cycles, temporarily, disputes could lead to suspension of work, arbitration, litigation, and delays, while permanent effects are terminal abandonment of the project (Olawajun and Anavhe, 2014).

RESEARCH METHODOLOGY

The study adopted a survey research design based on a questionnaire. The survey was conducted in five states of Southeast, Nigeria following precedence that adopted regional data (Nikinoshari and Staxang, 2016; Ujene and Edike, 2016; Bajere et al., 2017; Atuahene et al., 2017; Anjiba and Adu, 2018). The population of the study comprised 240-registered construction professionals (75 architect, 95 engineers, and 70 quantity surveyors) obtained from the directory of consultancy firms with vast experience in claims management through preliminary inquiries. Elmarsafi (2008) in a study of change strategies to reduce construction disputes, likewise drew the population of study from various stakeholders engineers, construction company owners, building materials suppliers, project supervisors, developers, and architects. The questionnaire was administered to a random sample of 200 targets using

mainly face-to-face administration and emailing. This sample comprised the minimum sample size of 166 obtained using the Kish equation and 34 additional targets included to eliminating non-response bias.

The data need in the study is characterised as quantitative. It comprised data collected in numerical terms and analysed using statistical tools to explore and explain relationships, effects, and interdependency (Borden and Abbott, 2011). The design of the questionnaire adopted close questions with multiple choices. Section A has seven questions related to the background information and adopted the nominal scale. Section B had three questions relating to the frequency of claims, indicators of effective client-contractors' relationships, and the effect of claims on the relationship interface between client and contractors. Questionnaire piloting involved selected experts and feedbacks from face-to-face interaction with ten quantity surveyors directed the review of the final questionnaire used for the field survey. Newman (2014) revealed 'a small number of pretest participants' is appropriate and related studies aligned to the use of a single case in project piloting (Kähkönen and Keinänen, 2014) and up to ten participants in questionnaire piloting (Tang et al., 2006; Bekr, 2014). The interaction during piloting enhanced the assessment of time used by each respondent as a pertinent factor in the design of the questionnaire (Borden and Abbott, 2011).

Cronbach' Alpha value underpinned the reliability test in the study. The Cronbach's coefficient ranged from zero to one but values close to one represent greater reliability. Since the benchmark for Cronbach alpha varies with authors and the level of accuracy expected (Bhattacharjee, 2012), the cut-off value of 0.70 (Pallant, 2016) was adopted to determine concept/variables reliability. The variables in the research instrument however showed strong internal coherency and consistency with the score > 0.80 . Construct validity was performed to evaluate the measurement constructs applied to a concept and fitness of scale applied in measuring theoretical constructs (Bhattacharjee, 2012). The first test of construct validity was constructs' capability to generate expected results (that is, valid output values, Hoxley, 2008). The validity test focused on the strength of the relationship between variables (e.g. the Canonical Correlation Analysis), the results showed the adopted constructs were appropriate (see results section)

The study further developed a database management system using SPSS to aid data analysis. Table 3 summarises the research objective, hypothesis (where applicable), type of tools, and applied statistical tools.

The mean is the sum for the group of items divided by the total number of items in that group. Section B of the questionnaire adopted an ordinal scale of measurement and ordinal data suggests infiltration of bias and fussiness. The study performed data transformation to eliminate fussiness and to provide concrete data for canonical correlation analysis using Terrell Transformation Index (TTI) (Toh et al., 2012). TTI was applied at two levels firstly, to determine the hierarchy of the data set and secondly, to prepare related data for canonical correlation analysis. TTI ranged from zero – 100, however, indices above 65

percent are valid thresholds for this study (Toh et al., 2012). TTI is given as (Toh et al., 2012):

$$[\text{ARS} - \text{LPRS}/\text{PRSR}] \times 100 \quad (\text{equation 1})$$

Where ARS is the average raw score (mean), LPRS is the least possible score (least scale point) while PRSR is the possible raw score range ($5 - 1 = 4$). Canonical Correlation Analysis (CCA) determined the hypothesis in Table 1. CCA compliments Pearson Product Moments correlation analysis by determining the relationship between a group of independent and a group of dependent variables. The tool works by generating variates (two new variables) for each subject (dependent and independent variables). The decision rule was governed by a p-value (0.05).

Table 3: Summary of Statistical Tools

Objectives	Hypothesis	Tests	Statistical Tools
Identify the prevalent claims in the research environment		Hierarchy/financial implication	Mean item score
Assess the level of the importance of relationship ties to client-contractor's relationship		Hierarchy/level of significance	Mean item score and Terrell Transformation Index
Evaluate the correlational effect of claims on the relationship between client and main contractor in construction project interface	The frequency of contractors' claims have no correlation; effects on clients' willingness to engage the contractor in future projects	Hierarchy and correlational effects	Canonical Correlation Analysis

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The financial implications of claims were evaluated based on the scale developed by Ujene et al. (2011). The scale has five categories (1) 1-10 percent, (2) 11-20 percent, (3) 21-30 percent, (4) 31-40 percent and (5) 41-50, each cost range was determined from equation one. Categories one to five depended on equation two and the mean scores of the frequency of claims.

$$X_p = L_b + 10 (P) \quad \text{(equation 2)}$$

Where X_p is the average percentage value of the claim, L_b is the lower limit of percentage range conforming to the integer of Mean score and P is the decimal value of the mean score.

RESULTS

Questionnaire response rate and respondents' characteristics

The study retrieved 130 valid questionnaires and the response rate of the study was 65percent. The level of education of the participants is adequate; over 98percent have the equivalent of the first degree and above. The sample likewise has more quantity surveyors than engineers and architects. The result indicates the sample has the requisite professionals with relevant expertise in contract management, claim analysis, and valuation. The years of experience of over 81percent of the sample is above ten. The cognate experience portrays the respondents could advance useful knowledge in the research subject. The data were mainly from building projects (85percent) and civil engineering projects (15percent).

Frequency of construction claims

The data in Table 4 reveals payments and measurements are the most frequent claim. Other claims in the top five most frequent claims events are variations (2nd), errors and omissions (3rd), direct changes (4th), and fluctuation and cost escalations claims (5th). Claims related to acceleration (13th), force majeure (12th), termination of contracts (11th), suspension of works claims (10th), and delays (9th) are infrequent. However, ten out of thirteen claims cases evaluated obtained mean scores greater than 3.0 or 60 percent. Ten claims: payments and measurements, variations, errors and omissions, direct changes, fluctuation, cost escalations suspension of works, delays, disruption, inflation and exchange rate, and penalty are important claims cases, which frequency could govern relationship structure due to their costs. The ten most frequent claims cases obtained an averaged mean score of 3.60 and the overall spread of their frequency cuts across 72 percent of the population.

Following the understanding that claims prominently results in adjustment of the project resources, the data in Table 4 also depicts the cost implications of each claim. The cost range of all claim cases lay between 10.50 and 35.70 percent. The additional cost associated with payment and measurement, errors and omissions, direct changes, and variation claims is above 30 percent. The cost effect of the second category of claims is above 20 percent. The claims in the second category are the suspension of works, delays, fluctuation and cost escalation, penalty and damages, disruption and inflation, and exchange rate claims. The third category, comprising termination, acceleration, and force

majeure has cost implications above 10 percent. The costs of claims and their frequencies showed the transaction costs of all claims are high. The average additional cost of claims to cost overrun or estimated project cost is 25 percent.

Table 4: Frequency of Claims

Codes	Claims	Des. Stat.		Financial Implications		
		MIS	Rank	L _b	10(P)	L _b + 10(P)
VFC1	Termination of contracts	2.49	11 th	11	4.9	15.9
VFC2	Measurement and payment	4.47	1 st	31	4.7	35.7
VFC3	Acceleration	1.95	13 th	1	9.5	10.5
VFC4	Suspension of works	2.92	10 th	11	9.2	20.2
VFC5	Force majeure	2.43	12 th	11	4.3	15.3
VFC6	Delays	3.28	9 th	21	2.8	23.8
VFC7	Errors and omissions	4.33	3 rd	31	3.3	34.3
VFC8	Direct changes	3.97	4 th	21	9.7	30.7
VFC9	Variations claims	4.38	2 nd	31	3.8	34.8
VFC10	Fluctuation and cost escalation claims	3.86	5 th	21	8.6	29.6
VFC11	Claims for penalty	3.28	8 th	21	2.8	23.8
VFC12	Disruption claims	3.38	6 th	21	3.8	24.8
VFC13	Inflation and exchange rate	3.36	7 th	21	3.6	24.6

N = Number of respondents, Tot = Total score, MS = Mean score, L_b = Lower limit of mean score,

P = decimal of the mean score, Fin Imp = Financial Implication.

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Significance of client-contractors' relationship ties

The level of importance of seven relationship ties is analysed using mean item score and Terrell Transformation Index (TTI). The effect of claims on relationship ties is significant with TTI greater than 65 percent (Toh et al., 2012). The results in Table 5 shows that claims affect the seven dimensions of relationship ties evaluated by the study (TTI scores, 73-94 > 65 percent benchmark). The average effect of claims on relationship ties is 84percent > 65percent.

Claims, therefore, decrease parties' willingness to develop these dimensions of relationship ties. The results further suggest that projects with enormous claims have to develop strategies to decimate tensions on relationship ties: longevity, dependence, interaction, relationship atmosphere, mutual orientation, exchange, and adaptations.

Table 5: Effect of Claims on Relationship Ties

Relationship Dimensions	High-involvement relationship ingredients	Cronbach Alpha	ARS	LPRS	PPRS	TS	TTI (%)	Decision
Longevity	Frequent and loyal business exchange in long term	0.873	4.33	1.00	4.00	0.83	83	Critical
Dependence	Dependencies between organisations through settlements of technical complexities	0.92	4.22	1.00	4.00	0.81	81	Critical
Interactions	Vivid interactions between the parties which directs the current and future states	0.88	4.36	1.00	4.00	0.84	84	Critical
Relationship atmosphere	Cooperative factors facilitating conflict caused by contradictive interests of the parties	0.87	4.17	1.00	4.00	0.79	79	Critical
Mutual orientation	Generated by frequent interaction and adaptation, enhance the interdependence relationship development	0.78	4.35	1.00	4.00	0.84	84	Critical
Exchange	The satisfaction with product (buildings), services, money, interpersonal relationship (sociality) and information	0.92	4.66	1.00	4.00	0.92	92	Critical
Adaptation	Level of commitment by parties to maintain relationships	0.96	4.76	1.00	4.00	0.94	94	Critical

The reliability test of the relationship ties was also adequate (Cronbach Alpha; 0.78 - 0.96 > 0.70 – Pallant, 2016). Longevity, dependence, interaction, relationship atmosphere, mutual orientation, exchange, and adaptations are therefore coherent and consistent in assessing client contractor's relationships under claims.

Effects of construction claims on client-contractors' relationship

The hypothesis for this objective states that the frequency of claims has no correlational effects on clients' willingness to engage main contractors in future projects. The test statistics involved Canonical Correlation Analysis (CCA) and the significance of the test depends on the p-value (0.05). The results in Table 6 reveals that the frequency of claims has a varying degree of correlational

effects on relationship ties. Three groups of correlation co-efficient exist: very high (0.97; longevity), above average (0.599, 0.535; dependence and interactions) and weak relationship atmosphere (0.375), mutual orientation (0.284), exchange (0.207) and adaptation (0.194). The inference is that the correlational effect between the frequency of claims and longevity is very high. The effect on dependence and interactions is above average, while the effect on relationship atmosphere, mutual orientation, exchange, and adaptation are low.

Table 6: Canonical Relationship between Frequency of Claims and Relationship Ties

Roots	Correlation Coefficient	Eigenvalue	Wilks Statistic	F	Sig.	Decision
Longevity	0.97	15.978	0.020	19.964	0.000	Reject Ho
Dependence	0.599	0.561	0.332	5.631	0.000	Reject Ho
Interactions	0.536	0.403	0.519	4.267	0.000	Reject Ho
Relationship atmosphere	0.375	0.164	0.728	2.764	0.000	Reject Ho
Mutual orientation	0.284	0.087	0.847	2.115	0.001	Reject Ho
Exchange	0.207	0.045	0.921	1.756	0.033	Reject Ho
Adaptation	0.194	0.039	0.962	1.879	0.072	Accept Ho

Sig. = significance of Wilk's test

The Wilks values of the correlation (Wilk's coefficient) indicate the canonical correlation is significant for six relationship ties or roots (adaptation, dependence, interactions, relationship atmosphere, mutual orientation, and exchange; 0.332, 0.519, 0.728, 0.847, 0.921, and 0.962), except longevity (0.020). The p-values are likewise less than 0.05 for roots one to six (dependence, interactions, relationship atmosphere, mutual orientation, and exchange), except adaptation (0.072). The study rejected the null hypothesis for the significant canonical roots. The frequency of claims, therefore, reduces dependence, interaction, relationship atmosphere, mutual orientation, and exchange governing client-contractors' relationship ties. However, the null hypothesis for root seven (adaptation) was accepted ($p(0.072 > 0.05)$). The inference suggests the frequency of claims does not inhibit client-contractors' commitment to maintaining their relationship ties. Thus, despite the prevailing adversarial relationship in the traditional procurement setups, parties are committed and make the investment to extend their relationship ties beyond a project. However, since the correlational effects were significant for six roots and their null hypotheses rejected, there are significant positive correlational effects (r , 0.207 to 0.97) between the frequency of claims and client-contractors relationships. The strength of the correlation between the frequency of claims and client-contractors' relationships is also significant for longevity only (Eigenvalue, 15.978 > 1.000). Therefore, the amount of variance in longevity is equal to the quantity of variance explained by the other seven

dimensions of relationship ties. The significance of Eigen statistics support the fitness of the models, while the F-values were likewise greater than one and significant.

DISCUSSION

The result of the first objective revealed the prevalent claims. Payments and measurements, variations, errors and omissions, direct changes, fluctuation, cost escalations suspension of works, delays, disruption, and inflation and exchange rate have varying cost implications. The varying cost implications averaged 25percent. The financial implications represent a high transaction cost, significant to govern the relationship between the client and contractors, in agreement with the theory of transaction cost economics (TCE). TCE advanced this position in stating that the frequency of certain transactions is critical attribute that govern relationship structure. Documentation (measurement) and payment-related concerns should be managed properly to reduce their transaction costs with a view to reducing their influence on relationship governance. The best practices toward claims governance must focus on improving contract documentation, payment, variations, and fluctuations triggers in the contract. The results imply that construction stakeholders must prioritise contracts without errors, reduce variations, and properly forecast of macro-economic factors. These dimensions are imperative strategies for reducing claims-related transaction costs in construction contracts.

The results agree with past studies (Ujene and Edike, 2016; Anjiba and Anjiba, 2018) in terms of the principal claims and their costs. The estimate of these costs is nevertheless a coherent evaluation of the contribution of claims to the overall cost of projects in Nigeria. Ujene and Edike (2016) found that construction change order was one of the principal claims, with an estimated cost averaging 6.90 to 30.70percent of the winning bid price. Fluctuation claims likewise accounted for 97% of cost overrun in public building projects in South-South, Nigeria (Anjiba and Adu, 2018). Claims, therefore contribute to costs increases, necessitating proper management to benefit contractual relationships (Chaphalkar and Iyer, 2014; Kumar et al., 2017). The study also reinforces variation as one of the most important claims triggers in building construction projects in agreement with past studies (Moura and Teixeira, 2007; Mbakwe et al., 2015). Mbakwe et al. (2015) showed that 53.84percent of claims is variation driven based on data obtained from a state in the Southeast zone of Nigeria. Moura and Teixeira (2007) linked 64percent of total claims to the varying degrees of direct and indirect changes. The results of the study, besides establishing congruence with past studies, also suggests a lack of improvement in claim management.

The influence of claims on relationship ties produced the strongest correlation with longevity. Longevity refers to parties' readiness to commit, nurture and extend contractual relationships from one project to another (TTI, 94 > 65 percent). Claims also reduce clients' satisfaction with exchange products (buildings) and sociality elements (interpersonal connection) with the

contractor (TTI, 92 > 65 percent). Claims have the same degree of impact on interactions and mutual orientation to show that it reduces the level of visible interaction between parties and decreases frequent interaction and interdependency prerequisite to foster future engagement. The effects on dependencies and relationship atmosphere were likewise important to explain that claims weaken the dependency distance between contracting organisations. The higher the degree of dependence, the higher the affinity to share technical problem-solving expertise and cooperation. In addition, decreased cooperation heightens the disposition towards contradictions, conflicts and subsequently, triggers disputes. The frequency of claims also weakens the mutuality perception distance of how contractual parties conceive/receive the intentions and interpretations of one another in the contract (TTI score, 73 percent > 65 percent). Although the effect of claims on the level of interaction between parties is significant, it is, however the least affected relationship ties amongst the seven variables evaluated in the study. This result further shows that the intentions of parties in the contract would not vary except modified by the escalating frequency of claims and their transaction costs, because, the terms of traditional contracts are documented and rigid. The frequencies of contractors' claims and transaction costs induce conflicts that reduce (1) loyalty (longevity), (2) dependence (shared technical problem solving), (3) interaction (interpersonal relationship distance), (4) relationship atmosphere (zero contradictions and conflicts) and (5) mutual orientation (reduces interdependencies), (6) exchange (satisfaction with the product and societal time) and (7) adaptations (investment towards relationship building).

The strong tie between claims and longevity implies a failure to recognise that the transactional disputes arising from the settlement of claims are vitiating long-term relationships. Longevity within project management organisations drive long-term relationship; the result is, therefore not a surprise. Traditional project management structures in Canada adopted longevity to enrich internal coordination structure among construction project stakeholders (Blois et al., 2010). Projects with high claims frequency, therefore, develop less interaction, exchange, longevity, relationship atmosphere, mutual orientation, and dependence. The frequency of claims reduces dependence, interactions, relationship atmosphere, mutual orientation, and exchange between the client and main contractors. This understanding has implied consequences that are, limiting the willingness to engage in the future. Focal literature review on the effects of claims on client-contractors' relationship supports the result that claims diminish the level of satisfaction of parties with exchange mechanisms (the construction project and sociality tie) (Chaphalkar and Iyer, 2014; Lee et al., 2014). Lee et al. (2014) affirmed that claims-related disputes denigrate the relationship ties for continuous business performance by reducing the client's level of satisfaction in completed projects – the exchange. The result of the study is suitable to provide empirical grounding for the compromise strategy, whereby contractors waved their contractual rights to sustain relationships in Malaysia (Bakhary et al., 2016). However, this study embeds theoretical implications of waving of contractual rights constitute adaptation mechanism

instituted to reduce the transaction costs of claims that could influence the relationship ties.

The measurement of construction project performance based on clients' satisfaction with the exchange characteristics during project execution is not new (e.g. Rahman and Alzubi, 2015). The use of contractors' attributes in this perspective, therefore, provides a beneficial standpoint to the study of relationships between project organisations. Rahman and Alzubi (2015) showed that information exchange (communication) is the second most important performance criterion that contractors in Jordan must improve to enhance client satisfaction. Communication (exchange) and commitment (adaptation) were likewise among the top five factors affecting client-contractors relationships in Ghana (Atuahene et al., 2017). A plethora of clients uses prior relationship performance criteria in the selection of sub-contractors in Nigeria (Fagbenle et al., 2011). The results call for an increase in the current level of adaptations to the contractual relationships to improve relationship ties in order to lower claims culture using mutually oriented claims management practices.

CONCLUSION

Construction contracts interfaced with several parties, clients, contractors, suppliers, and sub-contractors. Nurturing the contractual relationship during the project lifecycle for continuity in the future is contingent on the exchange characteristics. Claims are products of the exchange interface known to trigger relational problems if not properly managed. Contractual parties, therefore, increasingly apply prior relationships to decide current and futures contracts in order to reduce exchange problems. Limited empirical evidence exists to show that past exchange attributes influence future contractual engagement between parties.

This paper reports the findings of the study that investigated the influence of claims culture on client-contractors' willingness to engage in the future. The study showed that projects with high claims developed less interaction, exchange, longevity, relationship atmosphere, mutual orientation, and dependence towards future relationships. The frequencies of claims, therefore, weaken client-contractors relationship ties and their willingness to engage in future projects. The results suggest that lowering claims during projects would likewise limit adversarial behaviours, frequency of claims, and transaction costs to benefit future contractual exchange. Theoretically, the study revealed the source of tension arising from claims, is importantly their transaction costs. The high prevalence of construction claims as revealed by the study showed an imminent gap in ex-ante contract practices of the stakeholders. The traditional procurement despite the ample time available for documentations, the frequencies of claims in the study revealed incomplete contracts are prevalent (bounded rationality). Effective contract management through proper documentation of the contract would reduce opportunistic behaviours towards claims for a flowing future business relationship. Construction stakeholders likewise have to increase their adaptations to the contractual relationships

within the traditional contracts to improve exchange, interaction, mutual orientation, relationship atmosphere towards lowering claim culture.

The results of the study concede to possible variations along with regional contexts in future studies. Even though the spread in the uses of traditional procurement is universal, the perceptions and prevalence of claims may respond to regional contexts, thereby instigating contextual variations. The conclusion of the study could be strengthened further using large-scale data and research approach different from the quantitative settings adopted in this study. Future studies should consider expanding the scope of the study to other regions and triangulating with interpretivist approach. The developing research frontiers would pave way for the development of a framework for embedding relational contracting in the region. Relational contracting is the precursor of claims reduction and other transactional costs tendencies arising from incomplete contracts and opportunisms.

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FIRE SAFETY DESIGN ATTRIBUTES OF STUDENTS' HOUSING FACILITIES IN KNUST GHANA

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The purpose of the study was to develop fire safety design attributes for students' housing facilities and also assess the adequacy of design and construction factors that affect fire safety in student housing facilities at the Kwame Nkrumah University of Science and Technology. One noticeable trend in previous works of authors was the prioritisation of the management aspect of fire safety to the detriment of the design and construction aspects. A critical literature search was carried out and 24 fire safety design attributes with requisite standards were identified and validated using carefully selected hostel design and fire prevention management experts. The 24 attributes with the requisite standards which served as a fire safety design framework were used to obtain quantitative data by auditing purposively selected 42 students' housing facilities using various instruments including a BOSCH DLR130 Distance Measurer and a HOBO H8 data logger. The data were analysed using descriptive statistics, content analysis and chi-square test. The study identified 24 fire safety design attributes as critical to students housing designs. Further, the audit revealed that the means of escape, fire safety construction, and fire-fighting and rescue attributes were inadequate in 57%, 69%, 38% facilities, respectively. The rationale behind some of the design decisions was generally conventional design practice contrary to standard requirements. A chi square test also recorded asymptomatic significant values of 0.692, 0.446 and 0.494 for width of stairs, number of stairs and number of exits, respectively, in the facilities; indicating that in contravention to the standards, these attributes were independent of the building capacities. This study provides empirical fire safety design attributes for design practitioners, hostel administrators and fire safety authorities. Architects, hostel developers, and regulatory authorities would find the results very useful.

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Keywords: design and construction, fire safety, fire-fighting, Ghana, means of escape, student housing

INTRODUCTION

Fire as opined by Stollard and Abrahams (2002) is a good servant but a bad master. This is in view of its usefulness to society in diverse ways but can also cause devastating damage when out of control including loss of lives, injuries and destruction to property. Wildfire has been identified as one of the major disasters in the world. Out of a list of man-made disasters including aviation, maritime and rail in 2017, fire disaster was ranked the highest by the Swiss Reinsurance Company Limited (2017). This translated to a global fire outbreak of approximately 3,115,061 with some estimated deaths of 16 808 with the United States recording the highest cases of 1,349,500 with estimated 3,400 deaths, Italy with 325, 941 incidents with some estimated 288 deaths and France with 306, 600 incidents and estimated 277 deaths in that order (Brushlinsky et al., 2019). According to a Ghana Business News report (2019), The Ghana National Fire Service recorded about 5,531 fire outbreaks in 2018. This was a significant increase in the 2017 outbreaks of 4,544 cases. Again 44 lives were lost in the 2018 from fire disasters 11 more than the 2017 figure of 33 lives. The cost of damage to property in 2018 was estimated at GH¢28,870,000 (\$5,368,755.25)¹ which was however lower than the 2017 damage cost of GH¢36,280,000 (\$6,745,527.55). Similar trends occurred in previous years as captured in Table 1.

Table 1. Statistics of fire outbreaks in Ghana

FIRE OUTBREAKS	2009	2010	2011	2012	2013
Domestic	1,241	1,066	379	1,663	285
Industrial	91	83	48	133	32
Commercial/Market	283	268	133	345	65
Vehicular	-	-	-	-	12
Bushfires	355	299	73	503	84
Total	1970	1716	633	2644	478
Crop Acreages	-	-	-	-	3,339
Injured	56	57	73	106	29
Death	56	20	12	54	15
Cost of damage(GH¢	6,988,292.52	359,982,095.75	1,613,814.08	9,596,905	15,164,792

(Source: NADMO, 2013)

The National Disaster Management Organisation (NADMO, 2013) of Ghana categorised fire outbreaks under 4 main headings namely Domestic, Commercial/Market fires, Industrial and Bush/Wild/Ecological. Domestic fires are predominantly fire outbreaks in residential facilities including student accommodation which is the subject of this study.

¹ Exchange rate of \$ 1 to GH¢ 5.37838

The main purpose of student accommodation is to provide shelter and supporting facilities for students' comfort in addition to safety from fire related hazards (Hassanain, 2008). Students' housing remains a high fire risk facility and a threat can expose students to physical danger and trauma. The high fire risk nature of students' housing according to Hassanain (2008), can be attributed to large concentration of combustible materials in rooms, several number of floors with limited means of escape, large student population and common student careless behaviour such as misuse of products, smoking, etc. Fire in student housing will occur when there is a combination of three main elements, namely; heat, combustible materials such as papers, bookcases, trash, mattresses etc., and at least 16% oxygen.

The global fire statistics in student housing facilities are quite alarming and a course for concern. For examples, between the periods of 2011-2015, the USA recorded an annual average of 4100 in student housing facilities resulting in annual averages of 35 injuries and \$14,000,000 property damage (Campbell, 2017). In sub-Saharan Africa and specifically in Ghana, student housing over the years has experienced a number of fire incidents. Among them was a fire incident in a two storey dormitory block at the Bolgatanga Polytechnic, which led to a closure of the school for 2 weeks in 2009 (Ghana News Agency, 2009). According to a report from the Kwame Nkrumah University of Science and Technology (KNUST) Fire Station (2014), 71 fire cases were recorded in the University between the periods of 2013 and 2014. Fifty-four (54) of these occurred in the halls of residence on campus with Unity Hall experiencing nine cases, three in Independence Hall, 18 in Africa Hall, 16 in Queens, two in Republic, one case in Stephen Paris hostel and three in University Hall. Most of these fire incidences were attributed to technical faults and carelessness. Other recorded cases in privately-owned student hostels from neighbouring communities include the Sir Max Hostel in March 2013 which resulted in an estimated damage cost of GH¢ 25,000 (\$4,648.24) and the Crystal Rose Hostel in 2014 (KNUST Fire Station Report, 2014). There was also a fire incident at the Presidential Square Hostel in 2014 resulting in the loss of property worth GH¢ 8000 (\$1,487.44) (KNUST Fire Station, 2014). Thompson (2001) opines that a lot more fire incidents in student housing facilities may occur but not likely to be reported due to its minor nature. These minor fires can however develop into full scale fire outbreaks.

It is generally accepted that design and construction measures targeting fire outbreaks can minimise incidents to acceptable levels. The British Standards Institution Group (BS 9991) (2011) affirms that, the entire building design should be able to enhance fire safety in buildings. In view of this, many experts both locally and internationally have proposed a number of design and construction measures to minimize incidents. Several authors have also recommended design elements such as adequate escape routes in buildings, access for firefighting, fire hydrant placements and escape stairs to minimize the effects of fire outbreaks in buildings (Stollard et al. 2002; Baiche and Walliman, 2002; Littlefield, 2008; Ayarkwa et al. 2010; Agyekum et al. 2016). Stollard et al. (2002) argue that, these elements should be combined with basic

design principles such as aesthetics, functionality, technology and economics to achieve a good design.

Research into different aspects of fire safety has been conducted by numerous authors both locally and internationally. One noticeable trend in the works of these authors however is the prioritisation of the management aspect of fire safety to the detriment of the design and construction aspects. Even though authors such as Subramaniam (2004), Hassanian (2008), Ayarkwa et al. (2010) and Agyekum et al. (2016) examined fire safety design and construction tacitly, their main focus were on the management aspects. Subramaniam (2004) used two design elements such as staircases and exit signs in addition to installations such as portable fire extinguishers, hose reel systems and fire alarm systems to audit the compliance level of fire safety conditions in a local Malaysian University. The overall aim was however targeted at the management aspect of fire safety without much emphasis on the design and construction aspect. In Ghana, research in fire safety has also largely concentrated on the management aspect. Unlike their international counterparts, where building auditing using some design elements is done to achieve certain outcomes, most local authors have largely relied on questionnaire surveys. Agyekum et al. (2016) for instance used a total of 220 questionnaires with 177 completed to assess the perceptions of students on challenges to fire safety management in multi-storey students' hostels around KNUST. Botchway and Boatemaa-Oti (2012) to an extent used design elements to audit safety in multi-storey annexes at KNUST but this was limited to the egress system in these structures.

For the benefit of architects and allied building industry professionals in the field of fire safety design and construction, there is a need to bridge the research gap in this area as a first step to the overall fire safety management. To date, the most readily available resource materials in the design and construction aspect of fire safety are the various building regulations and fire safety codes. In Ghana for instance, design and construction fire safety measures are mandatory under The Ghana National Building Regulations, 1996, (LI1630)¹ and the Fire Precaution (Premises) Regulations, 2003, LI 1724. From the foregoing, this study therefore aims at developing fire safety design attributes for students' housing and also assess the adequacy of design and construction factors that affect fire safety in student housing facilities through building audit of selected halls of residence and hostels at KNUST, Ghana.

LITERATURE REVIEW

2.1 Design factors affecting fire safety in student' housing

There is a possibility of fire outbreaks in every building and the threat though impossible to be eliminated entirely can be minimised. Stollard (2014) argues

¹ Fire safety measures in LI 1630: Fire resistance (59); Separating walls (60, 61, 62); Stairways (63); Limiting the spread of flames over surfaces of walls and ceiling (64); Roofs (65); Means of Escape (67); Exits (68); Dimensions of means of escape (69) Obstructions and hazards in means of escape (70, 71, 72, 73, 74); Exit signs (75); Certificate of safety (76); and Access accommodation (77, 78, 79, 80, 81, 82, 83)

that at the conceptual stage of a project, fire safety design measures should be incorporated together with key design principles such as functionality, aesthetics, technology and cost of construction. Design and construction factors that affect fire safety in students' housing facilities as outlined by several authors include the width of access road to premises, width of entrance to premises, space for movement of fire engines, width of exit from room, corridor sizes, headroom of exit route, distance of travel, lighting at exit corridors, exit and directional signs, width of stairs, number of stairs, lighting within staircase, riser to tread ratio, access to staircase, handrails, final exits, fire assembly point, fire separation walls, and sub division of concealed spaces (Baiche and Walliman, 2002; Littlefield, 2008; Afful, 2010; Billington et al, 2002; Grondzik et al, 2010; Cheung, 2008). These factors or attributes have been categorised and further elaborated under access for firefighting and means of escape, and construction factors that affect fire safety in student housing.

Regarding access for firefighting and means of escape, Baiche and Walliman (2002) have argued that, for effective firefighting by fire fighters, accessibility options in addition to firefighting facilities should be provided in buildings. In view of this, Littlefield (2008) suggests that facilities such as firefighting shafts and dedicated lifts for firefighting when installed in buildings will enable easy transportation of equipment and fire fighters which will in turn reduce longer firefighting periods. Baiche and Walliman (2002) further posit that these facilities are necessary in high rise buildings unlike low buildings which can use the normal escape routes. According to Afful (2010), when designing a building, there should be adequate free space around the building at the conceptual stage to cater for movement of fire appliances without obstruction such as pitching ladders, fire engines position of fire tenders in relation to the use of inlet breeching. Again, Afful (2010) suggests that adequate attention should be given to fire hydrants in terms of location, water flow situation and alternative source of water. To this end, Baiche and Walliman (2002) recommend an access road width of not less than 3.7m; a building main gate of at least 3.1m wide and minimum headroom of 4m. Furthermore, turning circles of 17m is required and if there are curbs at opposite sides, it could be increased to 26m. Again, fire hydrants should also be available in the immediate vicinity.

Means of escape can be defined as a passage way in a building provided for the building occupants to travel to a place of safety (Littlefield, 2008). Its attributes include travel distances, horizontal escape routes (exits from rooms, exit routes from storey, final exits), vertical escape routes (stairs, lighting within exit corridors and staircase, riser to tread ratio, handrails), fire escape plan, fire exit and directional signs, and fire assembly points (Billington et al, 2002; Littlefield, 2008 and Stollard, 2014). These attributes according to Stollard (2014) are best positioned in circulation areas of a building when designing. The number of occupants in a building is key in determining the design of means of escape attributes. Several authors including Stollard and Abrahams (2002), Baiche and Walliman (2002) and Kister (2012) further affirm that the building capacity is the main determinant of escape elements such as staircase

width, required number of staircase and required number of exits. These, according to these authors should be incorporated in the design process.

According to the BS 9999 (2008), travel distance is the movement from the furthest point in the building to the nearest exit. There are four main stages of travel distance namely: escape from area of origin; escape from the area of origin through the circulation route to a final exit; escape from the floor of origin to the ground floor and; final escape at ground level. The BS 9999(2008) recommends a maximum travel distance of 14m for student housing facilities. Furthermore, horizontal escape routes include exits from rooms through doors, corridors, balconies, final exits and alternative final exits from the building. The BS 9991 (2011) stipulates that there should be easy access elements such as doors from all habitable rooms to the main entrance or to the alternative exit. In this regard, the right sizes of doors that open into corridors are paramount for easy access and escape. The LI 1630 (1996) recommends door heights of 2013mm and width of not less than 813mm or not more than 1200mm.

Vertical escape routes are mostly staircases with accompanying accessories such as risers, treads and handrails. The LI 1630 (1996) stipulates that, at least two staircases should be provided in a storey building positioned not more than 30m apart with a minimum stair width of 1200mm. The width and number of staircases could however increase depending on the building population and number of floors. Adequate stair widths are necessary for ease of movement of building occupants in an event of fire outbreak (Baiche and Walliman, 2002). Kister (2012) gives more elaborate stair widths of 1000mm, 1100mm and 1100-1800mm based on building occupancies of 150, 220 and 220+ respectively.

The LI 1630 (1996) stipulates a minimum width of 1050mm and minimum height of 2130mm for exit corridors. The width could however increase depending on the building population. Cheung (2008) further posits that exit corridors should be provided with adequate artificial and natural lighting for easy movement to exit staircase. In view of this, Grondzik et al (2010) recommend a lighting level of not less than 100 lux in exit corridors. The balcony approach due to its open nature provides more natural lighting as compared to the corridor approach (Asigri, 2016).

The British Standard Institution Group (2011) states that final exits should be clearly visible from the stairs and should discharge directly to a street, passageway, walkway and open space. Cheung (2008) also asserts that doors at the final exits on the ground level should be suitably recessed from the drop level to prevent escaping people from falling. Apart from the final exit from the building, there is the need for alternative exits as well to permit quick evacuation during emergencies. The British Standard code BS 9991 (2011) also stipulates that the alternative exits should be sited away from the main entrance door to the building so that it can be used as an escape or alternate route. In terms of acceptable number of exits, Baiche and Walliman (2002) recommend 2, 3, 4 and 5 exits for 500, 1000, 2000 and 4000 occupants, respectively.

Fire escape plans are required in all buildings including students' housing. The fire escape plan shows the layout of the building with clearly marked exits, circulation areas, staircases, hose reels, firemen's lifts, extinguishers locations and other escape routes. Since it is for the public and building occupants, it should be highlighted with legible lettering and placed at common easily visible areas (Fire Code Handbook, 2013). The Ghana National Building Regulations (LI 1630) (1996) state that, buildings with more than 150 occupants should have appropriately labelled exit and directional signs on each exit except the main entrance door. The regulations further stipulate that, the signs should be located at the circulation spaces and escape routes on each floor. The importance of a fire assembly point is to provide a place where headcount is done after a fire outbreak and also serve as a temporary station to provide first aid (Kironji, 2015). For an ideal fire assembly point, Evacuation Planning Guidelines (2018) recommend a space large enough to accommodate the full occupant load, about 20m from the building, away from vehicular routes and clearly marked.

Construction factors affecting fire safety in students' housing

Thompson (2001) and Hassanain (2008), the construction-related factors that affect fire safety in students' housing according include unprotected openings, hidden spaces and fire separation walls. Unprotected openings such as ducts, stairwells and lift shafts can easily allow the spread of fire from one room to the other (British Standard Institution Group, 2008) and thus Thompson (2001) explains it is often the case that holes will be created on floors during construction for various services including pipes, plumbing and conduiting. These holes, however, when not properly sealed will serve as an easy passageway for the spread of fire. To avoid this situation, Thompson (2001) recommends the use of fire resistance sealants to cover these holes and fill the gaps between pipes and the edges of floors. Hidden spaces in buildings such as attics and stud spaces can facilitate the spread of smoke and flames from one place to another (British Standard Institution Group BS 9991, 2011 and Havel, 2011). To limit this possibility, the BS 9991 (2011) recommends the use of cavity barriers to subdivide these spaces. Hassanain (2008) further affirms that creating compartments can limit a fire to the place of origin. Compartments are spaces separated by walls and floors. The separating walls should be constructed to the roof level to prevent spreading of fire in the ceiling spaces from one room to another (Ghana National Building Regulations, 1996).

Fire safety audit

Fire safety audit is an important tool to determine the fire safety level of buildings (Siddiqui et al., 2014). The most effective form is by physical inspections of premises using a checklist of fire safety parameters with its requisite compliance standards. These parameters are largely the design and construction elements previously discussed in this paper. In a study entitled "Human factors influencing fire safety measures", Subramaniam (2004) used five main elements to identify the level of fire safety in five out of ten residential colleges in a Malaysian University. These elements included fire extinguishers, hose reel system, fire alarm system, exit signs and staircase. Based on the Malaysian Uniform Building Bye-Laws, which were passed into law in 1984,

the research indicated an overall compliance level of 76%. Even though Subramaniam expanded the research and further related the building audit to human factors affecting fire safety measures, conducting an audit based on only five elements seems inadequate to get a true picture of the fire safety level. This is also in view of the fact that important elements such as travel distances, exit corridors, number of exits and others issues were not included in the auditing. Even though Al-Homoud and Khan (2004) used more elaborate fire safety parameters, the study relied on questionnaire survey of tenants and house owners and also did not measure the adequacy of the parameters with requisite standards hence making the findings a bit subjective. As Siddiqui et al (2014) stated that, auditing the fire safety in a building is more effective through physical inspections using a checklist of parameters with requisite standards. Based on this, physical inspections using a checklist of parameters was adopted in this research.

RESEARCH METHODS

The study employed desk study and a case study to address the research objectives. A critical review was conducted to identify fire safety design attributes. Forty-two (42) fire safety design attributes identified were listed and presented to eight (8) purposively selected fire safety and design experts for validation. The inclusion criteria for these experts included stakeholders in the student accommodation industry, design and fire experts occupying management positions such as the Ashanti Regional Fire Safety Officer, Director of Works and Physical Development at Kumasi Technical University, KNUST Hostel Manager, KNUST Fire Station Officer, Hall Master of Queen Elizabeth II hall, Secretary of the KNUST Hostel Owners Association, Senior Architect at the KNUST Development office, and Vice President of the Ghana Institute of Architects. These experts subsequently validated and pruned down the 42 fire safety design attributes identified from literature to 24 as applicable assessment variables for fire safety in student housing.

The validated 24 attributes were used to design an assessment sheet for conducting a building audit of sampled student housing facilities. This approach became necessary due to the need for a detailed assessment of the selected students' accommodation within the KNUST environs. The selection of the hostels was based on the willingness of the managers to allow access to the facility. For ease of reference, the attributes were categorised under Means of Escape (MOE), Access for Fire-fighting and Rescue (AFR), and Fire Safety Construction (FSC). The building audit was done through physical inspections of the buildings using a BOSCH DLR130 Distance Measurer to get measurements of floor areas, exits, corridors, travel distances, stair widths etc. A HOBO H8 data logger was also used to measure the light intensity of escape routes such as corridors and stairwells. Structured interviews with architects who designed and/or were involved in the construction of these hostels were carried out to elicit the factors that determined the required fire safety designs in the buildings. Due to the unavailability of some of the architects and unwillingness of others to participate, only 7 architects were interviewed for the study.

A total of 42 students' housing facilities were sampled using the purposive sampling method from a sample frame of 73 recognised halls and hostels in KNUST and its environs. The inclusion of the hostels as stated earlier was based on the willingness of the hostel managers to allow access to the facility. These were made up of 4 out of 6 University/Public owned halls of residence and 38 out of 67 private-owned hostels.

Table 2. Fire Safety attributes and their standard requirements

MOE	MEANS OF ESCAPE (MOE)	STANDARD REQUIREMENT
MOE 1	Width of exit from room	Not less than 813mm (LI 1630, 1996)
MOE 2	Width of exit route from storey	Based on occupancy. 4-500 = 1050mm, 501-1000 = 1200mm; 1001-1500 = 1350mm (Code of Practice for Fire Safety in buildings, 2011)
MOE 3	Headroom of exit route	Not less than 2130mm (LI 1630, 1996)
MOE 4	Distance of Travel	Not less than 14000mm (BS 9999, 2008)
MOE 5	Lighting at exit corridor	Not less than 100 lux (Grondzik et al, 2010)
MOE 6	Exit and directional signs	Positioned in escape routes on each floor (LI 1630, 1996)
MOE 7	Width of stairs	Based on occupancy. 150 = 1000mm, 220 = 1100, 220+ = 1800mm (Baiche and Walliman, 2002).
MOE 8	Number of stairs	Based on occupancy. 4-500 = 2, 501-1000 = 3, 1001-2000 = 4 (Baiche and Walliman, 2002)
MOE 9	Lighting within staircase	100 lux (Grondzik et al, 2010)
MOE 10	Riser to tread ratio	150-175mm for riser and 225-300mm for tread (Cheung, 2008)
MOE 11	Access to staircase	Staircase should be approached from different directions and at least 50% of its perimeter should be opened to external air (BS 5588, 1998)
MOE 12	Height of handrail	Not less than 900mm for flights and 1100 for landing (BS 5395, 2010)
MOE 13	Space between rails	Maximum space of 200mm (BS 5395, 2010)
MOE 14	Final exits	Visible from stairs and discharge to an open space (BS 5395, 2010)
MOE 15	Number of final exits	Based on occupancy. 4-500 = 2, 501-1000 = 3, 1001-2000 = 4 (Baiche and Walliman, 2002)
MOE 16	Fire escape plan	Large enough to accommodate full building load, 20m from building, away from vehicular routes and clearly marked (Evacuation Planning Guidelines, 2018).
AFR	ACCESS FOR FIRE-FIGHTING AND RESCUE (AFR)	STANDARD REQUIREMENT
AFR 1	Width of access road to building	Should not be less than 3.7m (Baiche and Walliman, 2002).
AFR 2	Width of entrance to premises	Should not be less than 3.1m (Baiche and Walliman, 2002).
AFR 3	Space for movement of fire engine and pitching ladders	Adequate space around the building with a turning circle of 26m diameter (Baiche and Walliman, 2002).
AFR 4	Availability of fire hydrants	Should be available in the immediate vicinity (Baiche and Walliman, 2002).
FSC	FIRE SAFETY CONSTRUCTION (FSC)	STANDARD REQUIREMENT
FSC 1	Fire Stopping to Openings for Pipes, Ducts, Shafts	Fire resistance sealants (Thompson, 2001)
FSC 2	Subdivision of concealed spaces with cavity barrier	Cavity barriers to subdivide concealed spaces (BS 9991, 2011)
FSC 3	Fire separation walls	From floor to roof height (Hassanian, 2008)

Due to the nature of measurement of lighting at exit corridor and lighting within staircases which required empirically measuring the illuminance level for longer periods, 8 out of the facilities were successfully assessed. The data gathered from the survey was measured based on the compliance of the fire safety attributes to existing building codes, fire safety standards and

recommendations by several authors outlined in the literature review. With respect to a particular attribute, non-compliance with the requisite fire safety standard was measured as ‘inadequate/No’ and compliance was measured as ‘adequate/Yes’. The data were analysed using descriptive statistics with the aid of Statistical Package for Social Sciences (SPSS) version 16.0. Furthermore, the structured interview with the architects who were involved in the design and construction of some of the hostels was analysed using a summative content analyses of their responses. As discussed in the literature, several authors argue that the adequacy of means of escape elements should depend on the capacity of the building. In view of this, further analyses were done using the Chi-square test on selected means of escape attributes to determine dependency on the building capacity. Table 2 shows the 24 fire safety attributes and the corresponding standards and requirements used for the assessment.

FINDINGS AND DISCUSSION

Characteristics of students housing facilities surveyed

The characteristics of the facilities surveyed are presented in the appendix. The occupancy year of the facilities surveyed ranges between 1959 and 2010 and the capacity ranges from 36 to 1900 students. Again, in terms of ownership, the housing facilities were categorised under public or private. Four (4) out of the 42 facilities were public whiles the remaining 38 were private. Typically, the public owned facilities were constructed and occupied between 1959 and 1968 whiles the public owned were occupied between 1998 and 2010.

Means of Escape (MOE)

Table 3 presents the audit of the 42 student housing facilities using 15 Means of Escape attributes. The result of the 2 other attributes which were assessed on 8 out of the 42 facilities are presented later in the discussion.

Table 3. Adequacy of Means of Escape

Means of Escape (MOE)	Adequate (Yes)	Inadequate (No)	Percentage of Inadequate
MOE 1	6	36	86.0
MOE 2	39	3	2.0
MOE 3	42	0	0.0
MOE 4	10	32	76.0
MOE 6	15	27	64.0
MOE 7	16	26	62.0
MOE 8	20	22	52.0
MOE 10	19	23	55.0
MOE 11	24	18	43.0
MOE 12	12	30	71.0
MOE 13	18	24	57.0
MOE 14	21	21	50.0
MOE 15	19	23	55.0
MOE 16	3	39	93.0
MOE 17	4	38	90.0
AVERAGE	18 (43%)	24 (57%)	

Eleven out of the 15 fire safety attributes under the means of escape (MOE) category as shown on table 6 were inadequate in 24 out of 42 housing facilities representing 57%. These include: width of exit from room (MOE 1), distance of travel (MOE 4), exit and directional signs (MOE 6), width of stairs (MOE 7), number of stairs (MOE 8), riser to tread ratio (MOE 10), height of handrail (MOE 12), space between rails (MOE 13), number of final exits (MOE 15), fire escape plan (MOE 16) and fire assembly point (MOE 17). The attributes that recorded more than 70% inadequacy in this category were MOE 16, MOE 17, MOE 1, MOE 4 and MOE 12. With this high record of inadequacies, the implication is that, the speed, flow of exit and general evacuation time in case of a fire outbreak will reduce with consequences for fatalities. Purser et al. (2007) affirm that, means of escape elements have a large influence on evacuation time and hence a delay caused by inadequacy will lead to fatalities. Only 3 (7.5%) residential facilities out of the 42 had fire escape plans (MOE 16) of the buildings layout showing escape corridors, exit staircases and escape routes as recommended by the Fire Code Handbook (2013). The three residential facilities were all University/Public owned halls of residence which were constructed some 50 years ago. For MOE 17, only 4 (9.5%) out of the 42 residential facilities had clearly marked fire assembly points away from vehicular access and large enough to accommodate the building occupants as recommended by Nadzim and Taib (2014). The 4 were all privately-owned facilities namely Hostel 7, Hostel 12, Hostel 23 and Hostel 26. Furthermore, only 6 (14.1%) out of the 42 residential facilities had the required door widths (MOE 1) of not less than 813mm as mandated by the LI 1630 (1996). Amongst them, the exit width of rooms in 3 University/Public owned halls recorded the lowest width of 720mm.

Out of the eight halls/hostels measured for lighting at exit corridor (MOE 5), only Hall 3 had adequate lighting at its exit corridors with a standard maintained illuminance of 1621 lux which is far more than the required 100 lux proposed by Grondzik et al (2010). Hall 3 recorded this high figure due to its balcony approach character and hence the outdoor illuminance was captured by the HOBO H8 data logger as well. By inference, student housing facilities of similar characteristics are likely to record high illuminance level in exit corridors as well. Table 4 presents the results of the illuminance of the surveyed 8 housing facilities.

Table 4. Adequacy of lighting at exit corridor. Limits of Adequacy = 100 lux

Item	Name of Hall/Hostel	Average Illuminance (Lux) in exit corridor	Adequacy
1	Hall 1	75	Inadequate
2	Hall 3	1621	Adequate
3	Hostel 8	11.8	Inadequate
4	Hostel 7	19.7	Inadequate
5	Hostel 6	55.7	Inadequate
6	Hostel 5	31.53	Inadequate
7	Hostel 28	45.9	Inadequate
8	Hostel 36	4.3	Inadequate

Access for fire-fighting and rescue (AFR)

The adequacy or inadequacy of access for fire-fighting and rescue in the surveyed housing facilities was evenly distributed. Out of the 4 attributes, 2 were inadequate in 16 (38%) of the surveyed housing facilities whilst the other 2 were adequate in 26 (62%) of the facilities representing the majority. Space for movement of fire engines and pitching ladders (AFR 3) and availability of fire hydrants (AFR 4) were inadequate. For Space for movement of fire engines and pitching ladders (AFR 3), only 16 (38%) out of the 42 housing facilities had adequate free space around the building with a turning circle of 26m diameter as recommended by Baiche and Walliman (2002). Again, only 8 (19%) student housing facilities had identifiable fire hydrants (AFR 4) in and around their vicinities. These included the 4 public owned halls of residence and 4 private hostels on KNUST campus. The KNUST Fire Station affirmed that the availability of fire hydrants was a contributory factor to a swift handling of a major fire incident at Hall 1 in 2015.

The adequate attributes were Width of access road to building (AFR 1) and Width of entrance to premises (AFR 2). Using the recommended 3.7m access road width proposed by Baiche and Walliman (2002) all the halls and hostels recorded higher access road widths.

Fire Safety Construction (FSC)

All three fire safety attributes under the fire safety construction (FSC) were inadequate in an average of 69% of the halls and hostels. 27 (64.3%) of the surveyed facilities had inadequate or non-existing fire stopping to openings (FSC 1) on floors as recommended by Thompson (2001). Furthermore, 32 (76.2%) had concealed spaces not subdivided (FSC 2) as required to stop the spread of fire. Most of the concealed spaces in these hostels were within suspended ceilings which were examined through openings in the ceilings. Concerning FSC 3, only 13 (31%) out of the 42 student housing facilities had fire separation walls up to roof height to confine the spread of smoke and fire in the originating compartment. As stated in the literature, fire separation walls confine fire to the area of origin hence with 69% of the facilities lacking this, there will be easy spread of fire from room to room in case of an outbreak.

Interview results

Subsequent to the physical audit of the facilities, it became necessary to establish the rationale behind some of the design decisions in the fire safety elements. As reported in the research methods, seven (7) architects were interviewed. The choice was based on availability and willingness of the architects to be enrolled in the research. The designers generally indicated that conventional design practice was the main factor in most of the decisions. For example, a respondent indicated “conventional design practice, ease of movement, emergency and furniture were the main factors considered in the door sizes”. It may however appear that, the factors stated by the respondents did not translate to the minimum requirement of 813mm stipulated by the National Building Regulations (LI 1630, 1996) since the building audit revealed that only 6 facilities met this requirement and thus inadequacy of 86%.

Regarding the sizes of corridors in the facilities, a respondent indicated, “I chose sizes big enough for easy evacuation. The hostel was financed by an American company who suggested the 2200mm based on fire rating information”. Another designer observed, “Circulation for people, emergency, conventional design practice, Neufert’s recommendation for 2 or 3 people to use the corridor at a time”. Two respondents suggested the anticipated occupancy with one stating that “I considered the number of people supposed to use the facility”. This to an extent was in line with the standard requirement for Width of exit route from storey (MOE 2) stipulated by the Code of Practice for Fire Safety in buildings (2011). As discussed earlier in the results for Means of Escape, 39 out of the 42 facilities met the minimum requirement.

Again, the designers cited easy accessibility and ease of evacuation as main factors that determined the travel distances with one stating that, “Easily accessible to every room and conventional design practice. If a room was too far from the stairs, we had to locate another staircase closer to achieve a travel distance of 20m”. It was however deduced that they were not aware of the minimum standard requirement of 14m stipulated in the BS 9999 (2008) since the travel distances they mentioned as easily accessible were more than the minimum requirement. This is buttressed by the survey results of the building audit where Distance of Travel (MOE 4) recorded inadequacy of 76%.

Concerning the width of staircase and number of staircases, most of the designers cited recommendations by Baiche and Walliman (2002) in the Neufert Architects Data. One respondent stated that “I used Neufert’s recommendation, number of occupants and industry experience”. The responses were generally in line with the standard requirement used to access the Width of stairs (MOE 7) and Number of stairs (MOE 8) based on the occupancy recommended by Baiche and Walliman (2002). However, the building audit gave a totally different picture with the two (2) attributes recording inadequacies of 62% and 52% respectively. A further probe to identify reasons why MOE 7 and MOE 8 seemed adequate at the design stage but inadequate after construction and occupancy had one respondent explaining that “the client insisted on additional rooms so we had to reduce the number of stairs proposed at the design stage to create additional rooms”.

Emergency, ease of evacuation and industry experience was cited as factors that determined the number of exits by the respondents. A respondent stated that “Emergency, easy accessibility from the back of the building where two exits are located”. Another respondent explained that “Traffic and evacuation time”. Again, the exact numbers from the foregoing stated factors was arrived at using “conventional design practice” as indicated by one designer without considering the building occupancy recommended by Baiche and Walliman (2002) which served as the standard requirement for assessing Number of final exits (MOE 15). As discussed earlier, MOE 15 recorded inadequacy of 55%.

Further to the foregoing discussion, some of the designers admitted that they did not make provision for fire assembly points in the design. The very few who did contravened design requirements with one respondent observing that “There were a number of courtyards in the design which served as assembly

points. They were closer to the rooms”. As reported in the methods, the assessment of Fire Assembly Point (MOE 17) was based on the recommendations by Nadzim and Taib (2014) which state that it should be large, far from buildings, away from vehicular routes and clearly marked. Again MOE 17 as discussed earlier recorded inadequacy of 90%.

The Relationship Between Capacity of the Building and Design Attributes

Several authors argue that the adequacy of means of escape attributes such as width of stairs (MOE 7), number of stairs (MOE 8) and number of final exits (MOE 15) should depend on the capacity of the building. In view of this, further analyses were done using the Chi-square test on these attributes. The results of the Chi square test are presented in Table 5.

Table 5. Chi-Square Tests

Pearson Chi-Square	Value	df	Asymp. Sig. (2-sided)
Width of Stairs (MOE 7)	1.459	3	0.692
Number of stairs (MOE 8)	2.668 ^a	3	0.446
Number of final exits (MOE 15)	2.398 ^a	3	0.494

Since the asymptomatic significance levels of the tested attributes are all greater than 0.05 (MOE 7 = .692, MOE 8 = .446, MOE 15 = .494), it implies that the interdependency between the building capacities and these attributes are not statistically significant. Based on the chi-square test results, it is logical to conclude that the width of stairs, number of stairs and number of final exits of the surveyed student housing facilities is independent of the building capacity. This, by extension indicates that though these attributes in some of the housing facilities were adequate, it might have occurred by chance alone and not due to the design requirement of capacity dependency recommended by numerous building regulations and authors including Baiche and Walliman (2002).

Further, the research considered the possibility of inadequacy of the attributes due to increase in population of the buildings from their initial capacities. This was quite the case for the University/Public owned halls of residence most of which were constructed over 50 years ago. Hall 4 for instance was occupied in 1961 with an initial capacity of 96 (Botchway and Boatemaa-Oti, 2012) and subsequently increased to 384 at the time of assessment. For a capacity of 96 the required MOE 7, MOE 8 and MOE 15 are 1000mm stair width, 2 stairs and 2 final exits respectively. However, the existing situation which has not changed since the building was constructed is 918mm stair width, 1 stair and 1 final exit indicating that at the time of design, the capacity of the building was not considered in designing these means of escape attributes.

CONCLUSION AND RECOMMENDATIONS

The study developed fire safety design attributes and assessed the adequacy of design and construction factors that affect fire safety in student housing facilities in Ghana. Twenty four (24) fire safety attributes were thus developed

through expert validation to guide fire safety audit of students' hostel facilities. The audit revealed that the design and construction factors that affect fire safety were inadequate in majority of the facilities. This was not surprising since the structured interview results revealed that conventional design practice not hinged on standard requirements was the main factor that determined most of the fire safety design factors in the housing facilities. This was also buttressed by the Chi square test which revealed that, in contravention to the standard requirements, important means of escape elements such as width of stairs, number of stairs and number of exits was independent of the building capacities.

Instead of relying on conventional design practice and industry experience for key design decisions which may not be in line with standard requirements, this study provides much needed empirical data on fire safety design and construction elements with the required minimum standards for designers. The developed 24 attributes with requisite standards can also serve as a self-evaluation worksheet for hostel owners to adequately assess the fire safety adequacy levels of their facilities. Further, the attributes developed could be adopted in other jurisdictions for international comparison. Such exercise would help to provide cross-border fire safety management across the globe, thereby contributing to theory and practice. This research is especially timely in the sense that, the 25th February 2019 Edition of the Business and Financial Times projected that, 400,000 free Senior High School (SHS) beneficiaries will seek higher education in 2020. This will surely increase population in student housing facilities and put undue pressure on the fire safety elements. These standards can be tested in other universities within Ghana as well as developing countries facing similar demographic surge of students in higher educational institutions.

The study was delimited to auditing students' housing facilities in the context of design and construction. Future studies on user responses would help in validating results obtained in the present study. Based on the findings, the study recommends a more robust fire safety design as a standalone subject in the curriculum of architectural schools in the country. Furthermore, Continuous Professional Development (CPD) programs on emerging fire safety design trends, fire resisting materials and new technologies that can enhance fire safety should be organised for practising architects by the necessary associations on regular basis.

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APPENDIX

Characteristics of surveyed halls and hostels

No.	Hall/hostel	Ownership	Location	No. Of floors	Total floor area(m ²)	Occupancy	Year occupied by students
1.	Hall 1	Public	KNUST Campus	9	13198	1900	1968
2.	Hall 2	Public	KNUST Campus	3	6286	792	1959
3.	Hall 3	Public	KNUST Campus	9	5162	768	1967
4.	Hall 4	Public	KNUST Campus	8	2294	384	1961
5.	Hostel 5	Private	KNUST Campus	3	1986	72	2007
6.	Hostel 6	Private	KNUST Campus	5	3315	160	2009
7.	Hostel 7	Private	KNUST Campus	6	8410	893	2005
8.	Hostel 8	Private	KNUST Campus	3	6840	490	2002
9.	Hostel 9	Private	Bomso	3	4657	350	2005
10.	Hostel 10	Private	Ayeduase newsite,	4	3310	122	2006
11.	Hostel 11	Private	Gaza	4	4506	100	2003
12.	Hostel 12	Private	Gaza	4	1490	40	2007
13.	Hostel 13	Private	Gaza	4	3270	104	2011
14.	Hostel 14	Private	Ayeduase	3	629	40	2005
15.	Hostel 15	Private	Ayeduase	3	1129	105	2005
16.	Hostel 16	Private	Ayeduase	4	776	80	1998
17.	Hostel 17	Private	Kotei,	3	624	36	2012
18.	Hostel 18	Private	Kotei	4	706	59	2010
19.	Hostel 19	Private	Ayeduase,	3	1859	144	2003
20.	Hostel 20	Private	Kotei,	2	1151	73	2010
21.	Hostel 21	Private	Ayeduase	4	2106	170	2005
22.	Hostel 22	Private	Kotei	4	1280	140	1999
23.	Hostel 23	Private	Ayeduase-Kotei, Brobbey junction	3	1833	100	2001
24.	Hostel 24	Private	Gaza	5	5655	197	2005
25.	Hostel 25	Private	Ayeduase gat	4	1673	50	2006
26.	Hostel 26	Private	Ayeduase Kotei road	4	3554	131	2003
27.	Hostel 27	Private	Ayeduase	3	1800	100	2002

28.	Hostel 28 Private	Ayeduase-Kotei road.	3	1614	49	2007
29.	Hostel 29 Private	Ayeduase	3	700	60	2012
30.	Hostel 30 Private	Kotei	2	790	42	2008
31.	Hostel 31 Private	Ayeduase	3	1053	70	2007
32.	Hostel 32 Private	Ayeduase	3	1487	150	2007
33.	Hostel 33 Private	Ayeduase-Kotei	3	1677	142	2011
34.	Hostel 34 Private	Ayeduase	3	528	110	2002
35.	Hostel 35 Private	Bomso	4	1798	80	2009
36.	Hostel 36 Private	Ayeduase	4	3534	247	2011
37.	Hostel 37 Private	Ayeduase,	3	2391	152	2007
38.	Hostel 38 Private	Ayeduase,	4	6209	528	2006
39.	Hostel 39 Private	Ayeduase,	4	3273	191	2008
40.	Hostel 40 Private	Bomso	4	1800	76	2009
41.	Hostel 41 Private	Ayeduase	3	1650	57	2002
42.	Hostel 42 Private	Ayeduase	4	1137	48	2003



SKILLS AND COMPETENCIES FOR SURVIVAL IN THE MODERN CONSTRUCTION INDUSTRY: STUDENTS' PERSPECTIVE IN NIGERIA

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The nature and dynamism of the construction industry has made it one of the most competitive industries. Changes due to technological advancement and the need for innovation has caused a paradigm shift in the nature of skills and competencies needed for survival in the industry. Studies noted a gradual drift of job opportunities in the industry from knowledge based to competency based with no reciprocating change in the training of students in the built environment Programmes. This creates a huge gap between the competencies possessed by graduates of the built environment Programmes and the requirements of the industry. This paper assessed the perception of final year students in the built environment Programmes on the importance of key skills and competencies needed to survive in the industry, as well as the extent to which they possess such skills and competencies. A quantitative research approach was adopted, with questionnaires distributed to elicit data from the respondents. The data was analyzed using both descriptive and inferential statistics. Self-confidence, qualitative reasoning, and self-awareness were found to be the most relevant competencies for survival in the construction industry. Whereas, self-confidence, time consciousness and collaboration skills were found to be the most acquired competencies amongst the students. The findings of the study give a comparative view on the relevant competencies in the construction industry and the acquired competencies by graduates of the built environment Programmes. The study provides an insight into the gap between the required and acquired competencies, and recommends that the built environment Programmes improve their efforts towards ensuring active participation of students in practical industry cases which will improve the student's capabilities and provide graduates with requisite skills for survival in the industry.

Keywords: skills, competencies, construction industry, Nigeria, students

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INTRODUCTION

The construction industry has been identified as one of the key sectors driving the economic growth of many countries globally. Tunji-Olayeni and Mosaku (2016) noted that the building and construction sector is one of the top five sectors used in measuring the National Gross Capital Formation (NGCF) and the Gross Domestic Product (GDP) of any country and its effect on every other sector, makes it a significant factor for sustainable development. However, the construction industry has undergone significant changes in recent years and faced increasing challenges as a result of its complex nature, global competitiveness, changing regulatory requirements, aging workforce, new technologies, and environmental awareness (Abudayyeh et al., 2000; Chinowsky and Diekmann, 2004; Ahn, Pearce and Kwon, 2012). The industry's specific problem of fragmentation is gradually becoming obsolete as merging or blurring of professional services boundaries has become imminent. As such, job opportunities in the industry are gradually shifting from knowledge based to skills and competency based (Igwe, Okolie and Nwokoro, 2019). Industrial globalization and the need to hold a competitive advantage are among the factors forcing employers in the construction industry to seek for more competent and skilled workforce. Ahn et al. (2012) noted that apart from strong technical foundation of construction skills graduates of built environment courses must also additionally acquire competencies such as leadership, collaboration, creativity, and problem-solving skills in order to succeed in today's complex and dynamic industry. Beyond good academic qualifications, employers also require a workforce that is equipped with relevant competences and personal talents (Ogundele and Kayode, 2013). It is therefore expedient that graduates acquire useful skills that will help them succeed in the construction industry.

Various studies have ascertained the relevant skills and competencies required of graduates in different built environment disciplines across the globe from the perspectives of both graduates and professionals, with a view to transforming the graduates into confident, aggressive and purposeful individuals to bridge the gap between unemployment and job creation (Ahn, Pearce and Kwon, 2012; Moreno, Muñoz and Morote, 2019; Ustyuzhina, Mikhaylova and Abdimomynova, 2019). Most of the existing studies in Nigeria and beyond considered the competencies from the perspectives of the employers and some of them revealed similar skills emphasized by the employers and experienced professionals in the built environment with a few of them reporting some disparities that may be accounted for by environmental factors. (Acheampong, 2013; Aliu & Aigbavboa, 2018, 2019; Dalibi, 2017; Maina, 2018; Maina & Daful, 2017). Perspectives of the students and graduates, which can enhance the quality and balance of approaches to improving the situation have been majorly overlooked in the existing literature.

Although there were a few recurring requisite built environment skills needed for survival across different geographical locations, findings of these studies show that there is a disparity in the order of need. This can be attributed to the fact that geographical and cultural factors define perspectives and professional practices. Hence, in an attempt to give a holistic picture of the situation and

contribute to the debate leading to significant improvement in skills shortage in the construction industry, this study aims to broaden the perspective by assessing the relative importance of skills and competencies as well as level of acquisition amongst final year students of built environment Programmes in Nigeria, with a view to improving their chances of employability and survival in the construction industry.

LITERATURE REVIEW

Skills and competency development

Skills and competencies have been used interchangeably in the literature with no clear consensus on their definitions. The term “Competency” has often been discussed as a broad concept that includes knowledge, skills and attitude (European Commission, 2012; Garavan & O’Cinneide, 1994). This denotes that having the right knowledge, skills and a positive attitude provides an individual with the competencies to face challenges and uncertainties associated with a given vocation (Ernest, Matthew and Samuel, 2015). These competencies manifest in the form of innovation, change and other actions necessary for the personal or work life of the individual (Mensah, 2013). Evidently, every man possesses a certain skill which is acquired through learning or practice (Adedeji et al., 2017). As such, skills and competencies can be exploited to improve performance or employability of individuals.

Studies have highlighted the significance of skills and competency development in various industries and the business world (Zaharim et al., 2009; Ahn, Pearce and Kwon, 2012; Dalibi, 2017; Oladokun and Gbadegesin, 2017; Ruge and McCormack, 2017). Ahn et al. (2012) classified the skills and competences needed for USA construction graduates into four major clusters. The study noted that graduates are required to be responsible and creative in leadership coupled with good collaboration and interpersonal skills. In a study to assess the factors that affect employability of built environment graduates in Nigeria, Dalibi (2017) noted that skills such as communication, analytical and teamwork were ranked the most required from the employers’ perspective. These skills have been found to be the most requisite skills in quite a number more studies in various industries (Zaharim et al., 2009; Ahmed et al., 2014; Adebakin, Ajadi and Subair, 2015; Oladokun and Gbadegesin, 2017). From the professional’s perspective, the ability to handle uncertainty amongst other competencies are critical to graduates of the built environment due to the dynamic nature of work they are often involved in. Graduates of the built environment should have a balanced and wide skill-sets which as noted by Lazear (2004) develops their competency.

The disequilibrium between labour market requirements and lack of essential employable skills and competency by the graduates has been identified as the major contribution to unemployment in Nigeria (Oviawe, 2010). The emerging world economy of the 21st century is highly competitive and globalized which is not only knowledge based and science and technology driven. The human brain is now the number one resource and is re-affirming the fact that learning is a life-long process. Thus, skills certification is more relevant and critical to

sustainable development and global competitiveness. Anaele (2002) noted that the amount of knowledge and skill imparted to the students should meet the demand of industries with synergy between the academic and industrial environments. Table 1 shows the most consistent skills and competencies found to be relevant and important for survival in various industries around the globe. The skills and competencies were streamlined and adapted to fit the context of this study, and to limit ambiguity.

Table 1: Skills and competencies as derived from literature

S/N	Skills and Competencies	Source
1	Self confidence	(Oladokun and Gbadegesin, 2017)
2	Qualitative reasoning	(González and Wagenaar, 2003; Maina and Daful, 2017)
3	Self-awareness	(Edum-Fotwe and McCaffer, 2000)
4	Time consciousness	(Edum-Fotwe and McCaffer, 2000)
5	Team work and collaboration skills	(Bernold, 2005; Itani and Srour, 2016; Maina and Daful, 2017)
6	Competitiveness	(Oladokun and Gbadegesin, 2017)
7	Critical thinking skills	(Ahn, Pearce and Kwon, 2012; Maina and Daful, 2017)
8	Creativity and innovative skills	(Itani and Srour, 2016)
9	Negotiations skills	(Edum-Fotwe and McCaffer, 2000; Irewolede, Omolayo and Zakariyyh, 2020)
10	Commitment and resilience	(González and Wagenaar, 2003; Maina, 2018)
11	Judgment and decision making	(González and Wagenaar, 2003; Maina and Daful, 2017)
12	Interpersonal skills	(Padil, Esa and Jamal, 2015; Maina and Daful, 2017)
13	Networking and relationship building	(Itani and Srour, 2016; Irewolede, Omolayo and Zakariyyh, 2020)
14	Opportunity taking	(Ahn, Pearce and Kwon, 2012)
15	Strategic thinking	(Oladokun and Gbadegesin, 2017)
16	Pro-activeness	(Padil, Esa and Jamal, 2015; Maina and Daful, 2017; Oladokun and Gbadegesin, 2017)
17	Open mindedness	(Oladokun and Gbadegesin, 2017)
18	Curiosity	(Oladokun and Gbadegesin, 2017)
19	Cognitive flexibility	(Padil, Esa and Jamal, 2015; Maina and Daful, 2017)
20	Emotional intelligence	(Fernández-pérez <i>et al.</i> , 2017)
21	Risk taking propensity	(Itani and Srour, 2016)

Construction education and training in Nigeria

The educational sector in Africa as noted by Amoako (2010) has continued to be predicated on the colonial style, which focuses majorly on producing “task-groomed” individuals with certain skill sets and expertise suitable for specific jobs only. Ernest et al. (2015) opined that the focus of academia in Africa have not been to produce innovative graduates with the ability to be dynamic in their professional practice. In an ideal climate, tertiary institutions are expected to generate knowledge through research, disseminate same and ignite the development mechanism of the nation through innovative inputs. Promotion of positive character for career development is also sacrosanct. Such graduates of tertiary institutions are expected not only to be well developed cognitively but to also develop the ability to analyze issues and develop logical thinking capacities. However, studies claim that knowledge exchange in Nigeria and some other African countries have been decreasing as opposed to increasing (Nwajiuba et al., 2019; Okolie et al., 2019). The educational sector particularly in developing countries like Nigeria have been reported to be very slow in reforming the activities of the sector to compliment the changing outlook of a dynamic society. Education stakeholders in developing countries still find it difficult to innovate in order to cater for today’s labour demands (Okolie et al., 2019).

Theoretical inclination has been identified as major defect in the Nigerian educational system (Ejere and Tende, 2012). There is a broad sentiment in the construction industry that new graduates are not adequately trained to deal with the soft issues on complex construction project (Nwajiuba et al., 2020). In particular, Toor and Ofori (2008) noted that academic Programmes do not prepare professionals with an appropriate blend of hard and soft skills. The technological education system in Nigeria is closely fashioned after the British system which is basically suited to a society with a high level of technological development and awareness as in Britain (Aniekwu & Ozochi, 2010). More so, the quality of graduates has been a major area of concern among most employers in the Nigerian construction industry, who have expressed relative dissatisfaction with regards to the level of technical and essential skills possessed by the graduates (Udofia et al., 2000). These observations are as relevant in the construction industry as any other in the contemporary times, but more so in construction because of the dynamic nature of the industry.

METHODOLOGY

The final year students of the construction courses offered in Ahmadu Bello University; Zaria-Nigeria were used as respondents for the study. This resulted from a preliminary assessment of all the final year students in construction related departments in the University which revealed that the students have acquired some construction industry experience during their industrial attachments with various organizations in about 25 states covering all the regions of the country. A total of 180 questionnaires were distributed final year students across all the departments to form the study sample. This sample size was derived from the preliminary assessment which showed the average number of students per department to be 100, with homogeneous

characteristics. As such, thirty (30) questionnaires each were distributed to six strata which include the Department(s) of Architecture, Building, Civil Engineering, Geomatics, Quantity Survey and Urban & Regional Planning to minimize estimation error due to over sampling of certain departments as noted by (Bartlett, Kotrlik and Higgins, 2001). Students were selected at random within each stratum to allow for even opportunity across the population. The questionnaire was designed into three sections with a view to elicit perceptual data from the respondents. Section A inquired about the demography of the respondents. A Likert scale was presented in section B which inquired about the perception of the sample population on the importance of identified skills and competencies needed for survival in the built environment. Finally, section C inquired about the respondent's acquisition level of the skills and competencies based on a self-assessment. Data was analyzed using descriptive and inferential statistics. A one sample T-test was used to test the significant difference of the respective variable means to further ascertain the most relevant and acquired skills and competencies. This is consistent with similar studies assessing diverse variables with regard to a certain study phenomena (Hwang and Low, 2012; Zailani, Abubakar and Muhammad, 2019). Furthermore, comparative analysis was used to ascertain the difference between relevant and acquired competencies amongst students in the built environment.

RESULTS

Response rate

Figure 1 shows the distribution of the questionnaires used for analyses. A total of 136 questionnaires which represent 75.5% response rate were used. The Department of Urban and Regional Planning had the least response rate with only 8 questionnaires returned, while the Department of Quantity Surveying had the highest response rate with 29 questionnaires. Department of Geomatics had 27, Civil Engineering had 26, and the Departments of Building and Architecture returned 24 and 22 questionnaires respectively.

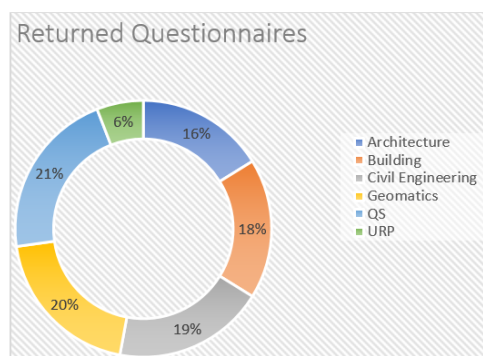


Fig 1: Response rate

Demography of respondents

The first section of the questionnaire asked questions regarding the age of the respondents. This is based on fact that a correlation was found between the age and competency levels of respondents (Lévesque and Minniti, 2011). The study noted that the distribution of a population across age cohorts matters because

survival decisions are not neutral with respect to age. Figure 2 shows the age distribution of the respondents across all strata.

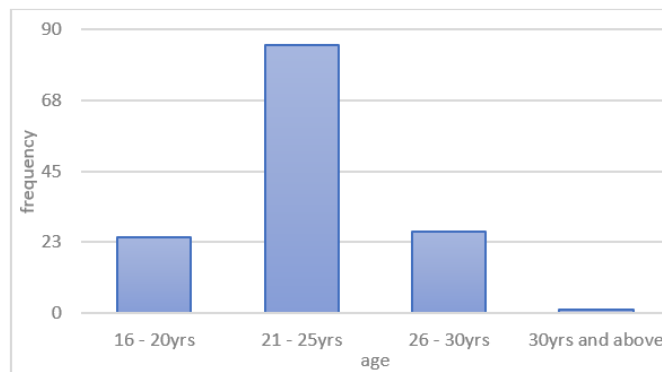


Fig 2: Age Distribution of Respondents.

Majority of the respondents (62.5%) fell within the age bracket of 21 – 25 years. Respondents with respective ages within the range of 26-30 years as well as 16-20 years represent 19.1% and 17.6% of the respondents respectively. Whereas, only 0.7% of the respondents reported being of 30 years or above. Previous studies reported that individuals between the ages of 25 to 34 years are at their peak of entrepreneurial intentions, although the exact number varies across countries based on their level of development (Cowling, 2000; Blanchflower, 2004; Grilo and Irigoyen, 2006)

Relevance of Skills and Competencies for Industry Survival

The construction industry has been often referred to as one of the most competitive industries due to its nature and dynamism (Flanagan et al., 2007). As a result, industry professionals often have to resolve to their skills and competencies for survival. A total of twenty-one (21) skills and competencies were identified from literature and presented to the respondents on a Likert scale. Respondents were required to rate their perceived relevance of each identified skill and competence using a scale 1-4, where (1 = Not important, 2 = Moderate importance, 3 = Important, and 4 = Very Important). Table 2 shows the ranking of the respective skills and competencies based on the ratings provided by the students.

A one sample T-test was used to test the significant difference of the respective variable means at the 95% confidence level and 0.05 interval. The average mean values for all the twenty-one variables were above the t-value (2.0) and were found significant ($p < 0.05$). As such, all variables were deemed relevant to the built environment. Self-confidence as a survival competency was ranked 1st with a mean value of 3.5 and standard deviation of 0.843. The respondents perceived the attitude of an individual to be confident and self-assertive as the most relevant survival competency in the built environment. This is in line with the thinking of (Peters and Brijlal, 2011) who opines that successful professionals believe strongly in their ideas, trust their instincts and can be prudent and persuasive in presenting those ideas. More so, the ability to think as an individual, as well as be a team player with team work and collaboration skills were reported to be highly important to survival with respective mean scores of 3.4. Other competencies and skills that include qualitative reasoning,

creativity and innovative skills, time consciousness, self-awareness and competitiveness were all ranked high with respective 3.4 mean scores.

Table 2: Ranking of skills and competences based on Relevance

		N	Mean	Std. Dev.	T-Sig.	Rank
ESC21	Self confidence	136	3.5	0.843	.000	1
ESC17	Qualitative reasoning	136	3.4	0.718	.000	2
ESC18	Self-awareness	136	3.4	0.738	.000	3
ESC13	Time consciousness	136	3.4	0.754	.000	4
ESC9	Team work and collaboration skills	136	3.4	0.758	.000	5
ESC20	Competitiveness	136	3.4	0.767	.000	6
ESC7	Critical thinking skills	136	3.4	0.796	.000	7
ESC3	Creativity and innovative skills	136	3.4	0.804	.000	8
ESC15	Negotiations skills	136	3.3	0.744	.000	9
ESC4	Commitment and resilience	136	3.3	0.751	.000	10
ESC11	Judgment and decision making	136	3.3	0.812	.000	11
ESC8	Interpersonal skills	136	3.3	0.819	.000	12
ESC6	Networking and relationship building	136	3.3	0.825	.000	13
ESC19	Opportunity taking	136	3.3	0.913	.000	14
ESC1	Strategic thinking	136	3.3	0.971	.000	15
ESC16	Pro-activeness	136	3.2	0.803	.000	16
ESC5	Open mindedness	136	3.2	0.808	.000	17
ESC12	Curiosity	136	3.2	0.949	.000	18
ESC14	Cognitive flexibility	136	3.1	0.755	.000	19
ESC10	Emotional intelligence	136	3.1	0.837	.000	20
ESC2	Risk taking propensity	136	3.0	0.910	.000	21

t-value=2; p<0.05

Relevant survival skills and competencies ranked in the mid-table, all with respective mean scores of 3.3 include negotiation skills, commitment and resilience, judgement and decision making, interpersonal skills, networking and relationship building as well as opportunity taking. This shows the perceived significance of having a positive attitude towards success, complimented by the ability to interact and find common grounds with industry stakeholders. Furthermore, the constant thought of strategy formulation and implementation to attain a sustainable competitive advantage was ranked 15th with a mean score of 3.3 and standard deviation of 0.825. However, competencies and skills with regards to the cognitive flexibility, emotional intelligence and risk propensity of the individual were ranked least among the variables with mean scores of 3.1, 3.1 and 3.0 respectively. Regardless of their respective mean values and rank, the variables were found to be significantly different from the sample t-value (p<0.01).

Skills and competencies acquired

Using the twenty-one identified skills and competencies, respondents were further asked to assess the level to which they possess or acquire the skills and competences using a scale 1-5, where (1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high). Table 3 shows the ranking of the skills and competencies based on self-assessment of the respondents. The result of the one sample T-test shows almost all the variables were significantly different

from the sample t-value (3.0) on the 95% confidence level and 0.05 confidence interval.

Table 3: Ranking of skills and competencies based on self-assessment.

	N	Mean	Std. Dev	Sig	Rank
SAESC21 Self confidence	136	3.8	1.065	.010	1
SAESC13 Time consciousness	136	3.6	1.051	.000	2
SAESC9 Team work and collaboration skills	136	3.6	1.081	.000	3
SAESC18 Self-awareness	136	3.5	0.902	.000	4
SAESC7 Critical thinking skills	136	3.5	1.003	.000	5
SAESC8 Interpersonal skills	136	3.5	1.003	.000	6
SAESC3 Creativity and innovative skills	136	3.5	1.032	.000	7
SAESC6 Networking and relationship building	136	3.4	0.976	.000	8
SAESC4 Commitment and resilience	136	3.4	0.987	.000	9
SAESC14 Cognitive flexibility	136	3.3	0.904	.000	10
SAESC17 Qualitative reasoning	136	3.3	0.951	.000	11
SAESC16 Pro-activeness	136	3.3	0.967	.000	12
SAESC5 Open mindedness	136	3.3	1.065	.001	13
SAESC19 Opportunity taking	136	3.3	1.074	.001	14
SAESC20 Competitiveness	136	3.3	1.090	.000	15
SAESC15 Negotiations skills	136	3.3	1.108	.001	16
SAESC11 Judgment and decision making	136	3.3	1.141	.001	17
SAESC1 Strategic thinking	136	3.3	1.251	.010	18
SAESC12 Curiosity	136	3.2	1.046	.051	19
SAESC2 Risk taking propensity	136	3.1	0.537	.000	20
SAESC10 Emotional intelligence	136	3.0	0.934	.714	21

t-value =3.0; p<0.05

Self-confidence was ranked 1st as the most possessed survival competency amongst the sample population with a mean value of 3.8. The mean score, despite been not farfetched from the t-value (3.0) was found to be significantly different from the t-value (p<0.05). Time consciousness and the ability to be a team player through collaborative skills were ranked 2nd and 3rd respectively. Individual attitudes and skills that include being self-aware, critical thinking, interpersonal skills and creativity were all ranked high amongst the skills and competencies acquired with respective mean scores of 3.5. The study respondents reported to have the capacity to be introspection and have the ability to recognize their inherent and unique capabilities. The students have a relative ability to think critically, interact with others and also be creative in providing innovative solutions to problems. More so, the ability to establish connection and build relationship, with a strong commitment and resilience to succeed were ranked 8th and 9th with respective 3.4 mean values.

Cognitive flexibility amongst other competencies which include, qualitative reasoning, pro-activeness, open mindedness, opportunity taking, competitiveness, negotiations skills, decision-making and strategic thinking were all ranked mid-table with respective mean scores of 3.3. All variables were found to be significantly different from the t-value (p<0.05). However, the

inherent characteristic of an individual to be inquisitive and curious for knowledge was ranked 19th with a mean value of 3.2. Furthermore, results of the t-test show the mean score is not significantly different from the t-value. As such, it can be reported that the curiosity level of the students is not farfetched from average.

Risk taking propensity which indicates the willingness and ability of an individual to engage in risky or uncertain endeavors was ranked 20th with a mean score and t-significance (3.1, $p < 0.05$). Emotional intelligence which is the ability to understand respective individual feelings and feelings of others was ranked the least possessed competence amongst the students. Result of the one sample t-test shows that the mean value for emotional intelligence is not significantly different from the sample t-value ($p = 0.714 > 0.05$), and as such can be interpreted to be possessed or acquired to a relative level amongst the students regardless of its rank.

Comparative analysis

To ascertain the gap between the skills and competencies relevant to the construction industry and those acquired by students of the built environment Programmes, a comparative analysis was undertaken. Figure 3 shows the comparison between ranking of the identified skills and competencies based on relevance and acquisition.

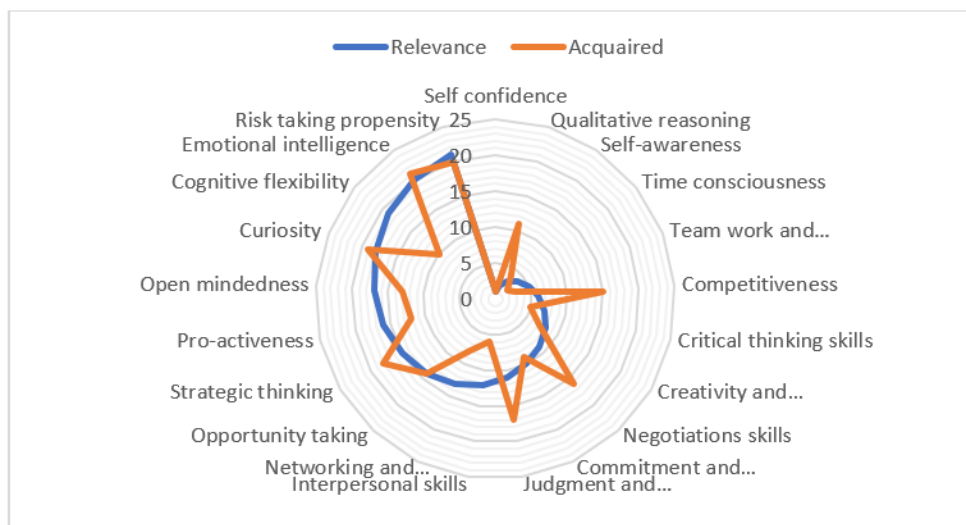


Figure 3: Comparison between relevant and acquired skills and competencies

Self-confidence ranked highest as the most relevant and the most acquired competence as shown in Table 2 and 3. Qualitative reasoning which ranked 2nd most important competence was ranked 11th most acquired. The disparity in the ranking shows that students in the built environment Programmes lack the relative ability to express conceptual knowledge, make judgements and draw conclusions subjectively using quantitative data. This can limit their ability to make “on the spot” professional judgements or decisions during practice. Being self-aware of respective individual capacity and limitations, time consciousness, critical thinking and creativity, commitment, and the ability to work in a team through collaboration measured closely as skills and competencies highly relevant in the industry and also acquired by the students.

However, competitiveness and negotiation skills which both ranked amongst the top most relevant skills and competencies in the construction industry ranked low in the acquired skills and competencies assessment.

Judgement and decision making were relatively farfetched from the level of acquisition amongst the students with respective rankings of 11th and 17th as shown in Tables 2&3. So also, interpersonal skills, networking and connection building, strategic thinking, pro-activeness, open-mindedness, and cognitive flexibility all have relative level of disparity among the two rankings. Whereas, relevance of skills and competencies that include opportunity taking, curiosity and risk-taking propensity in the industry were not farfetched from the level of acquisition amongst students.

DISCUSSION

At the dawn of the new century, technological advancement and the dynamic nature of the construction industry have created a paradigm shift in the nature of job opportunities in the industry from knowledge based to competency based. Graduates of the built environment Programmes are now required to have requisite skills and competencies in addition to their academic qualifications, in order to survive in the highly dynamic and competitive job market. The findings of the study add to existing literature by assessing the skills and competencies requisite for survival in the construction industry from the perspective of the students in construction related Programmes. As noted earlier, the perspective of students has been majorly overlooked when assessing such skills and competencies in the construction industry. The comparative analysis showed that there was no significant difference between the perceived relevant competencies and the acquired competencies amongst students. Looking at the top 10 ranked relevant skills and competencies in the industry presented in Table 2&3, only qualitative reasoning, competitiveness, and negotiation skills were ranked out of the top 10 acquired skills and competencies amongst the students. Emotional intelligence and risk-taking propensity which were both ranked the least relevant competencies, were also ranked least in the self-assessment. This shows that students feel that to an extent they possess the requisite competencies that would ensure their survival in the industry. Although Maina and Daful (2017) opined that students tend to overrate the level of skills acquired and relevance of the skills when compared to what is expected in the industry from the perspective of professionals, the ranking of the relevant competencies by the students in this study mirrors the perception of professionals and recruiters in the industry as found in literature (Edum-Fotwe and McCaffer, 2000; Ahn, Pearce and Kwon, 2012; Oladokun and Gbadegesin, 2017). Ahn, et al., (2012) noted that due to the complex nature of the construction industry, graduates that possess the ability to critically analyze complex issues and proffer viable solutions to the problems tend to be most preferable for employment by recruiters. This problem-solving skill involves a combination of problem definition and decision making which is concerned with addressing the problems that have already occurred (Edum-Fotwe and McCaffer, 2000). Furthermore, competencies that manifest in the attitude of the individual such as self-confidence, time consciousness, self-

awareness, interpersonal and negotiation skills were perceived to be relevant in the industry from both perspectives.

Relatedly, the skills that were ranked low from the perspective of the students in this study were also not farfetched from findings in previous studies. Risk taking propensity that applies to the intrinsic drive of an individual to take on job opportunities was perceived to be not relevant in the construction industry. Itani and Srouf (2016) found that risk taking propensity is amongst the least competencies employers demand from graduates in the construction industry. Cognitive flexibility which is the ability of an individual to be open minded with regards the approach to execute job task is amongst the least relevant competencies which is in line with the findings of Maina and Daful (2017) that creativity and ability to generate novel ideas in technical jobs is often not valuable. This might be largely due to the fact that such jobs often involve predefined tasks that need to be executed in a predefined manner. More so, Although Fernández-pérez et al. (2017) noted that Individuals with strong Emotional Intelligence seem to be more aware of how certain outcomes influence their behavior towards task execution, Emotional Intelligence was ranked amongst the least relevant and also least possessed competence amongst the students.

CONCLUSION

This study identified the relevant survival skills and competencies in the construction industry from the student's perspective, as well as assess the acquisition level of these skills and competencies amongst the students of the built environment Programmes. The study provides an insight into the gap between the relevant skills expected of built environment graduates for survival in the industry and the extent to which such skills are acquired by the respondents. The major strength of the study in academic and industry debates lies in its consideration of the perspectives of students who have experienced the workings of the construction industry and therefore able to combine the insights of the academic and industry environments. Previous studies are mostly limited to the views of practitioners and employers in the industry. The findings show that the students of the built environment Programmes have the requisite competencies and skills to survive in the industry. However, it is recommended that students of construction related courses should strive to improve their skills and competencies relevant in the industry by active engagement with experts through internships, and participating in diverse industry practical cases. Albeit the contributions of this study, the generalizability of the results may be limited by the demographic context of the respondents. Although the respondents have had their industrial attachments from different states in Nigeria, the fact that all of them studied in the same University makes it impossible to generalize the findings of the research.

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INVESTMENT PROPERTY TYPOLOGY ANALYSIS; EVIDENCE FROM NIGERIAN URBAN PROPERTY RETURNS AND MACROECONOMIC VARIABLES

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The study examined the return characteristics of investment-properties on typology basis in Abuja, Nigeria and quantified the impact of macroeconomic-variables on the return. Quantitative primary and secondary data were gathered for the study. Structured questionnaire was administered on 420 investment-properties available in the portfolios of practicing Estate Surveying Firms (ESFs) in the study area. Both descriptive and inferential statistics were adopted for data analyses with mean, growth rate, standard deviation, correlation and regression coefficients. The result showed a constant yield range for the study area, but variations in the return, risk and return/risk among the property-types and a mixture of negative and positive relationships between/among the property-types. The result further showed that returns on most property-types do not correspond with their risks and detached house with boy's quarter exhibits an out-performance over all other property-types. However, in relation to the economy, property-return exhibits a strong negative relationship with the currency exchange rate and a weak negative relationship with interest rate, but none of the macroeconomic variables statistically explain or drive return on the property. This study contributed to the literature on Nigeria property-investment analysis by providing guiding information for a better knowledge of the Abuja property market dynamics that can enhance decision making of investors towards an improved market rewards analysis. Despite the observed variations in the return characteristics in the study area, an appropriate mix of property-types can still bring about improved performance benefit to the investors. The study is beneficial to investors through reduction in the wide gap between investment expectation and actualization through appropriate and specific investment prescriptions. The notable variation between the yield and return on property suggests that investors cannot rely solely on the yield of an investment analysis as their investment guide, rather they should extend to the reward characteristics. This is one of the few studies on Abuja direct property market reward analysis on property-type approach that explored the sensitivity of property return to the Nigeria economy.

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Keywords: investment-property, macroeconomic-variables, property-return, risk-return, typology

INTRODUCTION

Real estate or property investment has been noted to have some seeming prospects and benefits over other forms of investment; making it to be gaining more acceptance in the general investment market. However, among other objects of investment, property generally requires a huge capital outlay for the acquisition. According to Olawore (2014), the fund invested on property by foreign investors in Africa totals about 2.9 billion US dollars. In Nigeria, Babawale (2014) observed that property market capitalization rate is far above N20 trillion while capital market capitalization rate is less than N14 trillion indicating that more funding is devoted to the property market in Nigeria than capital market. Since the main motivation towards this huge investment on property as an object of investment is the reward coming from it, this has therefore necessitated the understanding of its reward analysis through return indices as a guide to the local and international investors.

Level of performance of property investment has now become a major and growing concern of conscious investors needing information on forces governing the variation in its specific performance. However, according to Olapade et al (2019); Olaleye and Adebara (2019), the compilation of transaction based direct property indices is yet to be given full attention in the Nigerian property market, making it opaque and immature due to lack of large property transaction database with consequences on property market predictability and its non-attractiveness to the foreign participants. The first attempt to compile property indices in Nigeria was in 2013 by the Nigerian Institution of Estate Surveyors and Valuers (NIESV, 2013) with a pilot survey on Abuja, Port-Harcourt and Lagos; but this was purely on estimates or appraisal basis for both capital and rental values, not on return. In addition, the compilation just gives a range of value expected on typology of investment properties, but not specifically on the actual rental values or capital values generated on individual properties.

It was noted that some property investors both local and international who rely on these estimates were grossly misled or wrongly guided by these compiled value estimates. This is because their actual investment realization differs significantly from their expectation due to the use of non-precise data. The wide variation was attributed to assumptions that each property typology has full occupation and that there was no vacancy on them; the issue of outgoing on gross rental value was not well considered and yearly variation or fluctuation in the income generated from year to year was not considered. However, in view of the fact that different type of investment-properties currently exists in most urban property markets, it suggests that the investment peculiarity of one type of property will be different from other on an empirical basis.

Furthermore, for property investment analysis to be more comprehensive, both the inherent and adherent factors that may influence its performance must be considered simultaneously, hence a need to consider the state of the economy

with the return analysis of the investment property. These variables are expected to serve as indicators signaling the current trend in the economy of any given nation. This type of analysis is desired in the developing and the developed economy of the world, because macroeconomic variables are key factors in the determination of the operation of property investment (Ezeokoli, 2019). There is therefore a link (forward effect or backward effect) between the property market and the economy of any nation. Linking the returns generated on investment-properties with the national economy will explore its sensitivity to the exogenous macroeconomic variables. Though macroeconomic factors may seem not to have direct link with investment generally, but they do influence the investment behaviour either directly or indirectly. Numerous studies on hedonic analysis of return structuring, determinants and prediction of investment-properties have been documented locally and internationally (Ojetunde et al., 2011; Oyewole and Ajayi 2013; Udoekanem et al 2015; Ezeokoli et al ., 2019; Nzalu 2013; Gruma and Govekarb 2016; Sivinitanides 2018 and Kroencke et al 2018 among others). However, the current study exceptionally examined the return characteristics of the various types of direct investment-properties and measure their differential effects on the urban property market in relation to the national economy with focus on developing (Nigeria) market. This is a notable vacuum in property investment literature that required empirical information.

Evidently, different studies (Emele and Umeh, 2013; Oyewole and Ajayi 2013; Onwuanyi 2018; Ezeokoli et al 2019; and Ekwebelem and Emoh 2020) have established the different macroeconomic factors as the determinants of real estate prices, value and return in Nigeria. However, most of these studies focus on estimates of income (distribution/dividend) and/or market capitalization of indirect property investments, none has specifically focused on the actual return generated on transaction basis of direct property investment typology in the federal capital city of Nigeria. Direct application of analysis on financial assets or public real estate on direct real estate may produce spurious and misleading results, due to variations in determinants.

The focus of the existing studies is either on rental value (Yakub, et al, 2013; Iroham, et al, 2014; Udoekanem, et al, 2015 among others) or on capital value (Chegut et al, 2013; Olowofeso, et al, 2013; Olaleye, et al, 2015). Few literature are available on total return i.e. the combination of income return and capital return and such includes among others: Bello (2012); Emele and Umeh (2013); Oyewole and Ajayi (2013) and Ekwebelem and Emoh (2020). Most of the related available literature are concentrated on property markets of the developed economies of Europe and U.S.A. Since different locality are subject to separate return dynamics, the economic climate of those developed countries and volume of available data is different from that of an emerging property market of Africa like Nigeria. In addition, most of the indigenous work on local property market return in Nigeria focused on other city centers like Lagos, Port-Harcourt and some state capital cities. Abuja, the federal capital territory is another hub of property transaction in Nigeria, being the seat of government expected to have unity of data generation as well as potential of unbiased responses from the

respondents, still remains relatively under-researched with respect to its investment-property market.

Return on investment-properties as previously stated, is influenced not only by specific property related factors (supply side), but also the macroeconomic-variables (demand side) (Fisher, et al, 2007). None of the studies seem to have combined the supply and demand side of return on property typology exclusively. There is therefore a need for quantitative evidence and analytic procedure on different types of investment-properties variation, in terms of the return characteristics and their nexus with the macroeconomic variables to guide the local and foreign investors in properties in Nigeria. This work therefore empirically analyzed the return characteristics of investment-properties in Abuja, Nigeria (considering the status as the seat of federal government) towards understanding its property market rewards dynamics and macroeconomic-variables mechanisms to be able to supply information to property stakeholders, test assumptions and make informed property investment decision. The outcome of this study will not be limited in use for Nigeria property market only, but also in comparison with other developing economies, especially in Africa. This paper has been structured into 5 sections. Next to this introductory section is the review of literature; third section is devoted to the research methodology while section four is on the data, its results and discussion. Section five concluded the study.

LITERATURE REVIEW

Investment-property is property bought or developed purposely to earn an income (reward) through renting, leasing or price appreciation, but excluding the owner occupied (Bello, 2012). Return as a property reward is however coupled with risk i.e. the variability of returns that are associated with an investment owing to movements in financial variables. Substantial empirical work has been undertaken to shed light on the relationship between common stocks, listed real estate, and direct real estate returns. Listed real estate however dominated the direct real estate in most of these empirical studies. Ghysels et al., (2013) has provided a comprehensive review of this literature and warned that if the risk and return characteristics of listed and direct real estate have different economic sources, results obtained from investigating the listed real estate market might not carry over to the direct real estate market. However, academics as well as practitioners are surprisingly divided in their opinion as to the fundamental driving factors behind the returns and risks of real estate investments (Ghysels et al., 2013). This section of the study is therefore structured into the empirical documentations of property performance analysis from the developed economies and Nigeria property markets.

Evidence from developed economies

As indicated previously, most of the studies on return on property are derived from the developed economies. One of such is Filotto et al., (2018) that evaluated the impact of macroeconomic condition and real estate price trend on the amount of loan advanced to residential property for the period of 2007-

2015 in Europe. The study found a GDP shock in Europe with impact on the GDP, real estate prices and residential mortgages. The study concluded that for the real estate, macroeconomic and housing price shocks matter and that the impact/effect of the shock vary from short term to medium term, country to country and level of variation in the financial development of the country. Although, this study links the property prices with the economy variables to the extent of loan/mortgage, its analysis was not on all property typology nor multiple macroeconomic variables.

The study was not really on property investment performance, but on property investment feasibility analysis. While providing a potential explanation of how a combination of risk factors might simultaneously drive the risk premia in three different property markets in the US, Kroencke, et al (2018) analyzed the joint stochastic properties of common stocks, listed real estate, and direct real estate and the results show that listed real estate and direct real estate are likely to be driven (up to a large fraction) by common risk factors. It also shed new light on the risk-characteristics of real estate returns and are of high interest for academics, regulators, and portfolio managers alike. The study focused on inter-investment analysis, but has no link with the economy of the country of study. Amonhaemanon (2013) examined whether real estate in Thailand can hedge against ex post and ex ante inflation during the 1987-2011. Following the Fama and Schwert (1977)'s framework, the study finds that real estate returns have positive relation with both ex post and unexpected inflation over the period, even though the statistical evidence does not strongly support this. In addition, after separating the time series into sub-periods to control for the possible structural changes in the economy, the study finds that the relationship between inflation and real estate returns change under various economic environments.

This is a return/macroeconomic variable limiting to inflation only and did not examine the property typology in its analysis. Chegut et al. (2013) used a comprehensive data-set of transactions from Estates Gazette interactive and real capital analytic, highlighted the return characteristics of the repeat-sales sample over the 1996 to 2011 periods and related the logarithmic returns of income-generating property to weight time dummies. Although this work improves with date, highlights the return characteristics, but it solely depended on secondary data on repeat sales, collected from Estates Gazette interactive and was neither on property typology nor connect the prices with the economy. It is intuitive that real estate investments are related to the general economic activity of a region or country and a sound economic structure are perceived to be significant factor in respect of its ability to attract foreign real estate investors. In attempt to provide guidelines for improvement towards attraction of international capital allocation (through real estate) to a potential host nation, Lieser and Groh (2011) explored how different social-economic demographic and institutional characteristics affect commercial real estate investment activity of a region or nation. The study provided evidence that the economic growth, rapid urbanization and compelling demographics are the major factors attracting real estate investments while lack of transparency in the legal framework, administrative burdens of doing real estate business,

sociocultural challenges and political instability of a country are the factors that reduce international real estate allocation to nations. In the UK, Sivitanides (2018) validated and quantified the effect of key macroeconomic drivers on London house prices using annual data over the period 1983–2016 with the estimate of alternative error-correction and partial-adjustment models (PAMs). The results verified the existence of a strong long-term relationship between London house prices and key macroeconomic variables, such as UK GDP, London population and housing completions. The study although linked the property prices of a capital city of a nation to its national economy, but was unable to indicate the link to the investment property. Gruma and Govekarb (2016) investigated the macroeconomic factors (unemployment rate, the current account of the country stock index, gross domestic product and industrial production) that are most significant with property prices in relation to the Slovenia, Greece, France, Poland and Norway different cultural environments. The study found statistically significant correlations between the prices of residential real estate and selected macroeconomic factors. The results show a distinct pattern that applies to France, Greece, Norway and Poland, where the price of real estate observed statistically significant association with the unemployment. In the case of Slovenia, the results show that a statistically significant relationship reflects to a share index only. That was illustrated by the finding that prices in Slovenia on an annual basis, between the observed cultural environments in the observed time interval, most declined.

Most of these studies exhibit the characteristics of mature markets having robust data for their analysis. This obviously is at variance with what is obtained in Nigeria urban markets confronted with lack of the required data for property market analysis. However, the empirical studies on Nigeria property market is the focus of the next section of this study.

Evidence from Nigeria, a typical developing economy

As earlier indicated, in Nigeria the development of transaction based real estate indices was hampered by lack of large real estate databases. Babajide *et al.* (2014) corroborated this while examining the implications of property market forecast to real estate valuation in Nigeria and revealed that real estate forecasting is yet to be given full attention by the stakeholders in the Nigerian property-market, probably due to lack of property index. Ekemode and Olaleye (2015) used the time frame of 1998 to 2012 to analyze and compare the return/risk performance profiles of direct and indirect real estate, relying on data from direct commercial property collected from estate surveying firms in Lagos, share prices and dividend of UACN Property Company and publication of Nigerian Stock Exchange. The study concluded that real estate exhibits higher return performance and higher downside risk to investors. The study is on comparative analysis of real estate investment, it neither embrace property typology nor link the property performance to the nation macroeconomic variables. Bello (2012) is another inter-property investment comparison which analyzed the risk and returns profile of commercial property in South West Nigeria with selected stock market investment between 2000 and 2009. The study concluded that stock market investment offered attractive higher return

when compared with commercial property, although with higher risk and there could be diversification benefits of combining commercial property with stocks-investment. This work is limited to commercial property without linking to the nation's economy; it was also not on the investment-properties typology.

Linking property return with the national economy, previous study has shown that there exist a significant negative relationship between residential real estate prices and interest rate and a positive relationship between real estate and the GDP and level of money supply (Ojetunde et al. (2011); GDP contributed significantly to the growth of real estate (Nzalu, 2013) and Nigerian macroeconomic factors influence return on specialized property investments (Ezeokoli et al., 2019). Ojetunde et al (2011) in their study of the interaction between the Nigerian residential property market and macro economy with empirical evidence using vector autoregressive (VAR) model found that macro economy shocks explain 28% of the variation in residential property rents and exogenous influence of the economy account for 31.4% of the variation within the residential property market. The study was limited to rent of residential property, but not on total return on property typology. In a similar direction with Ojetunde et al (2011), Udoekanem *et al.* (2015) explored the dynamics of office rents on 36 commercial properties in Minna, by obtaining their rental values data from practicing estate surveying firms engaged in the commercial property market for the period 2001-2012. The findings revealed that the rental growth factor for office properties for the study period is 1.056. The study concluded that real GDP growth and vacancy rates are the major drivers of office rental change in the commercial property market in Minna. Although, the study established the need for real estate practitioners in the study area to get a better understanding of the characteristics of rental fluctuations, but was limited to the rental value of the office property, it did not expand to have a total return of property typology.

Ezeokoli et al (2019) explored the influence of selected macroeconomic variables on the return of events centres as an investment property in Akure, Nigeria between 2005 and 2014. The study discovered that both inflation rate and exchange rate have significant effect of 69.5% and 21% respectively on the return of event centres in the study area. The study adopted only two macroeconomic variables to the event centres. The outcome of event centres analysis cannot be applied to property typology due to the peculiarity variation.

Oyewole and Ajayi (2013) used multiple regressions to establish the relationship between the trend in property returns and selected macroeconomic-variables. The results showed that GDP, interest rate and employment rate are the only significant determinants of office property-return. This study is restricted to office property-investment of institutional investors, but did not include the public and individual private investors in its analysis. Olaleye et al. (2015) provided information on the trends in the Nigerian capital market to domestic and international investors by analyzing the movements in the indirect real estate assets prices and its determinants from the perspective of African emerging market. The study found that Nigerian property listed stocks appeared to be highly sensitive and aggressive when related to six macroeconomic-variables except the composite price index.

The study concluded that decision to invest in property listed stocks in Nigeria should be a short or medium term basis, because long term basis may gradually erode the investment due to the high sensitivity to interest rate, inflation rate and exchange rate. This study was limited to capital gain (stock price movement) of indirect real estate, and not total return analysis on direct property typology.

The extent at which the economic principles of price and value guide in explaining the asking prices of property in the two Nigerian urban cities (Abuja and Lagos) was evaluated by Onwuanyi (2018) mainly to resolve whether the property price in Abuja is higher than Lagos to ascertain the true indicative of property market buoyancy. This was done by relying on the data collected from the property marketing publication named Castles weekly with adoption of averages and relative importance analysis. The study found that property prices in Abuja were consistently higher than that of Lagos and that Abuja has higher vacancies and unsold properties after more than one year of listing. This study was limited to the asking price only, it did not extend to return on property typology, nor link it with the country macroeconomic variables.

Olaleye et al (2015) is one of the few studies that focused on the relationship between asking prices, time-on-market and sales prices of property from Nigeria (emerging) property market point of view, using transaction data on listed prices, time-on-market and sales prices involving 113 residential properties accessed through the practitioners in Lagos property market. The finding shows a strong significant relationship between the asking price of properties and sales price and concluded that offering about 84% of asking prices of residential property in Lagos, Nigeria could be used to predict their sales prices. This study limited its scope to property prices prediction and not specifically on property performance analysis.

The most related to this study is Ekwebelem and Emoh (2020) that assessed the driving forces of value chain of residential property market in Abuja and examined the effects of macroeconomic variables on them. This was done by assessing the risk- return performance of the rent and price of the residential property in the sub markets of the study area and their linkages with the macroeconomic factors. Results showed that Gwarimpa market exhibited high risk-return performance for the residential property with a noted fall of interest rate and that residential properties were significantly influenced by macroeconomic indicators in nine of the twelve identified sub markets while three markets were not significantly influenced. The study therefore concluded that macroeconomic policy has significant effect in Abuja residential market. The study was not generally on income generating properties, it was restricted to only two property typology (3B/R and 4B/R accommodation) of residential properties across the sub markets in the study area.

From the foregoing, most of the work done on investment return were on financial assets and indirect real estate investments (public listed real estate company), little was actually done on direct real estate and more of the studies were foreign derived (developed market) with few local studies, most of which focused on Lagos and some other state capital cities. Abuja (Nigeria) has been

little researched in term of investment-properties analysis especially in property typology analysis. The data used for most of the foreign studies were made available through property databases (NCREIF, IPD and NAREIT), but lack of large property database in Nigerian property-market compelled the use of transaction based data more than the appraisal data by most Nigerian authors including the current study that actually combined the property related factors with the economic related factors on property types analysis.

RESEARCH METHODS

Cross sectional survey research design was adopted by collecting data on the sampled investment-properties available in the portfolio of the Estate Surveying Firms (ESFs) who had established their practice in Abuja on or before 2006. Abuja was selected being a fast growing hub for real estate with its official status of being the administrative capital of the federal republic of Nigeria. It has witnessed and still witnessing a continuous influx of Nigerian business class and foreigners alike for business and official transactions with government both in real estate and other sectors of the economy, making it a real estate investment destination of the highest property value in Nigeria (National Bureau of Statistics, NBS 2015). In addition, with 139.7% growth rate between 2000 and 2010, Abuja was the fastest growing cities in the world followed by Al-Hudayda in Yemen with a growth rate of 108.1% (Boumphrey, 2010). While most international literature on reward of property investment focus on the capital cities of the nations (Johannesburg in South Africa, Kuala Lumpur in Malaysia, Helsinki in Finland among others), Nigerian local literature on reward of property investment is dominated by work done with the focus mostly on commercial centres like Lagos, the former federal capital city of Nigeria and other notable state capital cities. Quantitative primary and secondary data were collected. Primary data such as rental income (transaction-based) and the capital value (appraisal-based) were collected. Secondary data collected include; yield, gross domestic product; interest rates on capital, currency exchange rates, unemployment rates, foreign direct investment and inflation rates; searched and retrieved from government and non-government publications electronically and by print. A total of 2101 properties were listed and stratified into 11 property-types. These property types include: semi-detached house without boy's quarter, detached duplex with boy's quarter, semi-detached house with boy's quarter, detached house without boy's quarter, detached house with boy's quarter, semi-detached house with boy's quarter, semi-detached duplex without boy's quarter, block of flats, terrace house, lock up shops and office apartment/open offices. Twenty percent of this sample frame representing 420 properties was randomly selected from each stratum and questionnaire was administered on each in line with the data requirement. Five macroeconomic variables: property-return, the interest-rate, the inflation-rate, the gross domestic product, the unemployment-rate, the currency exchange-rate and the foreign direct investment were linked with the property return.

Data collected were screened for normality using Skewness and Kurtosis. Skewness shows that tail of the return curve on the left side is longer than that

of the right side of the curve by virtue of negative values for 6 property-types. The skewness shows that tail on the right side is longer than the left side of the curve by virtue of positive values for remaining 5 property-types. The kurtosis shows that all property-type have platykurtic kurtosis because their values are less than 3, meaning that their distribution produces less extreme deviations/outliers than the normal distribution. The use of Cronbach alpha coefficient, calculated as 0.835 indicated that the questionnaire used in this study is deemed to be adequately reliable and valid for interpretations (Kvale, 2006). Gross rental value on each property was deflated with the supplied percentage of all inclusive outgoing to arrive at the net rental income. Total returns were analyzed with the use of growth rate, study period-returns (annual/mean), correlation coefficients, regression, standard deviation, return/risk ratio. Annual growth rate was calculated based on the following equation:

$$\text{GR} = \frac{T1 - T0}{T0} \dots\dots\dots (1)$$

Where GR represents the growth rate, T1 is the succeeding year value while T0 represents the preceding year value. Annual total return was calculated with the equation:

$$R_t = \frac{CV_t - (CV_{t-1}) + RI}{CV_{t-1}} \dots\dots\dots (2)$$

Where: R_t is the total/annual return on investment over time period of t , CV_t represents the property capital value at the end of period t , CV_{t-1} represents the capital value of property at the beginning of period t and RI represents the rental income. Mean return was therefore calculated with the equation:

$$\bar{X} = \frac{\sum R_{t1-n}}{N} \dots\dots\dots (3)$$

$\bar{X}$ Represents the mean return, $\sum$ represents the summation of all returns while R_{t1-n} represents an annual return for year 1 to n year, N is the number of years for the study period.

The standard deviation was calculated to assess the level of risk of the investments while the study period return to risk trade off of each investment-property was measured with the mean return/risk ratio. The standard deviation (risk) was calculated as:

$$SD = \sqrt{\sum (X_i - \bar{x})^2 / n} \dots\dots\dots (4)$$

Where SD is the standard deviation of returns; X_i is the set of returns for each property-investment considered for the study, n is the number of observations or returns. $\bar{x}$ is the mean of ranking of observations or returns. Return to risk ratio was expressed as the division of $\bar{x}$ by SD. The relationship between returns was investigated with the use of correlation coefficients.

For the macroeconomic variables, percentages of annual change of the considered variables for the period 2007-2016 were related to the study period return of the investment-properties to evaluate the specific contribution of each of the property return. Retrieved macroeconomic-variables data were converted to a yearly basis before the calculation of their indexes. Multiple regression coefficients were used to test for statistical significance of the contribution of these macroeconomic-variables to return. Relating the property-return with macroeconomic-variables has to do with interrelationships of dependent and independent variables (exploratory variables). The relationship takes the following form of equation:

$$Y = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \dots + \beta_k X_{kt} + \mu_t \quad (5)$$

Where Y represents the asset's return, α represents the constant, β represents the beta coefficient, $X_{1t} - X_{kt}$ represents the return of an underlying market multiple independent variables, while μ_t represents the error term. Therefore, to adequately capture the multiple independent variables, a predictive log-linear multiple regression/causal model of the property-return time series needs to be regressed on macroeconomic-variables with the following equation:

$$MR = \alpha + \beta_1 INT_t + \beta_2 INF_t + \beta_3 GDP_t + \beta_4 UEM_t + \beta_5 EXC_t + \mu_t \quad (6)$$

Where the time series MR is the investment-properties mean return representing the dependent variable, α represents the constant, β represents the beta coefficient of independent variables, INT_t is the interest rate on real estate loan, INF_t is the inflation rate, GDP_t is the growth rate of the nation's economy, UEM is the unemployment rate and EXC represents the currency exchange rate, plus a random error or residual term μ_t .

The study adopted transaction data for income return and appraisal data for capital return to derive the total return which does not require de-smoothing as stated by the earlier study of Edelstein and Quan (2006) that reflected that appraisal and transaction based portfolio returns have equal or near equal volatility that may not let their de-smoothing be necessary. Augmented Dicker Fuller (ADF) test was carried out on all the data series to examine the extent of their stationarity and showed that all the variables are stationary at first order of difference; indicating the suitability of the variables for the regression analysis. All analyzed quantitative data were presented in a fraction of 2 decimal places.

DATA ANALYSIS AND DISCUSSION OF RESULTS

Data analysis

Total of 420 questionnaires was distributed and 272 were successfully administered representing 62.38% response rate and the results of analysis is shown in Table 1. The yearly mean of return were related or linked to the 5 selected macroeconomic variables.

Table 1: Investment property-types and the sample sizes

Types of Investment-Properties	Sample Frame	Planned-Sample	Actual-Sample
Detached house without boys quarter (DH-BQ)	179	36	22
Detached house with boys quarter (DH+BQ)	221	44	28
Semi-detached house without boys quarter (SDH-BQ)	58	12	6
Semi-detached house with boys quarter (SDH+BQ)	122	24	12
Detached duplex with boys quarter (DD+BQ)	211	42	22
Semi-detached duplex without boys quarter (SDD-BQ)	71	14	6
Semi-detached duplex with boys quarter (SDD+BQ)	156	32	18
Terrace house (TH)	182	36	24
Block of flats (BOF)	623	124	111*
Lock-up shops (LOS)	88	18	4
Office apartment and open offices (OA&OO)	190	38	20
Total	2101	420	272

*Block of Flats has 78 residential use and 33 commercial use components. Source: Field Survey (2017)

Descriptive statistics/analysis of return characteristics on property-type basis

To explore the unique variations in reward of property-type, Table 2 shows the average yield of 0.04 for all the property-types for the study period; but semi-detached house without boy's quarter, detached duplex with boy's quarter and semi-detached house with boy's quarter exhibited a yield of 0.05 being the highest. This is followed by detached house without boy's quarter, detached house with boy's quarter, semi-detached house with boy's quarter, semi-detached duplex without boy's quarter, block of flats, lock up shops and office apartment/open offices which exhibit the same yield of 0.04 while terrace house exhibits the lowest yield of 0.03.

Mean return of 0.08 was the peak return of property-type and this was noted in 4 property-types (detached house with boy's quarter, semi-detached duplex without boy's quarter, block of flats and lock up shops). Three property-type (semi-detached house without boy's quarter, detached duplex with boy's quarter and semi-detached house with boy's quarter) documented the mean return of 0.07, 3 other property-type; semi-detached house with boy's quarter, terrace house, and office apartment/open space) exhibited a mean return of 0.06 while only the detached house without boy's quarter exhibited a mean return of 0.05.

In term of the investment-risk, range of 0.02- 0.15 with an average of 0.06 was documented. However, lock up shops is the most risky property-type (0.15) while detached house with boy's quarter and semi-detached house without boy's quarter are the less risky property-type (0.02). The implication of more return than risk confirms what operates in the literature that an appraisal based property data are known to display low level of variability (Ekemode and Olaleye 2015).

Analysis of return/risk reflects an overall of 1.17 with a range of 0.53- 4.00. Detached house with boy's quarter has the highest unit of return/risk (4.00) followed by semi-detached house without boy's quarter (3.50). Lock up shops however exhibited the least return/risk (0.53). Further analysis of return/risk reflects that only terrace house exhibits equality of value in term of its return and risk. Three property types exhibited low return to high risk and they are detached house without boy's quarter, semi-detached house with boy's quarter and lock up shops. Seven property-types displayed high return to low risk: detached-house with boy's quarter, semi-detached house without boy's quarter, block of flats, office apartment/open office, detached-duplex with boy's quarter, semi-detached duplex without boy's quarter and semi-detached duplex with boy's quarter.

Table 2: Analysis of return characteristics of property

Property-type	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Renta yield	Total Return	Risk	Risk// return	Skewnes	Kurtosi
Detached house without boys quarter	0.06	0.11	-0.02	0.22	0.08	0.04	0.06	0.05	0.01	-0.07	0.04	0.05	0.08	0.63	0.70	1.86
Detached house with boys quarter	0.09	0.08	0.04	0.10	0.09	0.09	0.09	0.04	0.09	0.04	0.04	0.08	0.02	4.00	-0.90	-1.28
Semi-detached house without boys quarter	0.07	0.06	0.08	0.05	0.09	0.05	0.10	0.07	0.08	0.03	0.05	0.07	0.02	3.50	-0.30	-0.25
Semi-detached house with boys quarter	0.04	0.10	-0.04	0.12	0.19	0.04	0.06	0.13	0.03	-0.08	0.04	0.06	0.08	0.75	-0.21	-0.14
Detached duplex with boys quarter	0.10	0.08	0.08	0.10	0.03	0.05	0.11	0.07	0.11	-0.04	0.05	0.07	0.05	1.40	-1.63	2.84
Semi-detached duplex without boys quarter	0.06	0.11	-0.02	0.08	0.13	0.04	0.17	0.19	0.04	0.00	0.04	0.08	0.07	1.14	0.23	-0.94
Semi-detached house with boys quarter	0.07	0.05	0.03	0.08	0.18	0.02	0.02	0.17	0.05	0.01	0.05	0.07	0.06	1.17	1.23	0.32
Terrace house	0.04	0.09	0.15	0.10	0.06	0.04	0.10	0.01	0.03	-0.06	0.03	0.06	0.06	1.00	-0.45	0.80
Block of flats	0.09	0.08	0.04	0.12	0.07	0.08	0.10	0.08	0.06	0.04	0.04	0.08	0.03	2.67	0.04	-0.15
Lock up shops	0.00	0.04	0.17	0.36	0.04	0.07	0.21	-0.05	0.15	-0.17	0.04	0.08	0.15	0.53	0.24	0.52
Office apartment & open offices	0.06	0.09	0.07	0.06	0.08	0.08	0.07	0.00	0.04	0.02	0.04	0.06	0.03	2.00	-1.04	0.27
Average	0.06	0.08	0.05	0.13	0.09	0.05	0.10	0.07	0.06	-0.03	0.04	0.07	0.06	1.71	-0.19	0.35

Source: Field Survey 2017

The correlation coefficients measuring the degree of relationship of total returns among the properties were displayed in Table 3 showing how the mix of property typology can bring about an improved performance of the property-investment in the study area. However, the result shows the mixture of zero, negative and positive relationships between the combinations of property-types.

Generally, all the property-types have strong positive return relationship, except little ones with a weak positive relationship or a weak negative relationship. Detached-house without boy's quarter has no relationship whatsoever with semi-detached duplex with boy's quarter. However, the

combination of the block of flats and detached-house without boy's quarter (0.877) will impart a corresponding positive return performance than detached-duplex with boy's quarter (0.003). Semi-detached duplex and office apartment/open office shall have inverse return relationship (-0.227) when combine by an investor, likewise if semi-detached duplex with the terrace-house (-0.065). There exists also a negative relationship between semi-detached duplex with boy's quarter and office apartment/open offices (-0.089).

4.2 Degree of return relationship between property-types

Table 3: Correlation matrix of total return on property-type basis

	DH- BQ	DH+BQ	SDH- BQ	SDH+BQ	DD+BQ	SDD- BQ	SDD+BQ	TH	BOF	LOS	OA&OO
DH-BQ	1.000										
DH+BQ	.650	1.000									
SDH-BQ	.060	.237	1.000								
SDH+BQ	.737	.480	.374	1.000							
DD+BQ	.504	.493	.570	.298	1.000						
SDD-BQ	.464	.208	.457	.774	.286	1.000					
SDD+BQ	.346	.000	.302	.798	.003*	.605	1.000				
TH	.452	.271	.528	.226	.648	.055	-.065**	1.000			
BOF	.877*	.685	.110	.610	.562	.580	.192	.292	1.000		
LOS	.631	.549	.348	.248	.710	.047	-.121	.766	.554	1.000	
OA&OO	.364	.590	.266	.210	.265	-.089	-.227**	.669	.229	.430	1.000

* Strongest positive and weakest positive relationship ** strongest negative and weakest negative relationship

Source: Field Survey 2017

Analysis of property-return with macroeconomic-variables

To evaluate and determine the main driver of return on property-investment among the considered macroeconomic variables, the yearly mean returns (as previously analyzed) were regressed on yearly mean of the macroeconomic-variables. Table 4 reflects that all the variables experienced the mixture of rise and fall and it could be deduced that none of the variables maintained uniform rise or fall during the study period. This seems to be in agreement with the findings of previous studies that the pattern of property-returns performance is cyclical in nature, probably due to varied investment indigenous traits.

Table 4: Rate of return and the macroeconomics-variables

YEAR	RET	INT	INF	GDP	UEM	EXC
2007	6.00	16.94	6.33	15.10	14.70	125.75
2008	8.00	15.14	7.88	23.00	19.70	118.99
2009	5.00	18.99	13.03	-19.11	9.70	118.99
2010	13.00	17.59	13.26	34.50	21.50	151.09
2011	9.00	16.02	12.10	9.00	23.90	155.79
2012	5.00	16.79	11.48	8.50	16.21	159.05
2013	10.00	16.72	10.26	6.50	12.83	159.27
2014	7.00	16.55	8.08	7.10	7.83	164.88
2015	6.00	16.85	8.48	-14.60	8.19	195.52
2016	-3.00	16.82	12.27	14.58	13.90	253.49

Source: Field Survey (2017)

RET represents property-return, **INT** represents the interest-rate, **INF** represents the inflation-rate, **GDP** represents the gross domestic product, **UEM** represents the unemployment-rate, **EXC** represents the currency exchange-rate and **FDI** represents the foreign direct investment.

Table 5 reflects positive and negative correlations of the coefficients of the variables. Although, relating the return to all macroeconomic variables, return has strongest positive relationship of 0.463 with the gross domestic product, the strongest positive relationship of 0.494 exists between the inflation rate and interest rate. Also, coefficients of the variables indicate a strong negative relationship (-0.706) between unemployment rate and GDP and between return and exchange rate (-0.613).

Table 5: Correlation coefficients of return and macroeconomic-variables

The variables	Return	Interest rate	Inflation rate	Gross domestic product	Unemployment rate	Exchange rate
Return	1.000					
Interest rate	-.119	1.000				
Inflation rate	-.102	.494	1.000			
Gross domestic product	.463	-.336	.081	1.000		
Unemployment rate	-.449	-.396	.312	-.706*	1.000	
Exchange rate	-.613	-.077	.220	-.115	-.218	1.000

*Correlation is significant at the 0.05 level (1-tailed). Source: Field Survey (2017)

This result suggested that the currency exchange rate has a strong negative relationship with the return on property-investment. However, return further has negative weak relationship with the interest rate (-0.119), inflation rate (-0.102) and unemployment (-0.449), but positive relationship with GDP (0.463).

The variables were further subjected to regression analysis where the results indicated in Table 6 that the coefficient of determination R² is 0.539 which is seen to have a high explanatory power and interpreted that the five macroeconomic-variables explained 53.90% of variation in return of investment-properties in the study area. However, the remaining 46.10% is to be explained by other factors not included in this study. Durbin-Watson (D) statistic was used to confirm the in-dependency of the residuals and absence of auto-correlation that can hinder the accuracy of the regression and this is calculated as 1.98 in the model. Since the D-statistic is greater than R² this indicates no sign of spurious in regression, this fall in the range its critical value (1.645; 2.355) at 0.05 indicating that there is no significant auto-correlation or residual serial correlation in the model that may call for unit root test. The results further showed that each of the independent variables contributed differently to the variation in property-return. Beta coefficients measure the sensitivity of return to each of these five macroeconomic-variables together with the constant of 8.890. The model for the return and macroeconomic-variables is therefore presented as:

$$MR = 8.890 + 0.191INT - 0.120INF + 0.063GDP - 0.091UEM - 0.036EXC \dots\dots\dots(8)$$

Having positive effects are the beta coefficients of 0.191 for interest rate, and 0.063 for GDP. This suggests that an increase of a unit of interest rate and GDP will correspond with 19.10% and 6.3% increases in property return respectively. This confirms the earlier result of Udoekanem et al. (2015) that GDP is a driver of return on investment properties in Nigeria.

The result on inflation variable translates that a unit decrease in the inflation rate will correspond with an increase in return by 12%; a unit decrease in the currency exchange rate will correspond with 3.6% increase in return while a unit decrease in unemployment rate will correspond with 9.1% increase in property-return. On the negative influence are the inflation rate (-0.120), exchange rate (-0.036) and unemployment rate (-0.091).

Table 6: Model evaluating the macroeconomic contribution to property return

Model	Abuja Property Return	Macro-Economic Variables	Coefficient	T	Sig.
R	0.735	(Constant)	8.890	0.263	.805
R Square	0.539	Interest Rate (INT)	0.191	0.099	.926
Adjusted R Squar	-0.036	Inflation Rate (INF)	-0.120	0-.150	.888
Std. Error	2.919	Gross Domestic Product (GDP)	0.063	0.614	.572
F- statistic	2.178	Unemployment Rate (UEM)	-0.091	0.224	.834
P	0.040	Exchange Rate (EXC)	-0.036	-1.090	.337
D Statistics	1.986				

Source: Field survey, 2017

Discussion of results

Noted variations in the reward characteristics of property type in this study is a sign of caution for investors not to accept a generalized reward characteristics specified for investment property. Rather, they will need to study the varying characteristics of each property reward in terms of yield, return, risk and return/risk analysis. Also, the established relationship between pair of property typology will guide the investors in determining the property type that can be combined and the ones that cannot, for improved investment performance. Relating the property return to the macroeconomic variables, the result on interest rate as the main driver of property return in the study area is expected on the mortgage driven property-investment because the interest rate and investment-return is inversely related. The more the interest rate, the less likely the investment-return and vice versa. A mortgage driven investment may strive well at a reduced interest rate than at a higher interest rate. Thus, if the interest rate is higher, it may deep into the investment profit in form of reduction of the net rental income, prolong the payback period or make the investment not re coup-able with a great effect on property-return. GDP positive growth rate as next driver of property return indicates that as level of economic activities in Nigeria increases, more transactions take place to influence the ability to pay for occupation of investment-properties by occupiers which may in turn leads to a subsequent increase in return to the property owners. The statistically significant relationship between return and currency exchange rate might be due to the Central Bank of Nigeria foreign exchange policies that negatively impacted on currency exchange rate by widening the gap between the official and parallel market rates of Naira to Dollar and other currencies; having a great effect on the inflow of foreign direct investment fund into Nigeria economy. The decrease in unemployment is an indication of increase in household income, ability and willingness to spend on goods and services, hence, a reduced unemployment rate attracts increase in property-

return. It needs stressing that the Nigerian Economic Recovery and Growth Plan (FGN, 2017) anticipates a reduction of unemployment rate in Nigeria from 13.90% in 2017 to 11.23% in 2020. In summary, while there is notable corresponding relationship between the return on property and macroeconomic variables through their correlation and regression, the coefficients in the model generally explain the investment-property return. However, the model suggests that none of these macroeconomic-variables specifically determines or explains the return of investment-properties in the study area because none of them is statistically significant (the t-statistics and the significant level in Table 6).

CONCLUSION

The study examined the returns characteristics of investment-properties on typology basis in Abuja, Nigeria and quantified the impact of macroeconomic-variables on them. The result showed a constant yield range for the study area, but variations in the return, risk and return/risk among the property-types. The results further showed that except the terrace house, returns on most property-types do not correspond with their risks and detached house with boy's quarter exhibits an out-performance over all other property-types. Relationships of returns among the property-types indicate a strong positive and a weak negative relationship between most pairs. The notable variation between the yield and return on property may mean that investors must not rely solely on the yield of an investment analysis as their investment guide, rather they should extend to its return characteristics generally. Despite the observed variations in the return characteristics in the study area, an appropriate mix of property-types can still bring about improved performance benefit to the investors. However, in relation to the economy, property-return exhibits a strong negative relationship with the currency exchange rate and a weak negative relationship with interest rate, interest rate and GDP attempt to be the main drivers of property return, but in real sense of it, none of the macroeconomic variables statistically explain or drive return on the property during the study period. This study has therefore contributed to the literature on Nigeria property-investment analysis by exposing the Abuja property market dynamics that can enhance decision making of investors towards an improved market rewards analysis. It will also guide the investors in the reduction of wide gap between investment expectation and actualization through appropriate and specific investment prescriptions. This seems to be one of the few studies on Abuja property market that combined direct property-type approach of reward analysis and explored its sensitivity to the Nigerian national economy. However, due to the emerging nature of the property market, the study is limited to investment-properties with a minimum of ten years period, a small data-set. The model derived from the study explains the real estate return generally, but it cannot be used to explain the macroeconomic variables. Capital return element of the total return analysis was based on appraisal and estimates, not transaction based. Nevertheless, the highlighted limitation of this study do not invalidate the results therein but points a direction for further researches.

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ISSN 2414-0236



9 772414 023609