

Estate Surveyors and Valuers' Perception of the Role of Big Data in Property Marketing in Lagos, Nigeria

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Abstract

Property marketing in Nigeria has frequently been characterised by unique challenges due to inadequate and unreliable data. In recent times, big data has presented a wide range of solutions to contemporary issues in different industries, including real estate. Notwithstanding, there is a paucity of practical studies on the role of big data in property marketing of many developing nations, including Nigeria. Hence, there is a need to investigate the role of big data in transforming property marketing in Nigeria. The aim of this study is therefore to investigate Estate Surveyors and Valuers' (ESVs) perception of the role of big data in property marketing in Lagos, Nigeria. 82 questionnaires were administered to ESVs in the study area and 55 (67%) of them were found useful for analysis. The data were analysed using frequency, percentage, mean and relative importance index. The results revealed that out of 9 possible roles of big data in property marketing, the 2 most notable ones are that real estate firms can execute laser-focused marketing strategies; and they can match demand with supply. These outcomes distinctly disclosed the merits of adopting big data in marketing properties. The implication of these findings is that big data has the potential of reducing fraud due to the presence of sufficient and reliable data in the property market. This study concludes that big data is a worthy addition to the toolset of real estate practitioners, particularly with respect to property marketing, and wholly recommends its adoption.

Keywords: Big data, property, marketing, perspective, Nigeria

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01.0 INTRODUCTION

Over the course of time, data has been proven to be an extremely valuable asset to man. Data has been used in different fields of study to accomplish various tasks and achieve certain goals. Ajibola and Ogungbemi (2011) emphasized that precise, authentic and timely data is essential to both individuals and organizations for making accurate decisions. Winson-Geideman and Krause (2016) further stated that data is an important element in all aspects of life in our world. Over the past few decades, as devices and methods for more effectively capturing, storing, and analyzing data have been created, its sheer volume has grown significantly.

Big data is a modern concept, one that has created solutions to several modern-day challenges. Winson-Geideman and Krause (2016) stressed that big data is a phenomenon worth investigating, because of the expected benefits of mining data. These benefits include a deeper understanding of human behaviour, lifestyle and habits. Boyd and Crawford (2012) stated that big data technology is poised to revolutionise the way we think about various fields of research, ranging from the social sciences to the medical sciences to the environmental sciences, specifically estate management.

Big data has engendered innovative solutions to challenges in the estate management field. Brown et al. (2011) affirmed that big data has the potential to benefit both sellers and buyers of real estate by allowing direct data sharing without the use of estate agents. In Australia, Winson-Geideman and Krause (2016) also stated that it has been used to estimate property values based on media reaction and internet search keywords. In the United States, Wu and Brynjolfsson (2015) demonstrated the effectiveness of big data by analysing Google search trends. They constructed a model that outperformed the National Association of Realtors' house price projections by more than 20% using the data they obtained. According to Onwuanyi (2020), it allows investors to choose the best locations for projects targeting high customer traffic; and it allows for easier trend identification and more accurate predictions.

Given all the benefits of big data in real estate practice, a number of studies have focused on how it may be applied to different areas of the profession. For instance, in property management (Tarmidi et al., 2018 in Malaysia); asset management (Machado, 2019 in Italy); disaster management (Munawar et al., 2020 in Australia); predicting real estate prices (Grybauskas et al., 2021 in Lithuania), among others. In Nigeria, a number of studies have also been conducted. In particular, Aihie (2019) looked into the necessity for Nigerian real estate professionals to embrace PropTech as a means of bridging the technological divide that could harm the industry. Later, Onwuanyi (2020)

assessed the problem of property data inaccessibility and inadequacy in Nigeria. The paper concluded that the property data dilemma in Nigeria goes beyond property market data. More recently, Mohammed and Bello (2021) also scrutinised the impact of information and communication technology on real estate management and valuation in order to develop a more sustainable real estate practice.

Arising from the above reviews, it is obvious that extant studies have dealt on issues relating to the impact of big data on the real estate profession. However, as far as we can tell, no published study focused on the application of big data in property marketing. Moreover, the majority of these studies did not seek the opinion of ESVs, one of the key stakeholders in the real estate market who act as property investment advisers to investors in the property market. They are key because they help people make one of the largest investment decisions of their lives (Patel, 2019). Also, most of the studies in Nigeria are limited to the application of big data in property management and valuation, thus it appears that the positive impact of big data in real estate practice - particularly in property marketing - has not been fully researched. It is based on the foregoing that this research is set to investigate the perception of ESVs on how big data can be applied in property marketing in Lagos State, Nigeria. This research adds to the compendium of knowledge by expanding the understanding of the use of big data in property marketing among ESVs in the Nigerian real estate market.

02.0 LITERATURE REVIEW

Property marketing in Nigeria has always been filled with a lot of hurdles. As stated by Akomolede (2006) and Oni (2010), the issues faced by the Nigerian property market are quite numerous. Some of these include the absence of collaboration between estate firms, competition from unregistered agents (quacks), and even threats from certain local laws such as the Lagos State Estate Agency Law 2007, Economic and Financial Crimes Commission Act, Lagos State Land Use Charge Law 2001 and Money Laundering Act. Other challenges that have arisen include differences in opinion on perceived value, as well as a lack of proper training for active ESVs, gazumping, gazundering and topping up of rent/price, among others. These issues are regarded as unethical in the practice and according to Oni (2010), each one presents grievous negative impact on sustainable real estate practice in the country.

Aside from the aforementioned issues, there is also the issue of data inaccuracy. One of the most pressing issues for market participants and policymakers who rely on price signals to make choices, according to Lum (2004), is the accurate monitoring of real estate price movements. Accuracy is an issue due to the inherent unpredictability of all property market data. According to Dunse et al. (1998), the unique location of each building, the physical layout, neighbourhood characteristics, and other similar factors, like convenience - as assessed by proximity to the city centre or public transport services - all pose assessment problems that are yet to be resolved. Ajibola and Ogungbemi (2011) went on to say that in recent years, the absence of precise data to help with property decisions has been generally recognised. Property investment transactions (letting, valuation and sales) depend on accessible and up-to-date data, the lack of which would mar the efficacy of advisories and reports prepared by estate surveyors.

According to Oni and Adebayo (2012), the obstacles experienced in the Nigerian real estate sector are only surmountable if there is a strong desire and willingness to embrace innovative methods to address these concerns. The efforts of the Nigerian Institution of Estate Surveyors and Valuers (NIESV) and the Estate Surveyors and Valuers Registration Board of Nigeria (ESVARBON) must be maintained in order to ensure a sustainable real estate practice that is upright, desirable, practicable, and enriching not only in this day and age, but also in the future. This is to ensure that future generations of professionals will be able to succeed in the profession without any hindrance.

2.1 Concept of Big Data

The concept of big data has received much attention from researchers in real estate practice around the world. In China, for example, Du et al. (2014) showed how big data has provided considerable support for property development. A study by Wu and Brynjolfsson (2015) in the United States focused on how effective big data has been after analysing Google search trends on different properties. With the data collected, they created a model that exceeded the National Association of Realtors' home price predictions by more than 20%. In India, Apoorva et al. (2017) analyzed how data collected from road transportation agencies and analysed by big data techniques could be used for several purposes like avoiding traffic and lowering cab fares in areas with high demand. Also, a contribution by Li, Xing, Liu, et al. (2017) in Hong Kong demonstrated how big data analytics might perfectly capture customer intentions and preferences, aid recommendations tailored to consumer demand, and therefore improve purchasing power.

2.2 Sources of Big Data

Big data can be in the form of structured, unstructured, as well as semi-structured data accumulating in data stores from a variety of sources (Kareem et al., 2021; Saleh et al., 2018). Bekker (2017) is of the opinion that there are two sources of big data: internal sources (e.g. internal documents, sensors, website logs etc.) and external sources (e.g. social media, official statistics, weather forecast etc.). In the words of Sharma (2021), big data is produced from 3 main sources: machine data (all data derived from multiple sources such as logs, road cameras, smart sensors, medical devices and wearables, Security Information and Event Management (SIEM) platforms, Internet of Things (IoT) devices, and so on); social data (which includes data from social media platforms like Facebook, Instagram, Twitter, Youtube etc.); and transactional data (e.g. data on location, product price, transaction time, products purchased, payment methods etc.). According to Kareem et al. (2021), big data sources include online sales transaction data, user feedback, social media posts, email messages, marketing data, and a variety of other log data which are related - directly and indirectly - to an organisation's business processes. Supporting this view, Bhadani and Jothimani (2016) commented that social media and video surveillance are also viable sources of big data due to technological advancements that have resulted in a high rate of data generation. The paper stated that these sources can be used to analyse customer behavioural patterns. Padmavalli (2016) classified the sources of big data into six major categories, namely: enterprise data, transactional data, social media, activity generated, public data and archive. TechTarget (2022) is of the opinion that big data comes from

countless sources such as email, customer databases, medical records, documents, internet clickstream logs, social networks, mobile apps, images, audio and video files, amongst others. In the words of George et al. (2014), big data can be gotten from search engine queries, tweets and other social networking posts, digitized documents, videos, audio files, photographs, e-mails, phone records, Radio-Frequency Identification (RFID) tags, text messages and financial transaction records. These authors emphasised that data is produced every time things are done online, leaving a digital trail that others can mine for useful information. Joshi (2017) added that amongst these sources, media is the most preferred source of big data, because it provides significant insights into consumer preferences and changing trends. Media, according to the author, includes social media and interactive platforms, like Twitter, Youtube, Google, Instagram, Facebook, as well as generic media such as photographs, audios and videos that provide quantitative and qualitative insights into all areas of user involvement.

In the light of the above reviews, the focus of the study is limited to the following sources of big data: social media, website links, website logs, geographic information system (GIS), sensors, radio-frequency identification (RFID) scans, official statistics (e.g. from the Bureau of Statistics), internal documents, text messages and email.

2.3 Application of Big Data in the Real Estate Profession

Many researchers that have contributed to the concept of big data in real estate practice have shown that it can be applied in different areas of the profession. Several commentators (e.g. Donner et al., 2018; Kok et al., 2017; Oluwunmi et al., 2019; Velpuri & Pidugu, 2016; Winson-Geideman & Krause, 2016) gave the following areas where it can be applied: data digitisation, sensor information on movement, information on user choices, sensor information on the urban environment, identification of risks, forecasting property values, project reporting, geographic information system, automated property appraisals and crowdsourcing.

2.4 Role of Big Data in Property Marketing

The role played by big data in the real estate industry has been linked to the development of Automated Valuation Models (AVMs) which avail practitioners of instant estimates of property value; this saves the precious time and other resources of both lenders and investors, as well as potential buyers of a single property (Kok et al., 2017). Some other roles are the discernment of the space-time patterns of housing prices, particularly in a big metropolis (Li, Ye, Lee, et al., 2017); risk reduction and improved customer engagement (Machado, 2019; Kharchenko, 2019; Treistman, 2020); budget management and safer transactions (James, 2020); provision of tools to broaden, diversify, and equalize housing search information (Boeing et al., 2021); provision of algorithms to match demand with supply of properties for sale, and accurate information on a property - e.g. insurance claims, historical usage, demographics of the property's neighbourhood, crime rates and the trajectory of home prices in the area (Kharchenko, 2019); datafication of real estate processes and capture of valuable data about buyers' market preferences (Braesemann & Baum, 2020); provision of deep insights into specific properties, predicting customer behaviour and forecasting market trends (Barber, 2020) and increasing the capacity of the real estate sector to innovate and persist on a transformative trajectory, particularly with respect to other sectors of the economy (Barber, 2020; Sergey, 2021). In the words of Treistman (2020), big data helps to refine an audience and target prospective buyers, track visitors' activity on websites, track interaction with online adverts, analyse the behaviour of buyers, their budgets and even their degree of commitment to completing a transaction. According to Starr et al. (2021) in property management specifically, big data helps to automate routine tasks, thereby increasing the productivity of manpower and simultaneously lowering labour costs. It also provides solutions for precautionary interventions.

In the light of the above, it is obvious that previous research efforts have looked at how big data can aid real estate marketing. However, to the best of the authors' knowledge, none of the past studies were carried out in Nigeria, a developing nation. Hence, there is little knowledge in Nigeria in this area of research. This is part of the gap the current study attempts to fill by investigating the perception of ESVs on the role of big data in property marketing in Lagos, Nigeria.

2.5 Hindrances to the Adoption of Big Data in the Real Estate Industry

Challenges in the adoption of big data can be enormous. According to sources like Beguy (2016), UNESCO Institute of Statistics (2021), Johnson (2021) and Onwuanyi (2020), it can be surmised that big data may have limited impact in real estate practice unless some of its adoption challenges are addressed. From existing literature, some of the prominent challenges associated with the adoption of big data are identified and summarised in Table 1.

Table 1 Hindrances to the adoption of big data in the real estate industry

S/N	Challenges	Sources
1	Security challenges	Benjelloun and Lahcen (2015); Boyd and Crawford (2011); Espinosa et al. (2019); Kalra et al. (2014); Kareem et al. (2021); Kim et al. (2013); Lu et al. (2013); Moreno et al. (2016); Saleh et al. (2018); Tarekgn and Munaye (2016); Venkatraman and Venkatraman (2019)
2	Choosing from the wide range of available big data analytics software can be a daunting task	Bhadani and Jothimani (2016); Kalra et al. (2014); Saleh et al. (2018)
3	Lack of in-house data scientists and the high cost of engaging experienced ones	Espinosa et al. (2019); Kalra et al. (2014); Machado (2019); Saleh et al. (2018)
4	Big data takes a substantial investment of time, effort, and resources for proper maintenance	Kalra et al. (2014); Saleh et al. (2018)

From Table 1, evidently, earlier studies have examined the challenges encountered in the real estate industry with respect to big data adoption. However, to the best of the authors' knowledge, no such research has been done with respect to a developing country such as Nigeria. Hence, it demonstrates an urgency for a study of this nature.

03.0 METHODOLOGY

The quantitative nature of the data sought in this study requires the use of a cross-sectional survey research design. This method has the added benefit of a relatively lower cost of data collection. Questionnaires were administered to Estate Surveyors and Valuers (ESVs) within Ikeja, Lagos State. Ikeja was chosen because it is one of three major stratifications of the Lagos property market (Akeju et al., 2021). Moreover, the study sought the perception of ESVs because they are one of the most important stakeholders of the property market, helping people make some of the largest investment decisions of their lives (Patel, 2019). Also, according to Onwuanyi (2020), they are the major users of data in the property market. From the 2020 online NIESV directory of registered firms, there are 82 firms located in the study area. Therefore, one ESV per firm constituted the study population and the sampling frame. Since the total number of firms is less than 100, one ESV in each of the firms was sampled. This falls in line with the counsel of Watson (2001) who proposed the use of a sample of 50% of the population for a population above 100 and 100% for a population below 100. A structured questionnaire designed by the researchers was used to gather data for the study. The questionnaire for the study has two sections, A and B. Section A's questions focus on the profile of study participants, while the latter section put forward questions on the level of awareness of big data among ESVs in the study area, role and sources of big data, level of adoption, and hindrances to the adoption of big data in property marketing. The scale of measurement used is a 5-point Likert type. The data obtained from the questionnaires was collated using a statistical tool, known as Statistical Package for Social Science (SPSS) and analyzed using descriptive analysis. Frequencies and percentages were used to show the distribution of the participants according to their profiles, level of awareness, level of adoption and sources of big data for property marketing. In addition, Relative Importance Index (RII) and mean were used to analyze questions relating to the role of big data in property marketing and hindrances to its adoption in property marketing. The results of the analyses are displayed in tables. Out of the 82 questionnaires administered, 55 (representing 67%) were correctly filled and found useful for analysis.

04.0 RESULTS AND DISCUSSION OF THE ANALYSIS

4.1 Profile of Respondents

Table 2 shows the results for the profile of each of the participants based on gender, age, academic qualification, professional qualification and years of experience.

Table 2 Profile of ESVs

S/N	Characteristics	Sub-headings	Frequency	Percentage
1	Gender	Male	38	69
		Female	17	31
2	Age	21 - 30 years	25	45
		31 - 40 years	21	38
		41 - 50 years	7	13
		51 - 60 years	1	2
		Above 60 years	1	2
3	Academic Qualification	HND	17	31
		B.Sc	27	49
		M.Sc	11	20
4	Professional Qualification	Probationer	20	36
		ANIVS	34	62
		FNIVS	1	2
5	Years of Experience	1 - 5 years	30	55
		6 - 10 years	16	29
		11 - 20 years	8	14
		21 - 30 years	1	2

According to Table 2, the gender distribution of the respondents showed that 69% are male while 31% are female; this implies that most of the Estate Surveying and Valuation firms in the study area have more male ESVs. This may be expected considering that the profession is a male-dominated one. The table also revealed the age distribution of the respondents. The majority (83%) of them are within the age range of 21 - 40 years, while others are 41 - 50 years (13%), 51 - 60 years (2%) and above 60 years (2%). This shows that the responses from the respondents can be relied upon as all of them are adults.

Table 2 further shows the academic and professional qualifications of the respondents. Most of them are HND/B.Sc holders (80%) and probationer/associate (98%). It can therefore be inferred that they are knowledgeable enough both academically and professionally to provide accurate responses to the questions. Finally, analysis on the years of experience of the respondents revealed that 84% of them have 1 - 10 years of experience while the remainder (16%) have 11 - 30 years of experience.

4.2 ESVs' Level of Awareness of Big Data

An analysis of the level of awareness of big data among respondents shows that the majority (83%) of ESVs in the study area are aware of the term. This is not surprising as a good number of the Continuous Professional Development programmes organised by the professional body (NIESV) after the COVID-19 pandemic-induced lockdown of March 2020 have focused on how ESVs can incorporate modern technologies into their services. Such technologies include drone, virtual reality, big data and artificial intelligence, among others.

4.3 Sources of Big Data for Property Marketing

ESVs in the study area were asked to indicate which of the 10 possible sources of big data (earlier selected in the study) they utilise. Table 3 depicts their responses. From the analysis, their major sources of data are text messages (100%), internal documents (93%), email (91%), social media (80%) and website links (76%). As seen in the table, they did not source much data from geographic information system (GIS), sensors and radio-frequency identification (RFID) scans that ranked 8th, 9th and 10th respectively.

Table 3 Sources of big data for marketing property

Big Data Sources	Sub-headings	Frequency	Percentage	Ranking
Text messages	Yes	55	100	1 st
	No	0	0	
Internal documents	Yes	51	93	2 nd
	No	4	7	
Email	Yes	50	91	3 rd
	No	5	9	
Social media (videos, audio files, chat, pictures etc.)	Yes	44	80	4 th
	No	11	20	
Website links	Yes	42	76	5 th
	No	13	24	
Website logs	Yes	27	49	6 th
	No	28	51	
Official statistics, e.g. Bureau of Statistics	Yes	21	38	7 th
	No	34	62	
Geographic information system (GIS)	Yes	15	27	8 th
	No	40	73	
Sensors	Yes	2	4	9 th
	No	53	96	
Radio-frequency identification (RFID) Scans	Yes	0	0	10 th
	No	55	100	

4.4 Level of Adoption of Big Data in Property Marketing in the Study Area

The researchers, after ascertaining the respondents' familiarity with the role of big data in property marketing, sought to know the level of adoption among ESVs in the study area. Their level of adoption was ranked using a five-point Likert scale of 5 = "Every time", 4 = "Almost Every time", 3 = "Occasionally", 2 = "Almost Never" and 1 = "Never". Table 4 shows their views.

Table 4 Level of adoption of big data in property marketing

S/N	Level of Adoption	5	4	3	2	1	Mean	Remark
1	Internal documents	42	13	0	0	0	4.76	Every time
2	Text messages	40	15	0	0	0	4.72	Every time
3	Social media	25	21	9	0	0	4.29	Almost Every time
4	Email	20	27	7	1	0	4.20	Almost Every time
5	GIS	0	25	26	4	0	3.38	Occasionally
6	Website links	0	26	22	5	2	3.31	Occasionally
7	Official statistics	0	24	24	4	3	3.25	Occasionally
8	Sensors	2	3	19	21	10	2.38	Almost Never
9	Website logs	0	2	10	30	13	2.02	Almost Never
10	RFID scans	0	0	5	10	40	1.36	Never

From the analysis, the ESVs use internal documents and text messages every time while they use social media and email almost every time. The analysis further shows that they occasionally use GIS, website links and Official Statistics. Finally, they almost never use sensors and website logs while they never use radio-frequency identification (RFID) scans in marketing real estate. The implication of this is that their level of adoption of big data seems to be low, since a majority of the sources of big data are hardly used every time.

4.5 Roles of Big Data in Property Marketing

Table 5 displays the result of nine areas identified from a literature review of the roles of big data in property marketing in the study area. Based on the relative importance indices (RII), it is obvious that six of the roles are the most important. The two most important roles

include the fact that: real estate firms can leverage big data to foster targeted marketing (RII=0.90); and big data enables firms to match demand with supply (RII=0.89). This result does not come as a surprise considering the outcome of existing studies of Kharchenko (2019), Treistman (2020) and Barber (2020) which revealed that big data can provide adequate information for real estate markets. With this information, estate firms would be able to anticipate the needs of customers and meet these needs more creatively, thereby improving customer satisfaction. The next most essential roles are that big data systems provide a better understanding of market characteristics (RII=0.85); and it has the ability to provide precise behavioural patterns based on browsing habits of prospects (RII=0.84). Notably, previous authors (Ajibola & Ogungbemi, 2011; Dunse et al., 1998; Lum, 2004) had observed that data inaccuracy and absence of reliable data thrives in the real estate profession. These might help to explain why the second most important roles identified in this study are related closely to provision of sufficient and reliable data. The last 2 in order of importance are greater security in the property market because of the influx of information (RII=0.76); and quicker market trends identification (e.g. where demand is high), which is valuable information to investors (RII=0.76). These are directly linked to the second most important roles of big data in property marketing identified in this study. These outcomes support the findings from previous studies (Barber, 2020; Kharchenko, 2019; Oluwunmi et al. 2019; Treistman, 2020) that showed that big data has brought about much positive impact on the real estate profession. However, according to respondents they are not convinced that big data will enable ESVs to broaden their products, presenting clients with other value-added services (RII =0.51).

Table 5 Roles of big data in property marketing

S/N	Roles of Big Data in Property Marketing	SA	A	U	SD	D	RII	Rank
1	Foster targeted marketing	34	17	2	1	1	0.90	1 st
2	Match demand with supply	21	29	5	5	0	0.89	2 nd
3	Grasp market characteristics	21	29	4	1	0	0.85	3 rd
4	Produce precise behavioural patterns of patterns	20	27	7	1	0	0.84	4 th
5	Greater secure in the property market	14	25	8	7	1	0.76	5 th
6	Quicker market trends identification	5	36	13	1	0	0.76	5 th
7	Provide detailed information	2	18	20	10	5	0.61	7 th
8	Fosters greater efficiency	1	15	25	11	3	0.60	8 th
9	Drives value-based service offerings	0	5	22	26	2	0.51	9 th

Note: 5 = strongly agree (SA); 4 = agree (A); 3 = uncertain (U); 2 = disagree (D) and 1 = strongly disagree (SD).

4.6 Hindrances to the Adoption of Big Data in Property Marketing

It is obvious from the previous analyses (Tables 3 to 5) that big data is not new to ESVs in the study area. The question then is: why are they not leveraging the amazing benefits of big data in Nigeria? This question was posed to the participants of the study and their responses were analysed using a 5-point Likert scale. The researchers assigned 5 to strongly agree (SA), 4 to agree (A), 3 to uncertain (U), 2 to disagree (D) and 1 to strongly disagree (SD). Table 6 shows the details of their responses.

Table 6 Hindrances to the adoption of big data in property marketing

S/N	Hindrance to the Adoption of Big Data in Property Marketing	SA	A	U	D	SD	Mean	Rank
1	Choosing from the wide range of available big data analytics software in the market can be a daunting task	40	10	5	0	0	4.64	1 st
2	Lack of in-house data scientists and the high cost of engaging experienced ones	35	15	3	2	0	4.51	2 nd
3	Big data systems present unique security challenges	34	17	2	1	1	4.49	3 rd
4	Big data takes a substantial investment of time, effort, and resources for proper maintenance	13	35	5	2	0	4.07	4 th

The analysis in Table 6 on the hindrances to the adoption of big data for property marketing shows that the major hindrance is the inability of ESVs to choose from the wide range of available analytics software in the market (mean = 4.64). This is closely followed by lack of in-house data scientists and the high cost of engaging experienced ones (mean = 4.51), data security challenges (mean = 4.49) and the fact that big data takes a substantial investment of time, effort, and resources for proper maintenance (mean = 4.07). This confirms the findings of previous studies (Cope & Kalantzis, 2016; Esomonu et al., 2020; Macfadyen et al., 2014) that showed that security issues, low level of infrastructural development and technical know-how and lack of trained ICT officers among others are the major problems of utilizing big data.

05.0 CONCLUSION AND RECOMMENDATIONS

In this study, the researchers investigated the role of big data and hindrances to its adoption in the real estate market in Nigeria. Based on the results, two key conclusions can be drawn.

First, nine roles of big data were investigated in this study, out of which six are significant in property marketing in Nigeria. These six roles centre on the provision of sufficient and reliable data. With adequate information, property dealings will be transparent thereby reducing the threat of fraud. Based on this, the researchers recommend that the use of big data should be encouraged in property marketing

as it would add value to the real estate profession in Nigeria. Hence, it will be a worthy addition to the tool-set of real estate practitioners, particularly with respect to property marketing.

The second conclusion is that the most significant hindrances to the usage of big data in property marketing revolve around lack of expertise and security concerns. To surmount these hindrances, the authors proffer the following recommendations:

1. Owners of estate firms in Nigeria should send ESVs in their employment to training workshops, both local and international, where skills on managing big data platforms competently could be gained.
2. Furthermore, to curb security challenges, firms should engage the services of cyber security consultants to perform regular security audits of their big data systems.

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