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Awareness-based indicators of the potential adoption of blockchain technology by real estate practitioners in Lagos, Nigeria

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Abstract

Purpose – This study examined the awareness-based indicators of the adoption potential of blockchain technology (BCT) by real estate practitioners in Lagos, Nigeria. Specifically, the study assessed the level of awareness of BCT in real estate practices among real estate professionals in real estate firms. The study also examined the relationship between the profile of the professionals and the real estate firms, and the level of awareness of BCT.

Design/methodology/approach – The data were elicited using a mixed-method approach. Closed-ended questionnaires were administered to 252 real estate firms and 139(55.2%) were retrieved. Also, 10 real estate professionals with BCT knowledge for over 5 years were interviewed. Data were analysed using mean, frequency, percentage, Kruskal–Wallis H test and content analysis.

Findings – The study revealed that BCT awareness in the Lagos property market is low. The real estate professionals were mostly familiar with basic BCT terms. The professionals had a higher level of awareness of BCT applicability for real estate agency and property management compared to other areas of real estate practices. While the main source of BCT awareness was through tech blogs, news/magazines/articles and colleagues, the level of awareness was higher in Lagos Island than in Lagos Mainland and Ikeja. The study found that the cadre of employees and the location of firms had an influence on the level of awareness of BCT, with *p*-values of 0.019 and 0.002 respectively. There was no significant difference between BCT awareness and other real estate firms' profiles and the socioeconomic characteristics of real estate professionals.

Practical implications – The study offers insights into the awareness-based indicators of BCT in real estate practice in the Lagos property market. The results are useful to real estate firms and professional bodies in developing awareness-based programmes on the application of BCT in various areas of real estate practice.

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Originality/value – This study contributes to the literature on BCT in the real estate domain by assessing the knowledge of the real estate practitioners on BCT. This study will be the first effort to assess the level of BCT awareness in the Lagos property market.

Keywords Awareness, BCT, Real estate practice, Real estate firms, Technology, Innovation

Paper type Research article

1. Introduction

Digital transformation has transformed traditional industries rapidly. The new wave of innovation termed the Fourth Industrial Revolution (IR 4.0) has led to the emergence of new business models and value-creation opportunities (Schwab, 2016). Blockchain is one of the primary technologies driving this change. Blockchain comprises a series of digital records, or "blocks," linked together via cryptography. Each block is verifiable and essentially immutable; it is usually managed in a peer-to-peer network and is accessible to both public and private parties. Blockchain technology (BCT) facilitates transactions without the need of an intermediary (Yli-Huumo *et al.*, 2016; Deepak *et al.*, 2024), enabling new and innovative consumer and business solutions through the provision of transparent, tamper-proof and secure platforms (Andoni *et al.*, 2019).

BCT has three major types, which include private (permissioned), public (permissionless) and hybrid, depending on accessibility and control mechanism. The private or permissioned BCT enables the development of a private network with specific participants and roles (Martinovic *et al.*, 2017). This type of BCT is suited for sectors that demand security and confidentiality in their practice, such as the real estate sector. The second type of BCT, known as public or permissionless BCT, is an open-source setting that gives everyone access to utilise it (Bozic *et al.*, 2016). This type of BCT can encourage accountability and transparency in real estate practice. Finally, hybrid BCT combines the elements of both private and public BCT (Li *et al.*, 2017). It is suited for organisations that collaborate on projects.

The recent evolution, BCT 4.0, seeks to resolve technical limitations around scalability, throughput and latency that previously hindered widespread commercial adoption, unlocking new capabilities and use cases at an industrial scale (Joshi *et al.*, 2022). BCT 4.0 has been marked by substantial advancements and enhancements in the technology (Mourtzis *et al.*, 2023), which promise even more advanced capabilities and renders it more suitable for industrial applications. Many sectors have started using BCT to address different challenges facing the industries. For instance, inventory management and smart credit in the supply chain (Yu *et al.*, 2022), electronic medical records sharing for remote patient monitoring, health insurance claims, and drug supply chains in the health sector (Fekih and Lahami, 2020), finance and insurance issues in agro-industry. BCT also has the potential to transform the real estate sector, especially resolving some challenges facing the Nigerian property market (Olawumni, 2023).

Real estate sector in developing countries such as Nigeria is facing complex challenges undermining real estate transaction integrity and market efficiency. These challenges stem from an intricate interplay of historical, legal and practical barriers persistently affecting the real estate market (Ekemode *et al.*, 2019). BCT has emerged as a potential solution to address these challenges (Adilieme *et al.*, 2024). By providing an immutable, decentralised record of all transactions and relevant details, BCT can resolve significant issues in real estate practice such as transparency, inefficient and secure transactions (Ekemode *et al.*, 2019), land disputes (Singh, 2020), data and land information management (Pankratov *et al.*, 2020), delay and high cost of transaction (Hoxha and Sadiku, 2019). Furthermore, BCT creates opportunities for fractural property ownership, efficient management of transactions (Baum, 2020) and the use of smart contracts in real estate practice (Pankratov *et al.*, 2020).

Despite these promising prospects, the real estate industry has demonstrated a notable reluctance to fully embrace BCT (Xu *et al.*, 2019; Saari *et al.*, 2022a, b). This hesitancy stems from the sector's historical resistance to technological change (Poleva and Sjögren, 2016; Aihie, 2019) and widespread misconceptions about the technology being confused with

cryptocurrencies (Yusri, 2018). Although there are studies in various sectors including supply chain (Mathivathanan *et al*., 2021), insurance (Ravichandra *et al*., 2024), education (Jadhav *et al*., 2023) and healthcare (Sharma and Joshi, 2021), research on real estate professionals' awareness of BCT remains limited. This study addresses these gaps by investigating how firm profiles such as age, staff strength and ownership structure influence BCT awareness in Lagos State's real estate sector. Unlike previous studies that focused primarily on technological capabilities or implementation frameworks, this research uniquely examines the awareness-based indicators of the potential adoption of BCT in the Nigerian real estate context. Furthermore, while existing literature has predominantly employed single-method approaches and focused on developed markets, this study adopts a mixed-methods design to provide a more comprehensive knowledge of BCT awareness dynamics in an emerging market context.

A mixed-methods approach provides a comprehensive understanding of BCT awareness by integrating qualitative insights into contextual factors with quantitative data on the level of awareness (Fekih and Lahami, 2020; Sharma and Joshi, 2021). This research aims to contribute to both the understanding and practical implementation of BCT in developing real estate markets. Hence, this paper provides answers to the following research questions:

RQ1. What is the profile of the professionals and real estate firms in Lagos State?

RQ2. What is the level of awareness of BCT in real estate practices among real estate firms in the study area?

RQ3. What is the relationship between the profile of the professionals, the real estate firms and the level of awareness of BCT in the study area?

2. Literature review

The literature review is divided into five sections. The first section presents BCT key features, the second section examines the benefits of BCT in real estate practice, the third section addresses the level of awareness among real estate practitioners. The fourth section presents a review of extant studies on the level of awareness among stakeholders and the fifth discusses the study area, the Lagos real estate market.

2.1 Blockchain technology key features

BCT key features include Peer2Peer (P2P), Transparency, Smart Contract, Immutability, Distributed Ledger Technology (DLT), DApps, Public Private Keys, Private Public Hybrid BCT, Consensus Mechanism (Rajendran *et al*., 2023).

There are three major forms of BCT, including private, public and hybrid BCT. Private blockchain is the one in which only authorized parties can create or verify transactions on the network (Jirgensons and Kapenieks, 2018). Public blockchain is a an open-source BCT that is available to everyone who wants to utilise it and take part in it (Bozic *et al*., 2016). The hybrid blockchain combines the elements of both public and private blockchain (Alkhateeb *et al*., 2022). In BCT, public and private keys are important to BCT security (Lindqvist *et al*., 2021). Public keys are address that can be shared openly for receiving digital assets while private keys are unique phrases that must be kept secretly. Private keys help the owner to have control over their assets and authorise transactions.

In the BCT framework, smart contracts are self-executing, and self-verifying agreements written in code, deployed on a blockchain to carry out actions when certain conditions are met (Alharby *et al*., 2018). Similarly, DApps refers to autonomous programmes which operate on a blockchain or decentralized network of computers. The decentralised framework of DApp supports their special characteristics such as transparency and immutability (Iglesias, 2023). Transparency implies that the actions and transactions on the blockchain are visible to everyone, while immutability means that records on the blockchain cannot be changed.

BCT operates on a DLT, which functions as a shared ledger, and available to the participants (nodes) within the network (Wouda and Opdenakker, 2019). Furthermore, the network facilitates Peer2Peer transactions, a kind of transaction that is carried out without the involvement of third parties, between two or more nodes. The transaction in P2P is validated according to a standard specific consensus mechanism. The consensus mechanism validates transactions. It refers to authentication method which creates new blocks when sets of predetermined validation are met (Wouda and Opdenakker, 2019).

2.2 Benefits of BCT in real estate practice

BCT is still nascent in the real estate sector (Oluwatofumi and Hahn, 2021). Studies have shown that the adoption of BCT can improve various aspects of real estate practice, including property management, transaction processes (Garcia-Teruel, 2020) and land administration (Beznosov *et al.*, 2021), including property rights registration, asset tokenization and lease management (Joshi *et al.*, 2022). The decentralized and immutable nature of BCT provides a robust solution to longstanding challenges in real estate, addressing critical issues of vulnerability, processing delays and security concerns (Adilieme *et al.*, 2024). It is also capable of increasing transparency, reliability and efficiency, and substantially reducing costs, fraud and bureaucracy in real estate transactions (Akoguhi and Bhavsingh, 2023).

Smart contracts, a core BCT feature, further enhance these benefits by automating processes and enabling unprecedented levels of transparency and auditability in real estate operations (Akoguhi and Bhavsingh, 2023; Jasimin *et al.*, 2023). According to Garcia-Teruel (2020), the integration of smart contracts with BCT can streamline procedures, enable cross-border transactions, and facilitate interconnectivity between public administration systems. These technological capabilities suggest a paradigm shift in how real estate transactions could be conceptualised and executed. Despite these benefits, the promising landscape is tempered by significant challenges, such as the level of awareness among real estate practitioners, especially in emerging markets such as Nigeria.

2.3 Level of awareness among real estate practitioners

Past studies have largely revealed a low awareness and understanding among real estate practitioners as a critical barrier to the integration of the BCT. A qualitative study by Adilieme *et al.* (2024) revealed that there was a generally low BCT awareness among property valuers in Nigeria. In the construction industry, Aliu *et al.* (2024) also found that awareness and adoption of distributed ledger technology (DLT) are generally low. Other awareness-related concepts used in other studies are knowledge and understanding. For example, Vergouwen *et al.* (2020) identified a fundamental lack of knowledge as a significant barrier to BCT adoption in the Netherlands.

This awareness gap represents more than a simple knowledge deficit; it reflects deeper structural and psychological resistance to technological transformation (Lindholm, 2021). Yeoh *et al.* (2024) discovered that trust and perceived usefulness are more critical in driving adoption than purely technological considerations. This finding suggests that technological integration is fundamentally a human-centred process, requiring more than technical excellence. Similarly, Lindholm (2021) revealed that only 16% of real estate firms in Finland were actively piloting or implementing BCT solutions, indicating a significant gap between technological potential and practical implementation. This resistance to technological adoption could have stemmed from the complex interplay of technological unfamiliarity, organisational inertia and a fundamental misunderstanding of BCT's transformative potential.

BCT possesses a complex ecosystem of technological potential and institutional resistance owing to the low level of awareness. Where awareness barriers have been surmounted, the potential of BCT in real estate extends far beyond theoretical speculation, promising a fundamental reimagining of real estate practice.

2.4 Review of extant studies

Olawumi *et al.* (2021) emphasized the significant importance of stakeholder awareness and satisfaction in driving BCT adoption. The path to technological integration is not through technological imposition but through comprehensive education and increased awareness. In other sector such as accounting, Surana and Bhanawat (2022) investigated the knowledge and awareness of BCT-based accounting systems within the community of accounting professionals. The results indicated that while accounting professionals were somewhat aware of BCT, uncertainty about its practical application persists, which could be attributed to a lack of technical skills.

Furthermore, Owraigbo and Onah (2023) discovered that university libraries barely use BCT and that librarians often have low levels of awareness. Radanovic *et al.* (2018) highlighted a significant ignorance of BCT among medical students at Zagreb Medical School, with most students reportedly having no previous knowledge of blockchain. There were clear gender differences, with male students displaying a higher level of knowledge. Informed students recognised the potential impact of blockchain on daily life, especially in the medical and healthcare fields, despite the minimal awareness of the technology.

Peprah *et al.* (2022) study in West African businesses demonstrated a significant level of blockchain awareness and application within the region's accounting cycles. This indicates a proactive integration of the technology, revealing a substantial understanding among businesses about its benefits, including cost savings, improved digital identity and enhanced security. Salleh *et al.* (2022) revealed that most zakat payers, exhibit limited awareness of blockchain due to a lack of transactional experience with it. Sokołowski *et al.* (2023) revealed comparable levels of awareness across diverse economic sectors, with only significant differences observed in correlation with the digital or non-digital generational categorisation of the participants. Jayathilake and Seneviratne (2022) found that auditors generally knew very little about BCT, which could be a barrier to its successful application in Sri Lankan audit trails.

While these studies provide valuable insights into the general awareness levels across various sectors and demographics, a critical gap persists in understanding the level of awareness of real estate professionals on BCT-specific contexts within emerging markets, particularly the Nigerian real estate sector. Existing research predominantly focuses on international contexts, overlooking the unique dynamics of rapidly evolving markets like Lagos. This gap represents more than a geographical limitation; it signifies a potential missed opportunity to understand technological awareness in complex, developing real estate environments.

2.5 The study setting: Lagos State, Nigeria

Lagos State is ranked the second most populous state in Nigeria with a population of over 16 million (Otegbulu, 2017). Lagos State is the commercial nerve of Nigeria with vibrant economic activities and business hubs. The real estate market in Lagos State is the most active when compared to other states in Nigeria (Otegbulu, 2017). The Lagos real estate market is very active in terms of development and transactions (Famuyiwa, 2022). The Lagos property market has emerged as a viable hub for investors. However, the Lagos State real estate market is facing a persistent problem in terms of the property data bank (Abere *et al.*, 2018). Hence, the real estate market requires a systematic approach to reach its full potential (Famuyiwa, 2022).

The lack of transparency in property transactions, leading to unreliable data often undermines trust in real estate firms' operations (Ekemode *et al.*, 2019). Investors and lenders struggle to evaluate risks properly without access to verified data, limiting the opportunities for market growth. Lack of transparency and inaccurate records impede tasks such as verifying information, managing clients, tracking maintenance and coordinating service providers in Lagos State. The BCT has emerged as a potential solution to address data bank and integrity issues, lack of transparency and inefficient processes undermining the Lagos real estate market. Despite the potential of the BCT, the level of awareness still seems a major factor

towards the adoption of the BCT in the real estate sector. This paper addresses the issue of awareness of BCT in real estate practice with a particular focus on the Lagos real estate market. It is hoped that, with increased awareness among practitioners, the gains of BCT adoption can be accelerated especially in emerging real estate markets.

3. Methodology

The study employed a mixed research approach. The study population consists of registered real estate firms in Lagos State. According to the Nigeria Institution of Estate Surveyors and Valuers (NIESV) Directory (2023), there are 415 practising real estate firms in Lagos State. The Lagos market is stratified into three strata based on the NIESV directory. The stratified population consists of 156, 170 and 89 real estate firms in Lagos Mainland, Lagos Island and Ikeja, respectively. To reduce sampling bias, and ensure that each stratum is proportionally represented in the sample, stratified sampling was employed. From the submission of Watson (2001) and Denscombe (2003), the sampling frame for this study, consisted of 78 in Lagos Mainland and 89 real estate firms in Lagos Island, which represent 50% of the sample frame, while total enumeration (89) was adopted in Ikeja. One senior real estate professional from each firm was sampled. The response rate was 62.9%, 49.4% and 52.6% for Ikeja, Lagos Island and Lagos Mainland, respectively.

The data collected through questionnaires included the profile of both the firms and the real estate professionals. In addition, data on the level of awareness of real estate professionals were collected. The data for this objective included the familiarity of the respondents with BCT, how long have they been familiar with BCT, their source(s) of knowledge and knowledge-based information related to BCT. The questionnaire collected data relating to the socio-economic characteristics of the real estate practitioners and the profile of the real estate firms. Furthermore, it obtains questions on the respondents' level of awareness, years of familiarity with BCT, sources of knowledge and familiarity with BCT application in several real estate practices. Finally, the familiarity with some key BCT terminology was asked.

Also, qualitative data were obtained through semi-structured interviews with 10 purposively selected real estate professionals who were knowledgeable and experienced with the potential of BCT in real estate practice. The interview guide includes questions on sources of knowledge about BCT and familiarity with BCT applications in various real estate practices. The selection of the real estate professionals allowed for the sequential exploration of data collected through the questionnaire. The data collected supported the data collected through a questionnaire on the awareness of BCT in real estate practice.

To ensure the validity of the research instruments, a pilot study was conducted on 12 senior real estate practitioners (4 across the three strata). The pilot helped in setting the content validity of the tools, confirming that there was no ambiguity, and setting the mean time to complete. Based on feedback, several of the items were revised to improve, order and coherence with the research goal. Furthermore, the questionnaire was reviewed by two research professionals with knowledge of technology and research methods, and one real estate professional, who validated the relevance and coverage. The feedback was used for the final review before the questionnaires were administered. The interview guide consisted of open-ended questions, which were used to complement the quantitative findings.

Percentages and frequencies were used to analyse data obtained from the socioeconomic characteristics of real estate professionals and real estate firms' profiles. Also, mean rating was used to analyse questions on the profile of real estate firms and awareness of real estate professionals. A 5-Likert scale was used in the study for questions on the awareness of real estate professionals. The data collected using the 5-point Likert scale were statistically synthesised and described using the weighted mean. The mean interpretation was adapted from Nyutu *et al.* (2021).

1.00 to 1.80 - Very Low Level.

1.81 to 2.60 - Low Level.

2.61 to 3.40 - Average Level.
3.41 to 4.20 - High Level.
4.21 to 5.00 - Very High Level.

The Kruskal–Wallis *H* test, a non-parametric approach, was further used to assess the relationship between the profile of the practitioners, real estate firms and the level of awareness.

4. Findings and discussion of results

4.1 Socioeconomic characteristics of respondents

4.1.1 Real estate professionals. The analysis of the respondents' profiles is presented in Table 1. The analysis showed that the distribution of gender revealed that most respondents (81.3%) were male, while 18.7% were female. This observation suggests a significant gender imbalance in the real estate profession, with a predominance of male professionals. This may

Table 1. Socioeconomic characteristics of real estate professionals

Socio-economic characteristics	Variables	Frequency	Percentage
Gender	Male	113	81.3
	Female	26	18.7
	Total	*139*	*100.0*
Highest academic qualification	H.N.D.	45	32.4
	B.Sc.	52	37.4
	M.Sc.	33	23.7
	Ph.D.	6	4.3
	Others	1	0.7
	No response	2	1.4
	Total	*139*	*100.0*
Years of experience	1–5	38	27.3
	6–10	37	26.6
	11–15	23	16.5
	16–20	20	14.4
	21 and above	17	12.2
	No response	4	2.9
	Total	*139*	*100.0*
Position in the firm	Principal/Senior Partner	30	21.6
	Managing Partner	17	12.2
	Associate Partner	12	8.6
	Head of Practice	13	9.4
	Branch Manager	4	2.9
	Senior Surveyor	45	32.4
	Estate Officers	13	9.4
	No Response	5	3.6
	Total	*139*	*100.0*
Professional qualification	Probate/Graduate (NIESV)	36	25.9
	Associate (NIESV)	51	36.7
	Fellow (NIESV)	9	6.5
	RSV	27	19.4
	RICS student	3	2.2
	MRICS	2	1.4
	FRICS	1	0.7

Note(s): HND – Higher National Diploma; B.Sc. – Bachelor of Science; M.Sc. – Master of Science; PhD – Doctor of Philosophy; NIESV – Nigerian Institution of Estate Surveyors and Valuers; RSV – Registered Surveyor; RICS – Royal Institution of Chartered Surveyors; MRICS – Associate Member of RICS; FRIC – Fellow Member of RICS

Source(s): Authors' own work

reflect the hectic nature of real estate professionals, which makes employers prefer male genders. The findings corroborate Poon and Brownlow (2016), who posited that the real estate industry is a male-gender dominant.

Academic qualification results showed that most respondents hold a bachelor's degree (37.4%), followed by an HND (32.4%) and then a master's (23.7%), with the least holding a PhD (4.3%). The result showed a fair balance in academic qualifications between HND and B.Sc. holders. The years of experience indicated that the majority had 1–5 years (27.3%), followed by 6–10 years (26.6%), 11–15 years (16.5%), 16–20 years (14.4%) and 21 and above (12.2%) while 2.9% do not respond. Cumulatively, a significant proportion (43.1%) had over 10 years of experience in their firms, suggesting that the responses provided by the respondents could be reliable. The result suggests that there is a balanced mix of more experienced professionals and less-experienced estate surveyors and valuers in the Lagos property market. This diversity can foster knowledge transfer, mentorship opportunities and a balance between innovative ideas and established practices.

The result regarding the position of the respondents in the firm revealed that most of the respondents were senior surveyors (32.4%), followed by partners/principal surveyors (21.6%), 12.2% were managing partners of the firms, 9.4% were head of practice, 9.4% were estate officer positions, 8.6% were associate partners, 2.9% were branch managers and 3.6% did not respond. The predominance of senior positions and partners/principal surveyors showed that the respondents had adequate knowledge to respond to the survey.

For the professional qualifications, the multiple-choice responses showed the percentage of each professional qualification out of the total respondents. The majority were Associate members (ANIVS) (36.7%), followed by Probate/Graduate (NIESV) (25.9%) members, then RSV (19.4%). A smaller proportion were Fellow (NIESV) (6.5%), RICS student/trainee (2.2%), MRICS (1.4%) and FRICS (0.7%). In summary, most of the respondents are experienced and professionally qualified, and the reliability of their opinions is therefore not in doubt.

4.1.2 Profile of real estate firms. The profile of the real estate firms (Table 2) showed that 41.0% of the real estate firms were on Lagos Island while 29.5% were on Lagos Mainland and Ikeja respectively. Most real estate firms (58.3%) were owned by sole proprietors, while partnerships accounted for 31.7%. The majority (38.1%) of firms were over 20 years old, followed by firms aged 11–15 years (16.7%), 16–20 years (14.3%) and less than 6 years (21.4%). Additionally, 9.5% of firms were between 6 and 10 years old. The result revealed that most of the firms were young (1–5 years). This implies that the younger real estate firms may adopt BCT to compete with the established firms. Previous studies confirmed that the age of firms could influence the adoption of technology such as BCT (Karlsson, 2021; Handoyo *et al.*, 2023). Regarding the current total value of property portfolios under management, the majority (69.1%) of firms had a portfolio above 100 million Naira. This implies that most of the real estate firms may have the financial capacity to embrace BCT in their firms. The cost of the BCT may not be an issue for the adoption of BCT especially for bigger firms. For the number of employees, the majority (51.1%) of the firms had less than 10 employees. This can limit the adoption of BCT. Most firms employ few numbers of real estate professionals and most of them do not have IT professionals.

Analysis of geographical scope showed that while 26.8% of the real estate firms operate in several locations in Lagos, 19.5% operate in a single location in Lagos, while 24.4% operate in other states in Nigeria. Additionally, 14.6% operate regionally and 7.3% operate internationally. Overall, substantial number of the firms had a wider coverage beyond a single location. This could necessitate the adoption of BCT by firms that need to improve their data and knowledge sharing and collaborations. Foreign direct investment (FDI) refers to investment made by an individual or a company based in one country into business interests located in another country. The analysis regarding FDI showed that a substantial number of firms (37.4%) in Lagos State did not have FDI. This may discourage investment in BCT, since only a small number of firms had international clients or investors which could necessitate the use of a transparent and secure platform such as BCT.

Table 2. Profile of firms

Firm profile		Frequency	Percentage
Location	Lagos Island	57	41.0
	Lagos Mainland	41	29.5
	Ikeja	41	29.5
	Total	*139*	*100.0*
Ownership structure	Sole Proprietorship	81	58.3
	Partnership	44	31.7
	Limited Liability Company	11	7.9
	No Response	3	2.2
	Total	*139*	*100.0*
Firm age	Less than 6	25	18.0
	6 to 10	20	14.4
	11 to 15	21	15.1
	16 to 20	16	11.5
	Above 20	56	40.3
	No Response	1	0.7
	Total	*139*	*100.0*
Current total value of property portfolio	Under 10 M	16	11.5
	10 M–<50 M	10	7.2
	50 M–<100 M	11	7.9
	Above 100 M	96	69.1
	No Response	6	4.3
	Total	*139*	*100.0*
Number of employees	Less than 10	71	51.1
	10–49	36	25.9
	50–100	13	9.4
	Above 100	17	12.2
	No Response	2	1.4
	Total	*139*	*100.0*
Geographical scope	1 Location in Lagos	27	19.4
	Several Locations in Lagos	34	24.5
	Other States in Nigeria	40	28.8
	Regional Operation	20	14.4
	International	10	7.2
	No Response	8	5.8
	Total	*139*	*100.0*
Foreign direct investment	None	52	37.4
	Less than 4	35	25.2
	4–7	23	16.5
	8–11	5	3.6
	12–15	1	0.7
	Above 15	11	7.9
	No Response	12	8.6
	Total	*139*	*100.0*

Note(s): The type of client is a multiple choice. The percentage for the type of client is calculated as the frequency of each option/total number of respondents *100

Source(s): Authors' own work

4.1.3 Profile of the interviewees. The profile details of the interviewees are presented in Table 3. The interviewees with knowledge of BCT were asked about their years of experience in real estate, knowledge of BCT, position within firm, and academic qualifications. The real estate professionals have been represented sequentially in alphanumeric form to preserve confidentiality. The letters "*RealPro*" denote "Real Estate Professionals" and the associated figures represent the individual interviewees.

Table 3. Profile of interviewees

ID	Years of experience in real estate	Years of knowledge with BCT	Position in the firm	Academic qualification
RealPro1	6 years	5 years	Senior Surveyor	BSc
RealPro2	8 years	6 years	Principal Partner	MSc
RealPro3	7 years	4 years	Senior Surveyor	MSc
RealPro4	5 years	5 years	Senior Surveyor	HND
RealPro5	7 years	4 years	Senior Surveyor	BSc
RealPro6	25 years +	6 years	Principal Partner	PhD
RealPro7	15 years	7 years	Principal Partner	MSc
RealPro8	20 years	6 years	Principal Partner	MSc
RealPro9	22 years	7 years	Principal Partner	PhD
RealPro10	17 years	6.5 years	Principal Partner	MSc

Source(s): Authors' own work

The results show that (5 of 10; 50%) had more than 10 years' experience in real estate practice. This result suggests a balance between the younger and more established real estate professionals in the knowledge of BCT. Additionally (9 of 10; 90%) had at least 5 years of knowledge in BCT. The experience includes knowledge and interaction with BCT. The result is not unexpected as BCT is still relatively new technology in real estate sector. BCT started in the year 2008, and the application of BCT in many sectors started in the middle of 2010s. The majority (6 of 10; 60%) of the interviewees were principal partners, indicating that the top management in the real estate professionals were aware of the trends in real estate. Lastly, at least 50% (5 of 10) had at least a master's (MSc) qualification. The results imply that the interviewees had adequate knowledge and professional experience to provide a reliable response.

4.2 Level of awareness of blockchain technology (BCT)

To assess the level of awareness among real estate practitioners, the respondents were asked questions relating to their familiarity and understanding of BCT. Furthermore, the source of knowledge and how long they have been familiar with BCT were asked. The respondents were further asked about their level of familiarity with some common BCT terminologies. Using Likert scale questions, the respondents were asked about their level of awareness of BCT in real estate practices.

4.2.1 Awareness of BCT in aspects of real estate practice. Before examining the awareness in aspects of real estate practice, the overall level of awareness was assessed on a 5-point Likert scale. The data were triangulated with the qualitative analysis. The results indicated a *moderate level of awareness of BCT* among real estate professionals in Lagos with a mean score of 2.82.

The result of the qualitative analysis slightly differed from the quantitative analysis. Most interviewees noted *a very low level of awareness*. However, *RealPro 7* submitted that there are varying levels among professionals and are dependent on the type of client being served by the firms, e.g. those with foreign partners. For instance, RealPro7 said that:

> [. . .] Well, if I am to represent it, let us just say probably less than 5%. [. . .]
>
> [. . .] There are such few people that, you know, that probably they have all these foreign partners due to their international exposure. You know, there's no other way to operate successfully without gravitating towards that direction [. . .]

Some other professionals explicitly confirmed that the awareness is *"extremely low," "not as it should be,"* or that *"80% of them are not aware."* For instance, *RealPro3* mentioned that:

> [. . .] We are not aware. As a matter of fact, I think real estate profession is one of the professions that does not adapt to technology easily [. . .]

The result of the study aligns with studies in other fields. For example, Jayathilake and Seneviratne (2022) found that auditors in Sri Lanka generally knew very little about BCT. However, Surana and Bhanawat (2022) found that professionals in the accounting sector are aware of BCT. This implies that awareness could be based on the environment where the business operates and the profession, as there is no consensus among professionals regarding the state of awareness across many fields globally.

The awareness of BCT in different aspects of real estate practice including agency, valuation, development, management, facility management, and finance was examined. The data were triangulated with the result of the qualitative analysis. The quantitative findings are presented in Table 4. The results show that all the areas of real estate practice have a range of mean values ranging between 3.05 and 3.49. This indicates that real estate professionals predominantly possess an *average level of awareness* of BCT across the areas of practice. Property Agency (*mean* = 3.49) ranked first, followed by Property Management (*mean* = 3.46) while finance recorded the lowest level of awareness (*mean* = 3.05).

The findings from the qualitative analysis showed that while some respondents identified some areas of real estate practice where BCT could be adopted, a few interviewees noted that BCT could be adopted across all areas of real estate practice.

For instance, *RealPro6*, *RealPro7* and *RealPro8* mentioned that BCT can be applied to all aspects of real estate practice. In the words of RealPro6:

> [. . .] We can apply to all facet of it. I'm not sure we should leave any [. . .]

From the perspective of *RealPro8*, the application area depends on awareness. RealPro8 stated that:

> [. . .] Well, I think it can fit in on everything we do. So, it all just depends on our exposure. Everybody is on the Blockchain. [. . .] Almost every aspect of real estate You can use Blockchain Technology in almost every aspect [. . .]

The findings are consistent with previous studies, Oluwumni (2023) claimed that BCT could be used for tokenized ownership, record keeping, cost reduction, smart contracts and quick transactions, which is essential for real estate agency and property finance. Furthermore, Oluwumni (2023) claimed that it can be used in land registration. This claim is further emphasised by Saari *et al.* (2022a, b) who identified four major key areas which include land administration, real estate management, tokenization and real estate transactions. More also, Saari *et al.* (2022a, b) other key areas where BCT could be implemented which include property transactions, real estate investment, leasing and renting.

4.2.2 Years of awareness and sources of awareness of real estate professionals. The years of awareness of BCT among real estate professionals are presented in Table 5. Most of the

Table 4. Level of awareness of BCT in real estate practice

Awareness of BCT	Mean	Rank	Interpretation
Property agency	3.49	1	High
Property management	3.46	2	High
Land administration	3.25	3	Averagely
Facility management	3.21	4	Averagely
Property valuation	3.18	5	Averagely
Property development	3.13	6	Averagely
Finance	3.05	7	Averagely

Source(s): Authors' own work

Table 5. Years of awareness and sources of awareness of real estate professionals

Variables		f	%
Years of awareness of real estate professionals	Less than 1 year	18	12.9
	1–3 years	86	61.9
	4–6 years	24	17.3
	7–9 years	3	2.2
	Above 9 Years	1	0.7
	No Response	7	5.0
	Total	*139*	*100.0*
Sources of awareness[a]	Tech websites/blogs	43	33.1
	Colleagues	38	29.2
	News/Articles/Magazines	38	29.2
	MCPD/Conferences	31	23.8
	Peer discussion	27	20.8
	Professional Articles or blogs	23	17.7
	Workplace Training	15	11.5
	TV/Radio	5	3.8

Note(s): [a]Multiple responses
Source(s): Authors' own work

respondents (61.9%) had been aware of BCT for 1–3 years. Only 2.2% of the overall sample fell into the 7–9 years category. The above 9-year category had the lowest representation (0.7%). The result suggests that BCT is a new concept in the real estate profession. Since BCT 3.0 started in the mid-2010s, the fact that only 20.2% of the respondents had been aware of BCT for six years indicates that the diffusion of innovations like BCT is very slow in Nigeria.

The sources of awareness (Table 5) showed that the most common source of awareness was tech websites/blogs. Tech websites/blogs are often the first point of exposure to emerging technologies like BCT, as they are quick to report on new developments and innovations. The low rating of MCPD/Conference, which are professional source, could indicate that the professional bodies are not actively involved in enlightening professionals about emerging technologies. The finding is supported by Sokołowski *et al.* (2023), who claimed that most frequent source of BCT was Internet.

From the interview responses, *RealPro8* confirmed that the professional bodies are not working towards research or dissemination of information.

> [. . .] they are not making any development towards the awareness or keeping the professional abreast of any technology or trend in the real estate industry [. . .]

The professional further claimed that the source of awareness had been the technical blogs, peer discussions and social media.

> [. . .] But for me, my sources of awareness have been the technical Blogs, and blogs peer discussions, then Social media [. . .]

Reinforcing the role of social media, *RealPro4*, submitted that:

> [. . .] Um, basically, social media. I mean, that's, that's the, it's, that's the main source of almost everything we do in life, you know, this, in this current age of time, and, you know, we get information from social media, we get new information about technology, about life, about basically everything we do, so, or everything we know. So, I, I believe social media does more of it, yeah. [. . .]

RealPro2:

> [. . .] I mean the social media. That was the first thing [. . .]

RealPro7 also shared the same source of awareness:

> [. . .] I think I heard about it on social media or something. I think it's on social media [. . .]

The second most common sources of awareness are *colleagues* and *news, articles and magazines.* This suggests that knowledge about BCT is being disseminated through both colleagues and traditional media channels. This was also identified by one of the interviewees.

RealPro1 mentioned that:

> [. . .] Friends, colleagues, and all that, that are using the Blockchain [. . .]

RealPro2 also shared the same view as the professional identified a moment of discussing with a BCT professional.

> [. . .] I reached out to the CEO of XYZ. XYZ is a Blockchain company in Nigeria. [. . .]

Emphasizing the importance of professional organisations, *RealPro5* identified professional seminars organised by RICS as the source of awareness. *RealPro5* mentioned that:

> [. . .] Well, maybe through seminars online. As chairman, while I was planning the information, I think the current chairman discussed it with somebody, then he gave us some insight into Blockchain Technology during COVID . . . that was at one RICS event, we discussed it and all that [. . .]

Furthermore, *RealPro2* said that:

> [. . .] I know there are some blogs written by RICS that talks about Blockchain Technology potential in real estate [. . .]

Academic journals and books were identified by some professionals. This indicates a written forms of information on BCT for professionals. However, the level of awareness remains low among the professionals. *RealPro3* mentioned that:

> [. . .] Okay, I thought I read it in a journal . . . There is this country that I read about . . . I read it in a journal [. . .]

The finding is supported by Sokołowski *et al*. (2023), who claimed that research papers are the least source of information of BCT.

RealPro1 further said that:

> [. . .] Even the smart contracts that some of us are, in fact, I have a, I have a, can I call it a book or journal? But I'm looking at, you know, some of the smart contracts, Blockchain, . . . I plan to read it this weekend [. . .]

Summarily, the sources of awareness include tech websites/blogs, peer discussion and professional articles and seminars by RICS. While most interviewees identified social media as one of the main sources of awareness, professional bodies may consider leveraging on this medium.

4.2.3 Awareness of blockchain technology terminologies. Before evaluating respondents' awareness of BCT terminologies, their understanding of the definition of BCT was evaluated to ascertain if the respondents truly understood the BCT. Most respondents (47.5%) correctly defined BCT as a decentralised distributed digital ledger. This showed that most of the respondents have a fundamental understanding of the BCT. A substantial percentage (33.1%) defined BCT as a database management system. A fractional proportion of respondents (6.5%) defined BCT as a type of cryptocurrency. An equal proportion of respondents (4.3%) defined BCT as either a cloud storage system or a secured record-keeping system, and professionals did not respond. These findings suggest that although a significant portion of the respondents have a good understanding of BCT as a decentralised distributed digital ledger, a considerable number of respondents still lack a comprehensive understanding. This shows that there is significant knowledge gap among the real estate professionals in Lagos State. Furthermore,

while 136 out of 139 respondents (95.7%) claimed to be aware of BCT, there are still misconceptions about BCT with other technologies and cryptocurrencies. It can be inferred that the level of awareness is still low owing to misconceptions.

The study analysed the respondents' familiarity with ten (10) key BCT terminologies (Table 6). *Bitcoin and other cryptocurrencies* recorded highest mean score (3.19), suggesting a moderate level of awareness. This is not surprising, as cryptocurrencies, particularly Bitcoin, are among the most well-known applications of BCT. This is closely followed by *Peer2Peer* (3.16) and *Transparency* (3.03), indicating *a moderate level of awareness*. These are general concepts that are not exclusive to blockchain but are fundamental to its operations. In contrast, the lowest mean scores were recorded for *Private Public Hybrid BCT* (2.66) and *Consensus Mechanisms* (2.49), indicating a moderate and slightly aware, respectively. These are more advanced or technical aspects of BCT, and the lower scores suggest that respondents are least familiar with these terms. The findings are in consolidation with the study of Tsihrintzis *et al.* (2023), indicating that the most common term related to BCT is cryptocurrencies. In conclusion, while majority had a moderate familiarity with general BCT concepts but were less familiar with the more technical aspects of BCT.

4.2.4 Awareness of the advantages of BCT in real estate practice. The respondents' perspectives on the advantages of BCT in real estate practice are presented in Table 7.

The analysis showed that *enhanced security and transparency* were the most recognised advantages, with 54 respondents (43.5%). This aligns with the fundamental characteristics of blockchain, as its decentralised and immutable nature enhances data security, while its public ledger ensures transparency in transactions. *Elimination of intermediaries* is recognised by 31 respondents (25%). Blockchain can enable peer-to-peer transactions, potentially reducing the need for intermediaries and streamlining the process. *Reduced transaction costs* are identified by 30 respondents (24.2%). By reducing intermediaries and automating processes through

Table 6. Blockchain technology terminologies

BCT terminologies	Mean	Std. deviation	Interpretation	Rank
Bitcoin and other cryptocurrencies	3.19	1.35	Moderately Aware	1
Peer2Peer	3.16	1.21	Moderately Aware	2
Transparency	3.03	1.26	Moderately Aware	3
Smart contract	2.78	1.20	Moderately Aware	4
Immutability	2.77	1.17	Moderately Aware	5
Distributed ledger	2.71	1.16	Moderately Aware	6
Dapps	2.71	1.10	Moderately Aware	7
Public private keys	2.70	1.22	Moderately Aware	8
Private public hybrid BCT	2.66	1.08	Moderately Aware	9
Consensus mechanisms	2.49	1.08	Slightly Aware	10

Source(s): Authors' own work

Table 7. Advantage of BCT in real estate practice

Advantages[a]	Frequency	Percentage
Enhanced security and transparency	54	43.5
Elimination of intermediaries	31	25.0
Reduced transaction costs	30	24.2
Decentralized and distributed ledger	25	20.2

Note(s): [a]Only the total number of respondents who are aware

Source(s): Authors' own work

smart contracts, blockchain can lower transaction costs in real estate deals. *Decentralised and distributed ledgers* are recognised by 25 respondents (20.2%). This is a fundamental aspect of blockchain that underpins its other advantages, yet it is the least recognised among the options. This indicates that some professionals understand the benefits of blockchain without fully understanding its underlying technology. This may explain why the interviewee rated the level of awareness as very low. This study is in consolidation with other studies, for example, Pathan *et al.* (2024) identified security of transaction, transparency and efficiency as the key advantages of BCT in real estate. Furthermore, Yang *et al.* (2025) confirmed that BCT for real estate could improve efficiency, cost, elimination of intermediaries and enhance security. Spiga *et al.* (2024) also claimed that BCT could improve real estate transaction.

4.3 Level of awareness based on profile of the professionals and the firms

4.3.1 Level of awareness based on profile of real estate professionals. The level of awareness of BCT based on the profiles of real estate professionals was assessed (Table 8). The awareness level was quite similar between males ($m = 2.77$; Moderately Aware) and females ($m = 2.75$; Moderately Aware). The result suggests that gender may not contribute to the level of BCT awareness since both genders showed a moderate level of awareness. However, this differs from the global study by Di Vaio *et al.* (2023) who claimed that the females are still finding it difficult in the use of BCT system, and Al Tamime (2024) confirmed that woman are underrepresented in BCT usage.

The awareness was highest among individuals with an M.Sc. ($m = 4.50$; Extremely Aware) and lowest among those with an HND ($m = 2.38$; Slightly Aware). The result revealed that a higher level of academic achievement may indicate a way of staying abreast of trends in the industry, hence, a higher level of awareness of BCT in real estate practice. The finding aligns with the claims of Bahtiyar *et al.* (2020), who revealed the willingness of the higher-class

Table 8. Awareness across socioeconomic characteristics of real estate professionals

Socioeconomic characteristics		Mean	SD	Interpretation
Gender	Male	2.77	1.07	Moderately Aware
	Female	2.75	1.17	Moderately Aware
	Average	*2.76*	*1.12*	Moderately Aware
Highest academic qualification	HND	2.38	1.02	Slightly Aware
	B.Sc.	3.09	0.83	Moderately Aware
	M.Sc.	4.50	0.71	Extremely Aware
	Ph.D.	3.17	1.2	Moderately Aware
	Others	4.00	0.00	Very Aware
	Average	*3.43*	*0.76*	*Very Aware*
Years of experience	1–5	2.50	0.86	Slightly Aware
	6–10	3.75	1.26	Very Aware
	11–15	2.67	1.03	Moderately Aware
	16–20	3.50	2.12	Very Aware
	21 and above	2.50	1.00	Slightly Aware
	Average	*2.98*	*1.25*	*Moderately Aware*
Position in the firm	Prin./Sen. Par	2.58	0.90	Slightly Aware
	Man. Partner	3.80	0.65	Moderately Aware
	Ass. Partners	3.00	1.73	Moderately Aware
	Head of Practice	2.00	0.00	Slightly Aware
	Branch Manager	2.57	0.92	Slightly Aware
	Senior Surveyor/Valuer	2.75	1.00	Moderately Aware
	Others	2.25	0.50	Slightly Aware
	Average	*2.71*	*0.82*	*Moderately Aware*

Source(s): Authors' own work

category in BCT. However, Ku-Mahamud (2019) findings claimed that education background does not play a role in involvement in BCT.

The average awareness level was highest for individuals with 6–10 years of experience (m = 3.75; Very Aware) and lowest for those with 1–5 years (m = 2.5; Slightly Aware) and those with 21 years and above (m = 2.5; Slightly Aware). The very high level of awareness of BCT among professionals with 6–10 years of experience could be attributed to the aim of trying to balance the professional experience and leveraging innovation. However, the result contradicts the findings of Ku-Mahamud *et al.* (2019) who claimed that BCT involvement does not depend on age groups.

Awareness was highest among managing partners (m = 3.8; Very Aware) and lowest among principals and senior partners (2.5789; Slightly Aware). This suggests a higher level of responsibility of the managing partners while staying abreast of the industry trends and emerging technologies. The low level of awareness of the senior partners could indicate a more focused on business strategy than innovative technologies. The finding is consistent with the study of Sokołowski *et al.* (2023), who claimed that there is no difference between in the position of employees.

4.3.2 Level of awareness of BCT based on firms' profile. The level of awareness of BCT based on the firm profiles was assessed (Table 9). The results showed that awareness level was

Table 9. Awareness across profile of the firms

Profile	Variables	Mean	SD	Interpretation
Location	Ikeja	3.00	1.14	Moderately Aware
	Lagos Island	3.50	0.71	Very Aware
	Lagos Mainland	2.20	0.79	Slightly Aware
	Average	*2.90*	0.88	*Moderately Aware*
Ownership structure	Sole Proprietor.	2.75	1.01	Moderately Aware
	Partnership	2.85	0.91	Moderately Aware
	LLC	3.00	1.27	Moderately Aware
	Average	*2.87*	*1.06*	*Moderately Aware*
Firm age	<6 years	3.26	0.92	Moderately Aware
	6–10	2.81	1.22	Moderately Aware
	11–15	2.75	1.02	Moderately Aware
	16–20	3.13	0.92	Moderately Aware
	Above 20	2.44	0.87	Slightly Aware
	Average	*2.88*	*0.99*	*Moderately Aware*
Current total value of property portfolio	<10 M	2.63	0.96	Moderately Aware
	10 M–50 M	3.10	1.10	Moderately Aware
	50 M–100 M	3.36	0.92	Moderately Aware
	>100 M	2.72	0.99	Moderately Aware
	Total	*2.95*	*0.99*	*Moderately Aware*
No. of employees	<10	2.66	0.92	Moderately Aware
	10–49	3.07	1.16	Moderately Aware
	50–100	3.00	1.20	Moderately Aware
	Over 100	2.77	0.83	Moderately Aware
	Total	*2.88*	*1.03*	*Moderately Aware*
	Average	*2.88*	*0.91*	*Moderately Aware*
Foreign direct investment	0	2.73	0.94	Moderately Aware
	Less than 4	2.91	1.07	Moderately Aware
	4–7	2.73	1.03	Moderately Aware
	8–11	2.40	0.55	Slightly Aware
	12–15	2.00	0.00	Slightly Aware
	Above 15	3.00	1.23	Moderately Aware
	Average	*2.63*	*0.80*	*Moderately Aware*

Source(s): Authors' own work

highest in Lagos Island ($m = 3.5$; Very Aware) and lowest in Mainland ($m = 2.2$; Slightly Aware). This finding corroborates Olapade *et al.* (2018), who reported found that practitioners in Lagos Island had a higher level of computer literacy compared to those in Lagos Mainland.

For ownership structure, sole proprietorship and partnership firms and LLCs were moderately aware, with mean values of 2.75, 2.85 and 3.00 respectively. The awareness is higher among LLC firms and lowest among sole proprietors, indicating consistently higher awareness among larger firms. Firms with less than 6 years of establishment, 6–10 years, 11–15 years and 16–20 years were moderately aware, with mean values of 2.81, 3.13, 2.75 and 3.26 respectively. Firms with 20 years were slightly aware with a mean value of 2.43. The awareness is higher among firms below 6 years and lowest among firms above 20 years. Firms with Current Total Valuation (CTV), between 10 and 50 M, less than 10 M, 50 M to 100 M and above 100 M were moderately aware, with mean values of, 3.10, 2.63, 3.36 and 2.72 respectively.

Firms with less than 10 employees ($m = 2.66$), 10–49 ($m = 3.07$), 50–100 ($m = 3.0$ and over 100 ($m = 2.77$) employees were moderately aware. Firms with no branches ($m = 2.90$), one branch ($m = 2.74$) and 2–5 branches ($m = 2.89$) were moderately aware. Firms with 6–9 branches had a high awareness level, with a mean value of 4.00, while firms with 10–13 branches had a very aware, with a mean value of 2.00. For foreign direct investment (FDI), firms with no FDI ($m = 2.73$), less than 4 FDIs ($m = 2.91$), 4–7 FDIs ($m = 2.73$) and above 15 FDIs ($m = 3.00$) were moderately aware. Firms with 8–11 FDIs ($m = 2.40$) and 12–15 FDIs ($m = 2.00$) were slightly aware.

4.3.3 Statistical significance difference based on profiles. The statistically significant differences in the awareness across respondents' socioeconomic characteristics and real estate firms were examined using the Kruskal–Wallis *H* test. The result of the Kruskal–Wallis *H* test as presented in Table 10 showed that there is no statistically significant difference in the level of awareness of BCT across the most of socioeconomic characteristics examined. While the descriptive statistics showed some variations in awareness levels across these characteristics, the Kruskal–Wallis *H* results suggest that these differences are not statistically significant. However, the respondent's position in the firm was statistically significant at $p = 0.019$. The results show that the *p*-values (Sig.) for the firms' profiles were not statistically significant at $p < 0.05$. This perhaps may be because BCT is still in the early stages of adoption in the Lagos property market, and the awareness levels across the real estate professionals and firm profiles may not have differed significantly. The findings differ from earlier studies such as Marengo

Table 10. Statistical difference between professionals and firms profile and awareness of BCT

Demographic	Variables	*N*	Mean rank	Kruskal-*H*	df	Sig
Position in firm	Principal/Senior Partner	30	86.90	*15.18*	*6*	*0.019*
	Managing Partner	17	54.29			
	Associate Partner	12	58.08			
	Head of Practice	13	58.69			
	Branch Manager	4	47.00			
	Senior Surveyors/Valuers	43	64.21			
	Others	12	58.92			
	Total	*131*				
Location of firm	Ikeja	54	70.21	*12.469*	*2*	*0.002*
	Lagos Island	41	81.62			
	Lagos Mainland	41	53.12			
	Total	*136*				

Source(s): Authors' own work

and Pagano (2023) which found that a firm's size and age significantly influence the awareness of BCT. The results, however, showed that location was statistically significant at $p = 0.002$.

Although the finding does not revealed variation in BCT awareness across a number of branches, current total valuation (CTV), ownership structure, firm size, firm age, number of employees and foreign direct investment. These findings were not supported by previous studies, as literature in these areas is limited. Thus, these findings contribute to a preliminary study, which needs further research for validation. However, the outcome of the firm size differs from the study of Garrison (2009), who reported a similar finding that the larger firms by number of employees have the capacity to sense new technologies like BCT than the smaller firms. Conversely, Coad and Karlsson's (2022) findings revealed that smaller firms have a higher propensity to adopt emerging technology than the larger firms. This may help give the smaller firms a competitive advantage over the bigger firms.

Similarly, the findings of Ki and Adhikari (2023) claimed that younger firms are more focused on growth and investment, which implies that they could adopt BCT and other emerging technologies to gain a competitive advantage. The preference of the younger firms for growth and innovation means that they would be more aware and more likely to adopt BCT. Meanwhile, the older firms are more stable financially, although they are less propelling to adopt disruptive technologies faster than the younger firms due to established business processes and risk aversion. This could imply that older firms could be less aware of BCT and are less likely to adopt it. The study of Garrison (2009) further showed that the number of employees could influence the awareness of BCT in the firm. The firms with more staff strength may allocate some to a dedicated research and development department. Hence, they may have a higher chance of awareness of emerging technology that could enhance the firms. However, in a larger firm, the bureaucracy in a larger firm could slow down the process of adoption despite their ability to stay abreast of new technology like BCT.

5. Conclusion

The real estate firms in Lagos State are slightly aware of BCT and were beginning to gain knowledge of BCT. However, the level of awareness for most firms relates to general terminologies of BCT, with less familiar with more technical aspects of BCT. The level of awareness of BCT was found to be high for real estate agency and property management sectors and average for other areas of real estate practice. Furthermore, the findings showed that BCT can potentially enhance the security and transparency in real estate practices.

While studies revealed that BCT could transform real estate sector, the professional level of awareness and institutional readiness remain limited. The low awareness in real estate could hinder competitive edge of real estate firms in rapidly transforming global market. The findings suggest that there is a clear need to promote awareness and education about BCT among real estate professionals. Hence, there is a need for mandatory continuing professional development programs for real estate practitioners. The educational institutions need to incorporate curriculum that align with the industry trends and digitalisation. Other skill development initiatives could also be explored by the professional bodies. Furthermore, collaboration between real estate professionals, technology providers, regulatory bodies and educational institutions could improve the level of awareness of BCT. The government could also enforce regulatory frameworks that support the adoption of BCT in real estate practice. Additionally, Lagos State Government can collaborate with property technology company to run a pilot test of BCT in real estate practice. The government can also develop a strategic roadmap for BCT adoption. Policy framework should be developed to facilitate BCT-based transaction, and smart contract. While the study has explored the awareness-based indicators of the potential of blockchain technology adoption in real estate practice in the Lagos property market, further studies could explore awareness across global markets in the Global South in comparison to the developed markets.

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