Tropical Built Environment Journal. Volume 9, No. 3, 295-308, 2023 www.tbejournal.com
ISSN: 1118-1790

EXAMINATION OF THE FACTORS AFFECTING INFORMATION AND COMMUNICATION TECHNOLOGY IN REAL ESTATE PROJECT MANAGEMENT, IN SOUTH-EAST, NIGERIA

Chiemezie C. Nwosu*, Charles C. Egolum and Esther I. Oladejo

Department of Estate Management, Nnamdi Azikiwe University, Awka Anambra State, Nigeria
*Corresponding Author: chisom.nwosu@unizik.edu.ng

Abstract

Information and Communication Technology (ICT) has become an integral part of various industries, including the real estate sector. In South-East, Nigeria, the presence and impact of ICT in real estate project management have been steadily growing. This examination aims to explore the various factors influencing the adoption and utilization of ICT in real estate project management in the South-East Nigeria. By understanding these factors, it becomes possible to identify opportunities for improvement and potential barriers to overcome. The research work adopted survey method using two different data collection instruments viz: mixture of structured and open-ended questionnaire and semi-structured interviews with the selected project teams which includes architects, quantity surveyors, real estate project managers and real estate developers were used to gather perspectives on the study. The collected data were analysed using appropriate statistical methods for the quantitative survey. The study identified a positive relationship between the use of ICT and certain aspects of its implementation. For instance, the use of ICT tools significantly enhanced the data collection process conducted by field officers in real estate management. This investigation contributed to the body of knowledge surrounding ICT adoption in real estate project management. The findings inform policymakers, practitioners, and researchers about the specific factors influencing the implementation and utilization of ICT in the South East, Nigeria context. By embracing ICT and its potential, the real estate sector can leverage technology to streamline project management practices and achieve better outcomes.

Keywords: Information and Communication Technology, Mobile Technology, Project Management, Real Estate, Technology Innovation

Introduction

Information and Communication Technology (ICT) has become an integral part of various industries, including the real estate sector. In South East, Nigeria, the presence and impact of ICT in real estate project management have been steadily growing. With over 3.0 billion smartphone users globally (Technostacks, 2019), mobile technology (MT) is becoming increasingly popular across all industries, including real estate. The use of mobile technology has expanded the application of technological platforms in almost every aspect of our lives (Baum, Saull, Breasemann, 2020). This is due to its ability to provide enhanced mobility, location-centric features, and instant access to notifications. As a result, numerous mobile apps have been developed to improve customer accessibility, serve as direct marketing channels, handle paperwork, and address specific industry challenges (Technostacks, 2019).

Mobile technology encompasses a range of applications or software programs that are specifically designed for use on mobile devices, providing instant access to specific services. These technological innovations, with their diverse functions across various areas of life, have become essential for real estate professionals aiming for efficient service delivery. Mobile technology is also seen as a ready-made solution to various real estate issues, including record keeping, data management, data retrieval and updates, letter dispatch, tenant meetings, and more. Additionally, mobile technology offers the advantage of a more flexible work environment for real estate professionals. It has revolutionized the practice of real estate by enabling data gathering, information dissemination, property search and listing, cash transactions, and more.

The use of technology has revolutionized the real estate industry, providing a range of benefits such as improved data gathering, information dissemination, property search and listing, cash flow forecast, and virtual inspection. All of these conveniences can now be accessed from the comfort of our homes or offices (Cradduck, 2013; Oyetunji, Ojo and Oyetunji, 2018). Mobile technology is also becoming increasingly prevalent in Nigeria and other developing countries. For instance, in 2020, it was estimated that between 25 and 40 million smartphone users existed in Nigeria with a population of about 200 million people (O'Dea, 2020). This rise in smartphone usage has allowed various sectors, including the financial sector, to effectively utilize mobile technology to provide services to their customers. However, the real estate sector in Nigeria and many developing countries lags behind when it comes to the adoption of mobile technology for service delivery. Despite a few real estate listing applications like Jiji.com, ToLet.com, PropertyPro.ng, and Kobo Rent, the industry as a whole has not fully embraced mobile technology (Aihie, 2019; Kakulu, 2003; Olufunso, 2020). The extent of awareness and usage of mobile technology in real estate practice in developing countries like Nigeria remains largely unknown. This is noteworthy considering the significant contribution of the Nigeria real estate sector to the country's GDP.

In recent decades, the sector's contribution to the GDP has increased from 3.5% to 13.4%, indicating an impressive annual growth rate of 11.2% (Elile, Akpan, and Raju, 2019). One area that holds great potential for enhancing project management in the real estate sector is the application of Information and Communication Technology (ICT). Globalization and advancements in technology have given rise to new challenges across various domains, including real estate project management. Practitioners in this field now confront the need to embrace new techniques and more efficient approaches to managing, tracking, and storing information. This investigation aims to explore the various factors influencing the adoption and utilization of ICT in real estate project management in the South-East region. By understanding these factors, it becomes possible to identify opportunities for improvement and potential barriers to overcome.

Literature Review

Information and communication technology

Information and Communication Technology (lCT) and Globalization are the two global phenomena that influenced the modern practice of real estate project management in many nations of the world including Nigeria. Real estate project management in Nigeria is experiencing a transformation in response to globalization. (Aluwong, 2005) said, "the Nigerian government through recent policies on trade liberation, regional integration and Information and communication technology (ICT) shows some commitment to globalization and the adoption of information technology". The world market has become homogenized, converting the domestic market into a twenty-four-hour global

market. This trend according to (Bontz, 2000) has brought an unprecedented degree of competition among nations and among business organisations.

Information and communication technology as the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numeric information by a micro-electronic based combination of computing and telecommunications; a revolution that has penetrated almost all fields of human activity, thus transforming our economic and social life (Obi and Oborah, 2001). It has been recommended that efforts be made to create a conducive environment for the acquisition and usage of ICT equipment. (Akinola, 2005) observes that, there are now net managers of information, about millions of users, corporate and individual web sites, as the flow of information globally. Nigeria as a nation is not left behind in her desire to join the global internet race. The Federal Govt of Nigeria in March 2001 approved a national ICT policy and established a National Information and communication technology Development Agency (NITDA), to oversee its implementation. The National ICT Policy has a vision of making Nigeria an ICT capable country in Africa and a key player in the information society by the year 2007, using ICT as the engine for sustainable development and global competitiveness. Also, the Information and communication technology Association of America (ITAA) defined ICT as the study design, development, Implementation, support or management of computer-based information systems, particularly software applications and computer hardware. However, ICT deals with the use of electronic computer and computer software to convert, store, protect, process, transmit, and securely retrieve information.

Adoption of ICT in the Nigerian real estate projects industry

ICT adoption occurs in various fields, including the construction, industry, community, and private domains (MacVaugh and Schiavone, 2010). This review mainly focuses on the real estate project industry (organizational level and individual level) of the adoption, which is located in the construction sector and private domain. The real estate project industry domain focuses on the macro-level of the process in which new technology is adopted. The community domain relates to the social practice in which the possible adopters are discovered. Ultimately, the private domain uses micro-level analysis to understand the individual-level procedure (Apulu, and Latham 2011), (Moshood, Adeleke, Nawanir, Bamgbade, and Ajibike, 2020). As a scale differs, the perspectives on new technology adoption under these domains vary significantly from each other. Each point-of-view offers a specific "lens" to assess how a circumstance (e.g., technological difficulty, etc.) interacts with the adoption of modern technology. These views are shaped by different benefits, rules, and standards of given fields of actions and thoughts (MacVaugh and Schiavone 2010). The symbolic meaning of the term "adoption" is presented by (Yuanguan, 2017), "Making full use of a new idea as the best course of action available." The author further claims that innovation adoption consists of a series of complex and contingent decisions. Typically, various factors are interrelated in the transfer process. Therefore, analyses of innovation adoption should (and usually do) take into consideration more than a single act. As a result, the process of innovation adoption in an organization has been divided into phases in previous studies (Apulu, and Latham 2011; Taofeeq and Adeleke, 2019).

Yuanguan (2017) put forward an information and communication technology implementation model that contains six steps, particularly investment, organizational adoption, reutilization, acceptance and adoption, adaptation, and distillation. The outcomes of each stage are described as follows:

i. **Initiation:** an ICT solution is found to match the specific demands of the organization;
ii. **Adoption:** investment decisions are made by the organization to accommodate the implementation effort;
iii. **Adaptation:** the ICT application becomes accessible to end-users in the organization and is adapted to the organizational context;
iv. **Acceptance:** the implementation of the technology is employed in the professional activities of the organization;
v. **Reutilization:** the organization's governance systems are accustomed to accounting for the ICT application and thus would not treat it as something out of the routine any longer;
vi. **Infusion:** the ICT application could realize its full potential within the organization.

Implementation of ICT in the real estate project industry

Appropriate implementation of information technologies is a key focus area that must be addressed by the construction industry. The uniqueness of the construction industry poses challenges to the implementation of automation and ICT technologies. In the face of these challenges however, there are several factors indicating that the nature of the construction industry is changing (Çaglar, 2005).

These factors include:

i. An extensive lack of skilled workers and a growing average age of the staff;
ii. An inability to attract and retain talented, educated personnel;
iii. Increased industry competition;
iv. A need for works in dangerous and inaccessible areas of operation;
v. Increased requirements on the quality of the work execution; and
vi. An increase in performance and reduction in costs is required to maintain a competitive advantage (Perkinson and Ahmad, 2006).

In addition to the above listed industry changes, owner organizations are beginning to demand access to real-time data for their own automated site inspections and these owners expect this access to be available at all times. This has put increased pressure on contractor organizations to embrace new technologies in order to remain competitive and satisfy these changing owner demands (Perkinson and Ahmad, 2006).

Indeed, the reality is that many construction organizations have already begun implementing some form of automation and/or ICT or are considering doing so in the near future. Then again, this creates the need for players in the industry to consider expanding their technology programs to include ICT technologies which will utilize real-time data including those collected onsite to improve management and decision-making functions (Hampton, 2005). According to Perkinson (2006), a construction contractor can increase his competitive advantage by integrating the automation and ICT technologies thereby creating a total jobsite management tool capable of analysing the construction project in the areas of:

i. Project performance control,
ii. Materials and equipment management, and
iii. Human resource management.

Furthermore, some notable potential advantages of integrating automation and ICT for use as a total jobsite management tool may include:

i. Real-time monitoring and documenting of construction operations,
ii. Reduced paperwork,
iii. Improved project management capabilities in terms of tracking people, equipment, and assets,
iv. Early detection and fast response time to problems,
v. Standardization of data collection and management,

vi. More accurate performance data which can be used for planning of future projects,
vii. Creation of a history or baseline for dispute resolution, and
viii. Reduced contractor reporting requirements because the owner/engineer can continuously observe what is happening onsite (Perkinson, 2006).

In effect however, it seems the traditional manual processes are still being applied for management and decision-making purposes. As such, most data produced in the field is oftentimes not recorded and not converted into meaningful information (Ligier, 2001).

Factors affecting the use of ICT in real estate project

i. **Technological Infrastructure:**
   a. Availability of reliable internet connectivity and access to electricity,
   b. Adequate hardware and software resources,
   c. Data security measures and protocols.
ii. **Education and Training:**
   a. Awareness and knowledge of ICT tools and applications among real estate professionals,
   b. Competency in utilizing ICT for project management purposes,
   c. Continuous learning and professional development opportunities,
   d. Educational background and technical skills of project managers and stakeholders play a vital role in determining the extent of ICT adoption and also lack of awareness and training on ICT tools and technologies limits their utilization in real estate project management.
iii. **Cost and Affordability:**
   a. Initial investment required for ICT infrastructure and software implementation,
   b. Ongoing maintenance and operational costs,
   c. Affordability for small-scale real estate projects
iv. **Organizational Structure and Culture:**
   a. Willingness to adapt to technological advancements,
   b. Availability of support systems for employees during the transition to ICT-based project management,
   c. Alignment of ICT adoption with overall organizational goals and strategies.
v. **Government Policies and Regulations:**
   a. Regulatory frameworks addressing data protection, privacy, and cybersecurity,
   b. Collaboration between government bodies and industry stakeholders to promote ICT utilization,
   c. Favourable regulations and policies that encourage investment in ICT infrastructure create an enabling environment for its adoption,
   d. Inadequate government support and lack of incentives for ICT development can impede progress in real estate project management.
vi. **Infrastructure**
   a. Availability of broadband internet connection is crucial for effective use of ICT. However, inadequate infrastructure, especially in rural areas, poses a significant challenge. Power supply stability is essential for uninterrupted ICT usage. Frequent power outages hinder the smooth functioning of ICT systems.
vii. **Cultural Norms:**
   a. Traditional working methods and resistance to change can hinder the integration and acceptance of ICT in project management processes. Cultural attitudes towards technology may impact the perception of the benefits and usefulness of ICT.

Other factors according to (Gyampoh-Vidogah et al 2003), most problems with information management in companies are due to the slow and cumbersome information management processes, the lack of a policy on information management in companies, cultural issues and barriers to the adoption of Information Technology (IT).

One reason for the difficulty of implementing ICT is the misalignment of current organizational structures and cultures with ICT models for integrated and collaborative work environments. This is because the construction industry is largely decentralized and composed of separate organizations, which must participate together on a project-by-project basis. The multi-participant, multi-organizational framework is a significant barrier to implementing ICT in the industry (Young and Davis, 2001).

According to the Roadcon Project (2003), different barriers have in the past restrained the take up and advanced use of different ICT tools and that these barriers need to be overcome for the industry to progress further in the exploitation of ICTs to support its business activities.

To this effect, some notable barriers such as lack of a coherent ICT strategy, Low ICT competencies and lack of resources especially in SMEs, reactive approach to ICT investment, differing demands from customers for systems and functionalities, switching costs related to replacing old systems with new integrated solutions has been cited. Furthermore, some studies have also identified various factors that explain the reluctance of the construction industry to adopt and use ICTs (Rivard, 2000).

According to (Acar *et al.,* 2005), three of these factors best characterize the overall attitude of construction firms towards ICTs. He observed that apart from technical and financial problems (e.g. continuous demand for upgrading and high investment costs); cultural and psychological factors are increasingly receiving attention as barriers to the widespread adoption of ICTs (Ba¨ckblom *et al.,* 2003). Secondly, the fact that construction professionals are often satisfied with their traditional business methods and tools is a common barrier (Doherty, 1997; Samuelson, 2002). Thirdly, there is no single magic ICT solution for the whole construction market. The type of the ICT solution required by construction firms is likely to depend on the context of the work done (Egbu and Botterill, 2002).

Concerning the last argument, (Samuelson 2002) argues that the lack of effective applications for the core businesses of contractors might be one explanation for the low use of ICTs by contractors, when compared with other parties in the construction industry. Similarly, (e-business Watch Report 2005) on the construction industry cited that, implementation of ICT collaborative systems is hampered by a number of barriers such as:

i. Legal and contractual issues regarding for example data ownership and copyright holders, the legal validity of contracts, and digital signatures Oral culture and traditions where information is typically shared face-to-face Lack of shared standards for information exchange.
ii. Lack of financial resources, ICT competencies, and knowledge about the cost and financial benefits of ICT investments (Zeng et al 2007) categorized these into organizational structures, individual behaviours and the technical requirements of data in the industry as some of the barriers that hinders the flow of information among the participants in a construction project.

These Factors can be classified as follows;

i. Financial Factors: General lack of finance, High cost of ICT investments, Maintenance cost, Budget constraints etc.
ii. **Organizational Factors**: lack of business incentives, poor ICT strategies, lack of training, lack of appropriate ICT support.
iii. Human Factors: lack of personal incentives, lack of education/training/continuous professional development, cultural issues, reluctance to changes in business processes. On the other hand, the importance given to ICT training, re-design of current processes and support from software vendors appeared as the

most critical factors for successfully implementing ICT (Isikdag *et al.*, 2008).

iv. **Technology Factors**: difficulties in using new technologies, lack of support from ICT providers (or ICT department), incompatibility/interoperability problems: lack of (use of) standards, inefficient use of software, ill-defined processes and infrastructure related problems.

v. **Legal Factors**: risks for liability, lack of legal support for use of ICT, security of ICT transactions, other issues for electronic information and documentation.

Methodology

The research work adopted survey method using two different data collection instruments viz: mixture of structured and open-ended questionnaire and semi-structured interviews with the selected project teams. The study population was limited to those practitioners in the selected study area. This study examines the opinion of architects (59), quantity surveyors (44), builders (64), real estate project managers (50) and real estate developers (83) and their experience with existing technology and the new information and communication technology. Since the total population is not much, the researcher studied the whole population. In view of this, 300 stakeholders in real estate processes in selected study areas was considered. A total of three hundred (300) copies of the questionnaire were distributed to the stakeholders in real estate project management in order to gather information for the study. Out of these, two hundred, seventy-three (273) copies of questionnaire were retrieved, representing a response rate of 91%. The data collected were subjected to a descriptive statistical analysis using, mean ranking, analysis, tables, were applied in the presentation of data and in data analysis.

The examination focuses on the South-East region of Nigeria, which includes major cities such as Awka, Owerri, and Umuahia. The study addresses key factors that affect the adoption and effectiveness of ICT in real estate project management, such as financial, human resources, technical, environmental and legal factors.

Results and Discussion

Factors affecting the use of ICT in real estate project management in south-east Nigeria

Table 1: Individual Ranking of Response on financial factors affecting use of ICT

Financial factors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Rank
High cost of employing ICT professionals	51	172	43	5	2	57.43	1
Limited benefits/Low return on investment in ICT	16	152	75	25	5	54.43	2
Cost of training professionals in ICT	69	161	34	8	1	54.11	3
Budget constraint for ICT investment	31	63	72	5	2	52.75	4
Column Total	167	648	224	43	10	-	-

Table 1 shows that 172 respondents agree that high cost of employing ICT professionals is one of the financial factors that pose hindrance to the full use of ICT in real estate project management. 51 respondents strongly agreed, 43 were neutral, 5 respondents disagreed and 1 respondent strongly disagreed that high cost of employing ICT professionals is one of the financial factors that pose hindrance to the full use of ICT in real estate project management.

The analysis shows that 152 respondents agree that limited benefits/low return on investment in ICT is one of the financial factors that pose hindrance to the full use of

ICT in real estate project management. 75 respondents were neutral, 25 respondents disagreed, 16 respondents strongly agreed and 5 respondents strongly disagreed that limited benefits/low return on investment is one of the financial factors that pose hindrance to the full use of ICT in real estate project management.

The analysis shows that 161 respondents agree that cost training professionals in ICT is one of the financial factors that pose hindrance to the full use of ICT in real estate project management. 69 respondents strongly agreed, 34 respondents were neutral, 8 respondents disagreed and 1 respondent strongly disagreed that cost training professionals in ICT is one of the financial factors that pose hindrance to the full use of ICT in real estate project management.

Also, the analysis shows that 163 respondents agreed that budget constraint for ICT investment is one of the financial factors that pose hindrance to the full use of ICT in real estate project management. 72 respondents were neutral, 31 respondents strongly agreed, 5 respondents disagreed and 2 respondents strongly disagreed that budget constraint for ICT investment is one of the financial factors that pose hindrance to the full use of ICT in real estate project management.

Table 2: Human factors affecting ICT

Human factors	S. Agree	Agree	Neutral	Disagree	S. Disagree	Mean	Rank
Lack of staff and required skill	69	157	37	7	3	71.80	1
Fear of job loss and profit making	79	142	45	6	1	55.00	2
Satisfaction of existing method of use	51	146	62	11	3	54.60	3
Lack of knowledge on return	76	181	14	2	0	54.56	4
Firms' lack of commitment	31	155	81	4	2	53.20	5
Inadequate ICT content	32	163	59	11	8	52.60	6
Column Total	338	944	298	39	17	-	-

The analysis in Table 2, 157 respondents agree that lack of staff and required skill is one of the human factors that pose hindrance to the full use of ICT in real estate project management. 69 respondents strongly agreed, 37 respondents were neutral, 7 respondents disagreed and 3 respondents strongly disagreed that lack of staff and required skill is one of the human factors that pose hindrance to the full use of ICT in real estate project management.

The analysis shows that 142 respondents agree that lack of fear of job loss- and profit-making is one of the human factors that pose hindrance to the full use of ICT in real estate project management. 79 respondents strongly agreed, 45 respondents were neutral, 6 respondents disagreed, and 1 respondent strongly disagreed that lack of fear of job loss- and profit-making is one of the human factors that pose hindrance to the full use of ICT in real estate project management.

The analysis shows that 146 respondents agree that satisfaction of existing method of use is one of the human factors that pose hindrance to the full use of ICT in real estate project management. 62 respondents were neutral, 51 respondents strongly agreed, 11 respondents disagreed and 3 respondents strongly disagreed that lack of fear of job loss- and profit-making is one of the human factors that pose hindrance to the full use of ICT in real estate project management.

The analysis shows that 181 respondents agree that lack of knowledge on return is one of the human factors that pose hindrance to the full use of ICT in real estate project management. 76 respondents strongly agreed, 14 respondents were neutral, 2 respondents disagreed, while none of the

respondent strongly disagreed that lack of knowledge on return is one of the human factors that pose hindrance to the full use of ICT in real estate project management.

The analysis shows that 155 respondents agree that firms lack of commitment is one of the human factors that pose hindrance to the full use of ICT in real estate project management. 81 respondents were neutral, 31 respondents strongly agreed, 4 respondents disagreed and 2 respondents strongly disagreed that firms lack of commitment is one of the human factors that pose hindrance to the full use of ICT in real estate project management.

The analysis shows that 163 respondents agree that inadequate ICT content is one of the human factors that pose hindrance to the full use of ICT in real estate project management. 59 respondents were neutral, 32 respondents strongly agreed, 11 respondents disagreed and 8 respondents strongly disagreed that inadequate ICT content is one of the human factors that pose hindrance to the full use of ICT in real estate project management.

Table 3: Individual ranking of response on technical factors affecting ICT

Technical factors	S. Agree	Agree	Neutral	Disagree	S. Disagree	Mean	Rank
Rapid change in ICT	41	173	52	5		62.80	1
Access to relatively cheap work force	107	109	55	1	1	54.60	2
High rate of obsolescence ICT products in the Nigerian market	29	163	75	5	1	54.51	3
Security concern/privacy	32	169	70	2	0	52.71	4
Software and hardware reliability problems	108	107	52	5	1	51.60	5
Problem of ICT integration/compatibility in the organization	31	156	72	12	2	50.60	6
Column Total	348	777	376	30	7	-	-

The analysis in Table 3 shows that 173 respondents agree that rapid change in ICT is one of the technical factors that affects the use of ICT in real estate project management. 52 respondents were neutral, 41 respondents strongly agreed, 5 respondents disagreed and 2 respondents strongly disagreed that rapid change in ICT is one of the technical factors that affects the use of ICT in real estate project management.

The analysis shows that 109 respondents agree that access to relatively cheap work force is one of the technical factors that affects the use of ICT in real estate project management. 107 respondents strongly agreed, 55 respondents were neutral, 1 respondent disagreed and 1 respondent strongly disagreed that access to relatively cheap work force is one of the technical factors that affects the use of ICT in real estate project management.

The analysis shows that 163 respondents agree that high rate of obsolescence ICT products in the Nigerian market is one of the technical factors that affects the use of ICT in real estate project management. 75 respondents were neutral, 29 respondents strongly agreed, 5 respondents disagreed and 1 respondent strongly disagreed that high rate of obsolescence ICT products in the Nigerian market is one of the technical factors that affects the use of ICT in real estate project management.

The analysis shows that 169 respondents agree that security concern/privacy is one of the technical factors that affects the use of ICT in real estate project management. 70 respondents were neutral, 32 respondents strongly agreed, 2 respondents disagreed and none of the respondent strongly disagreed that security concern/privacy is one of the

technical factors that affects the use of ICT in real estate project management.

The analysis shows that 108 respondents strongly agreed that software and hardware reliability problems is one of the technical factors that affects the use of ICT in real estate project management. 107 respondents agreed, 52 respondents were neutral, 5 respondents disagreed and 1 respondent strongly disagreed that software and hardware reliability problems is one of the technical factors that affects the use of ICT in real estate project management.

The analysis shows that 156 respondents agree that problem of ICT integration/compatibility in real estate project is one of the technical factors that affects the use of ICT in real estate project management. 72 respondents were neutral, 31 respondents strongly agreed, 12 respondents disagreed and 2 respondents strongly disagreed that problem of ICT integration/compatibility in real estate project is one of the technical factors that affects the use of ICT in real estate project management.

Table 4: Presentation of pattern of response to environmental factors as they affect use of ICT

Environmental factors	S. Agree	Agree	Neutral	Disagree	S. Disagree	Mean	Rank
Lack of adequate job in the market	20	159	81	8	5	56.76	1
Majority of clients not interested in firms ICT base	18	155	80	15	5	54.56	2
Column Total	38	314	161	23	10	-	-

The analysis in Table 4 shows that 159 respondents agree that lack of adequate job in the market is one of the environmental factors that affects the use of ICT in real estate project management. 81 respondents were neutral, 20 respondents strongly agreed, 8 respondents disagreed and 5 respondents strongly disagreed that lack of adequate job in the market is one of the environmental factors that affects the use of ICT in real estate project management.

The analysis shows that 155 respondents agree that majority of clients not interested in firms ICT base is one of the environmental factors that affects the use of ICT in real estate project management. 80 respondents were neutral, 18 respondents strongly agreed, 15 respondents disagreed and 5 respondents strongly disagreed that majority of clients not interested in firms ICT base is one of the environmental factors that affects the use of ICT in real estate project management.

Table 5: Individual opinion of respondents and ranking of response for legal factors affecting use of ICT

Legal factors	S. Agree	Agree	Neutral	Disagree	S. Disagree	Mean	Rank
Security implications of ICT transactions	18	163	82	1	9	56.80	1
Lack of legal support for use of ICT	16	14	158	46	39	54.60	2
Risk of liability	18	23	151	72	9	54.20	3
Column Total	52	200	391	119	57	-	-

The analysis in Table 5 shows that 163 respondents agree that security implications of ICT transactions is one of the legal factors that affects the use of ICT in real estate project management. 82 respondents were neutral, 18 respondents strongly agreed, 9 respondents strongly disagreed and 1 respondent disagreed that security implications of ICT transactions is one of the

legal factors that affects the use of ICT in real estate project management.

The analysis shows that 158 respondents were neutral that lack of legal support for the use of ICT is one of the legal factors that pose hindrance to the full use of ICT in real estate project management. 46 respondents disagreed, 39 respondents strongly disagreed, 16 respondents strongly agreed, 14 respondents agreed that lack of legal support for the use of ICT is one of the legal factors that pose hindrance to the full use of ICT in real estate project management.

The analysis shows that 151 respondents were neutral that risk of liability is one of the legal factors that pose hindrance to the full use of ICT in real estate project management. 72 respondents disagreed, 21 respondents agreed, 18 respondents strongly agreed, 9 respondents strongly disagreed that risk of liability is one of the legal factors that pose hindrance to the full use of ICT in real estate project management.

Interview Result Analysis

What ICT obstacles do you encounter while carrying out project implementations?

ICT project implementation faces a multitude of obstacles that require careful consideration and proactive measures. From stakeholder involvement to resource limitations and technological challenges, addressing these hurdles is essential for achieving successful project outcomes. By acknowledging these obstacles and implementing appropriate strategies, organizations can overcome the challenges and ensure smooth project delivery.

How does information communication technology affect your projects?

Information Communication Technology (ICT) greatly affects projects by providing tools and resources that enhance communication, collaboration, and efficiency. With ICT, project teams can easily share information, documents, and updates in real-time, regardless of their physical location. This allows for effective coordination and seamless collaboration among team members, enabling them to work together more efficiently.

ICT also enables project managers to gather and analyse large amounts of data quickly and accurately, facilitating informed decision-making. Tools such as project management software, cloud storage, data visualization, and communication platforms make it easier to track project progress, identify bottlenecks, and make adjustments in a timely manner.

Furthermore, ICT enables effective stakeholder engagement by providing communication channels that allow for rapid information dissemination and feedback collection. This promotes transparency, enhances the project's visibility, and encourages the involvement of various stakeholders.

In summary, Information Communication Technology has become an integral part of project management, profoundly impacting efficiency and productivity. Streamlined communication, enhanced resource management, improved data management, efficient project monitoring, global collaboration opportunities, increased efficiency, and facilitation of remote work are just a few ways ICT improves projects. While challenges exist, proper mitigation measures ensure ICT remains an asset rather than a liability in project execution. Embracing ICT allows organizations to optimize project management processes and achieve successful outcomes.

How does information and communication technology influence your projects?

Information and Communication Technology (ICT) plays a crucial role in influencing my projects. ICT enables efficient communication and collaboration, allowing for the timely exchange of information and ideas among project team members. It also provides the necessary tools and software for

project management, data analysis, and documentation, which enhance project efficiency and productivity. Additionally, ICT enables remote work capabilities, facilitating task delegation and progress tracking even when team members are geographically dispersed. Overall, ICT empowers my projects by providing the necessary infrastructure, tools, and support for streamlined project execution and successful outcomes. Information and Communication Technology (ICT) plays a crucial role in my projects as it enhances communication, facilitates data management, and enables efficient information sharing. With ICT, I am able to access a vast amount of information and resources, which helps me provide accurate and up-to-date answers. Through the use of technology, I can also collaborate and interact with users more effectively, allowing for a more seamless and responsive experience. In summary, ICT greatly influences and improves the efficiency and effectiveness of my projects.

Conclusion

Information and Communication Technology has the potential to revolutionize real estate project management in South East Nigeria. However, the study has demonstrated that there are at least four (4) financial factors, six (6) human factors, sic (6) technical factors, two (2) environmental factors and three (3) legal factors that affects the use and adoption of ICT in real estate projects. By addressing these factors through infrastructure development, skill enhancement, government support, and change management practices, stakeholders in the real estate industry can enhance their real estate project management processes and improve overall productivity.

Recommendations

Base on the findings, the following recommendations can be made for enhancing ICT adoption in real estate project management:

1. Government and private sector collaboration is needed to improve ICT infrastructure, especially in rural areas and Investment in broadband connectivity and reliable power supply should be prioritized.
2. Stakeholders should invest in training programs to enhance the technical skills of project managers in using ICT tools and technologies and also Collaboration with educational institutions can help integrate ICT into real estate management curricula.
3. Governments should create policies and incentives to attract ICT investments in the real estate sector and Regular evaluation and updates of existing regulations and policies are necessary to meet evolving technological requirements.
4. Awareness campaigns should be conducted to educate stakeholders about the benefits of ICT adoption and address cultural resistance
5. Engaging experienced change management consultants can facilitate smooth transitions towards ICT integration.

Reference

Aihie, V. U. (2019). The PropTech revolution: The imperatives for Nigeria's estate surveying and valuation professionals to catch up or get left behind. *Journal of African Real Estate Research,* 4(2), 56-75.

Akinola, C. I. (2005). The challenges of reform, information, and communication technology in business education. *Business Education, Book of Reading,*15, 11-21.

Aluwong, S. W. (2005). The place of technical and vocational education in Nigeria economic reforms. *Paper presented at the 2005 annual seminar and vocations day of the school of vocations,* F.C.E., Zaria.

Apulu, I. and Latham, A. (2011). Drivers for information and communication technology adoption: A case study of Nigerian small and medium-sized enterprises. *International Journal of Business Management*, 6(5), 51-60.

Baum, A. Saull, A. and Braesemann, F. (2020). *Prop Tech 2020: The future of real estate*. Oxford: Saïd Business School. Available at https://www.sbs.ox.ac.uk/sites/default/files/2020-02/proptech2020.pdf.

Bontz, J. E. (2000). The accounting curriculum and information technology and the 21st century account. *The Nigerian Accountant*, 33(2).

Cradduck, L. (2013). Mobile valuations: The internet's impact on traditional valuation services. *Paper presented at the 19th Annual Pacific Rim Real Estate Society Conference*, Melbourne, Australia.

Doherty J. M. (1997). A survey of computer uses in the New Zealand building and construction industry. *Journal of Information Technology in Construction*, 2, 73-86. http://www./itcon.org/1997/.

E-Business W@tch (2005). Sector report No. 08-I (July 2005) ICT and electronic business in the construction industry, key issues and case studies.

Egbu, C.O. and Botterill, K. (2002). Information technologies for knowledge management: their use and effectiveness. *Journal of Information Technology in Construction (ITcon)*, 7, 125-137.

Elile, R. U. Akpan, S. A. and Raju, V. (2019). Real estate investment performance and macroeconomic dynamics in Nigeria: A sectoral analysis. *World Journal of Research and Review*, 8(2), 18-26.

Gyampoh-Vidogah, R., Moreton, R. and Proverbs, D. (2003). Implementing information management in construction: establishing problems, concepts and practice. *Construction Innovation.* 3, 157-173.

Kakulu, I. I. (2003). *A computerized approach to real estate practice in Nigeria.* Port Harcourt: IBK Publications.

Ligier, A., Fliedner, J., Kajanen, J. and Peyret, F., (2001). Open system for road information support. Laboratoire Central des ponts et chaussées. Bouguenais Cedax. France.

MacVaugh, J. and Schiavone, F. (2010). Limits to the diffusion of innovation: A literature review and integrative model. *European Journal of Innovation Management*, 3(2), 197-221. https://doi.org/10.1108/14601061011040258.

Moshood, T. D., Adeleke, A. Q., Nawanir, G., Ajibike, W. A. and Shittu, R. A. (2020). Emerging challenges and sustainability of industry 4.0 era in the Malaysian construction industry. *International Journal of Recent Technology and Engineering*, 9(1), 1627-1634.

O'Dea, S. (2020). Smartphone users in Nigeria 2014-2025. Retrieved on 25 January 2021 from https://www.statista.com/statistics/467187/forecast-ofsmartphone-users-in-nigeria/.

Obi, C. A. and Oborah, J. O. (2001). Business education teachers as an instrument for business education. *Business Education Journal*, 3(4),112-119.

Olufunso, A. P. (2020). PropTech in Nigeria: The revolution. Retrieved on 31 May 2020 from https://lawaxis360degree.com/2019/05/14/proptech-in-nigeriathe-revolution.

Oyetunji, B. O. Ojo, B. and Oyetunji, A. K. (2018). ICT utilization status and

challenges in the Nigerian real estate practice. *Journal of Information Science, Systems and Technology,* 2(2), 28-39.

Perkinson, C. L. Ahmad, I. U. (2006). Computing Technology Usage in Construction Contractor Organizations, *Fourth LACCEI International Latin American and Caribbean Conference for Engineering and Technology (LACETTi 2006), Breaking Frontiers and Barriers in Engineering: Education, Research and Practice,21-23 June 2006, Mayagüez, Puerto Rico.*

Rivard, H. (2000). A survey on the impact of information technology on the Canadian architecture, engineering and construction industry. *Journal of Information Technology in Construction*, 5, 37-56, http://itcon.org/2000/3/.

ROADCON. (2003). Deliverable D52 "Construction ICT Roadmap" from the ROADCON project – IST-2001-37278.

Samuelson, O. (2002). IT-Barometer 2000 – The use of IT in the Nordic construction industry. *Journal of Information Technology in Construction*, 7, 1-26. (http://itcon.org/2002/1/).

Taofeeq, D. M. and Adeleke, A. Q. (2019). Factors influencing contractors risk attitude in the Malaysian construction industry. *Journal of Construction Business and Management*, *3*(2), 59–67.

Technostacks. (2019). Why use mobile apps in the real estate industry? Retrieved on 26 January 2020 from https://technostacks.com/blog/why-use-mobileapps-in-real-estate-industry.

Yuanguan, H. (2017). Cultural Dynamics of Information Communication Technology (ICT) Adoption in Construction. Ph.D. Thesis, University of Hong Kong, Pokfulam, Hong Kong, 2017.

Zeng, S. X., Lou, G. X. and Tam, V. W. Y. (2007). Managing information flow for quality improvement of projects. *Measuring Business Excellence*, 11(3), 30-40.