

# Strategies for Effective Utilisation of Information and Communication Technology in Quantity Surveying Service Delivery in Abuja

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The effectiveness of Information and Communication Technology (ICT) in any organisation is principally determined by the organisation's strategies for its usage. However, very few Quantity Surveying organisations have this strategy, and thus, Quantity Surveyors (QS) are facing health, ergonomic, professional, and practical challenges in effective utilisation of ICT tools for service delivery. This study assessed effects of ICT on Quantity Surveying service delivery with a view to developing strategies for effective and safe utilisation of ICT in Quantity Surveying practice in Abuja, Nigeria. The research adopted mixed methods methodology using well-structured questionnaires and semi-structured interviews. A total of 230 questionnaires were administered to registered Quantity Surveyors working with QS firms, Federal Government ministries, department of works, and construction firms within Abuja, from which a total of 218 was returned and found valid for analysis. Interviews were purposively conducted with 10 principal Quantity Surveyors within the organisations. It was found that the key positive effects of ICT in QS profession were speedy exchange of information, provision of easy access to needed data and faster response to clients enquires. The key negatives effects of ICT on QS included eye strain, neck pain and watery and dry eyes. Most of the quantities surveying firms do not have an outlined strategy towards the implementation and utilisation of ICT. It was recommended that emphasis be made to encourage Quantity Surveyors not to only use the general ICT tools, such as computer system, Microsoft excel, but also the professional ones such as Workmate, Computer Aided Taking off (CATO), EQS2 and WinQS. Also, regular teaching of ergonomics to employees and installing original and updated software are important.

**Keywords:** ICT tools, Professionals, Quantity Surveying, Service Delivery, Strategy

## Introduction

The development of the Information and Communication Technology (ICT) has had immeasurable influence on business practices, with the construction industry inclusive. This is shown by the yearly increase of ICT users (Oyediran & Odusami, 2005; Akinagbe & Adalakun, 2014). The need to increase staff productivity, gaining competitive advantage, reducing the burden of data processing, storage and dissemination as highlighted by Ezeokoli *et al.* (2016), has

led to the gross acceptance of ICT in the construction sector.

The adoption and efficiency of ICT in the workplace is principally determined by the organisation's strategy for usage, but only few Quantity Surveying organisations have that strategy and thus, Quantity Surveyors are facing both health and ergonomic, professional and practical challenges in effective utilisation of ICT tools for service delivery (Awolesi, 2015; Egege *et al.*, 2018; Naik & Bobade, 2018). Peansupap and Walker (2004) noted that a deficient strategy for ICT could cause problems of

slow adoption of ICT by the industry and another problems during the ICT implementation phase relating to organisational and individual facets. The real problem of the information revolution is not the development of technology itself but how to use it especially in the Q.S profession (Awolesi, 2015).

In Nigeria, studies on ICT in the construction sector focused on factors influencing the adoption of ICT; apathetic disposition towards ICT approval among practicing QS; documenting factors that influenced the recognition of ICT devices for construction cost management; the scope of usage of computer by Nigerian Quantity surveyors; the risk related to the use of Quantity Surveying software in the South West Nigeria; and the obstacles to and the prospects for ICT usage in the industry (Oladapo, 2007; Chidiebere, 2012; Olalusi & Jesuloluwa, 2013; Peter & Johnson, 2014; Olatunji, 2015; Egege *et al.*, 2018). Naik and Bobade (2018) highlighted the need to develop strategies that will increase the patronage of ICT tools and ensure effective utilisation of ICT in the Construction industry, particularly in the QS profession in Nigeria. However, none of these studies concentrated on the development of such strategies in Nigeria, especially in the FCT and this has made the ICT utilisation inefficient and this indicates the gap of this research. In view of this, the study assesses effects of ICT on quantity surveying practice in Abuja, Nigeria with a view to developing strategies for effective and safe utilisation of ICT by quantity surveyors in Nigeria. In order to achieve the aim, the study is set to: examine the roles ICT plays in the QS profession; examine the effects of the ICT on the Quantity Surveyors; and examine the strategies for effective usage of ICT tools in QS workplace in Abuja.

## Literature Review

### The Roles ICT Performs in the Quantity Surveying Profession

It was revealed in more recent studies that the common ICT tools used by QS are: Work mate, MS Access, QSlotus, MS

Excel, MS Word, QSCAD, BQ+, QS Elite, Computer Aided Taking Off (CATO), QS Editor, Digitizer, Autocad, Super Project, Master Bill, WinQS, Estimator, Pro MB3, RIPAC, EVEREST, Kwikest, Internet, Email, Intranet, Ms Project, In house (Musa *et al.*, 2010; Ogunsina *et al.*, 2015; Olalusi and Jesololuwa, 2013). Other tools include: Autodesk Quantity Takeoff, Vectors, CCTV camera and use of PowerPoint. Awolesi (2015) highlighted the various functions Nigeria QS perform using ICT tools to include: word processing, technical reporting, staff information, equipment information, spread sheet functions, material schedule, project information, correspondence programme of works, estimating, Job costing, cash flow requirement, scheduling, and resource levelling.

### Positive Effects of ICT

The positive effects of ICT in the construction industry could be grouped into four (4) categories: Firstly, benefits associated with project success which includes: project completion in keeping with the estimated time, budget and specifications, project information acquired in real time and so forth (Agyekum *et al.*, 2015). The second category is related to effective team management which include: active partnership between project group members, effective management of communication amid team members, grander management control, effective multiparty decision making, and stimulus of the work force (Agyekum *et al.*, 2015; Ogunsina *et al.*, 2015).

Third category is related to effective use of technology: increased information compactness, abridged hard copy storage of official papers, bills and drawings and so forth. Lastly is the positive effects linked to increased organisation efficiency (Awolesi, 2015).

### Negative Effects of ICT

80-90 percent of quantity surveyors use computer for their services (Awolesi, 2015). Ellahi *et al.* (2011) reported that computers users who spend more than four hours daily,

are likely exposed to the risk of health disorders, such as, carpal tunnel syndrome, computer vision syndrome and musculoskeletal disorders. Carpal tunnel syndrome is basically a strained nerve in the wrist which arises as a result of built up pressure from swelling in this tunnel and thereby exert force on the nerve. The symptoms are: pain, numbness, tingling, weak grip, occasional clumsiness, tendency to drop things (American Society for Surgery of the Hand, 2015). In another study, Akinbinu *et al.* (2014) revealed that computer vision syndrome is a mixture of eye and visual problems ascribed to the use of computers. Symptoms are headache, gritty sensation, and eyestrain, burning sensation, blurred vision, redness, double vision, dry eyes, watery eyes and neck pain (Adishes, 2013). According to Bucher *et al.* (2013), ICT has psychological (Techno-stress) effect on the users. This include; techno-overload, techno-invasion, techno-uncertainty, techno-complexity and techno-insecurity. Agogo and Hess (2015) also highlighted techno-stress to be the effects of the technology-use, directly or indirectly impressed on attitudes, thoughts, and behaviour of individuals.

### **Strategies for Effective Usage of ICT Tools in the Workplace**

The main purpose of an ICT strategy is to ensure information is managed in such a way that it can be used to gain competitive advantages and support the grand organisational goal (Kehinde, and Ehijel, 2017). Sulakatko (2016) noted that the following steps must be followed in order to reap the benefit from ICT strategy: identifying the key objective of ICT and the linkage between overall corporate strategy; selection of a suitable methods and procedures; identifying the different options for systems and procedures; examining its effect on the organisational structure; using projects as new opportunity to learn to use new technology; designing the architecture of the system while focusing on the organisation's needs; trainings and education; understand the perception based factors which include perceived benefits

and barriers; and commitment of top management to IT implementation.

The strategies towards an effective usage of ICT in the workplace could include: developing professional expertise in fundamental competencies; learn, use and evolve with Computer Aided Design (CAD); form strategic alliances with designers; firms should guarantee that the choice of software packages be well-suited with existing models in the country, installation of original and updated antivirus on the computer systems among others (Mahboob & Khan, 2016; Akinnagbe & Adelokun, 2014; Olatunji, 2015; Mahboob & Khan, 2016). It can be deduced that existing literature revealed a dearth in strategies for effective ICT utilisation within the study area.

### **Research Methodology**

The study adopted mixed methods approach where both quantitative and qualitative data were collected in parallel, analysed separately, and then merged (Creswell & Plano-Clark, 2018). The qualitative data strand allows in-depth understanding, discovery, clarification of situation and provides a researcher with a unique avenue to probe in to responses (Guest *et al.*, 2013). The reason for collecting both quantitative and qualitative data in this study is to elaborate on specific findings from the breakdown of the interviews transcripts, and crosscheck the data against the questionnaire data set such as similarities in the usage of ICT in QS practice.

The population of the study (quantitative aspect) constitute the 569 registered Quantity Surveyors working with QS firms, Federal Government ministries, department of works, and construction firms in Abuja, Nigeria. The figure was gotten from the Quantity Surveying Registration Board of Nigeria (QSRBN, 2018). Abuja was chosen as a study area because it is one of the metropolitan cities of Nigeria that has a high presence of construction activities and has a record of a high usage of ICT tools in construction (Musa *et al.*, 2015).

A sample size of 230 Quantity Surveyors was drawn from the population of the 569 registered Quantity Surveyors obtained from Morgan Table for determining sample size. In order to ascertain equal representation of each of the identified groups/strata in the population, stratified random sampling method was adopted by categorising the respondents into different sections (Quantity Surveying firms, Federal Ministries, Department of works, and private construction firms) before they were randomly sampled accordingly.

A total of 230 questionnaires (the sample size) were administered to the Quantity Surveyors within the identified population in Abuja, from which a total of 218 questionnaires were returned and found valid for analysis. The returned questionnaires represent a response rate of 95% of the total distributed. The questionnaire was structured using 5-point Likert scale and divided into two (2) main parts.

The questionnaires were administered in the month of November, 2018 for a period of 2 weeks. The collected data was carefully analysed in relation to the stated objectives using descriptive statistical method (Relative Importance Index, Mean Item Score and Ranking method) with the aids of Statistical Package for Social Science (SPSS) version 21.

Decision rule for determining effects of ICT on QS profession in Table 1 reveals the outcome of Mean Item Score (MIS) on a 5-

point Likert scale as highlighted by Morenikeji (2006). This was adapted and further converted to Relative Importance Index (RII) on a scale 0 to 1.

According to Leedy and Ormrod (2014), typical qualitative research sample size for phenomenological interview research, ranges between 5 and 25 participants. For the purpose of this research, ten (10) principal Quantity Surveyors who have expertise on ICT were purposively identified and interviewed. The face-to-face interviews were conducted with the aid of an interview guide which asked questions on both the negative and positive effects of ICT on quantity surveying practice and the strategies for effective utilisation of ICT tools by quantity surveyors. Each interview lasted averagely for 30 minutes.

The collected interview data were analysed using thematic/deductive analytical methods. Using thematic data analysis, a nuanced account of the data could be presented by transcribing, coding and setting themes from the responses of the interviews (Clarke & Braun, 2013). For this study, all shared experiences during the interviews with the principal Qs were recorded and used as the interview data. The raw data was then analysed and categorized into conceptual themes, including both positive and negative effects of ICT on QS practice and strategies for effective utilisation of ICT in quantity surveying service delivery.

**Table 1: Decision rule for data analysis**

S/N	Cut-off Points for MIS	Cut-off Points for RII	Decision
1	4.50-5.00	0.90-1.00	Very High Effect (VHE)
2	3.50-4.49	0.70-0.89	High Effects (HE)
3	2.50-3.49	0.50-0.69	Moderate Effects (ME)
4	1.50-2.49	0.30-0.49	Little Effects (LE)
5	0.1-1.49	0.10-0.29	Very Little Effects (VLE)
6	0	0	No Effects

**Source:** Adapted from Morenikeji (2006).

## Results and Discussion

### Roles of ICT in Quantity Surveying Profession

Table 2 shows the major roles played by ICT in quantity surveying profession. These roles are: Spread sheet functions, with the RII of 0.857, measurement of works (0.845), preparation of Bill of Quantities (0.845), valuing of construction works (0.842), estimating (0.841), material and labour scheduling (0.837), communication functions (0.823), word processing functions (0.822), and preparing and agreeing accounts with contractors (0.821) were identified as often used. These findings align with the results of Chidiebere (2012) and Ikediashi and Ogwueleka (2016). This implies that most calculations works performed by the QS, like measurement, estimating and word processing are executed using spread sheet.

### Positive effects of ICT on Quantity Surveyors

Table 3 shows that all the 25 factors were rated to have 'high effects' on QS, because they had RII values 0.80 to 0.90. These include speedy exchange of information, ranked first with the RII value of 0.903, followed by provision of easy access to the needed data (0.892), faster response to client's requirements (0.891), and increase productivity through automated quantities and cost calculations (0.891). However, the least factors by the respondents were: Effective materials management (0.812) and increasing project value (0.810). This is not quite different from what was observed by Oyediran and Odusami (2005), who noted that making job easier for the professions, facilitating decision-making and savings in operating costs were the highest benefits of using ICT.

**Table 2: Roles ICT plays in the Quantity Surveying Profession**

Functions performed with ICT tools	RII	Rank
Spread sheet function	0.857	1
Measurement of works	0.845	2
Preparation of Bill of quantities	0.845	3
Valuing of construction works	0.842	4
Estimating	0.841	5
Material Scheduling	0.837	6
Communications functions	0.823	7
Word Processing function	0.822	8
Preparing and agreeing accounts with contractors	0.821	9
Programme of work	0.78	10
Preparation of tender documents	0.775	11
Cost Planning functions	0.735	12
Preliminary Cost advise duties	0.723	13
Cash flow functions	0.712	14
Financial analysis	0.71	15
Negotiating tenders	0.61	16
Investment appraisals	0.595	17
Risk Management	0.575	18
Life cycle costing	0.571	19
Property condition survey and appraisal	0.569	20
Dispute and conflict resolutions	0.567	21
Security management	0.547	22

**Table 3: Positive effects of ICT on Quantity Surveyors**

Positive effects of ICT on QS	RII	Rank	Effects
Speedy exchange of information	0.90	1	Very High effect
Provides an easy access to needed data	0.89	2	High effect
Faster response to client's enquires	0.89	2	High effect
Increased productivity through automated quantities and cost	0.89	2	High effect
Improves job presentations	0.89	2	High effect
Effective collaboration and communication between project team	0.88	6	High effect
Enhances innovation in work practices	0.87	7	High effect
Enhances employee's efficiency	0.87	7	High effect
Enhances Organization effectiveness	0.87	7	High effect
Decrease time for data processing	0.87	7	High effect
Reduce risks of errors	0.86	11	High effect
Elimination of drudgery from repetitive tasks	0.86	11	High effect
Gives one better competitive advantage	0.86	11	High effect
Saving operation costs	0.85	14	High effect
Enhances transparency and accountability	0.85	14	High effect
Enhances organisation flexibility	0.84	16	High effect
Better financial control	0.84	16	High effect
Reduce reworks on projects	0.83	18	High effect
Effective contract management	0.83	18	High effect
Effective material procurement management	0.82	20	High effect
Effective decision making	0.82	20	High effect
Improve forecasting and control	0.81	25	High effect
Improving client's satisfaction	0.81	25	High effect
Effective material management	0.81	25	High effect
Increasing project value	0.81	25	High effect

The interview results reveal that majority of the respondents reported that the introduction of ICT increase the speed of doing works, saving time and costs and making work easier, reducing errors, making knowledge sharing faster and also strengthen institutions to reduce corruption while making work appear neat. These findings agree with the studies conducted by Musa *et al.* (2015), Olalusi and Jesuloluwa (2013) and Agyekum *et al.* (2015) who concluded that ICT increase the speed of doing work by saving time and cost.

**Negative effects of ICT experienced by Quantity Surveyors**

In Table 4, 'eye strain' was ranked the most prevalent negative effect of ICT experienced by the QS with the RII value of 0.810. This was followed by 'Neck pain' with the (0.746), watery eyes/dry eyes (0.741), blurred vision (0.740), headache (0.729), and stress induced from loss of information due to virus attacks (0.708). These factors were considered 'high' because they fall between RII values of 0.80 to 0.70. Other factors with 'moderate effect' include: ICT addictions, sleep disturbance, less time spent with the family, double vision, and muscle weakness. These findings aligns with Akinbinu *et al.* (2014) who stated that ICT users experience what is called computer vision syndrome.

**Table 4: Negative effects of ICT experienced by Quantity Surveyors**

Negative effects of ICT	RII	Rank	Effect
Eye strain	0.81	1	High effect
Neck pain	0.75	2	High effect
Watery eyes/dry eyes,	0.74	3	High effect
Blurred vision	0.74	3	High effect
Headache	0.73	5	High effect
Stress induced from loss of information due to virus attacks	0.71	6	High effect
ICT addictions	0.69	7	Moderate effect
Sleep disturbance	0.65	8	Moderate effect
Less time spent with the family	0.65	8	Moderate effect
Double vision	0.65	8	Moderate effect
Burning sensation	0.63	11	Moderate effect
Muscle weakness	0.63	11	Moderate effect
Wrist pains	0.63	11	Moderate effect
Information Overload	0.61	14	Moderate effect
Burn out syndrome	0.59	15	Moderate effect
Occasional clumsiness	0.59	15	Moderate effect
Work overload	0.58	17	Moderate effect
Invasion of personal/privacy time	0.58	17	Moderate effect
Numbness	0.55	19	Moderate effect
Feelings of being overwhelmed with tasks	0.55	19	Moderate effect
Job distractions	0.53	21	Moderate effect
Making professionals redundant	0.53	21	Moderate effect
Weak grip	0.52	23	Moderate effect

Most participants of the interview disclosed that they experienced negative effect of the ICT in one way or the other, and these include: body pains, job distraction, headaches, and feelings of been overwhelmed from work overloads, the threat to project confidentiality, mistakes by the younger or inexperienced quantity surveyors software not user friendly, the illiteracy level among professionals, the pain of losing important files due to system break down due to virus attack, increase in workload, bulky jobs are expected to be done faster while also rendering some worker jobless, not forgetting to add the cost implications of acquiring and train is burdensome. This was as well pointed out by various researchers that body pain, headaches job distraction and so forth are the major setback in using ICT tools (Bucher *et al.*, 2013; Ellahi *et al.*, 2011; Hoq, 2014; Akinbinu *et al.*, 2014).

#### **Strategies for Effective ICT usage in Quantity Surveying profession**

Table 5 shows that the strategies considered to be very effective by the respondents were: organizing ICT training with the RII of 0.94, a central backup and database be created and maintained (0.92), provision of adequate power supply by the management (0.92), management should teach employees on ergonomics (Proper and healthy use of ICT) (0.91), original and updated software should be installed (0.91), ICT investments should be made by the company (0.90), and Government should subsidize some of the ICT tools (0.90). This supports what was stated in the research understudied by Akinagbe *et al.* (2014), Olatunji (2015) and Mahboob *et al.* (2016) that organising ICT trainings ranked highest as a major strategy towards an effective ICT usage in most related literatures.

**Table 5: Strategies for effective ICT usage in Quantity Surveying profession**

Strategies for effective ICT usage in Quantity Surveying profession	RII	Rank
Organise ICT Training	0.94	1
A central backup database be created and maintained	0.92	2
Management should provide an adequate power supply	0.92	2
Teaching of ergonomics by the management (proper and healthy use of ICT)	0.91	4
Original and updated software should be installed	0.91	4
ICT investments should be made by the company	0.90	6
Government should subsidize some of the ICT tools	0.90	6
Develop professional expertise in core competencies before adopting ICT process	0.89	8
Time management should be encourage by the management	0.89	8
Management should ensure an adequate provision of lighting in the office	0.89	8
Setting a realistic and healthy policy to maintain an adequate work level	0.88	11
Creation of technology support centre for handling all arising problems	0.88	11
Establishment of a teamwork relationship between workers	0.88	11
Modification of ICT features to suit the job demands and family life	0.88	11
Use of monitor screen guide to reduce screen flares	0.87	15
Effectively communicating the characteristics of the new system before adoption	0.87	15
A realignment of the company's goal with ICT	0.86	17
Form strategic alliance with ICT designers	0.84	18
Take frequent breaks	0.79	19

The interview results reveals that 25 percent of the respondents reported having a strategy for ICT adoption and usage while the others do not. This is also substantiated by the research of Rezgui and Zarli (2006) which stated that ICT solutions tends to be adopted in an ad-hoc way resulting in various problems across teams, projects and organisation. Those who had identified organisational training as their major strategy towards enhancing ICT usage. It was generally admitted lack of funds have limited the full implementation of the training programs. One of the firm furthermore explained that the organisation go step further to purchase some useful professionals software and also subsidise cost of purchasing ICT tools for their workers.

The following are recommendations made by the interview respondents: Quantity surveyors are to train themselves and learn relevant software tools related to the practice; the younger professionals are to be vast in all relevant ICT tools and to also know the software. Quantity surveyors should be up-to-date with the new

technologies; the cost of procuring ICT equipment should be reduced and subsidised by the company, government and the institute; and trainings and retraining of QS be encouraged by the professional institution. Similar studies by Akinngbe and Adelokun (2014), Oyediran and Odusami (2005), Oladapo (2007) reiterated same views as to measures to improve the adoption, usage, and efficiency of the various ICT tools.

### **Conclusion and Recommendations**

This study has brought into focus the effective utilisation of ICT in Quantity Surveying profession. The results obtained from analysis of data led to the following conclusion: Quantity Surveyors predominantly use the computer system, printers and photocopiers to perform spread sheet functions, measurement of works, and to prepare bill of quantities. The positive effect of ICT on Quantity Surveying profession is speedy exchange of information. Eye strain and neck pain are the most common negative effects experienced by Quantity Surveyors in the short run. Finally, most of the Quantity



Surveying firms do not have an outline strategy towards the implementation and utilisation of ICT. Therefore, to obtain maximum yield from ICT in Quantity Surveying profession, the following recommendations are made: Organising relevant ICT training for Quantity Surveyors; creating and maintaining a central backup and database; provision of adequate power supply by the management; the teaching of ergonomics (the proper and health way to use computers) to employees; and installing original and updated softwares on computer systems.

## References

- Adishes, A. (2013). Musculoskeletal Disorders. Accessed from [http://www.ilo.org/wcmsp5/groups/public/---ed\\_protect/---protrav/---safework/documents/presentation/wcms](http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/presentation/wcms)
- Agogo, D. & Hess, T.J. (2015). Techno-stress and Technology induced state anxiety: Scale development and implications. *Thirty Sixth International Conference on Information Systems*: 1-11. Fort Worth, Texas. Accessed from <https://agogodavid.com/wp-content/uploads/2015/06/Agogo-and-Hess-ICIS-2015-Submit-pdf>
- Agyekum, K., Ayarkwa, J. & Acheampong, A. (2015). Incorporating InfoTech in Quantity Surveying Practice in Ghana: Challenges and Benefits. *Internal Journal of Engineering*, 4(1), 49-56.
- Ahuja, V. (2007). *IT Enhanced Communication Protocols for Building Project Management by Small and Medium Enterprises in the Indian Construction Industry*. Unpublished PhD thesis, Queensland University of Technology, Australia
- Akinbinu, T.R., Mashalla, Y.J. & Adalaku (2014). Impact of computer technology on health: Computer Vision Syndrome (CVS). *Academic Journals*, 5(3), 20-30
- Akinnagbe, F.P. & Adalaku, O.J. (2014). Assessment of Risks Associated with the Usage of Quantity Surveying Software in Nigeria: The Case Lagos State. *Asian Online Journal*, 1(2), 54-60.
- American Society for Surgery of the Hand (2015). Accessed from [https://www.assh.org/LinkClick.aspx?fileticket=7ToOme1rt\\_k%3D&portalid=1](https://www.assh.org/LinkClick.aspx?fileticket=7ToOme1rt_k%3D&portalid=1)
- Awolesi, J. A. (2015). The place of Technological Application in Entrepreneurship: A study of the use of Computers by the Quantity Surveyors in Nigeria. *Civil and Environmental Research*, 7 (9), 65-74
- Bucher, E., Fieseler, C. & Suphan, A. (2013). The Stress Potential of Social Media in the Workplace. *Information, Communication & Society*, 16(10), 1639-1667
- Chidebere, U.D. (2012). *An Appraisal of Information and Communication Technology (ICT) Application in Nigerian Construction Industry*. Unpublished Master thesis, University of Nigeria, Nsukka.
- Clarke, V. & Braun, V. (2013). Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. *The Psychologist*, 26(2), 120-123.
- Creswell, J.W. & Plano-Clark, V.L. (2018). *Designing and conducting mixed methods research* (3<sup>rd</sup> Ed.). Thousand Oaks, CA: Sage Publications
- Egege, C.C., Ayegba, M.O., Omange, O.M. & Ntem, T.S. (2018). Overview of ICT usage in Construction Industry: A case study of Lagos State, Nigeria. *International Journal of Advances in Scientific Research and Engineering (IJASRE)*, 4(9), 31-40.
- Ellahi, A., Khalli, M.S. & Akram, F. (2011). Computer users at Risk: Health disorders associated with prolonged Computer use. *Journal of Business Management and Economics*, 2(4), 171-182.
- Ezeokoli, F.O., Okolie, K.C., Okoye, P.U. & Belonwa, C.C. (2016). Digital Transformation in the Nigeria Construction Industry: The Professional View. *World Journal of Computer Application and Technology*, 4(3), 23-30.

- Guest, G., Namey, E. & Mitchell, M. (2013). *Collecting qualitative data: A field manual for applied research*. California: Sage Publication.
- Hoq, K.M.G. (2014). Information overload: Causes, Consequences and Remedies: A study. *Philosophy and Progress*, 15(16), 45-53
- Ikediashi, D.I. & Ogwueleka, A.C. (2016). Assessing the use of ICT and their impact on construction project performance in the Nigerian construction industry. *Journal of Engineering Design & Technology*, 14(2), 252-276
- Kehinde, O.B. & Ehijel, E.T. (2017). Assessment of participation of Quantity Surveyors in Oil and Gas projects in Nigeria. *Global Journal of Researches in Engineering: Journal of General Engineering*, 17(4), 124-132
- Leedy, P. & Ormrod, J. (2014). *Practical research: Planning and design* 10<sup>th</sup> edition. London: Pearson Education Limited.
- Mahboob, A. & Khan, T. (2016). Techno stress and its management techniques: A literature review. *Journal of Human Resource Management*, 4 (3), 28-31
- Morenikeji, W. (2006). *Research and Analytical methods* (for social scientist, planners and environmentalist). Jos: Jos University Press Limited.
- Musa, N.A., Oyebisi, T.O. & Badalona, M.O. (2015). A study of the impact of information and communications technology (ICT) on the quality of quantity surveying services in Nigeria. *ANNALS of Faculty Engineering Hunedoara- International Journal of Engineering*, 4(1), 49-56
- Naik, S. & Bobade, S. (2018). The Benefits of Information and Communication Technology Adoption in Construction Project Management for Small and Medium Enterprises. *International Research Journal of Engineering and Technology (IRJET)*, 5(6), 2256-2261
- Ogunsina, O., Ugochukwu, S. & Udoye, A.R. (2015). An Experimental Evaluation of the Benefits of Automated Quantification of Construction Works. *Global Journal of Advanced Research*, 2(11), 1770-1781.
- Oladapo, A.A. (2007). An investigation into the use of ICT in the Nigerian construction industry. *Journal of Information Technology in Construction*, 12(1), 261-277.
- Olalusi, O.C. & Jesuloluwa, O. (2013). The Impacts of Information Technology on Nigerian Construction Industry. *International Journal of Engineering and Innovative Technology (IJEIT)* 2 (9), 211-220
- Olatunji, A.A. (2015). Risk Associated with the Use of Softwares<sup>7</sup> for Quantity Surveying (QS) practices in South West Nigeria. *Proceedings of the 6<sup>th</sup> International Conference on Engineering, Project, and Production Management*, 1(1), 537-546
- Oyediran, O. S., & Odusami, K. T. (2005). A study of computer usage by Nigerian quantity surveyors. *Journal of Information Technology in Construction (ITcon)*, 10 (20), 291-303.
- Peansupap, V. & Walker, D.H.T. (2004). Strategic adoption of information and communication technology (ICT): Case studies of construction contractors. In: Khosrowashahi, F. (Ed.), *20<sup>th</sup> Annual ARCOM Conference*, 4 (2), 1235-1245.
- Peter, F.A. & Johnson, A.O. (2014). Assessment of Risks Associated with the Usage of Quantity Surveying Softwares in Nigeria: The Case of Lagos State. *Economy*, 1(2), 54-60.
- Rezgui, Y. & Zarli, A. (2006). Paving the way to the vision of digital construction: A strategic roadmap. *Journal of Construction Engineering and Management*, 132(7), 14-30
- Sulakatko, V. (2016). *The Importance of ICT in Construction Industry's Business Strategy*. Unpublished Master thesis, Tallin University of Technology, Estonia