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The Effects of Computer Software Packages for Quantity Surveying Profession in Nigeria

Okafor, Benjamin Onuorah

Principal Lecturer, Department of Quantity Surveying,
School of Environmental Studies, Federal Polytechnic, Nigeria

Abstract:

The use of quantity surveying (QS) software packages started in the late 1970's and early 1980's in some firms. Some of them were used for administrative purposes. However, the real works of the quantity surveyors start from taking off, bill of quantities preparation, pricing, tendering and valuation processes. It is worthy of note that though these processes are highly tasking but could be achieved by use of quantity surveying (QS) packages without much labour. The use of QS software in Nigeria has been developmental. Some of the QS packages are macro soft office (excel), auto cad, master bill, computer aided communications etc. Some relevant literatures on this study done within and outside Nigeria were reviewed. Towards doing a valid investigation, 80 (eighty) well-structured questionnaires were sent to quantity surveyors in consulting and contracting firms in Lagos, out of which 65 (sixty five) respondents completed their questionnaires very well. The retrieved questionnaires were analysed using the statistical frequency tables with mean values. The results justified the responses, the objectives were justified that QS software maximises the efficiency of the quantity surveyors.

Keywords: Software packages, valuation processes, master bill, computer aided communication, quantity surveyors

1. Introduction

Good corporate governance is a challenge in many developing countries or the so called 'Third World'. Some of the nations have adopted various strategies, policies, reforms, developing plans and theories in alleviating the problems of underdevelopment in which we see bad governance and economic retrogression.

To assess the impact of ICT on construction, surveys on the use of ICT in the construction industries of various countries in different parts of the world has been carried out in recent times. Oyediran (2005) studied the awareness and adoption of information and communication technology (ICT) by architectural, engineering and construction industry educators in Nigeria. Oladapo (2007) has also carried out a survey into the use of ICT in the Nigeria construction industry. However, his survey apart from it being limited to South West Nigeria focused more on the level of computer literacy of construction industry professionals and mode of acquisition.

Adejimi and Iyagba (2007) compared E-construction technology for integrating building processes between Nigeria, Canada and the Nordic countries. Their study however revealed that the digital divide between Nigeria and the developed world is closing up as more and more computer facilities are becoming accessible. However, they also indicated that modern and advanced information technology facilities such as internet, intra/extranet, virtual reality tools, conferencing, construction robots etc. are grossly inadequate. The intent of this research work is to ascertain the level of use of ICT in the Nigeria construction industry and also to determine the prospects with respect to the benefits.

1.1. Statement of Problem

Numerous problems are being encountered by the quantity surveying firms in Nigeria. Most of these problems are ICT related. Researchers opined that the quantity surveying firms in Nigeria has during the past few years increased its use of ICT. However, very little is known about the impacts of the technology on the industry and the prospects for its widespread penetration of the industry. This is because very few reports exist of research in ICT in developing countries, including Nigeria. Hence, there is necessity to carry out this research work.

1.2. Research Questions

The following research questions are pertinent for the study.

- What is the level at which ICT is being used by quantity surveying firms in Nigeria?
- What are the ICT application areas in quantity surveying?
- What are the impacts of ICT in quantity surveying performance

1.3. Aim and Objectives

The aim of this research is to assess the effect of Information Communication Technology (ICT) on quantity surveying performance in Nigeria.

The specific objectives of the study are:

- To assess the level at which ICT is used by quantity surveying firms in Nigeria.
- To identify the ICT application areas in quantity surveying.
- To evaluate the impact of ICT in quantity surveying performance.

1.4. Scope and Limitation of the Study

This research focuses mainly on the effect of Information Communication Technology on quantity surveying performance in Nigeria, using quantity surveying firms in Lagos.

The target respondents for this study are the professionals in the quantity surveying firms which may include quantity surveyors, architects, engineers etc.

2. Literature Review

2.1. Introduction

Over the decades, the world has witnessed major transformation in the global economy, in addition to revolution in information technology and communication which comes under the term. "Modern Technology"

In this section of the review of literatures is explored for information on and analysis of technology in Nigeria. The second part of the paper discusses modern technology and construction industry, modern technology and quantity surveying profession in Nigeria with emphasize on the challenges facing the quantity surveying profession in Nigeria. It further discusses quantity surveying and usage of specialized software, advantages of specialized software usage and the barriers of implementing specialized software in the practice of quantity surveying profession in Nigeria.

2.2. Technology in Nigeria

Studies have shown that the late 1970s and early 1980s is an era when construction industry professionals (CIPs) in Nigeria were awakened to the reality of applying computer into the operations and processes in the industry. The professionals in the advance economies have shown readiness and commitment to the adoption of computers in their operation than those in the developing economies like Nigeria. It was not until the late 1980s that researchers and practitioners in Nigeria began to draw attention of the industry to the advantages of the use of computers in the construction industry (Ayeni, 1989).

Early writers have indicated the software and hardware requirements for CIPs in performing their roles and responsibilities (Sidwell and McIntosh, 1982a and 1982b).

These requirements will continue to vary depending on the technological advancement, the clients and/or market demand, and the users' needs, amongst other factors. The 1980s witnessed the use of computers for functions such as cash flow forecasting, Computer Aided Taking off (CATO), projects management, accounting and cost control (Geary, 1982; Heckford, 1982; Sidwell and Cole, 1998). It was opined that the implementation of modern technology in many businesses has been more of accidents than design. This may be connected with the absence of industry-driven IT strategy. This partly accounts for the level of misunderstanding, confusion, and uncertainty common in the industry. His observation is still true, to a great extent, in developing economy like Nigeria, where the level of adoption has been found to be low (Oyediran and Odusami, 2004).

Several research efforts have been concentrated on the implementation of the information and technology tools in the Nigerian construction industry. For example, Oyediran and Odusami (2015) studied the extent of usage of computer particularly amongst Nigerian Quantity Surveyors. In the same vein, Oladapo (2006) studied the influence of information and communication technology and professional practice, and Oladapo (2007) investigated the impediments to the use of ICT in Nigerian construction industry. This study draws impetus from the need to fill a gap in knowledge in the area of technological innovation in construction as thorough of existing literature as shown the dearth of similar work in this area, particularly QS service delivery in Nigeria.

2.3. Modern Technology and Construction Industry

Construction workers today do not have to rely only on pages of blue prints and hand-held tools to transform raw materials into structures. Now, they can see and walk inside a project closing virtual modelling and other technologies such as building information modelling (BIM) etc.

The international construction market is open for firms from both developing and developed countries. The exports of construction activities are also available from all countries through the biggest contribution is from developed ones. Great attention has been focused on the role of construction development though more attention should be given to the nature of construction activities both in the developing and developed countries.

2.4. Quantity Surveying Profession in Nigeria

The Nigerian Institute of Quantity Surveyors (NIQS) was founded in 1969 by a group of Nigerian who trained, qualified and practice in the United Kingdom but who upon returning to Nigeria sensed the urgent need to develop the

profession of quantity surveying in Nigeria by establishing a parallel body to the Royal Institute of Chartered Surveyors (RICS) of United Kingdom.

The profession of quantity surveying is practiced in Nigeria along the same pattern as in the United Kingdom and other common wealth countries. In American, they are known as cost engineers. The regulated and other profession (miscellaneous provisions), Act 1978 recognized quantity surveying profession as one of the schedule profession while the decree No 31 of 1986 have legal backing and recognition to the quantity surveying profession and also set up the Quantity Surveyors Registration Board of Nigeria (QSRBN) to regulate the profession.

Quantity surveyors is that expert that is saddled with the responsibility of controlling the construction cost project from conceptualization stage of the project to its completion to ensure that the client got good value for his money. A quantity surveyor identifies and collates everything that involved in the cost of a building. Ashworth and Hogg (2002) defined quantity surveyors as those that cost design, and produce procurement and construction documents.

Musa, Oyebisi and Babalola (2010), opined that practicing quantity surveyors are to ensure that resources are utilized to the best advantage of the society by providing financial management for project and cost consulting services to the clients, designers and contractor during the construction process. The Nigeria Institute of Quantity Surveyors (NIQS) (1997) listed the major services of consultancy practice in project development chain to include: preliminary and final budget estimates, contract documentation and procurement; contract administration; cost modelling and final accounts. Anyadike(2001), break down the quantity surveyor's services according to stages involved in construction operation as indicated in table 1, below.

S/NO	Stage	Quantity Surveyor Service
1	Conceptualization / inception	Clients outline requirements (initial cost indication).
2	Determination of general requirement (scope, user's requirement, special features.	Budgeting planning.
3	Revision and amendments to scheme and final designs	Cost plan
4	Delivery of production drawing.	Contract documentation.
5	Tender evaluation/ Appraisal of client	Tendering reporting and representation of client.
6	Review of work method / sequence	Cost check and control, cost / value control
7	Verification of defects	Final costs from finalized accounts.
8	Commissioning	Conclusion of accounts.

Table 1: Schemes of Works and Quantity Surveying Services
 Source: Anyadike, E. I. (2001) *Quantity Surveying and Total Cost Management*

2.5. Modern Technology and Quantity Surveying

With the recent development in the industry and the recent explosion of information technology, the industry stakeholders are findings it most impossible to disseminate all pertinent and available information (Perera et al, 2007). Studies have shown that the early 1980s is an era when construction industry professional (CIPS) were awakened to the reality of applying compute into the operations and process in the industry. The professionals in the advanced economies have shown readiness and commitment to the adoption of computers in their operation than those in the developing economies like Nigeria. It was not until the late 1980s that researcher and practitioner in Nigeria began to draw attention to the industry to the advantages of the use of computer technology in the construction industry (Ayeni, 1989).

Early writers have indicated the software and hardware requirements of CIP. These requirements will continue to vary depending on the technological advancement, the client and/or market demand, the user's needs, among other factors. The 1980s witnessed the use of computer for functions such as cash flow for casting, computer Aided Taking Off (CATO), project management, accounting and cost control (Geary, 1982, Heckford, 1982, Sidwell and Cole, 1988). There were few specialist computer programs relevant to the need of the CIPs (Eiter, 1982).

The fewness of specialist computer programs, which he noted, is being overtaken by the rapid development in the IT world. Wolderspin (1988) observed that the implementation of IT in business has been more of accident than design. This may be connected with on the absence of industry-driven IT strategy. This accounts, partly, for the level of misunderstanding, confusion and uncertainty common in the industry. His observation is still true, to a great extent, in a developing economy like Nigeria, where the level of adoption has been fraud to be low (Oyediran and Odusami, 2004, Oni, 2003, Jagun, 2003).

The use of computer in the construction industry has been a subject of inquiry in Nigeria of late. Jagun (2003) noted that CIPs involved in project management services have been slow in adoption IT in their operations, while Oni (2003) reported a low level of IT adoption in the construction industry. He also noted the lack of comprehensive IT strategy by practitioners and management.

The best QS software to be used is the one that offers significant benefits to Quantity Surveyors by improving speed accuracy and efficiency in performing the following with an affordable price:

- Cost planning
- Bill preparation
- Estimating
- Pricing
- Tender appraisals
- Re-measurement

- Valuation
- Final accounts.

This provides an automated, intelligent and fully integrated system to allow the Quantity Surveyors to perform his tasks efficiently and accurately. This is the modern high technology designed to replace traditional methods, earlier computer systems based on coding and for computer systems which only performs part of the job.

Thus, using well-designed software may give us the potential to benefit in the following ways:

- Maximize the efficiency of QS
- Reduce errors and improve quality
- Re-use data within jobs and between jobs, building a valuable information resources for future projects
- Offer clients a faster and fuller services
- Saves time, efforts and money.

2.6. Software Usage in Quantity Surveying Firm

Software is defined as a program used by the computer in functioning a computer system and computer process. In general, there are two types of software, namely system software and application software. The system software is designed to manage all the computer components and function as a basis for operating application software. Meanwhile, application software is designed to assist the user to carry out a specific job. Study done by Zakaria (1999) explained the role of computer software application in QS firms in which it allows QS:

- To perform quantity surveying detailed programs, for instance Master bill, QSM, etc.
- To handle the project information either by using general application software or task connected software. These comprise of word processors, spreadsheets, databases, CAD systems, presentation software, etc.

From a survey done by Faridah and Iman (2001), they had recognized eight categories of software that are frequently used QS firms in the Kelang Valley are as follows:

- MS Office
- Accounting
- Databases
- Word processing
- Spreadsheet
- Quantity surveying software
- Presentation software
- Project Management software

For the purpose of the research, the researcher shall be focusing on to the QS software which it will be further explained in the next section of this chapter.

2.7. Quantity Surveying Specialized Software

In QS industry, the development of specialized software is growing positively in the construction industry. This is proved by many software are invented for QS usage. Mainly, the function of specialized software is to help in the production of BQ documentation, measurement and cost estimating. Faridah and Iman (2001), Abdullah & Haron (2006) and Ching & Sia (2013) had studies several software that can be used by the QS in the preparation of BQ. Below is the list of specialized software available for QS for the preparation of BQ.

- Building Information Modelling (BIM)
- Computer Aided Design/Drafting (CAD)
- Masterbill
- Build soft Global Estimating System (Buildsoft)
- RIPAC Estimating System
- Quality Service Management System (QSM)
- CATO Software

2.7.1. Building Information Modelling (BIM)

According to Wong, Wong, & Nadeem (2011), Building Information Modelling (BIM) is a software designed for the usage of Architecture, Engineering and Construction (AEC) industry and it have been practice by many different countries. This specialized software is a replacement for the computer-aided drafting such as AUTOCAD. Besides, other than that, it also served to assist in project planning, design stage and construction process starting from initiation until completion. As for the QS usage, this software also has the ability to produce BQ including the taking off and measurement works. One of the features that designed in BIM technology is an automatic production of BQ. For a project that has parametric modelling and object-orientated model in conducting construction data shows that this project is correctly implemented BIM. This software will then recognize each building element and be able to automatically generate BQ. The model must follow the Standard Method of Measurement (SMM) and work breakdown structure (WBS) to ensure a precise BQ generated. This automation preparation will takes place the traditional method of producing BQ and reduce human error (Gee, 2011).

In addition, this software is also being designed to control cost management of the project. Further explanation of the function of cost management of BIM is as follows:

2.7.1.1. Cost Estimates

Olatunji et al. (2010) found that BIM has the capability to operate measurement automatically and cost estimates. BIM also has the capability to excerpt accurate quantities that can be used for cost estimating at any time during the design duration. It also helps the estimators to recognize the connection between quantities, cost and location and differentiate how the area and elements of the building relates to the project cost. The estimators can assuredly produce cost estimates at the early stage of design process by using the quantity measured by BIM.

2.7.1.2. Automation Updated Cost Changes as the Design and Material Changes

By using BIM in cost estimation, it can ease the designer, estimator and client conduct value management for the project. As there is changes are made to design, then cost estimate will automatically change. The estimator does not need to conduct manual taking off quantities. The client has the option to consider different design suitable for the project, meanwhile at the same time project cost is monitored.

The usage of BIM cost management potentially can be used not only in the pre - construction process. By using the same practice of cost management in the post - construction process it can be calculated. This is a speedy calculation of cost in post-construction stage will simplify the production of documents such as cost reporting and monthly evaluations. Apart from that, the client can use BIM in managing building. For example, in scope of handling renovations works, space expansion and maintenance management.

2.7.2. Master Bill

Master bill software is created to assist in the preparation of BQ document. The features are designed to help with pricing, cost analysis and tender evaluation. This software allows the user to produce BQ at any time during the measurement process because it contains user-defined BQ standard and layout.

3. Research Methodology

3.1. Introduction

This chapter aims to provide assurance that appropriate procedure were used and followed in the carrying out of this study. The procedure is outlined as follows: Study population, Area of study, Research design, Research process, Sampling techniques, Data collection techniques, Tools for data analysis and Constraint to data.

3.2. Study Area

The study area of this research work will be carried out in Lagos State, which is a fast growing metropolitan state in Nigeria. In order to carry out this research successfully, data will be collected from Quantity Surveying professionals in reputable consulting and contracting firms and questionnaires will be designed based on the objectives of this study.

3.3. Sampling Size and Sampling Procedures

Due to the nature of the data to be collected from the population, 45 questionnaires will be administered on the sampled respondents to obtain data and relevant information to the study. The reason why this method will be adopted is because of the cost of obtaining samples from all professionals in the study area and time constraint.

3.4. Data Collection Instrument

Structured questionnaires that were personally administered using a set of predetermined questions will be instrument for data collection for this research work. The questionnaire to be designed for this research comprises of two parts.

3.5. Tools for Data Analysis or Method of Data Analysis

Researcher should indicate the statistical tools they use to elicit facts sought by the research. The tools will be stated in terms of descriptive and inferential (non-descriptive) statistics tools. The descriptive tools are such tools as tables, frequency distribution, mean ranking and standard deviation and range with the use of SPSS (statistical packages for social science).

Data obtained will be subject to both descriptive and frequency percentage statistics.

$$\text{Mean Score} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{N}$$

Where; n_1 = N_o of respondents who answer is very low

n_2 = N_o of respondents who answer is low

n_3 = N_o of respondents who answer is average

n_4 = N_o of respondents who answer is high

n_5 = N_o of respondents who answer is very high.

N= Total N_o of Answered Questionnaire that was administered.

4. Presentation of Data Analysis

4.1. Introduction

The research study is aimed at examining the implications of QS software packages on quantity surveying practice in Nigeria, using Lagos State as a case study.

This section deals extensively with the analysis of data collected through the use of a questionnaire which was analyzed using percentage Table and mean ranking. Eighty (80) questionnaires were administered whereas sixty five (65) questionnaires were retrieved giving a percentage of 81.25%

4.2. Presentation of Respondent's Results

The respondents were asked to indicate their particulars; their responses are as shown in tables below

Firms	No. of Respondents	Percentage (%)
Consulting	40	61.54
Contracting	25	38.46
Total	65	100

Table 2: Type of Organization
Source: Field Survey, 2018

Table 2 shows that from the total number of 40 populations considered, 61.54% population came from consulting personnel, while the remaining 38.46% came from contracting.

Gender	No. of Respondents	Percentage (%)
Male	45	69.23
Female	20	30.77
Total	65	100

Table 3: Gender
Source: Field Survey, 2018

Table 3 shows that 45 respondents representing 69.23% were male, while 20 respondents representing 30.77% were female.

Marital Status	No. of Respondents	Percentage (%)
Single	40	61.54
Married	25	38.46
Total	65	100

Table 4: Marital status
Source: Field Survey, 2018

Table 4 shows that most of the respondents in the survey are single with 69.4%. This is justified by the analysis above where 25 respondents are single, and 30.6% of the respondents are married.

4.3. Analysis Demographic Data

Effects	Mean	Rank
Ms office (Excel)	4.53	1
Project management software	4.19	2
MASTERBILL	3.81	3
BUILDSOFT	1.25	4
CATO	0.00	5
RIPAC	0.00	5
BIM	0.00	7
QSM	0.00	8

Table 5: The Extent of Use of QS Software among Quantity Surveying Firms in Nigeria
Source: Field Survey, 2018

Table 5 shows the extent of use of QS software among Quantity Surveying firms in Nigeria. The result shows that Ms Office (Excel) is highly used among quantity surveying firms in Nigeria as it ranked highest while, CATO, RIPAC, BIM and QSM are less used among Quantity surveyors, thus, ranked lower.

Elements	Mean	Rank
Maximize efficiency	4.25	1
Saves QS operational time	4.17	2
Offer clients a faster and fuller services	4.06	3
Saves money	3.86	4
Reduce errors and improve quality	3.83	5
Saves effort	3.69	6
Re-use data within jobs and between jobs and building valuable information resources for future project	3.44	7

Table 6: The Effect of QS Software Usage on the Practice of Quantity Surveying Profession in Nigeria
Source: Field Survey, 2018

Table 6 shows the effect of QS software usage on the practice of quantity surveying profession in Nigeria. The table shows that maximize efficiency ranked highest with mean of 4.25 and it is vital to the quantity surveying profession while Re-use data within jobs and between jobs and building valuable information is ranked lowest with mean of 3.44.

4.4. Discussion and Findings

This discussion is based on the result from the analyzed data from the distributed questionnaire. Relationships were drawn between observed information through the analysis and past studies similar to the research work. The study has attempted to examine the effects of QS software usage on the practice of quantity surveying profession in Nigeria. The results of the study show and highlight the various effects of QS software usage on the practice of Quantity Surveying profession. However, the result shows that the use of QS software can greatly maximize the efficiency of quantity surveying profession as obtained from the field survey.

Moreover, the study attempted to ascertain the extent of use of QS software among quantity surveying firms in Nigeria. The result of the study shows that Ms Office (Excel) is most used among quantity surveying professionals as obtained from the field survey.

Furthermore, the study attempted to examine the factors limiting the use of QS software in the practice of Quantity Surveying profession in Nigeria. The result of the study shows the various factors limiting the use of QS software in the practice of Quantity Surveying profession in Nigeria. However, the result of the study shows that high preliminary and installation cost of software and hardware limits the use of QS software very severely in the practice of Quantity Surveying profession in Nigeria.

5. Conclusion and Recommendations

5.1. Introduction

This section summarizes the whole research work; drawn conclusion based on the research work and provides recommendations. This research study was conducted to examine the implications of software packages usage on the practice of Quantity Surveying in Nigeria.

5.2. Conclusion

Based on the findings of the study, it can be concluded that there is a general relationship between the major effects stated which are; Maximizing the efficiency Quantity Surveyors, by ensuring competitive advantage, by saving Quantity Surveyors' operational time, saving money and efforts, through reduction in error and offering clients a faster and fuller services in order to move at almost the same pace with Quantity Surveying professionals in the developed countries of the world.

As observed from the findings in this research, it was discovered that some Quantity Surveyors are still very much naïve when it comes to the ranges of specialized software that have been developed to aid the numerous operations of the profession. However, this is caused by lack of awareness and motivation to implement specialized software, high preliminary and installation cost of software and hardware, lack of training and operational knowledge of it, risk of investment in cost of software and hardware, high cost of training, high maintenance cost of software and hardware and other limiting factors highlighted in this research. Hence, there is still lack of implementation of QS software in the practice of Quantity Surveying profession in Nigeria; which should be put into full consideration.

5.3. Recommendations

Based on the findings of the study, the following recommendations are offered to encourage the implementation and use of QS software in the practice of Quantity Surveying profession in Nigeria:

- The National Boards for Tertiary Education should ensure that Quantity Surveying curriculum includes courses that are IT oriented, which will adequately equip students during their course of training on how to use ranges of QS specialized software.

- Tertiary Institutions in Nigeria should ensure that academic staff in QS departments are constantly trained and re-trained on how to use QS specialized software.
- There should be need for quantity surveyors and quantity surveying firms to adopt recent trends and emerging concept in technological advancement in the quest for survival both in local and international markets which will also enhance their competitiveness and enhance that a better value are provided for clients moneys.
- The Nigerian Institute of Quantity Surveyors (NIQS), in conjunction with the Federal government of Nigeria, should find a way of subsidizing the price or cost of acquiring QS software by registered and approved small and medium scale Quantity Surveying firms.

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