Assessment of Risks Associated with the Usage of Quantity Surveying Softwares in Nigeria: The Case Lagos State

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Abstract

Several researchers have acknowledged the impact of software in Quantity Surveying Practice. However, it is suspected that not all the consulting firms in Lagos State are making use of all the Quantity Surveying Softwares. Hence, this study identified a set of risk factors associated with the usage of these softwares. The research adopted convenient method of sampling. Twenty nine (29) consulting firms were selected out of which twenty six (26) responded appropriately. Data collection was through a structured questionnaire that was administered by the researchers using set predetermined questions. The result of the study reveals that all the quantity surveying firms in Lagos State work with Microsoft Excel and Microsoft word packages. Thirty percent (30%) of the consulting firms work with Master bill, Qs Cad, Qs Elite, Ripac, Computer Aided taking off (CATO) and Building information model software etc. It also reveals that changing trends in technology is the major factor that necessitates the usage of softwares in quantity surveying firms in Lagos State. Furthermore, Incompatibility in software packages is the major risk associated with the usage of quantity surveying softwares. This study recommends that Quantity surveying firms must ensure that the choice of software packages should be compatible with the existing model in Nigeria in terms of interoperability, portability and flexibility. Also, most estimators should be trained and given technical support so that they can become first-hand software expert.

Keywords: Risk, Softwares usage, Quantity surveying, Professional practice, Relative Importance Index, Severity Index, Nigeria.

1. Introduction

The explosive growth of the software application has had unquantifiable impact on business systems and processes. The global acceptance and widespread adoption of Quantity surveying software has accelerated the dimensions of competition not only among organizations globally but among professions locally. The Quantity Surveyor's ability to avail themselves with the emerging opportunities provided by the advent of ICT depends on the adoption of new technologies (Castle, 2002). Computer software has promised to be a reliable tool in all spheres of human endeavour. Rivard *et al.* (2004) predicts that the evolution of Information Technology will have a profound impact on how organizations in the architectural, engineering and construction (AEC) industry operate. This is already coming to pass. With information technology playing an increasing role in the economy, quantity surveying firms have grown more heavily in Nigeria dependent on the successful delivery of information systems. Yet, many estimating and tender analysis software results in systems that do not function as intended, are not used, or are never delivered.

Oluwole (2010) asserts that to achieve appropriate business objectives, estimating practices have to make a lot of risky decisions in choosing what applications will be appropriate for the firm in the short, medium and long term scenarios. Apart from these, they also have to decide on choosing appropriate combination of applications for specific tasks as well as decision on their maintenance, technical support and allied supplementation. Regrettably, most estimators are not first-hand software expert. At best, they rely on marketing impulses and persuasions to make decisions on what software package to go for, when and how. This portends a lot of risks for any firm even in

purchasing a less productive software package. Paradoxically, there is inadequate knowledge in available resources on how decisions are made on software selection in construction and quantity surveying firms.

Oyediran and Akintola (2011) states that most patronized software packages used for estimating and tender analysis still rely on manual data input in an age when designs are robustly imbedded with metadata. This is not only counter-productive; it increases the risks for errors which will eventually give wrong budget estimate. Another problem in the choice of this software packages is the fact that existing models for selecting appropriate software packages are not based on objective frameworks as recommended in ISO/IEC 25051:2006 and 20282-1: 2006. Some of the peculiar challenges in this direction are interoperability, portability and flexibility. At the moment, it is difficult to customize how estimating applications are used, exchange file formats (e.g. quantification to planning and planning to pricing) and enable remote access.

The following are the research questions;
i.   What   are the factors that necessitate the usage of Quantity Surveying software?
ii.   What are the risks associated with the usage of Quantity Surveying softwares?
iii. What are the perceived impacts of risks associated with the usage of softwares on Quantity Surveying Practice?

This study is aimed at assessment of risk associated with the usage of quantity surveying softwares in Lagos State. The following objectives are proposed in achieving this aim, they are to;
i.   Assess the factors that necessitate the use of Quantity Surveying software.
ii.   Assess the risks associated with the use of Quantity Surveying softwares.
iii. Identify and assess the perceived impact of risks associated with the usage of softwares on Quantity Surveying Practice.

2. Literature Review

The basic concept behind the information age (computer age) is to create a platform for individuals to transfer and process information with ease and to have instant access to information that would have been difficult or impossible to assess using the traditional methods. This was able to come to fruition through the introduction of computers and the internet. These inventions, over the years have brought about an immeasurable transformation in the affairs of individuals, increasing efficiency and performance right from their business transactions and processes down to their domestic activities. The introduction of computer software application has brought about a stronger sense of will to achieve success, thereby making people more intellectually engaged than ever before. The application of Information Communication Technology techniques in various sectors of a nation's economy is by no way exhaustive.

The construction industry is so hierarchical and fragmented in nature that some of the major participants do not consider themselves to be part of the same industry (Hindle, 2000). According to Toole (2003), this requires close coordination among a large number of specialized but interdependent organizations and individuals to achieve the cost, time and quality goals of a construction project. Maqsood *et al.* (2004) state that a major construction process demands heavy exchange of data and information between project participants on daily basis.

The construction industry is not left behind in this trend towards computerization. The introduction of software application has improved the efficiency and capability of various aspects involved in project delivery in the construction industry. Quantity surveyors are information managers and tend to be concerned about the facilities available to them. This pivotal role requires that they must not lag behind in the adoption of tools that would improve their service delivery (Oyediran and Odusami, 2005). The impact of Information Communication Technology can be seen in several areas such as in estimating, bill preparation, tender analysis, life cycle costing, value analysis, and valuation.

The use of Information Communication Technology in construction has been sporadic and piecemeal (Hore, 2006). In an economic environment that is constantly changing, the need and ability to adapt and innovate becomes increasingly important (Van Der and Jeune, 2009). According to Musa *et al.* (2010), Quantity surveying in Nigeria is experiencing dramatic but significant changes in scope and service delivery. These changes were as a result of the introduction of the usage of softwares and online portals into their service delivery. This became necessary due to the increasing demand for quantity surveying services and complexity in modern constructions. Software application can be viewed in two major areas. The first was the use of softwares in creating drawings, making structural analysis, carrying out cost and time calculations. The second was concerned with the use of computers to classify, store and manage the construction information (Isikdag, 2006) cited in (Isikdag *et al.*, 2009). The connection of these computers to the internet creates a platform for readily exchange of information among firms and professionals across the globe. As a result of application of these Information Communication Technology tools, there tend to be changes in organizational processes, work methods and culture (Rukair (2005)) cited in (Oladapo, 2006). This brings about a new work order that leads to optimization of resources (Musa *et al.*, 2010).There are various adaptable software packages available in the practice of the quantity surveying profession today, and these packages have introduced ways for carrying out the various quantity surveying tasks.

According to Onyegiri *et al.* (2011), the construction industry is faced with the on-going challenge of changing and improving current work practices in order to become more client-orientated; more competitive as well as productive through adoption of ICT as an integral part of the construction process Weippert *et al.* (2003). Much effort has been directed toward improving construction productivity and the use of software in construction and this is an area worth concentrating upon because it can decrease the time for data processing, communicating information and increase overall productivity. Modern structural design software applications, such as 3D modelling and Building Information Modelling (BIM), provide an example where designing complex structures and organizing the electrical, mechanical, site, structural and quantifying of a project can be achieved in minimum time and increase the efficiency all in one data frame work, whereas in the past this was almost impossible Peansupap and Walker (2005).

Therefore the understanding of Information Communication Technology and its role is important for the realization of improved communications between participating organizations in construction projects.

Information Communication Technology in construction can be broken down into different segments for its better understanding and its role in construction. The word Information, 462 communication and technology can be understood from different perspectives as well as towards an ICT view, as a whole new meaning of its own. Adriaanse and Voordijk (2005) give explanation from the functionalist (positivistic, 'scientific') perspective that "Information Communication Technology is a neutral provider of input for decision making". In this point of view communication is no more than distribution of information. Information Communication Technology may be adopted by specific groups of users within an organization. For example, use of computer aided drafting (CAD) by Quantity surveyor, architects or estimating software used by engineers or project managers. Emmitt and Gorse (2006) identify the reality that communication between construction industry participants and organisations are concerned with information exchange, dealings with drawings, specifications; cost data, programmes plus other design and management information.

2.1. Various Softwares Used in Quantity Surveying Practices

There are various specialist softwares packages for performing the array of tasks involved in the practices. Below is an analysis of some selected softwares and their features;

   i. Autodesk Quantity Takeoff; WinQS; Vector; CostX; Develop; Feasibility Estimate; Cut and Fill; Digico; Ripac; QSPlus; Qs Cad; Masterbill; Building Information Model Software; Microsoft Excel.

2.2. Factors That Necessitates the Use of Quantity Surveying Softwares in Nigeria

Spread sheets databases and project management software are used frequently in construction organisations. Electronic document management systems and imagine systems are not widespread. Past surveys have found that software application are used in quantity surveying firms for functions such as word processing project management, data analysis etc.

Five Factors that Necessitate the Use of Quantity Surveying Software Are:

   i. Increasingly sophisticated clients.
   ii. Increasing collaboration.
  iii. Level of Competition.
  iv. Economic policies and
   v. Changing Trends in Technology.

2.3. Risks Associated with the Usage of Quantity Surveying Softwares

Despite the fact that quantity surveying softwares make professional job easier, facilitates decision making, improve public image of firms and increased productivity through automated quantities and cost calculations there are risks associated with the usage of software which would be explicitly explained and analysed below:

   i. Proliferation of Software Application.
   ii. Virus Attacks.
  iii. Project Information Discouragement.
  iv. Lack of First-Hand Software Expert.
   v. Health Risks.
  vi. Incompatibility in Software Packages.
 vii. Lack of Management Desire and Appreciation of Software.
viii. High rate of Obsolescence of Software.

3. Research Methodology

Specifically, this section consider areas which include research design, study population, sampling frame, sample size, sample techniques, research instrument, data collection procedure and method of analysis. Research design addresses the planning of scientific inquiry or designing a strategy for finding out something. The essence of this study is to evaluate the assessment of risks associated with the usage of quantity surveying softwares in Lagos State. The study focuses on the assessment of risks associated with the usage of quantity surveying softwares. This study was limited to Registered Quantity Surveying firms (Consulting firms) whose Head Offices are located in Lagos State.

The sample frame for this study is the Registered Consulting firm that uses quantity softwares in Lagos State. The total number of consulting firms gotten was ninety-five and this will serve as the frame of the study.

The sample size for the data was analysed only for registered Quantity surveying firms whose head offices are located in Lagos State, Nigeria.

Using Yamani Theory;

$$n = \frac{N}{1 + N(e)^2} \text{---------------------------------- Equation (1)}$$

e = 15%
Where   e (level of precision) = 0.15
N = Total population
n = Sample size

It is logistically, financially and technically impossible to collect from all the registered quantity surveying firms within the study area; it is therefore desirable to adopt a sampling process that will estimate bias in the choice of respondent for the target population. A simple convenient sampling method was used to obtain the necessary data.

The instrument used for collecting data from the respondent was through a structured questionnaire that was administered by the researcher using set predetermined questions. The questionnaire designed for this research was such that first section dwelled on the background information of the respondents while other section focused on matters relating to the research study.

Questions inherent in structured questionnaire were asked on a five (5) point linkert scale and it was chosen for ease and uniformity of response. Its application implies that most part of the data analysis was based on a scoring system. The schedule contains simple and straight forward questions in chronological order designed in such a way that response to it should not take more than 20minutes considering the busy schedules of the quantity surveyor.

Tables were employed in this research for data presentations. The analysis of the collected data was carried out using the following descriptive and analytical scientific methods.

3.1. The Mean Score
The mean was employed to calculate the mean year of working experience of respondent and to determine the variance among different professionals response. Since a Linkert of 5-point scale will be employed for the collection of data, the formula for mean is written as;

Formulae: where $M = \dfrac{\sum fx}{\sum f}$

Where f is the frequency of each class, x is the mid-point of each class interval

Based on this assertion, Microsoft Excel, SPSS and also inferential statistics will be used to analyse the assessment of risk associated with the usage of quantity surveying softwares.

Similarly, the summation of FX gotten from the multiplication of frequencies of the respondents and the ratio of the range of option between 1-5, FX is been divided by the total number of questionnaires analysed to get the mean factor which was then ranked from the highest to the lowest.

Mean score equation used for the calculation

$$M = \frac{5(FX_5) + 4(FX_4) + 3(FX_3) + 2(FX_2) + (FX_1)}{X_5 + X_4 + X_3 + X_2 + X_1}$$

Where M = mean score
X = range 1 – 5 with 5 being the highest and 1 being the lowest
F = Frequency of respondent in each factor

3.2. Relative Importance Index

$$\frac{\sum W}{A \times N}$$

$(0 < index \leq 1)$

where w = weighting given to each factor by the respondents and ranges from 1 to 5 where '1' is 'not significant' and '5' is 'extremely significant',
A = highest weight (i.e. 5 in this case), and
N = total number of respondents.

3.3. Severity Index

$$\frac{\sum W}{A \times N} \times 100$$

where w = weighting given to each factor by the respondents and ranges from 1 to 5 where '1' is 'not significant' and '5' is 'extremely significant',
A = highest weight (i.e. 5 in this case), and
N = total number of respondents

4. Data Presentation, Analysis and Discussion
This chapter analyses and discusses the data collected through questionnaires in order to achieve the aim and objective of this study. The data is presented in a tabular form, relevant and necessary information collected through the questionnaires would help to achieve the aim and objective of this research work.

4.1. Analyses of Data

Table-4.1. Number of Questionnaire Distributed and Retrieved

S/N	Location	No. Of Questionnaire Distributed	No. Of Questionnaire Retrieved
1	Ikeja	8	8
2	Ikorodu Road	6	4
3	Yaba	6	6
4	Mushin	1	1
5	Obalende	4	3
6	Surulere	4	4
	Total	29	26

Source: Field Survey 2013

Table 4.2 indicates the number of years of firm's establishment obtained. The years range of 1996–2000 predominate (33.3%), next is year range of 1985-1990 (26.7%), followed by year range of 1991-1995 (20%), and the year ranges of 1981-1985, 2001-2005 and 2006-2010 have the same percentage representation (6.7%). It can be deemed that most of the firms are well experienced and knowledgeable in construction and their responses to questions on the questionnaire can be relied on. About 11 firms did not thick their years of establishment.

Table-4.2. Number of Year's of Firm Establishment

Years of Firm Establishment	Frequency (f)	Percentage (%)
1981 – 1985	1	6.67
1986 – 1990	4	26.67
1991 – 1995	3	20.00
1996 – 2000	5	33.33
2001 – 2005	1	6.67
2006 – 2010	1	6.67
Total	15	100

Source: Field Survey 2013

Table-4.3. Years of Working Experience of the Respondent

Years of working Experience	Mid-point (x)	Frequency (f)	Percentage (%)
1 – 5	3.0	16	61.54
6 – 9	7.5	3	11.54
10 – 15	12.5	3	11.54
16 – 20	18.0	1	3.85
ABOVE 20	22.5	3	11.54
Total		26	100

Source: Field Survey 2013

Table 4.3reveals the respondents' years of working experience, 61.54% have 1-5 years of experience, 11.54% have between 6 – 9 years, 11.54% have between 10 - 15 years, 11.54% have above 20 years of experience, and 3.85% has 16-20 years working experience. It was also discovered that the mean years of working experience is7.4.

Therefore, it is evident that the data retrieved from these questionnaires are reliable and good enough to form a basis for this project due to the fact that the respondents are experienced, truthful and honest. It is also obvious from the data that the respondents are experienced enough to give adequate data and correct information on the assessment of risk associated with the usage of quantity surveying softwares.

Table-4.4. Level of Usage of Quantity Surveying Software

S/N	Softwares	Mean Score	Percentage (%)
A	Spread sheet (Microsoft Excel)	5.00	18.01
B	Word processor (Microsoft Word)	5.00	18.01
C	Ripac	1.46	5.26
D	Qs Cad	2.38	8.59
E	Qs Elite	1.62	5.82
F	Master bill	2.54	9.14
G	Win Qs	1.27	4.57
H	Computer Aided Estimating (CAE)	1.27	4.57
I	Computer Aided taking off (CATO)	1.42	5.12
J	Vector	1.15	5.12
K	Digico	0.92	3.32
L	Qs Plus	1.23	4.43
M	Building Information Model Software	1.38	4.99
N	Cost X	1.12	4.02

Source: Field Survey, 2013

Table 4.4 present the level of usage of quantity surveying softwares. Microsoft Excel and Microsoft Word (18%) have the highest level of usage among quantity surveying firms in Nigeria. The likely reason for the high usage of Microsoft Excel and Microsoft word is their availability and universal, low cost, and its application is simple to understand. Digico (3.3%) have the lowest level of usage. The likely reason for the low usage of Digico is the unawareness of its usage and has some restricted limitation in its usage.

Table-4.5. Factors That Necessitate the Usage of Quantity Surveying Software

S/N	Factors	Mean Score	Percentage (%)
1.	Changing trends in technology	4.85	23.54
2.	Increasingly sophisticated clients	4.16	20.21
3.	Level of competition	4.12	20.02
4.	Increasing collaboration	3.79	18.42
5.	Economic policies	3.67	17.81

Source: Field Survey 2013

Table 4.5 presents the factors necessitating the usage of Quantity surveying software. Changing trends in technology (23.5%) is rated as the highest factor with mean score of 4.85, increasingly sophisticated clients (20.2%) with mean score of 4.16 and Economic Policies (17.81%) is rated as the least factor with mean score of 3.67.

Table-4.6. The Risk Associated With the Usage of Quantity Surveying Software

S/N	Risk	Relative Importance Index	Rank
1.	Incompatibility in software packages	0.73	1
2.	Lack of first hand expert	0.71	2
3.	Virus attack	0.64	3
4.	Proliferation of software application	0.59	4
5.	Lack of management desire and appreciation of software	0.59	4
6.	High rate of obsolescence of software	0.56	6
7.	Capable of making professional redundant	0.52	7
8.	Project information discouragement	0.50	8
9.	Low return on investment	0.48	9
10.	Health risks	0.42	10

Source: Field Survey 2013

Table 4.6 reveals the relative importance index (RII) calculated for each risk based on overall risk significance in the usage of Quantity Surveying softwares. The most significant risk is incompatibility in software packages with the relative importance index of 0.73, followed by Lack of first hand expert with relative importance index of 0.71, Virus attack has relative important index of 0.64 and health risk is of the lowest significance (RII - 0.42).

Table-4.7. Perceived Impact of Risk Associated With the Usage of Softwares in Quantity Surveying Firms

S/N	Impact	Mean Score	Severity Index (S.I) (%)
1.	Capable of making Professionals Redundant	2.62	52.40
2.	Wrong Budget Estimate	2.42	48.46
3.	Project Failure	1.69	33.85
4.	Project Delay	1.65	33.08

Source: Field Survey 2013

Table 4.7 reveals the perceived impact of risk associated with the usage of software in quantity surveying firms in Nigeria. The major impact of risk associated with the usage of software on Quantity surveying Practice is the capability of making Professionals Redundant(S.I - 52.40%).Wrong Budget Estimate has mean score of 2.42 and Project delay (S.I - 33.1%) has mean score of 1.65.

4.2. Discussion of Findings
4.2.1. The Factors That Necessitate the Usage of Quantity Surveying Softwares.

It was discovered that changing trends in technology (23.5%) with the mean score of 4.85 is the most important factor that necessitates the usage of quantity surveying softwares due to the fact that the introduction of theses softwares is being viewed as an important strategic tool towards making the firm more efficient, profitable and competitive. Software application reduces the time for data processing and communicating information, and improves communications for effective decision making and coordination among construction participants to enhance construction productivity.

The least of the factors is Economic policy (17.8%) with a mean score of 3.67 due to the fact that the Privatization policy is gradually increasing the burden of development on the private sector and the nature of construction procurement and management will evolve to meet this privatization trend.

4.2.2. The Risks Associated With the Usage of Quantity Surveying Softwares in Lagos State.

The analysis reveals that the most significant risk is incompatibility in software packages with the relative importance index of 0.73 due to the fact that the wide range of software used and the incompatibility between many of these systems severely limits the scope for the firms to take advantage of the rapid technological advances surrounding it and also some software components or systems may be compatible in one environment and incompatible in another. Lack of first hand expert has the second most significant risk with relative importance index of 0.71 due to the fact that most estimators are not first-hand software expert. At best, they rely on marketing impulses and persuasions to make decisions on what software package to go for, when and how and this portends a lot of risks for any firm even in purchasing a less productive software package.

However, it is important to note that health risk is of low significance. It has the lowest risk with relative importance index of 0.42.

4.2.3. The Perceived Impact of Risks Associated With the Usage of Softwares on Quantity Surveying Practice

It was discovered that introduction of softwares has rendered professionals redundant due to the fact that Quantity surveying in Nigeria is experiencing dramatic and significant changes in scope and service delivery. These changes were as a result of the introduction of the usage of softwares and online portals into their service delivery. This became necessary due to the increasing demand for quantity surveying services and complexity in modern constructions Musa *et al.* (2010). Software application can be viewed in two major areas. The first was the use of softwares in creating drawings, making structural analysis, carrying out cost and time calculations. The second was concerned with the use of computers to classify, store and manage the construction information (Isikdag, 2006) cited in (Isikdag *et al.*, 2009). However, availability of this software has caused so many professionals in the field redundant.

However, the impact of risk will have little or no effect on Project delay (S.I - 33.1%) and project failure (S.I - 33.9%)due to the fact that poor risk management and supervision, work variations are one of the major factors that leads to project delay.

5. Conclusion and Recommendation

5.1. Conclusion

This study focuses on the assessment of risk associated with the usage of quantity surveying softwares in Nigeria. The assessment of risk associated with the usage of quantity surveying softwares reveals the following conclusions;

    i.   All the quantity surveying firms work with Microsoft Excel and Microsoft word packages.

    ii.   Changing trends in technology is the major factor that necessitates the usage of softwares in quantity surveying firms in Lagos State.

    iii.   Incompatibility in software packages is the major risk associated with the usage of quantity surveying software in Lagos State.

    iv.   The major Perceived impact of risk associated with the usage of softwares on Quantity Surveying Practice is that it is capable of making professionals redundant.

5.2. Recommendation

Below are some vital recommendations for this research work;

    i.   Quantity surveying firms must ensure that the choice of software packages should be compatible with the existing model in Nigeria in terms of interoperability, portability and flexibility.

    ii.   Estimators should be trained and given technical and financial support so that they can become first hand software expert.

    iii.   Original and updated antivirus (e.g. Microsoft Security Essentials) should be installed on computer system so as to avoid the risk of virus attacks.

    iv.   The use of monitor screen guide on computer system will automatically reduce the effect of monitor glare which could cause headaches, a burning sensation in your eyes, temporarily blurred vision. Also, constant body exercise will alleviate pains in the spinal cord and pressure on the invertebral discs that cushion impact stress when sitting at your workstation for extended periods.

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