

# The Place of Technological Application in Entrepreneurship: A Study of the Use of Computers by the Quantity Surveyors in Nigeria

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## Abstract

Independent Quantity surveyor, professional and opting to set up an organization of his own is a manager of a business enterprise who makes money through risk and initiative hence an entrepreneur. This study focus on the characteristic of an entrepreneur to access outside help to supplement their skills (technology) by examining the usage of computers in quantity surveying practices of southwest-Nigeria. Exploring this detailed knowledge of the technology relevant to skills expected of quantity surveyors will enhance project success in the construction industry hence the economy. The method adopted was questionnaire survey administered to a population of sixty-eight (68) practicing firms' staff using purposive sampling technique The data analysis included the determination of mean item score (MIS) of the responses from the respondents. The result of the study showed that about 80% of respondents Qs have been using computer for quantity surveying services as at the year 2005 with more use of computer in Microsoft software. This is a good indication that the coming generation of Quantity Surveyors in Nigeria will take advantage of the benefits of information technology thus having positive implication in their competing with other professionals and confirming the characteristic of entrepreneur by contributing to the ever-desirable efficiency in project management service delivery.

**Keywords:** Entrepreneurship, Entrepreneurs, Quantity Surveying, Technology.

## 1. Introduction

Organisation for Economic Cooperation and Development (OECD) in its 2001 publication entitled Drivers of Growth, referred to, "The concept of entrepreneurship generally as enterprising individuals who display the readiness to take risks with new or innovative ideas to generate new products or services. One of the most recent definitions of entrepreneurship is that of (Commission of the European Communities, 2003) referring to Entrepreneurship as the mindset and process to create and develop economic activity by blending risk-taking, creativity and/or innovation with sound management, within a new or an existing organisation.

Ede( 2011) posited that the five key elements of economic growth and sustainable development are (i) manpower, (ii) capital resources, (iii) technology, (iv) basic infrastructural facilities and (v) innovations and focusing on these elements can aid the realization of vision 20:2020 which is one the strategic tool set by Nigerian government towards becoming one of the top leading 20 largest economies in the world and more importantly to consolidate its leadership position in Africa and establish itself as a force to be reckoned with in the global economy and politics.

Following from above, it is realised that entrepreneurship is concerned with all the key elements of economic growth and sustainable development hence the need to study the role of Quantity Surveyor(Qs) as an entrepreneur and one of the stakeholders of the built environment that determines the nature and pace of national development and the citizens' quality of life.

Most of the information that flow within the construction industry is cost centered, the Qs, (as cost economist of the industry) stands a focal point as he deals with the construction cost, construction management and the construction communication which are the major challenging areas for any professional within the construction industry.(Musa,Awolesi and Okafor. 2012). Musa, Babalola and Oyebisi (2009) argued that right from the inception through the design and construction stages and indeed throughout the life of the project the consultants and other stakeholders rely on the cost information of the Qs to discharge their contractual obligations in particular and achieve desired project goals in general. Effective delivery of this role of the Qs can be enhanced by the use of available technology hence prompting the characteristic (Technological) of an entrepreneur as he applies knowledge to the practical aims of human life or to changing and manipulating the human environment,

by the use of materials tools techniques and sources of power to make life easier or more pleasant and work more productive.

However the adoption of the information and communication technology (ICT) by the quantity surveying profession, which is meant to enhance professional practice has been quite challenging. The real challenge of the information revolution is not the development of technology itself but how to use it. The technology is developing faster than our ability to adopt it. Catilidge (2002) opined that this sluggishness can be traced to conservativeness of the industry, high degree of fragmentation in both the procurement process and production system, and absence of management driven information technology (IT) strategy. Odeyinka (2008) posited that the barriers to the development of IT include the lack of personal skill, incapable use of the computer high web-based information and high rate of illiteracy.

Therefore the critical roles being played by the Qs require that the professionals must not lag behind in the adoption of tools that promise to improve on their service delivery. Thus an update on the state of the art of computing as a technological know-how by the professionals is necessary. The division between professionals in the advanced countries and developing countries level of computer skill acquisition and the accessibility of the computer as well as the appropriate applications is also a challenge. Adoption rate of ICT in Information and Scientifically underdeveloped Nations (ISUNs) is low compared to the Information and Scientifically Developed Nations (ISDNs) (Oyediran, 2005)

Proffering solutions to these shortcomings of Qs as an entrepreneur is to investigate the level of usage of basic IT techniques (Technological function of entrepreneur) that could be of the best advantage to the better professional Qs. This paper therefore sets to examine the nature and usability of IT and its applications by the Nigerian Quantity surveyors based in the southwest of the country

## 2. Entrepreneurship

Defining entrepreneurship has been source of confusion that occupied scholars for many years and, indeed, to this day there is still a lack of consensus on its exact meaning. Richard Cantillon, a French economist in about 1730 is generally said to be the first to coin the phrase 'entrepreneurship' in the context of what we view today as entrepreneurship and he defined it as self-employment of any sort, and entrepreneurs as risk takers, in the sense that they purchased goods at certain prices in the present to sell at uncertain prices in the future. Other eminent economists and scholars like Adam Smith, Jean Baptiste Say, Alfred Marshall and Frank Knight elaborated on Cantillon's contribution, but added leadership and recognizing entrepreneurship, through organization, as a fourth factor of production, while retaining the key tenets of risk taking and profit as important features of entrepreneurship. (Ahmad and Seymour, 2015). More modern interpretation, relating entrepreneurship, additionally, to innovation, was done by Schumpeter in 1934 as he defined entrepreneurs as innovators who implement entrepreneurial

change within markets, with the change having five manifestations:

- (1) the introduction of a new (or improved) good; (2) the introduction of a new method of production; (3) the opening of a new market; (4) the exploitation of a new source of supply; and
- (5) the re-engineering/organization of business management processes.

Schumpeter's definition embodies innovation, a characteristic of entrepreneurship that is widely recognized today, it still retains some ambiguity that has meant the debate regarding a definition of entrepreneurship continues as indeed even the Organisation for Economic Cooperation and Development (OECD) has contributed to the confusion since virtually every of their study that has focused on entrepreneurship has presented a different definition of the term. For example, in an OECD Economic Survey in 1997, it was defined as "the dynamic process of identifying economic opportunities and acting upon them by developing, producing and selling goods and services". In "Fostering Entrepreneurship", it was defined as "...the ability to marshal resources to seize new business opportunities..." In a 2001 publication on Youth Entrepreneurship, the term was equated with self-employment: "... an entrepreneur is anyone who works for himself or herself but not for someone else..." Finally, another 2001 publication entitled Drivers of Growth, referred to, "The concept of entrepreneurship generally as enterprising individuals who display the readiness to take risks with new or innovative ideas to generate new products or services." One of the most recent definition of entrepreneurship is that of (Commission of the

European Communities, 2003) Entrepreneurship is the mindset and process to create and develop economic

activity by blending risk-taking, creativity and/or innovation with sound management, within a new or an existing organisation.

An **entrepreneur** is an owner or manager of a business enterprise who makes money through risk and initiative. (Balachandran and Sakthivelan, 2003) Jean-Baptiste Say, a French economist, while defining entrepreneurship is believed to have coined the word "entrepreneur" in the 19th century and he defined an entrepreneur as "one who undertakes an enterprise, especially a contractor, acting as intermediary between capital and labour". Wheelen and Hunger (2000) identified four entrepreneurial characteristics as:

1. The ability to identify potential venture opportunities better than most people; 2. A sense of urgency that makes them action oriented; 3. A detailed knowledge of the keys to success in the industry and the physical stamina to make their work their lives; 4. Access to outside help to supplement their skills, knowledge and abilities.

## 2.1 Functions of the Entrepreneur

Kilby (1971) identifies thirteen entrepreneurial functions which are grouped as follows:

- **Exchange relationship**

1. Seeing markets opportunities (novel or imitative); 2. Gaining command over resources; 3. Marketing the product and responding to competition; 4. Purchasing inputs.

- **Political administration**

5. Dealing with the public bureaucracy (concessions, licenses, taxes, and so fourth); 6. Managing human relations in the firm; 7. Managing customer and supplier relations

- **Management control**

8. Managing finances 9. Managing production (control by written records, supervision, coordinating input flows with customer orders, maintaining equipment);

- **Technological**

10. Acquiring and overseeing plant assembly; 11. Minimizing inputs with a given production process – industrial engineering; 12. Upgrading processes and product quality;

13. Introducing new production techniques and products

## 2.2 The Quantity Surveying Profession and Entrepreneurship

The Quantity Surveyor (Qs) is equipped to be cost expert that closely watches agreed budget, provides guidance through the financial complexity of modern building construction, civil and structural engineering, mechanical and electrical engineering services, petrochemicals, mineral extraction, production engineering and environmental economics, planning and urban development, landscaping and interior design. However, expertise involves the provision of the principal services concerning cost management of projects according to Nigeria Institute of Quantity Surveyors (2003):

Quantity surveyors together with other professionals concerned with design and execution of construction projects (such as architect, structural engineers, Building services engineers, main contractors, subcontractors, and suppliers) operates in the construction industry which Seelay (1997) opined that any changes in the industry has a significant effect on the rest of the economy and its influence is greater than imagined thus the construction industry significantly affect the economy via employment, creating capital assets and creating durable consumer goods. It is also argued to be highly sensitive to the development of other sectors of the economy thus being a yardstick of the economic standard of countries.

In the dispensation of these services the quantity surveyors gets across to their clients and their professional colleagues either as an independent consultant or engage by others in public sector, private sector and contractors offices to contract his services at pre or post contract stages. Independent Quantity surveyors rendering services to clients are entrepreneurs that while meeting their responsibilities as listed in the functions of the quantity surveyors reflect the duties expected of entrepreneurs as listed by Kilby (1971). The **Exchange relationship function** of entrepreneur to a large extent is responsible for the QS after qualification and certification by the appropriate professional body to take the decision of professing independently having seen market opportunity. **Political administration function** came into play as the QS deals with clients and public bureaucracy, human relations of the staff members of the office. **Management control function** sees the QS manage both the finances and production of the office. **Technological function** came to play as the QS upgrade processes and product quality by introducing new production techniques and products.

A common competency required of consultants in delivery of construction goods is the ability to manage and communicate project information and documents. "In fact, a core issue in the drive for increased productivity in the construction industry is the effective management of information, both in the form of information flows that permit rapid inter-organizational transactions between project participants and in the form of information accumulated, coded and stored in firm database structure (Mohamed & Stewart, 2003). This from quantity surveyors, as basic competency in data, information and information technology is required (RICS, 1998), while from engineers, the availability of computer facilities is a measure of technical capability (Ng & Cow, 2004). In the case of the architects, the effective communication of design information to contractors is a key performance criterion (Oyedele & Tham, 2005). It has become a tactical necessity for these consultants and other project participants to integrate their information systems with each other to improve the flow of information between them and enhance the effectiveness of decision-making (Li et al., 2000). The adoption and use of ICT facilities this much-needed integration in the construction industry (Li et al., 2000; Mohamed & Stewart, 2003)." (Oladapo, 2008).

### **2.3 Computer: A tool for efficiency**

The rapid adoption of computers as mode of communicating design information has by the late nineties reached the peak in some advanced countries. However, many researchers have concluded that computer was used more for office works like book keeping, invoicing and technical calculations than for project tendering, purchasing, scheduling and material control. The significant benefit of computer usage include better quality of work, fastness, better financial control, better communication, satisfaction to the clients, less use of paper etc. With all these benefits, the above report still laments the continuous demand for computer software and hardware upgrading and know-how, too high investment cost, demand from staff, reduced security, etc.

### **2.4 Factors influencing computer usage in southwest Nigeria**

In the "communication domain", many people find computers as important as telephones and fax machines (Doherty, 1997). Yet, there are factors that drive it and also those that mitigates. Doherty (1997) argued that some of businesses are simply not possible for those who do not have access to a capable computer system. Therefore, some driving and inhibiting factors enumerated.

- Driving Factors
  - a. General technology demand
  - b. Corporate technology strategy
  - c. Industry competition among the quantity surveyors
  - d. Client/customer demand
  - e. Reduced cost of document production, increased speed of production, reduction in time spent in documents production and accuracy of processed information.
  - f. The use of automated quantities with the possibility of enormous productivity gains.
  - g. Accuracy and precision
  - h. Making professional jobs easier
  - k Saving operating cost and enhancing functionality & competency
  - l. Enhances data and information within the firm.
- Inhibiting Factors
  - a. Lack of knowledge and training, business size and maturity; and initial cost of hardware acquisition
  - b. Missing link in the educational training
  - c. Cost of hardware's and necessary software's
  - d. Lack of computer literacy
  - e. Lack of motivation to embark on its implementation due to short term profits
  - f. Insufficient/Erotic power supply
  - g. Personal abuse and difficulties in adapting to change
  - h. Virus attack, security breach and fear of accuracy.

According to Smith (2003), the most obvious benefit for quantity surveyor lies in the use of automated quantities with the possibility of enormous productivity gains. Smith (2003) further substantiated this by pointing out that the preparation of quantities in the traditional based model is tedious and time consuming and typically accounts for 80% of the total time spent in preparing tenders, budgetary estimates and cost plans. According to Tse & Wong (2004), the automated approach was found to be 14.3 times faster that could be associated. According to Cartlidge (2006), some negative factors inhibiting QS factors include: lack of knowledge and training, business

size and maturity; and initial cost of hardware and software acquisition. Cartlidge (2006) emphasized the fact that lack of knowledge of new technologies on the part of senior surveyors, the people who set the business objectives, led to scenarios where investment in new technology is driven from the bottom up which may meet with resistance in some cases.

### **Objectives of the study**

This study has the following objectives:

1. To determine the level and extent of the usage of computer (as a technology) in QS operations
2. To determine the extent of application of computer in Qs practice
3. To assess factors influencing the use of computers
4. To identify major determinants of computer usage

### **3.0 Method**

#### **Data Collection.**

The data collection instrument used in this study is the questionnaire. Ninety-six (96)

questionnaires were distributed to respondents, using purposive random sampling. Sixty-eight (68) hard copies of questionnaires were retrieved in person, yielding a response rate of 70.33%. The questionnaire is in three (3) parts. Part 1 contains the following respondent particulars: Age, Gender, Educational qualification, Professional qualification, Working Experiences in the construction industry and the type of organization the respondents work. Part 2 asked respondents to score the determinants of the use of computer, constraints to its use and its impact on professional practice. Part 3 gives the respondents scoring option on the current level of computer use and the future prospect in their countries. A 5-point Likert scale was used, the scale is: 1-not useful, 2-rarely useful, 3-somewhat useful, 4-useful and 5-very useful.

#### **Data Analysis**

The Statistical Package for Social Sciences (SPSS) was used to carry out the analysis.

The demographic details of the respondent were produced and the mean rank of the identified factors in the objectives were used for the ranking in the analysis.

#### **Results**

Sixty-eight (68) questionnaires were collected back from respondents and used for the analysis.

The demographic details of the respondents are presented in table 1:

***Table 1: Demographic details***

<u>Variables</u>	<u>Frequency</u>	<u>Cumulative Frequency</u>	<u>Percentage</u>	<u>Cumulative Percentage</u>
<b>1 Education Qualification (N = 68)</b>				
HND	16	16	24	24
BSC/B.Tech	20	36	29	53
MSC	32	68	47	100.00
PHD	-	-	-	-
<b>2 Professional Membership Grades (N = 68)</b>				
Student (NIQS)	0	0	0	0
Student (RICS)	0	0	0	0
Probationer (NIQS)	22	22	32	32
Probationer (RICS)	8	30	12	44
Corporate member (NIQS)	24	54	35	79
Corporate member (RICS)	4	58	6	85
Fellow (NIQS)	8	66	12	97
Fellow (RICS)	2	68	3	100.00
<b>3 Working Experiences in the Construction Industry (N = 68)</b>				
Less than 10 yrs	28	28	41	41
10-20 yrs	24	52	35	76
21-30 yrs	16	68	24	100.00

**Sources:** Field Survey, 2015

**Level of computing skills among the southwest NQSs**

The computing skills among the Southwest Nigerian Quantity Surveyors (NQSs) are assessed using the following measures: (1) Time when the respondents began to use computer/IT (2) Hard ware and software owned by the quantity surveyors and the computing facilities they are using, (3) Type of computer and software being used for their works, (4) Adaptation strategies and their measures of currency of computing systems, and (5) Proficiency level of quantity surveyors in the use of IT tools.

***Table 2: Time when computer usage began***

<b>Time Period (years)</b>	<b>NIQS</b>	<b>% of the total</b>
1990-1995	16	24
1996-2000	12	17
2001-2005	24	35
2005-date	16	24
<b>Total</b>	<b>68</b>	<b>100%</b>

**Sources:** Field Survey, 2015

Table 2: shows that about 80% of quantity surveyors have been using computer for quantity surveying services by 2005. There has been some tremendous growth in the number of surveyors using computers from 1996 to date. It can be inferred that a great proportion of QSs have been using computers either personally or in



organizations for quantity surveying services.

The variety of options available in software possession were explored and categorized to original and copied versions as shown in Table 3.

*Table 3: Quantity and Quality of Software (QS and other packages)*

Type of software by quality	QS software	Other
<b>Original</b>	<b>1.66*</b>	<b>0*</b>
Original with original manual	2.00	-
Registered ownership	1.08	-
Possession of license of package	<u>1.94</u>	-
<b>Copied version</b>	<b>1.39*</b>	<b>0.67*</b>
Original copy without original manual	1.18	-
Copied version without manual	1.81	1.11
<u>Copied version with photocopied manual</u>	<u>1.24</u>	<u>0.90</u>

**Sources:** Field Survey, 2015

1 = Not many, 2 = Many, 3 = Very many, 4=All, \*Average mean score

The variety of options available in software possession were explored and categorized to original and copied versions as shown in Table 3. Table 3 also shows that there is the existence of both original and copied versions of the various types of software in use by the responding QS. Quite many of the software available for quantity surveying services and other uses are original. Not many of the QS packages are copied versions. This is not unexpected since they are specialized software with limited market and adequate security systems to prevent duplication.

*Table 4: Quantity Surveying Software in use*

Software in Use	Mean regularity of use score	Rank
Cat Pro	1.31	1
Master Bill	1.29	2
QS Bill	1.22	3
In-house	1.21	4
QS Elite	1.15	5
Snape (vector)	0.90	6
Win QS system	0.70	7
<b>Average mean score</b>		<b>1.11</b>

**Sources:** Field Survey, 2015

CatPro, Master Bill and QS Bill are the three most used quantity surveying software. In-house software being used is of local origin, while Cat Pro, Master Bill and QS Bill types are foreign, of British origin. Their cost is an important factor in their acquisition. The most recent system in the Nigerian market is the South African developed software – Win QS system. The system was introduced in 2004 and there is evidence from this survey that it is being given some consideration. The level of usage of these QS software is low.

### Functional Demand of IT by NQSS

Table 5 shows the functional demand of IT by NQSS. The three groups of function are Word processing function, Database function and spreadsheet function. There are functions being performed using computers and there are those, which they hope can be performed by computers. This is to reflect the needs as well as indicate those who have not been performing those functions already.

*Table 5: Functions which NOSs perform using computer*

Functions	Presently performed		Desired to perform	
	Respondent	%	Respondent	%
Word Processing Functions	68	100	-	-
External correspondence	68	100	-	-
Internal correspondence	60	88	-	-
Technical Reporting	22	64.7	6	18
Project Information	64	94.12	-	-
Staff information	64	94.12	-	-
Equipment information	28	41.18	10	29
Spreadsheet Functions	48	70.59	10	29
Programme of works	8	11.76	28	82
Material schedule	8	11.76	28	82
Estimating	4	5.88	32	94
Cash flow requirement	24	35.29	18	53
Scheduling	20	29.41	20	59
Job costing	28	41.18	16	47
Resource levelling	36	52.94	6	18

**Sources:** Field Survey, 2015

Word processing functions are being performed by all the respondents. Spreadsheet functions are being carried out using computer by 70.59% of the respondents while about 29.41% wish to perform spreadsheet functions with computer. Of the functions that the QS desires to computerize spreadsheet functions resource leveling, and job costing requirements appear to be the three most desirable functions.

*Table 6: Proficiency in computing capacity of QSs*

Packages	Percentage of response	Rank	Comments
Word processing packages	100	1	Very proficient
MS Excel	100	1	Very proficient
E-Mail	82.5	2	Very proficient
Internet	83	2	Very proficient
Presentation packages	65	3	Proficient
Intranet	59	4	Fairly Proficient
In-house packages	53	5	Fairly Proficient
MS Access	41	6	Not proficient
QS Software	41	6	Not proficient
Others, MS project etc	41	6	Not proficient
Design packages	35	7	Not proficient
Lotus 1-2-3	18	8	Not proficient
Programming language	18	8	Not proficient
Accounting packages	12	9	Not proficient

**Sources:** Field Survey, 2015

Proficiency in computing adoption in PCMS offered by SW-NQSs can be used as a proxy for computer literacy level. There are indications of high level of proficiency in using Microsoft Excel and Microsoft Word (table 6). They appear to be moderately proficient in the computer based communication media - the E-mail and the Internet facilities. There is indication of fair proficiency in presentation packages such as Microsoft PowerPoint.



The proficiency level of SW-NQs in quantity surveying packages calls for concern. Majority cannot programme at all. All these are pointers to the fact that they still have a long way to go and ample challenges for growth, especially when it comes to adaptation of existing software to peculiar situations or individual office needs.

*Table 7: Factors Driving the Computerization of QS Services*

Driving Factors	Mean Score	Rank	Comments
1. General Technology demand	3.59	1	High influence
2. Corporate Technology strategy	3.45	2	High influence
3. Competition among Professionals	3.35	3	High influence
4. Industry competition among QS	3.30	4	High influence
5. Client/Customer demand	3.00	5	High influence
6. General construction demand	3.00	6	High influence

**Sources:** Field Survey, 2015

Table 7 shows that all the drivers have high influence on the decision of the QSs to computerize their services. As it appears the QSs had to computerize their services because the driving force of technology is too compelling to ignore. Closely following this is another technology related factor: corporate technology strategy. Other factors are: competition (either in form of competition among construction industry professionals or among the QSs), client and customer demand and general construction industry demand.

#### 4.0 Conclusion

From the study, it was found out that about 80% of respondents QSs have been using computer for quantity surveying services as at the year 2005. The yearly rate of adoption or use of computer in PCMS is a good indication that the coming generation of southwest NQs will take advantage of the benefits of information technology. This, of course, will have positive implication in their not only to compete with other professionals but also to contribute to the ever-desirable efficiency in project management service delivery. Two major job functions amenable to computer operation are those requiring technical reporting and spreadsheet programmers as the baseline operating programmes. Consequently, a good understanding of and proficiency in spreadsheet programmers is necessary for quantity surveyors to assert any reasonable computer literacy. Similarly, this requiring understanding in database management, such as information storage, data mining and data retrieval will be necessary of quantity surveyors. However, further study could be made into factors inhibiting the use of Quantity surveying software by the targeted quantity surveyors as this study reveal that the level of usage is below average.

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