

## **APPRAISAL OF INFORMATION TECHNOLOGY REQUIREMENTS IN QUANTITY SURVEYING FIRMS IN NORTHERN NIGERIA**

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### **Abstract**

A worrisome trend in the adoption of emerging technologies for competitive advantages and improved productivities by QSs have been observed in that there is overwhelming evidence that there is an increasing usage of IT in quantity surveying firms but little or no noticeable benefits on the practice. It however becomes pertinent to ask then, that despite the increases adoption of computing and telecommunication technologies, why isn't there any noticeable change due to the impacts of IT in the Nigerian Construction Industry with particular reference to Quantity Surveying practices. The study appraised the requirement of IT in quantity surveying practice in Nigeria. It examined the position of IT in quantity surveying firms in terms of its requirement and analyzed IT requirements-based problem constraining quantity surveying firms. The study is a survey research designed to obtain information on information technology in QS firms. A self-administered questionnaire was employed to quantity surveyors in consulting firms for responses. Responses were returned and analyzed using severity index and later ranked in order of importance. The results indicate a high level of computerization of professional services among the firms with greater number of their computers being networked. However, despite high level of networking of available computers, sharing of printers and other scarce tools/technologies are not established. Compared to developed countries such as Canada, Australia, United Kingdom and USA, the position of IT requirements in QS firms in Nigeria can be said to be at basic level with organization possessing and applying basic IT tools and technologies (e.g. scanners, digital cameras, dvd/cd-rom, general purpose software, QS application software, chat programs etc.) in their daily operation and processes. While most firms are progressing toward intermediate level by possessing intermediate IT tools and technologies (e.g. teleconferencing, DBMS software, mobile data networks, voice output devices etc.) but these technologies are not currently utilized in their operation. Also, advanced technologies (e.g. data conferencing, digital information services, extranet, remote databases, white boarding, voice recognizers etc.) that would make QS firms reap the full benefit of IT and make difference in the industry are hardly available. It is recommended that for the quantity surveying firms in developing countries to maximize their returns on investments on IT, it must go beyond the possession of IT tools to harnessing same to reap the full benefit of technology.

**Keywords:** Technology infrastructure, Information technology, Mobile computing, Quantity Surveying

### **1. Introduction**

The explosion of information technology (IT) in the 20<sup>th</sup> century and the increasing demand for it has accelerated the dimensions of competition not only among organizations globally but among professions locally. Castle (2002) asserted that the Quantity surveyors (QSs) ability to avail themselves with the emerging opportunities provided by the advent of information and communication technology depends on the adoption of new technologies. Lucey (1994) defined Information (and communication) technology as the acquisition, processing, storage, and dissemination of vocal, pictorial, textual and numeric information by a micro-electronic based computer and telecommunications.

A survey conducted by Rivard, (2000) on the impact of information technology on the Canadian Architecture, Engineering and construction industry, reported that the advent of IT has raised productivity, increased quality of documents, enhanced speed of work, better financial control, better communication, simpler and faster access to common data as well as decrease in the number

of mistakes in documentation. Thus, information technology has now been accepted as an essential element of best practice (Egan report, 1998 and Latham report, 1994). The prominence of the technology on improving efficiency makes it easy to be considered into the best practice agenda because it conforms to the dominant way of thinking of much needed improvement due to growing under achievement and dissatisfaction by the client with the construction industry. However, success has its own requirements in the age of information. The presence of a sound telecommunication and computing infrastructures and quality human resources are the most important requirements for any country to reap the benefits from the ongoing IT revolution (Chiu, 1993; Alemna and Sam, 2006; Ruiker *et al.*, 2005; Pozzebon and Heck, 2002). Rhine (2006) stated that it would be naive to develop ICT infrastructure without breeding the requisite expertise to handle it and stimulate demand for its exploitation. Pozzebon and Heck (2006) emphasized local adaptation as a critical factor in consideration of high rate of the failure of IT projects in firms, particularly those located in developing regions. While, Avgerou and Walsham (2000) assert that technologies developed and implemented in one culture may fail when taken to a different setting. Pozzebon and Heck (2006) therefore encouraged firms across locations to use generic IT but to locally adapt it.

Behrsin, *et al.*, (1994) argue that if new organizations are to be as responsive, flexible and cost-effective as they need to be, then there must be a coherent IT infrastructure supporting them. In Nigeria, Oyediran and Odusami (2005) reported that professionals in the advanced economies have shown readiness and commitment to the adoption of computers in their operations than those in the developing economies. Moneke (2001) asserted that information technology will exert monumental influence in the practice of quantity surveying. This influence is not going to be restricted to the profession but will pervasively affect all professions. He therefore suggested that the profession should keep pace with the IT revolution which will shape the ways businesses are run. Oyediran and Odusami (2005) assessed the level of computer usage by Nigerian Quantity surveyors. They found that majority of the firms were using computers heavily in administrative tasks such as book keeping, although fewer firms use IT tools for project management tasks or for electronic document exchange. In a recent survey, Oladapo (2007) reported that the yearly rate of adoption of IT tools has been on the increase and predicted that the coming generation of Nigerian Quantity surveyors will take advantage of the benefits of information technology. Despite the rapidity in the growth of computer usage by quantity surveyors in Nigeria, there seems to be a rather slow pull toward reaping the full benefits of IT in the profession (Oladapo, 2006; Oyediran and Odusami, 2005). Comparatively however, a similar studies undertaken on the use of IT in the construction industry in developed countries (Peansupap and Walker, 2005; Rivard *et al.* 2004; Rivard, 2000; Smith, 2003; Tam, 1999; Doherty, 1997 and William *et al.*, 2007) reported that many of them are at the cutting edge in their use of IT for construction operation and processes. This lack of evidential benefits is in spite of the persisted monumental influence, increased yearly growth of computer usage and emerging opportunities IT exerts upon it adoption (Moneke, 2001; Castle, 2002; Oyediran and Odunsemi, 2005) makes it pertinent to ask then, why isn't there any noticeable change due to the impacts of IT in the Nigerian Construction Industry with particular reference to Quantity Surveying practices.

To suggest likely reasons for the non-impact, a cursory analysis of researches conducted on IT in Nigeria (and elsewhere) reveals that efforts have been solely concentrated on computing technologies within particular interest in utilization (hardware and software), perceived benefits, problems and barriers. There however, exists a gap of the non-consideration of IT infrastructure requirements and its successful implementation. Since the Quantity Surveyor plays a pivotal role in information management during project life cycle, particularly that of financial probity, this research work distinguish itself by considering the compliance to IT infrastructure requirements in Quantity Surveying practice in Nigeria. The objectives of this research are;

- I. To identify and examine the requirement of information technology in quantity surveying practices.
- II. To determine the position of IT in quantity surveying firms in terms of its requirement.

## **2.0 Research Methodology**

This paper appraises the requirement of information technology in Quantity surveying firms in Nigeria. Two methods seem adequate for this purpose: survey research and observation research. The survey research method was chosen for this study, been a much economical and convenient method of collecting data. It tends to be less time demanding upon its subsequent administration and provided more untied up time for use in other aspect of the research endeavors (Kolo, 2005). The target population for the survey research are Quantity surveyors in consulting firms. Collecting information from the whole of the population would undoubtedly result in a true representation of the population but an attempt at such is prohibitively expensive and practically impossible within the confines of resource constraints. Hence, the need to select appropriate sampling technique. De Vaus (1991) identified two types of sampling method for a survey research: probability and non-probability samples. He advised that the probability samples are preferred "*because they are more likely to produce representative samples and enable estimates of the sample's accuracy*". Hence, the choice of the probability sample type for the purpose of this study.

## **2.1 Survey Techniques/Methods**

Basically, data can be collected by observation, in-depth interview, content analysis, and/or through questionnaire amongst other known techniques. The questionnaire technique was found to be very suitable for the needs of this survey for been quick, allowing wide geographic coverage and allowing ample time for the respondents to check fact and give accurate answers. Of the three methods of administration identified by De Vaus viz: face-to-face, telephone and mail, the face-to-face method was adopted. This is due to the fact that the method allows quick dispatch, assurance of delivery and efficient response rate in terms of general and specialized samples. Additionally, the questionnaire sets were prepared in a highly structured order. The 'set' consists of close ended question types. A total of 45 sets of questionnaire were distributed amongst various quantity surveying consulting firms in a random manner. An appreciable 67% were returned duly filled. These dully filled and returned sets were carefully sorted, presented and analysed and inferences drawn from the analysed data.

### 3.0 Results and Discussion

Upon sorting and collating the questionnaires, they were studied to bring out likely patterns of the responses gathered. An appropriate tool for presenting such patterns is the Chart. For the purpose of this research, two types of charts were used – the bar charts and the pie charts. Presented below are the percentage distribution of the patterns of responses gathered during the field survey. The results arrived at are presented in tables to show frequencies, Severity index and ranking. Some of the data collected for the study were ordinal in nature. To be able to rank the factors perceived by the respondents to impact the various aspects of the study, it was necessary to highlight the relative importance of the factors (Fellow and Anita, 2008). The severity index (SI) method was used for the ranking of the factors. SI is a non-parametric technique based on the aggregate weighting of the initial frequency score of each factor. The formula for the severity index is given as follows:

$$SI = \left[ \sum_{i=1}^{i=n} wif_i \right] \times \frac{100\%}{n}$$

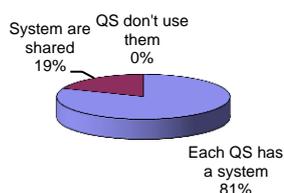
Where,  $F_i$  = the frequency of response,

$W_i$  = weight for each rating,

$n$  = total number of response

#### 3.1 Availability of Infrastructures/Technologies in QS Firms

PERCENTAGE DISTRIBUTION OF HOW QS USE COMPUTING RESOURCE



AVAILABILITY OF PRINTERS

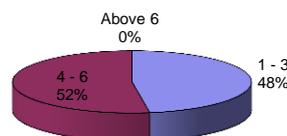


Figure 1: Distribution of computing Resources

Figure 2: Availability of Printers in QS firms Usage

Figure 1 above shows how QS use computing resource. It indicates that more than 80% of the respondents were in the possession of a computer but very few of them (19%) share computer systems in their offices. While from Figure 2 more than half of the respondents indicate between '4 to 6' printers, are available in their offices, with about 48% of them having between '1 to 3' printers. Since printer is a shareable resource and considering that majority of the QS firm have employees between 1-5. The aforementioned result suggest lack of economy in the use of printers as the printers are not mostly shared in their offices which might lead to high cost as compared to benefit that it would bring to the organization.

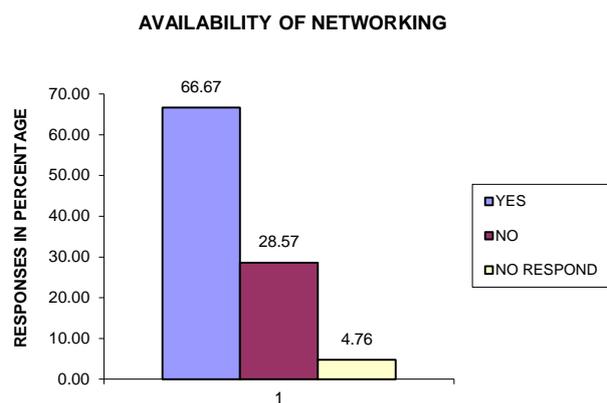


Figure 3: Availability of Networking

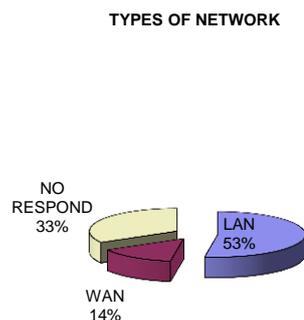


Figure 4: Types of Network

A major aspect of computing resource and data sharing is computer networking. Behrson et al (1994) discussed the importance and advantages of networking in business organization. To this end therefore, respondents were requested to provide information on the networking configuration obtainable in their organization. On the issue of availability of computer networks, respondents were asked if the computers in their organization were networked. The result of the response is contained in figure 3, which shows that 67% of the respondents indicate that computers are networked in their firms while 29% of them opined that they do not have computer network. A further 5% of the respondents did not provide any response to this question. This may mean that they do not know the concept of networking. This revelation is rather interesting for the following reasons:

It shows that a high proportion of the firms investigated do have their computers on a network and by so doing, they are tapping the benefits of computing resource sharing. Though a third of the firms do not have networks thus are not reaping the benefits of networking when compared with the size of the firms (in terms of the number of QS employed in each firm) and the number of Printers available in each firm, as earlier reported, it become clear that there is a relatively high prevalence of computer networking but these networks are not reaping the benefits of networking (i.e sharing of scarce resources). Relative to the availability of computer networks in the firm, the respondents were further asked to indicate the type of networks (topologies) adopted in these firms that do have computer networks (see figure 4), fifty-three percent indicated that the computers available in their organizations are on a Local Area Network (LAN), while 14% of them indicated that they use the Wide Area Network (WAN). Again a third of the respondents did not provide any response to this question. The non-response further suggests lack of knowledge in networking by a substantial proportion of the QS investigated. From the foregoing, it can be deduced that only a third (i.e 30%) of the whole respondents do have LAN infrastructure in their organization (since only 53% of the 67% respondents who indicated having Network in their firms, use LAN), while only 12% of the entire respondents do use WAN. The low proportion of availability of networks in firms and the low utilization of LAN topologies indicates that, though there exist evidences of networking in QS firms via LAN but resource sharing in QS firms is hardly established as can be seen with each computer having its own printer. Thus the requirements for IT within the construction Industry as regards networking technologies are not adequately met by QS firms in Nigeria. Moreover, the low use of WAN may not be unconnected to the advent of the Internet particularly the presence of the WWW.

**Table 1: Availability of IT Infrastructure/Technologies**

IT Infrastructure/technologies	PERCENTAGE SCORES			SEVERITY INDEX (%)	Applicability		
	Not available 1	Available not Used 2	Available and used 3		Not applicable (%)	Applicable (%)	No response (%)
<b>Input Devices</b>							
Touch screen	75.00	20.00	5.00	43.33	66.67	9.52	23.81
Light pen	80.00	20.00	0.00	40.00	71.43	4.76	23.81
Scanner	0.00	4.76	95.24	98.41	0.00	80.95	19.05
Voice recognizers	89.47	10.53	0.00	36.84	42.86	14.29	42.86
Digitizers	64.71	29.41	5.88	47.06	42.86	14.29	42.86
Digital Cameras	0.00	4.76	95.24	98.41	0.00	80.95	19.05
OCR devices	88.24	5.88	5.88	39.22	38.10	28.01	52.38
<b>Output Devices</b>							
Plotters	73.68	5.26	21.05	49.12	28.57	38.10	33.33
Audio response devices	88.24	5.88	5.88	39.22	61.90	9.52	28.57
Voice output devices	50.00	11.11	38.89	62.96	52.38	9.52	38.10
Image processing equipment	70.59	11.76	17.65	49.02	28.57	33.33	38.10
<b>Storage Devices</b>							
Magnetic disks	16.67	22.22	61.11	81.48	4.76	52.38	42.86
DVD/CD-ROM	0.00	4.76	95.24	98.41	0.00	71.43	28.57
Computer Hard drive	0.00	4.76	95.24	98.41	0.00	66.67	33.33
Stand-alone devices	68.75	6.25	25.00	52.08	19.05	19.05	61.90
<b>Software</b>							
Special Web browsers	57.89	5.26	36.84	59.65	19.05	38.10	42.86
Lotus Notes	76.47	5.88	17.65	47.06	28.57	19.05	52.38
Netscape communicator	78.57	14.29	7.14	42.86	68.03	34.01	76.19
Search engines	10.00	30.00	60.00	83.33	0.00	52.38	47.62
General Purpose software	10.53	5.26	84.21	91.23	0.00	52.38	47.62
QS application software	10.53	47.37	42.11	77.19	4.76	57.14	38.10

**Table 2: Availability of IT Infrastructure/Technologies**

IT Infrastructure /technologies	Percentage scores					Applicability	
	Not available 1	Available not used 2	Available and used 3	Severity index (%)	Not applicable (%)	Applicable (%)	No response (%)
Data warehouse	92.86	7.14	0.00	35.71	28.57	4.76	66.67
Data repository	78.57	7.14	14.29	45.24	19.05	14.29	66.67
Data mining software	23.53	47.06	29.41	68.63	19.05	28.57	52.38
DBMS software							
Portable and Mobile computing							
Paging system e.g. pager	84.21	5.26	10.53	42.11	38.10	14.29	47.62
Personal digital assistants (PDA)	84.21	5.26	10.53	42.11	19.05	23.81	57.14
Palmtop	90.00	5.00	5.00	38.33	19.05	38.10	42.86
Cellular telephone	4.76	4.76	90.48	95.24	4.76	71.43	23.81
Mobile data networks	57.89	5.26	36.84	59.65	14.29	38.10	47.62
Networked computing							
Network computer	18.75	6.25	75.00	85.42	14.29	57.14	28.57
Internet	0.00	5.26	94.74	98.25	0.00	76.19	23.81
Intranet	76.92	7.69	15.38	46.15	14.29	28.57	57.14
Extranet	92.31	7.69	0.00	35.90	14.29	19.05	66.67
Remote databases	90.00	10.00	0.00	36.67	14.29	19.05	66.67
Groupware technologies							
Screen sharing	76.92	15.38	7.69	43.59	23.81	23.81	52.38
White boarding	92.31	7.69	0.00	35.90	28.57	19.05	52.38
Chat programs	35.29	35.29	29.41	64.71	4.76	57.14	38.10
Newsgroups	50.00	37.50	12.50	54.17	19.05	33.33	47.62
Visual communication							
Teleconferencing	50.00	22.22	27.78	59.26	9.52	42.86	47.62
Video teleconferencing	72.22	27.78	0.00	42.59	23.81	28.57	47.62
Data conferencing	83.33	16.67	0.00	38.89	23.81	28.57	47.62

**Table 3: Availability of IT Infrastructure/Technologies**

IT Infrastructure/ technologies	PERCENTAGE SCORES				Applicability		
	Not available 1	Available not Used 2	Available and used 3	Severity index (%)	Not applicable (%)	Applicable (%)	No response (%)
<b>Electronic voice communication</b>							
Voicemail	22.22	27.78	50.00	75.93	9.52	52.38	38.10
Audio text	64.29	28.57	7.14	47.62	14.29	23.81	61.90
Voice annotation	75.00	25.00	0.00	41.67	19.05	9.52	71.43
<b>Data communication</b>							
E-mail	0.00	4.76	95.24	98.41	0.00	80.95	19.05
Electronic bulletin boards	88.89	5.56	5.56	38.89	23.81	33.33	42.86
Digital information services	90.00	5.00	5.00	38.33	23.81	42.86	33.33
Electronic data interchange	72.22	11.11	16.67	48.15	14.29	42.86	42.86
Electronic document management	72.22	11.11	16.67	48.15	14.29	42.86	42.86
Electronic calendaring	65.00	10.00	25.00	53.33	23.81	23.81	52.38
Electronic meeting software	66.67	9.52	23.81	52.38	23.81	19.05	57.14

Table 1, 2 and 3 above shows the availability and applicability of IT infrastructures/Technologies in QS firms. The results indicate that some devices are heavily available and applicable in QS firms with severity index greater than 60% and applicability greater than 50% such devices are; scanners, digital cameras, magnetic disks, dvd/cd-rom, computer hard drive, search engines, general purpose software, QS application software, cellular telephone, network computer, internet, chat programs voice mail and e-mail. However, these technologies do not compress distance and timescales and are considered to be basic stand-alone technologies that are needed for daily office activities and would not make organisation have an edge over its competitors or make organisation to have much difference in the industry. Exception to this are; internet, chat programs and e-mail technologies. Internet is reported to be highly available and applicable in QS firms but it has to be noted advanced internet supportive technologies such as visual communication, digital information services, electronic data interchange are barely applicable in QS firms. Given the high prevalent rate of e-mail, search engines and chat programs application, it can be deduced that the internet availability in QS firms are mostly used to support these basic services. Intermediate technologies identified in the results are heavily available but not applicable in QS firms with availability severity index greater than 59% and applicability ratio less than 50%. Such devices are; voice output devices, DBMS software, mobile data networks, teleconferencing, and special web browsers. Thus from the result, availability of technologies does not necessarily correspond to applicability in practice. These technologies are needed for simpler and faster access to common data and allows more informed decision to be taken irrespective of user location. For example, DBMS software is needed for storing in a standard format current and historic cost data of all projects which would enable accurate forecasting of future projects. While mobile data networks allow for connection and network access to office data, project irrespective of user location. However, with low applicability of these technologies in QS organisations in spite of high

availability means that apart from waste of resources that are tied in these technologies and not put into productive use, the benefits identified above cannot also be harnessed.

Finally, advanced technologies identified in the results are indicated to have low availability and low applicability in QS firms with availability severity index less than 40% and applicability ratio less than 50%. These technologies are; voice recognisers, OCR devices, audio response devices, data repository, palmtop, Extranet, remote databases, white boarding, data conferencing electronic bulletin board and digital information services. These technologies when utilised would compress distance and timescales, makes difference and enables QS organisations to reap the benefits of IT.

#### **4. Conclusion**

The study appraised the requirement of IT in quantity surveying practice in Nigeria via a questionnaire survey of quantity surveyors in consulting firms. It examined the position of IT in quantity surveying firms in terms of its requirement and analyzed IT requirements-based problem inhibiting quantity surveying firms. Some of the major findings are;

The results indicate a high level of computerization of professional services among the firms with greater number of computers being networked. However, despite high level of networking of available computers, sharing of printers and other scarce tools/technologies is not established. Printers in particular are not shared in most of the firms with each printer been allocated to a PC. This might lead to high cost of hardware and software to support computerization and may serve as constraint to the use of IT. Compared to developed countries, the position of IT requirements in QS firms in Nigeria can be said to be at basic level with organization possessing and applying basic IT tools and technologies in their daily operation and processes. While most firms are progressing toward intermediate level by possessing intermediate IT tools and technologies (e.g. teleconferencing, DBMS software, mobile data networks, voice output devices etc.) which are not currently utilized in the organization. Advanced technologies (e.g. data conferencing, digital information services, extranet, remote databases, white-boarding, voice recognizers etc.) that would make QS firms reap the benefit of IT and make difference in the industry are hardly available. The result indicates that all the cutting edge technologies that support mobile computing belongs to intermediate and advanced technologies which are either available but not in used or not available at all. This indicate why the path of mobile computing would be difficult to follows by the firms. Hence the benefit assert by Laudon and Laudon (2000) that work is no longer tied by location and that works become portable is not going to be reaped by the firms. These findings highlight a wide gap in IT infrastructure between developed and developing countries. Also, the findings highlight for cutting edge technologies to be deployed and function in QS firms, it need the support of basic and intermediate technologies as a backbone. This indicates a possible trend towards adoption of IT infrastructures with a progressive adoption of more advanced.

For these reasons, top managers in QS firms if interested in reaping much of the benefit accrued to mobile computing, to provide for their skilled employees a portable system e.g. mobile data networks, palmtop for increased productivity. Also, for the quantity surveying firms in developing countries to maximize the returns on investments in IT, it must go beyond the possession of IT tools to harnessing of the same to reap the full benefit of technology. With access to e-mail being more severe in quantity surveying firms in Nigeria, this format should be utilized for the publishing and distribution of information and the networking of professionals.

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