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Effect of the Use of ICT in the Nigerian Construction Industry.

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----------ABSTRACT----------

This study examines the effect of the use of ICT in the Nigerian construction industry. It goes on to assess the contributions of ICT and also assessed the factors that determine the use of ICT in Nigeria construction industry. The study further examined the benefits of ICT and showed the barriers to the use of ICT in Nigerian construction industry. Data were obtained from both the primary and secondary sources which include interview, questionnaire, textbooks journal publications and internet facilities. The data was analyzed (i.e the mean and standard deviation), using statistical package for social society (SPSS). The finding revealed that the size of company mostly determines the use of ICT with the highest mean value of 3.81, followed by professionalism with mean value of 3.78 and so on. Findings showed the ranking with the highest mean value of 4.10 i.e. wastage control could now be achieved with the use and application of ICT. Follow by lower operational expenses and less paper work with the same mean value of 4.09. Furthermore, the findings showed that the technical know-how and the fear of virus attack have the same mean value of 3.73 i.e. they contribute mostly to the limitation of effective application of ICT in the Nigerian construction industry. Conclusion and recommendation are made on the report of this work.

KEYWORDS: *Information and communication technology, construction industry*

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I INTRODUCTION

Information and Communication Technology (ICT) is a wide-ranging term that includes all technologies for the manipulation and communication of information. For instance, the internet is widely used for electronic mail (e-mail) and electronic commerce (e-commerce) including electronic invoicing, payments and receipt of materials process [1]. Apart from that, more sophisticated solutions of ICT based technologies are emerging such

as wireless communication, bar-coding and Radio Frequency Identification (RFID) for tagging technologies. Thus, an appropriate implementation of ICT could facilitate more effective and productive information processes.

Generally, the construction industry in Malaysia has lagged behind other industries in embracing ICT. It was found that although the professionals are quick to assimilate computerisation into their construction processes, the contractors and builders are still far from the adoption of ICT [2]. In the international construction industry, Turkey and other countries faced similar challenges in the area of communication and loss of information [3]. Accordingly, the implementation and practice of ICT in construction industry will strongly ease unnecessary lost and increase productivity in any projects. Thus, there is clearly a need to explore on the existing ICT implementation of the contractors while studying the availability for ICT to be implemented. Other than that, current constraints that are hindering the acceptance of ICT in the construction processes will also be identified.

The purpose of this research is to study the implementation of ICT for materials management in construction projects. Therefore, this study investigating the ICT implementation of materials management processes in construction projects. Apart from that, it is essential to examine the acceptance of contractors towards the transformation of ICT implementation in materials management processes. Thus, there is a need to explore on the area of information processes, the issues relating to materials management problems and the implementation of ICT in construction industry [4].

The benefits of information and communication technology in the Nigerian construction industry cannot be over-emphasis. Therefore, construction industry and management requires effective collaboration and co-ordination between all the stakeholders involved in order to achieve a successful project delivery. It is even

more so in construction where project teams may be geographically separated from the head office and the client or consultants.

The use of ICT therefore provides means of effective management and communication. The construction industry has been show in adoption of ICT applications compared to other sector of the economy. The complexity of the construction industry is exhibited in the fact that, it is so hierarchical and fragmented in nature that some of the major participants do not consider themselves to be part of the same industry. Thus close co-ordination among a large number of specialized but interdependent organizations and individuals to achieve the cost, time and quality goals of a construction project is necessary. Hence, according to Maysood et al. (2013) cited by [5], a major construction process demands heavy exchange of data and information between project participants on a daily basis.

Architectural, engineering and quantity surveying professionals are the consultants traditionally responsible for the production and management of most of the project information and documents required by such other project participants such as contractors, and suppliers for the execution of construction project.

II LITERATURE REVIEW

[6] reports that construction is one of the most important activities of any economy and a large proportion of the country's resources are usually used in the construction and maintenance of building. The construction sector in Nigeria accounts for 3-8% of Gross Domestic Product (GDP), about 5% of the labour force, 40-70% of the gross fixed capital formation and about 12% of industrial sector production [7]. Construction contributes up to 7% of the GDP in most OECD countries and up to 12-14% in Japan and Korea (Gann, 2012) cited by [5], while in developing countries (according to Dharwadker, 2009) and cited by [5] said that investments in construction project could be as high as 50-60% of national budgets. In Nigeria, the construction industry was the dominant contributor to the nation's GDP in the 1980's, accounting for about 70% of the GDP (planning committee on the national construction policy, 1989). This made the industry very strategic to Nigeria's development efforts. Unfortunately, however, the industry has been be divided by a combination of low demand and consistently low productivity and poor performance over the years. This has reduced its contribution to the national economy to a mere 1% of the GDP in 2002 (AFDB/OECD 2009).

The industry is made up of an organized formal sector and an unorganized informal sector. The formal sector comprises foreign and indigenous companies, which are classified into small, medium and large scale according to their level of capitalization and annual turnover. The few large firms (mostly foreign), which constitute just about 5% of the total number of contractors in the formal sector, control about 95% of the construction market, giving the small firms just about 5% share of the market [5].

Following the raking of Nigeria very low as 27th among 51 African countries and 153rd among 178 countries in the world by the international telecommunication union (ITU, 2013), very little was known about the impact of the technology on the industry and the prospects for its widespread penetration of the industry. This is because very few reports existed prior to these rankings of research in ICT in developing countries, Nigeria (Pamulu and Bhuta, 2014) cited by [5].

The use of ICT in construction industry has been making jobs easier, facilitating decision making and saving operational costs among others.

EVOLUTION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN NIGERIA

Information has always played a very important role in human existence. However, in the mid 20th century, the role of information increased immeasurably as a result of social progress and the vigorous development in science and technology. In addition as Transtnikov(2012) cited by [5] has pointed out, rapid expansion of a mass of diversified information is occurring, which has received the name "informant explosion". As a result, the need has arisen for a scientific approach to information and elucidation of its most characteristic properties which led to two principal changes in interpretation of the concept of information.

Firstly, it was broadened to include information exchange not only between man and man but also between machine and machine, as well as the exchange of signals in the animal and plant worlds. The pace of change brought by new technology has had a significant effect on the people's live, work and play worldwide, new and emerging technologies challenges the traditional process of teaching and learning, and the way education is managed. Information technology, while important area of stud in its own right, is having a major impact across all curriculum areas. Easy worldwide communication provides access to a vast array of data, challenging assimilation and assessment skills.

Rapid communication plus increased access to IT in the home, at work and in educational establishment could mean that learning becomes a truly lifelong activity i.e an activity in which the pace of technological changes force constant evaluation of the learning process itself. Communication can be described as the process of transmitting and receiving ideas, information and messages, information and communication technology (ICT) may be viewed in different ways. The World Bank defines ICT as "the set of activities which

facilitate the electronic means the processing, transmission could display of information" (Rodriguez and Wilson, 2000) and cited by [5]. ICT "refers to technologies people use to communicate through computer and computer net works [5].

MERITS OF ICT IN NIGERIAN CONSTRUCTION INDUSTRY

1. Globalization

ICT has not only brought the world closer together, but it has also allowed the world's economy to be become a single interdependent system. This means that we cannot only share information quickly and efficiently, but we can also bring down barrier of linguistic and geographical boundaries. The world has developed into a global village due to the help of information technology allowing countries like Chile and Japan who are not only separated by distance but also by language to share ideas and information with eat other.

2. Communication

With the help of information communication technology, communication has also become cheaper, quicker and more efficient. We can now communicate anywhere around the globe by simply text messaging or sending email for an almost instantaneous response, the internet has also open up face to face direct communication form different parts of the world.

3. Bridging the cultural gap

Information communication technology has helped to bridge the cultural gap by helping people from different cultures to communicate with one another and allows for the exchange of views and ideas, thus increasing awareness and reducing prejudice.

4. Cost effectiveness

Information technology has helped to computerize the business process thus streamlining businesses to make them extremely cost effective money making machines. This in turn increases productivity which ultimately gives rise to profits that means better pay and less strenuous working conditions.

5. More time

ICT has made it possible for businesses to open round the clock all over the globe. This means that a business can open any time anywhere, thereby making purchases from different countries easier and more convenient. It also means that you can have our goods delivered right to your door step within a very short period of time.

6. Creation of new jobs

Probably the best advantage of information and communication technology is the creation of jobs. Computer programmers, system analyzers, hardware and software developers and web designers are just some of the many new employment opportunities created with the help of ICT

DEMERITS OF ICT IN NIGERIAN CONSTRUCTION INDUSTRY

1. **Unemployment**

While information technology may have streamlined the business process, it has also created job redundancies downsizing and outsourcing. This means that a lot of lower and middle level jobs have been done away with causing more people to become unemployed.

2. **Privacy**

Though information technology may have made communication quicker, easier and more convenient, it has also brought along privacy issues from cell phone signal interceptions to email hacking people are now worried about their once private information becoming public knowledge.

3. **Lack of job security**

Industry experts believe that the internet has made job security a big issue since technology deeps on changing each day. This means that one has to be in a constant learning mode. If he or she wishes for their job to be secure.

III METHODOLOGY

One hundred and fifty (150) questionnaires were distributed for collection of data. Data were obtained from both the primary and secondary sources which include interview, questionnaire, textbooks journal publications and internet facilities. The data was analyzed (i.e the mean and standard deviation), using statistical package for social society (SPSS).

The statistical tools used for this study include percentage, mean, and relative significance index RSI (also known as Index of Relative Importance, IRI or Relative Importance Index, RII) to determine which of the stated causes of rivalry is the most prevalent among the professionals in the Nigerian construction industry. The relative significance index ranking (RSI) was used for ranking of the factors studied. These methods had been used in construction research by authors such as, [8]-[12] among others.

The Likert scale involving rating on interval scale of 5 and 1 developed for application in social sciences and management researches for quantification of qualitative variable were used. It elicited information from the building construction professionals concerning the causes of rivalries among professionals in Nigeria construction industry. The responses of the items on the questionnaire were obtained on a 5-point scale ranging from 1 to 5. ''Very High" were scored 5, ''High'' were scored 4, ''Average'' were scored 3, ''Low'' were scored 2 and ''Very Low'' were scored 1.

IV DATA ANALYSIS AND RESULTS

The data were presented using tables for clarification and better interpretation. The analysis tools included both descriptive and inferential statistics.

A. Respondent Profile

Table 1: Respondents' state

State	Frequency	Percentage
Lagos	**50**	**33.33**
Ogun	**30**	**20**
Oyo	**25**	**16.67**
Osun	**20**	**13.33**
Ondo	**15**	**10**
Ekiti	**10**	**6.67**
Total	**150**	**100**

Table 1 showed the state of respondents. It showed that 33.33(50) percent are received from Lagos, 20(30) percent are received from Ogun, 16.67(25) percent are received from Oyo, 13.33(20) percent are received from Osun, 10(15) percent are received from Ondo, and 6.67(10) percent are received from Ekiti states

Table 2: Contributions of ICT in Nigerian Construction Industry

Descriptive Statistics					
STATEMENT	N	Minimum	Maximum	Mean	Std. Deviation
The use of ICT is a welcome development in the construction industry	150	1	5	2.71	1.467
ICT software has been effective design tools for construction professionals	150	1	5	2.97	1.458
ICT has been effective tools to builders and surveyors for effective construction planning	150	1	5	2.68	1.411
Most stakeholders in the construction industry are well framed in the use of computers and necessary construction software	150	1	5	2.85	1.394
The use of ICT has really created a lot of difference and have entirely changed the quality and nature of the construction industry	150	1	5	2.63	1.468

Table 2 indicates that the use and application of ICT has really improved the construction sector of the Nigeria economy. It signify that ICT software has been effective design tools for construction professionals (i.e Architects, builders, quantity surveyor etc) with the highest mean of 2.97.

Table 3: The Factors that determine the use of ICT in Nigeria Construction Industry

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Cost of procurement	150	1	5	2.79	1.431
Size of company	150	1	5	3.81	1.126
Educational background	150	1	5	3.51	1.330
Cost of investment	150	1	5	3.71	1.125
Professionalism	150	1	5	3.78	1.092
Wastage	150	1	5	2.63	1.144

Table 3 showed that the size of company mostly determines the use of ICT with the highest mean value of 3.81, followed by professionalism with mean value of 3.78 and so on.

Table 4: The Benefits of ICT in Nigerian construction industry

Descriptive Statistics					
Benefits	N	Minimum	Maximum	Mean	Std. Deviation
Budget control	150	1	5	3.27	1.180
Saves time	150	1	5	3.93	0.932
Less paper work	150	2	5	4.09	0.802
High productivity	150	1	5	3.81	1.052
Wastage control	150	2	5	4.10	0.910
Lower operational expenses	150	2	5	4.09	0.951
Enhance material procurement	150	1	5	3.05	1.203
Effective information sharing	150	1	5	3.29	1.206
Monitoring the progress of site work	150	1	5	3.37	1.255

Table 4 showed the ranking with the highest mean value of 4.10 i.e. wastage control could now be achieved with the use and application of ICT. Follow by lower operational expenses and less paper work with the same mean value of 4.09.

Table 5: Barriers to the use of ICT in Nigerian construction industry

Descriptive Statistics					
Barriers	N	Minimum	Maximum	Mean	Std. Deviation
High cost of implementation	150	1	5	3.44	1.282
Uncertain return of investment	150	1	5	3.53	1.344
Technical know-how	150	1	5	3.73	1.203
Fear of virus attack	150	1	5	3.73	1.175
Lack of job security	150	1	5	2.78	1.409

Table 5 showed that the technical know-how and the fear of virus attack have the same mean value of 3.73 i.e. they contribute mostly to the limitation of effective application of ICT in the Nigerian construction industry.

V DISCUSSION OF FINDINGS

With the use of statistical tools, the study was able to assess effect of the use of ICT in the Nigerian Construction industry in Nigeria.

The findings revealed that 33.33(50) percent are received from Lagos, 20(30) percent are received from Ogun, 16.67(25) percent are received from Oyo, 13.33(20) percent are received from Osun, 10(15) percent are received from Ondo, and 6.67(10) percent are received from Ekiti states as presented in Table 1. The size of the company has been the major factors that determine the use of ICT in Nigerian construction industry.

It showed that the size of company mostly determines the use of ICT with the highest mean value of 3.81, followed by professionalism with mean value of 3.78 and so on.

Findings showed the ranking with the highest mean value of 4.10 i.e. wastage control could now be achieved with the use and application of ICT. Follow by lower operational expenses and less paper work with the same mean value of 4.09.

Furthermore, the findings showed that the technical know-how and the fear of virus attack have the same mean value of 3.73 i.e. they contribute mostly to the limitation of effective application of ICT in the Nigerian construction industry.

VI CONCLUSION

Building project design and management requires effective communication between project team members. This can be achieved through the strategic use of ICT in the construction industry. The entire construction firm accepted that the use of ICT is very important in Nigerian construction industry, many of the site workers are computer illiterate, technical know-how and fear of virus attack has limited the effective utilization of ICT approach in Nigerian construction industry and it is the believe of site personnel that ICT approach is a welcome development in Nigerian construction industry.

VII RECOMMENDATIONS

With the above mentioned findings and conclusion, the research carried out on ICT approach within the axis of south-western part of Nigeria (i.e. Lagos, Ogun, Oyo, Osun, Ondo and Ekiti-state), the following are made in order to promote the use of ICT in the construction industry in Nigeria. Efforts should be made by professional bodies to establish the use of ICT in Nigerian construction industry, basic application of ICT like word processing, design, detailing and costing should be known to improve technical business applications like e-business, electronic data management, and teleporting should be part of training for all the site personnel.

The construction industries and professional teams should be optimistic about the future use of ICT in the construction industry, such as communication facilities like e-tendering and teleporting, anti-virus applications should be available and installed on the computers to avoid virus attack and adequate awareness and enlightenment programme on application packages used in construction project to the construction workers by the professional bodies.

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