

INFORMATION TECHNOLOGY PROFILES AND TYPES OF ARCHITECTURAL FIRMS IN NIGERIA**DOLAPO AMOLE,***Obafemi Awolowo University, Ile-Ife, Nigeria*

and

DAPO OLUWATAYO,*Covenant University, Ota, Nigeria***Abstract**

This paper examines the information technology profiles as well as the types of architectural firms based on these profiles. It uses the notion of adoption to describe firm profiles. The types of firms are derived through a taxonomical process using the variables that describe the profiles. The study used data collected from 92 firms randomly selected from the cities where architectural firms are most concentrated. The results showed that there was a low level of adoption of IT. While the computer was highly available, the intranet and the internet were not. Only about a third of the firms had a website and used the internet to a high degree. The internet was used mainly for sourcing design information and administrative tasks. The internal factors which appeared to be strongly related to the adoption of IT were the ownership form of the firm, the leadership style of the principal and the performance of the firm. The external factor; clientele was also related to the adoption of IT. Two types of architectural firms emerged from the analysis and the adoption of the internet appeared to be the strong differentiating factor. The paper concludes by highlighting the implications of these results for the profession.

Introduction

The use of information technologies in professional firms has become ubiquitous for many reasons. First of all, like with all organizations and businesses, information technologies (ITs) increase the ability of the firm to compete locally in the construction industry and also in the international market. In this way, ITs are promotional tools. Second, they improve work processes within the firm. The ease and convenience with which a firm may transact business 24 hours a day and 7 days a week is enhanced. They also increase the ease with which firms can manage, store and retrieve information. In addition, ITs make it easier for firms to operate from multiple locations. Finally, ITs improve work group productivity because of the ease of communication they offer. The architectural firm has also benefited tremendously from the world of IT. In the last three decades, in the western world, there has been a phenomenal increase in the adoption and diffusion of ITs in architectural firms. It has become an integral part of the landscape of the architectural office. It is no more considered as an expensive luxury but a

basic tool and a significant staff hiring criteria.

A study conducted in Canada (Rivard, 2000), shows that in 1999 architectural firms had more than one desktop computer per employee (1.2 computers per employee), 92.9% of architects used Auto Cadd for their work and 86% of them were connected to the Internet. In addition although only 27% of the architectural firms had a home page, the situation was expected to change in a few years since 51% of the firms which did not have a web page planned to have one in the near future. For those firms that were connected to the Internet, an average of 70% of the employees had an e-mail address, 49% of the employees had access to the World Wide Web from their own computer; Since this Canadian study compared architectural firms with contracting and engineering firms, it was possible to situate the status of architectural firms in the construction industry. The results showed that the architectural firms appeared to be less IT driven compared with the engineering firms but better than contracting firms.

However, very little is known about the adoption of this technology in Nigeria. While there have been many empirical studies on the use of ITs in architectural firms in the developed and developing nations, (Doherty, 1997; Howard and Samuelsson, 1998; Howard et al., 1998; Futcher and Rowlinson, 1998; Futcher and Rowlinson, 1999; O'Brien and Al-Biqami, 1999; Rivard, 2000) there are very few studies conducted in Nigeria. Consequently, an empirical examination of the IT profile would be a worthwhile endeavour. It will provide an insight to the nature of architectural practices in the country; a matter that has often been speculated. It will reveal the levels of adoption of IT, what types of IT are in use and for what purposes; and the types of firms based on IT adoption levels. More specifically, such a study would be of immense benefit for a number of other reasons. First of all, it will indicate how well architectural practices in the country can compete in the international market. As well as in the local building industry. There is enough evidence to suggest that IT is a critical factor in enhancing a firm's market reach and competitiveness. (Dholakia and Kshetri, 2004). The second reason, which is also related to the first, is that it will suggest the status of professional

architectural services. Professionalism is socially construed. High professionalism suggests expertise which has been significantly transformed by IT. Third, it will indicate the progress made so far in the adoption of IT by architectural practice. This will be possible by comparing current data with the data from previous studies in the country. Finally such a study will highlight the factors which inhibit or contribute to the use of IT; the results of which will contribute to improving the state of professional practice in the country.

What constitutes IT has often been debated (Southern and Tilley, 2000). While some authors use the term 'information systems' (IS), others use the term 'information communication technologies' (ICT). The use of the term IT may be somewhat confusing and so authors have usually defined what their term comprises. While Bjork (1999), defines Information technology (IT) as "the use of electronic machines and programs for the processing, storage, transfer and presentation of information", Rivard (2000), construes IT as encompassing many technologies such as computers, software, networks and even telephones and fax machines. What authors agree to is that the purpose of IT is to facilitate the exchange and management of information and that this has a lot of potential for the information process component of the construction industry (Rivard 2000). In this paper, the working definition of IT that is adopted refers to the convergence of computers, software, networks and the internet in the context of architectural services.

Given this definition, this study focuses on adoption and types of IT in architectural firms in Nigeria. It is mainly an exploratory study. The aim is to describe and examine the IT profiles of architectural firms in Nigeria. Specifically, it aims to identify the types of ITs adopted in the firms, the degree to which these technologies are adopted, the purposes for which ITs are employed, the factors which influence the adoption of these technologies and the types of firms based on IT profiles.

ITs, Organizations and Architectural Firms: Issues in the Literature.

Although diverse philosophical approaches have been encouraged in the study of IT in organizations (Orlikowski and Baroudi, 1991), the quantitative approach still remains the most common. Amongst those who use the quantitative

approach, two main perspectives may be identified. The first, which may be called the technological perspective focuses on technological issues such as software design and development (cf Doherty and King, 1998; Li *et al*, 2005). These studies are concerned with the efficiency and effectiveness of IT in organizations. The second perspective, places more emphasis on the organization and hence may be called an organizational perspective. The focus here is to understand the organizational approach to using IT and the capabilities and structures in place to use this technology (cf Naylor and Williams, 1994; Cragg and King, 1993; Kale and Ardit, 2005). It is also concerned with the social and organizational changes which occur in firms arising from the introduction of IT. In this perspective, various issues such as *adoption, use, growth, diffusion, sophistication and application* of IT in organizations have been examined (Raymond and Pare, 1992; Arif and Karam, 2001; Fasheun-Motesho, 2001; Kale and Ardit, 2005; Fabiani *et al* 2005; Dholakia and Kshetri, 2004).

The issues that have been of most interest are *adoption, use and sophistication* of IT within organizations. These concepts have sometimes been used synonymously. For example, Cragg and Mills, (2005) viewed adoption in terms of stages and as the way a technology is used. Nevertheless, the concept of adoption has been the most common in the literature. Various models of adoption are in use. For example, a 6-stage model of adoption was proposed by Kwon and Zmud (1987) which comprises *initiation, adoption, adaptation, acceptance, routinization and infusion*. Other researchers have suggested that adoption may take place in two stages: the *initiation* stage (which involves knowledge and awareness, formation of attitudes and decision to adopt) and the *implementation* stage; when the actual implementation takes place (Cragg and Mills, 2005).

In measuring such concepts as adoption, the different dimensions have not often been identified. For example, when Pare and Sicotte (2000) used the notion of sophistication, they identified various dimensions of IT sophistication such as *functional sophistication and technological sophistication*. This has rarely been done with the notion of adoption and it will be useful to identify the dimensions of an organization in which ITs are adopted.

Finally it has been noted that IT adoption is influenced by a number of factors. The most common categorization of these factors was made by Lefebvre and

Lefebvre (1996) who classified the factors which affect a firm's adoption of IT as

- **Internal Factors** These are the factors which are internal to the firm such as the firm's size, age, experience, attitudes towards technology and organizational strategy. Workers' levels of education and the principal/owner's knowledge, experience and attitude have also been emphasized as central to these internal factors (Southern and Tilley, 2000; Fabiani *et al*, 2005).

- **External factors** These factors refer to the general and competitive environment within which a firm operates. For example, competitive environments have been shown to have a strong influence on IT adoption (Dasgupta *et al*, 1999). Other factors include pressures from clients and working partners.

In the specific context of architectural firms, all these issues have also been of interest to researchers. Researchers have examined the *use of IT*, (Arif and Karam, 2001) *adoption of IT* (Fasheun-Motesho, 2001), the *diffusion of IT* (Kale and Ardit, 2005) and the *impact of IT* (Rivard, 2000) on the profession and professional practice of architecture. In these studies, they have investigated ITs such as Computers, the Internet, networks and AutoCadd software. They have also examined the aspects of practices for which ITs have been adopted such as design, design production, communication, marketing, administration, desktop publishing, project management and financial management. The internal and external factors of the firm, which are closely associated with IT adoption, have also been examined. However, in most of these studies very limited internal/external factors were examined. In addition, the relationships between the use of IT and these factors have not been rigorously examined. Specifically the role of factors such as firm size, characteristics of principal and firm performance which have emerged as important in the literature on IT and organizations, have rarely been examined in the context of architectural firms. Another gap in the literature is that with the exception of the study by Fasheun-Motesho (2001), most studies (Ogundiran, 2006, Akinyosoye, 2005) conducted in the Nigerian context were very cursorily done; lacking the necessary rigour to enable the authors reach generalizable conclusions.

In an attempt to fill these gaps in the literature, this study was conducted. The paper conceives adoption of IT as a two stage process of availability (initiation) and use (implementation).

Hence it examines whether ITs are available in architectural firms in Nigeria and it also examines how well used a specific IT, the Internet, is used in these practices. The paper examines certain types of use; namely *design-task use, project management use and office management use*. In order to measure use, the respondents were requested to assess themselves on a likert-type scale of *not at all, fairly and very much*. The rationale is that the respondents' self assessments are not spurious but very much related to the social context of architectural practice. Hence the results would be more useful than that of an outsider 'expert' observer.

Methodology

This study is part of a larger study that examined the characteristics of architectural firms in Nigeria (Oluwatayo, 2009). The sample frame was the total number of architectural firms entitled to practice in Nigeria (ARCON, 2006). To obtain the sample, the cities where architectural firms were concentrated were first purposefully selected. The cities were Lagos, Enugu, Abuja, Port Harcourt, Kaduna and Ibadan. Next, a random sample of firms was selected from each of the cities. About 58% of the firms in each city were randomly selected. The total number of sampled firms was 157 out of 265 firms in all the cities. A structured questionnaire was administered between February and May 2008, with the firm as the unit of data collection and analysis. A total of 92 valid questionnaires were obtained representing a 58.6% valid response rate and approximately 35% of the total number of firms in these cities. This sample was found to be a good representation of the total population of firms in Nigeria (Oluwatayo, 2009:73). A structured questionnaire was designed to investigate ITs (computers, intranet and Internet) of the architectural firms in Nigeria. The questions measured the availability and use of information technology facilities by the firms as well as the adoption of electronic mail (e-mail) and websites.

General profile of firms

The age distribution of the firms (Fig. 1) shows that majority of the firms were either between 11 and 15 years old (26%) or between 16 and 20 years old (20%). Very few firms (10%) were less than 6 years of age. Most of the firms (52.27%) adopted the sole principal form of ownership. The next most common form of ownership was the partnership (21.59%). The proportions of the firms that had other forms such as the limited liability company, unlimited liability company and the public company were 17.05%, 7.95% and 1.14% respectively (Fig. 2).

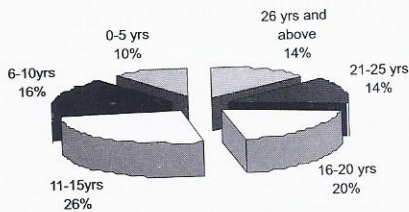


Figure 1: Age of firms

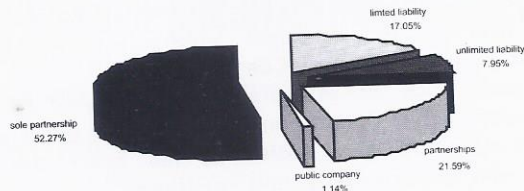


Figure 2: Ownership form of firms

The firms had a workforce that varied from one to eighty employees. Figure 3 shows the results of the number of staff in the architectural firms. The results show that a third of the firms (33.33%) had between 6 and 10 staff; more than a quarter (27.59%) had between 10 and

20 staff; and 14.94% of the firms had between 1 and 5 staff. Very few firms had below or above these numbers of staff. Only about 20% of the total number of staff were not professionals.

The firms had principals who described themselves in various ways.

Figure 4 shows that most principals (40.7%) described themselves as productivity-oriented or as visionary and innovative leaders. Fewer proportions described themselves as efficient managers (11.63%), or as mentors (9.30%).

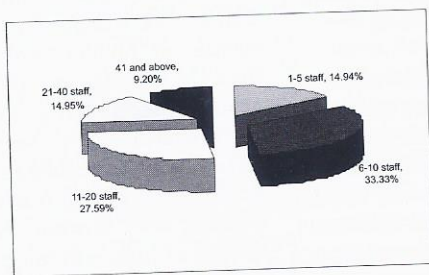


Figure 3: Total number of staff

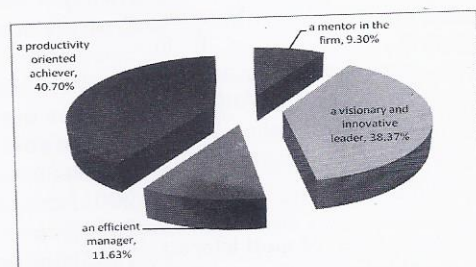


Figure 4: Types of Principals

Architectural firms collaborated both locally and internationally (Fig. 5 and Fig. 6). The

results however show that there was very little international collaboration by the firms. About

78.89% of firms collaborated locally while only 32.05% of the firms collaborated with other firms internationally

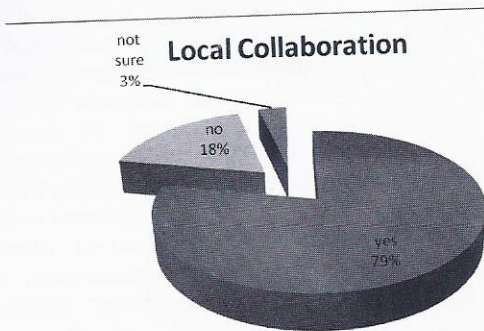


Figure 5: Local Collaboration

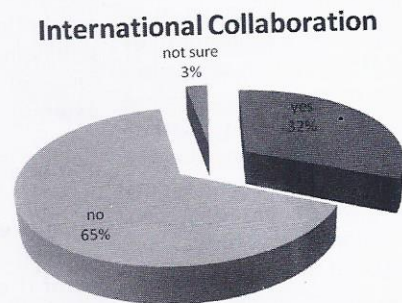


Figure 6: International Collaboration

While local individual clients and private organizations in Nigeria constituted most of the clients, the firms had very few international individual clients and hardly any international organizations as clients

(Fig. 7). The firms' perception of their performance in terms of profit in the last two years was also assessed. Most of the firms (39.3%) considered themselves to be performing

well. A substantial proportion (24.7%) reported that their performance was very high. Only a small proportion (3.4%) did not think they were performing well at all (Fig. 8).

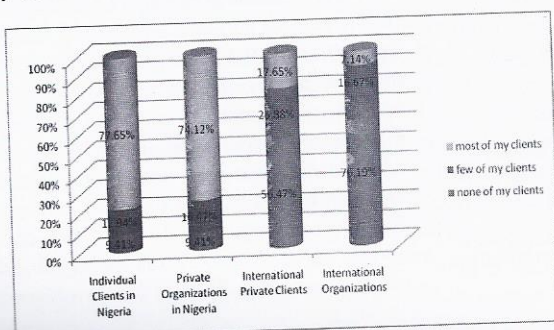


Figure 7. Clientele of the Firms

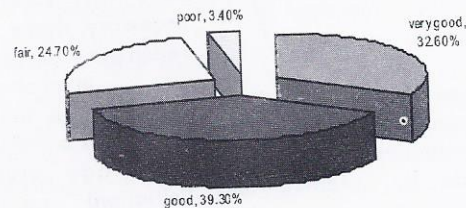


Fig.8 Performance of the firms

Information Technology profiles

The profiles of the firms are discussed under the following four subheadings: availability of information technologies, use of internet; websites and emails, and IT literacy in hiring staff.

Availability of information technologies

The availability of computers, networks and the internet was examined. The results (Fig. 9) show that in most firms (62.12%) the computer was available at every staff's desk. This suggests that in these firms, most of the work had been computerized. This is however a relatively lower proportion compared with 83% in South Africa (Arif and Karam, 2001) in 2000 and 99% in Canada (Rivard, 2000) in

1999. Nevertheless, this is a significant growth because in 1990, only 10% of the firms had ITs in their offices. The internet and the intranet, on the other hand, were less available in the firms. About one-third (31.33%) had the internet widely available in the firm while 22.89% did not have it at all in the firm. This means that the internet was available in 77.11% of the firms. Again this is an improvement when compared with the results of Akinyosoye (2005), who found that in 2005, the internet was available in only 36.6% of the firms. There also seems to be some growth in the use of the intranet. In 2005, only 33.3% of firms had local networks (Akinyosoye, 2005). Now, about 22.67% did not have any form of local networks, which means that 77.33% had networks.

Studies of IT in developed countries however show that as far back as 1999, the proportions of firms which were networked and linked to the internet were more than 60% and 80% respectively. These results show that although there has been significant growth in the availability of ITs in architectural firms in Nigeria, the levels of availability were still well below that of developed nations. In addition, and as expected, the most available IT was the computer. There was no firm without a computer on at least one desktop. Table 1 show that computers ranked first on the list of available information technologies. Next was the intranet and the least available in the firms was the internet, which ranked last.

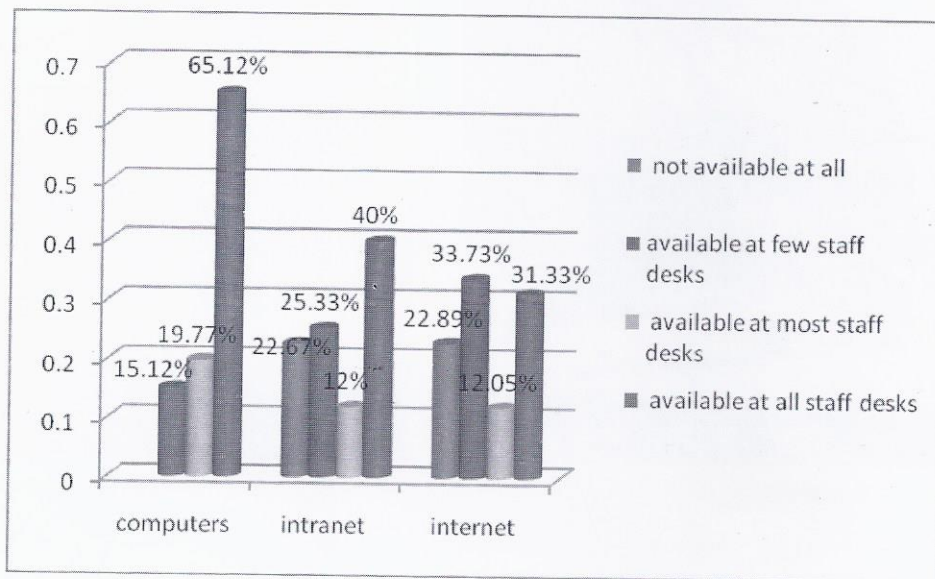


Figure 9. Availability of Its

Table 1: Ranking of availability of information technologies

Facility	Mean	Rank
Computers	3.50	1
Intranet	2.69	2
The internet	2.51	3

The scores of the firms on the level of availability of computer, internet and intranet were added to arrive at an overall level of availability of the IT for each firm. Figure 10 shows that information technologies were highly

available in 43.84% of the firms, fairly available in 30.14% of the firms and there was a low level of availability in 26.03% of the firms. What this means is that more than half of the architectural firms are still at a low level of IT adoption;

given that availability is just the first stage in the process of adoption of IT. In fact this is more so because the issue of availability of ITs is no more a subject of discussion in developed countries.

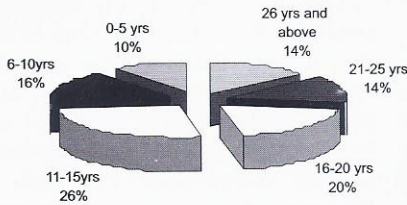


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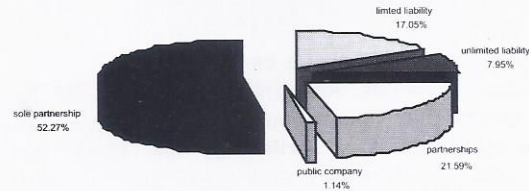


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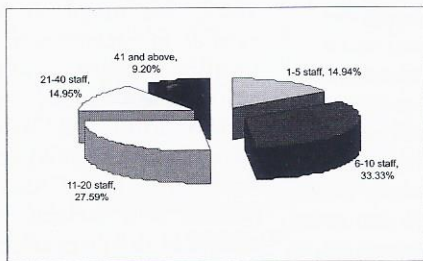


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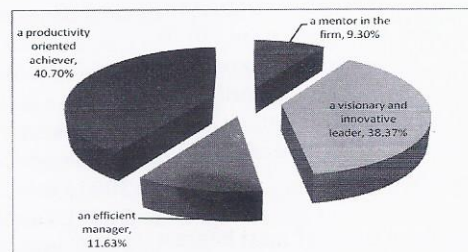


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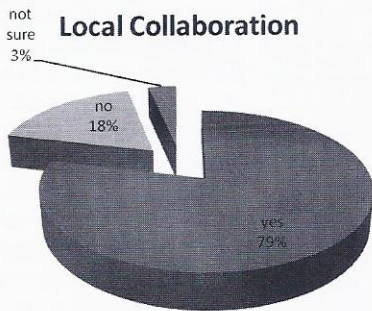


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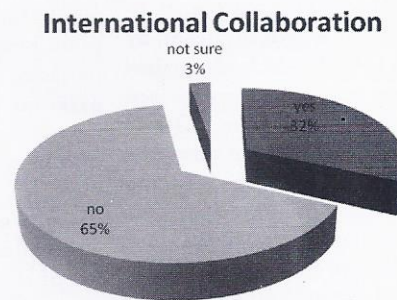


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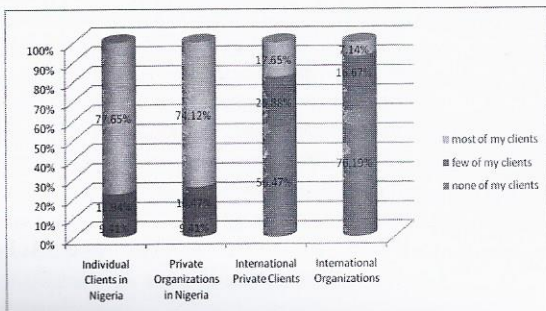


Figure 7. Clientele of the Firms

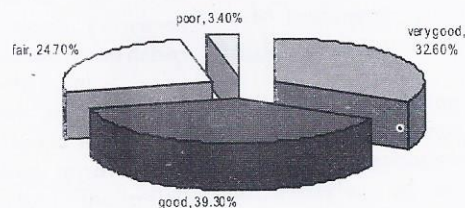


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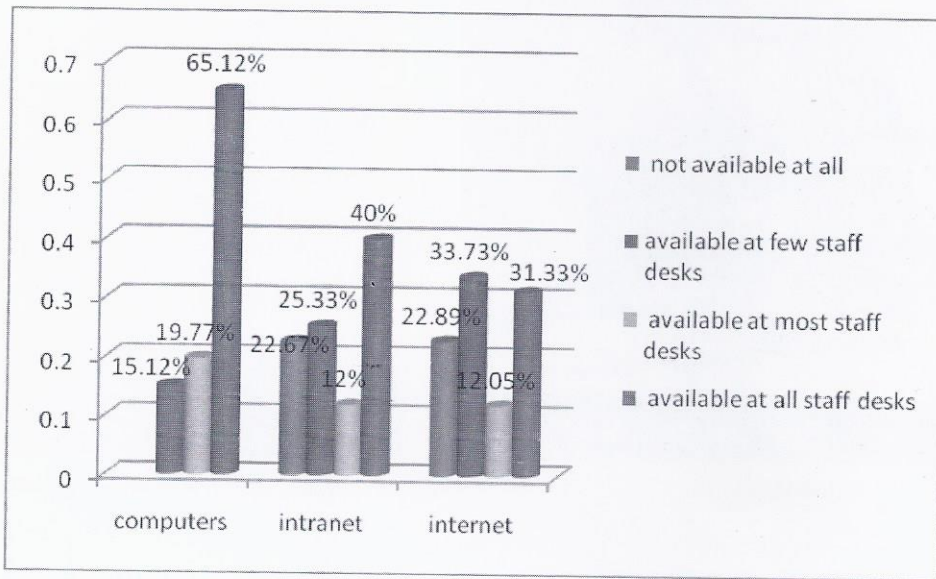


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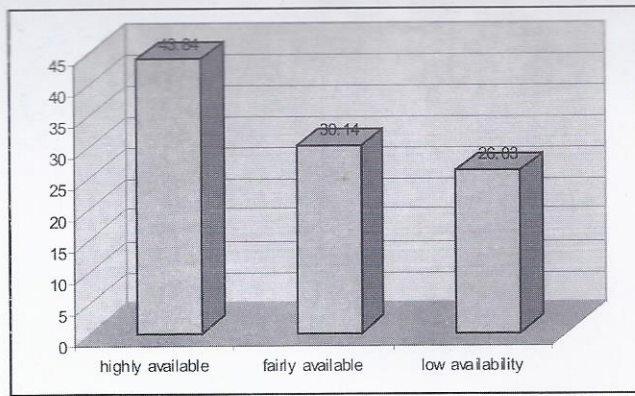


Figure 10: Overall availability of information technologies

Websites and electronic mail addresses

The presence of a firm on the Web is also an indication of a further level of adoption of IT. It suggests that the firm is exploiting the potentials of the Internet for more of its

benefits. In this study, the sampled architectural firms were asked if they had websites. Figure 11 shows that about two-thirds (63.53%) of the firms did not have websites, only 32.94% of the firms had

websites. On the other hand most of the firms (93.9%) had electronic mail addresses (Figure 12) while very few (6.1%) did not have any electronic mail address.

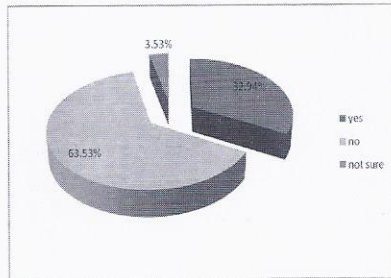


Figure 11: Own websites

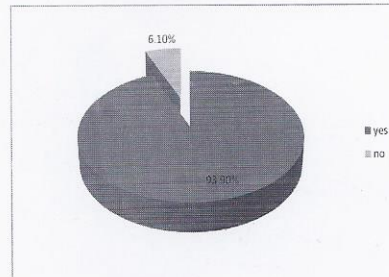


Figure 12: Electronic mail addresses

It thus appears that the architectural firms adopted the internet more for mailing purposes than for promotional purposes or to gain competitive advantages. This is certainly a lower level of Internet adoption than if it were used for design tasks and collaboration. The results discussed in the next section seem to confirm this.

The use of the Internet in architectural firms

The survey evaluated the use of the internet for certain project-related tasks in the architectural firms. Figure 13 presents

the levels of use of the internet. The bar chart shows that 47.14% of the firms moderately used the internet; 35.71% highly employed the internet; while the use of the internet in 17.14% of the firms was low. Table 2 shows that the firms mostly used the internet for *sourcing information for design* as this ranked first with a mean score of 2.52. The next activities that the firms used the internet for were *correspondence with other professionals* (2.30) and *correspondence with clients* (2.20). The use of the internet for design

purposes (such as using web-based software and design collaboration on the web) ranked fifth with a mean score of 1.93. The least ranked uses were *project management* (1.90) and *correspondence with staff in the office* (1.75). The results indicate that most of the architectural firms rarely used the internet to carry out project tasks (PT). They used the internet mostly for sourcing design information (a pre-project task) (I), and for administrative purposes (A).

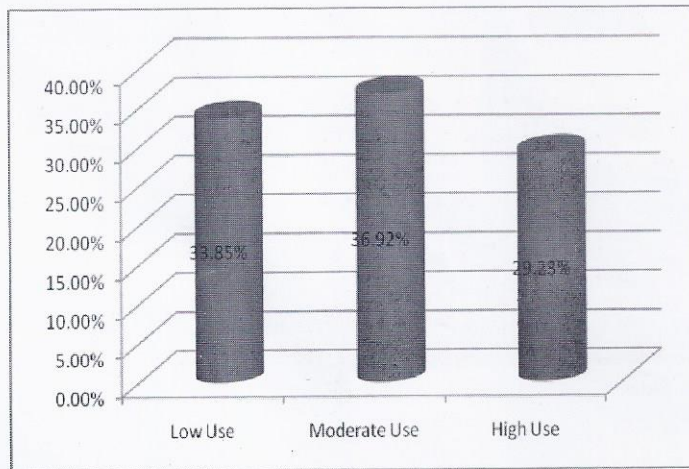


Figure 13: Degree of use of internet

Table 2: Ranking of the use of the Internet

Task	Mean	Ranking
Sourcing information for design (I)	2.52	1
Correspondence with other professionals (A)	2.30	2
Correspondence with clients (A)	2.20	3
Design tasks (PT)	1.93	5
Project management (PT)	1.90	6
Correspondence with staff in the office (A)	1.75	7

(PT) project task

(I) information

(A) administration

IT literacy in the selection of staff

Information technologies also play an important role in the staffing strategies of most firms. Given the fact that the firms are moving towards higher levels of IT adoption it is expected that IT literacy would be a criteria for hiring staff. This

study therefore examined how important IT literacy was in the criteria used for hiring architects. The results (Table 3) show that IT/AutoCADD literacy was the second most important criterion out of eight criteria in selecting architects. It was considered less important to design competence but more

important than knowledge of construction and educational qualification. This has significant implications for the training of architects, especially if they are to be ready for the employment market.

Table 3: Criteria for hiring staff

Criteria	Mean	Ranking
Design Competence	4.55	1
IT/AutoCadd literacy	4.33	2
Knowledge of Construction	4.13	3
Educational Qualification	4.10	5
Interpersonal/Manageril skills	3.72	6
Personality	3.70	7
Gender	2.33	8

Factors influencing IT adoption in Architectural Firms

The adoption of information technology is influenced by organizational characteristics such as size, the principal's attitudes, and performance (Seyal *et al*, 2000). These may be categorized as internal and external factors as discussed earlier. This study thus examined the relationships between availability of ITs/use of the Internet and internal factors such as the size of the architectural firms, the performance of the firm (in terms of profits), collaborations with other firms

and the type of principal. It also examined the relationships between availability of ITs/use of the Internet and an external factor: the types of clientele.

IT and Size of Firms

Availability of ITs did not appear to be related to the size of the firm. However, the use of the internet was related to the size of the firm. ($\chi^2 = 22.05$, $df = 12$, $p = 0.05$). The use of the internet was high in most of the firms that had few (between 1 and 10) staff; lower for larger firms (between 11 and 20) while most of the

firms with more than 20 staff rarely used the internet (Figure 14). It may be posited that the use of the internet did not encourage firms to employ more staff. This finding is consistent with the literature which suggests that firm size has significant effects on internet adoption (Dholakia and Kshetri, 2004; Arif and Karam, 2001). In fact, the study on IT and architectural firms in South Africa by Arif and Karam (2001) showed that having computers would reduce the employment of architects.

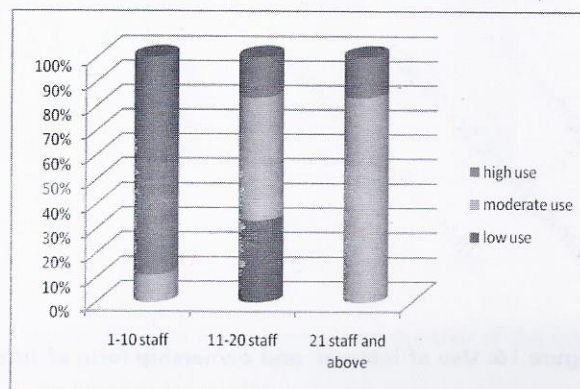


Figure 14: Use of internet and total number of staff

IT and Ownership Form of Firms

The study found a relationship between the availability of IT facilities ($\chi^2 = 22.09$, $df = 8$, $p = 0.05$) and the ownership form of the firm. As shown in Figure 15, IT facilities were not highly available in most of the firms with a sole principal or in limited liability firms. ITs were almost non-existent in public companies but were highly available in most of the

partnerships and unlimited liability firms. Hence it appears that partnerships and unlimited liability companies facilitated the availability of ITs than other forms of ownership.

It was also found that the use of the internet was significantly related to the ownership forms of the firm ($\chi^2 = 15.715$, $df = 8$, $p = 0.05$). Although the use of the internet was

high in most of the unlimited liability firms, it was just moderate in most of the partnership firms, the public companies and the limited liability companies (Figure 16). The use of the internet was however lower in most of the sole principal firms. Hence, it appears that the sole principal form of ownership did not encourage the adoption of IT as much as in other forms of ownership.

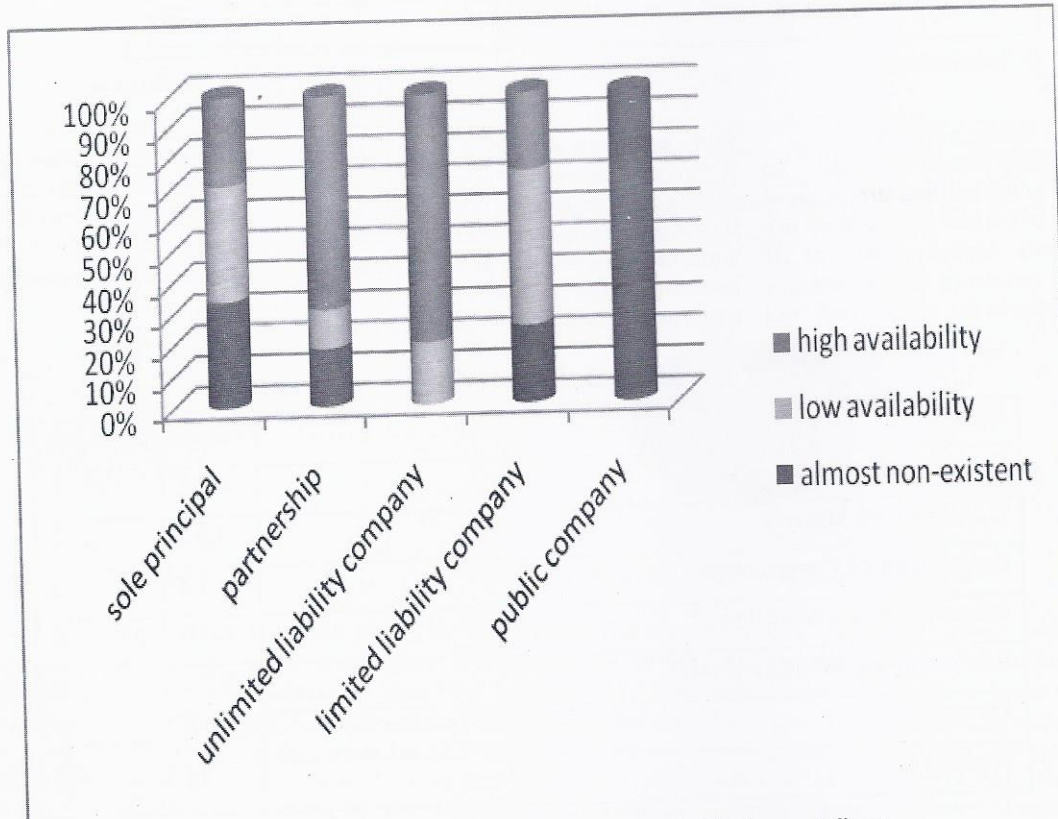


Figure 15: Availability of IT and the ownership form of firms

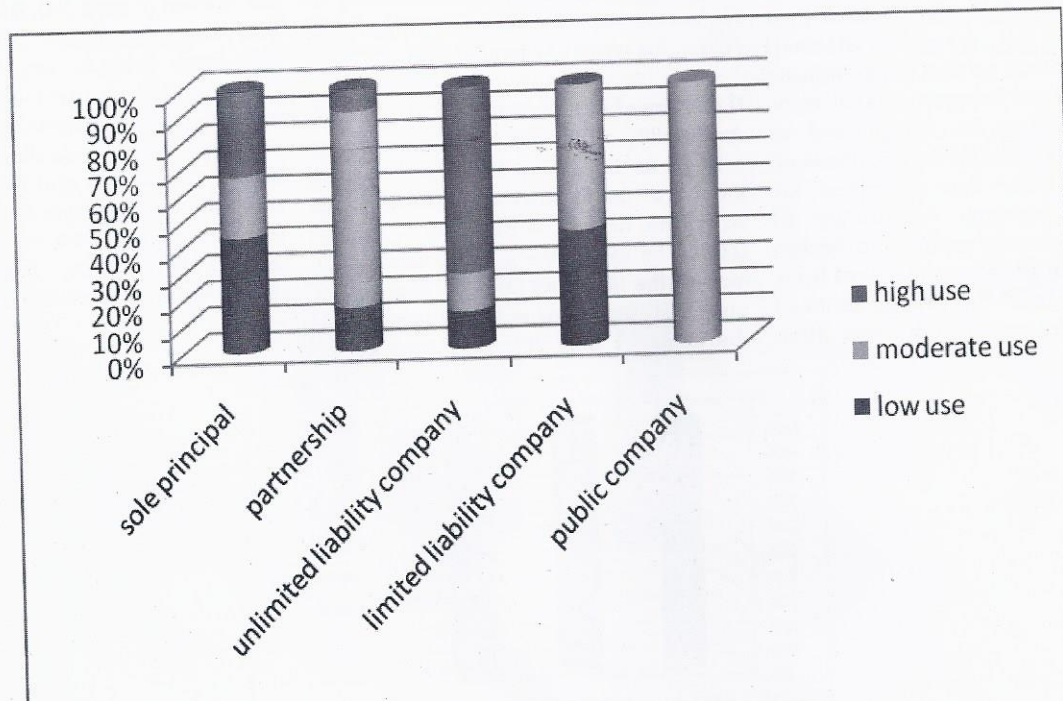


Figure 16: Use of internet and ownership form of firms

IT and Collaboration with other Firms

This study was also interested in knowing whether having local or international collaborations would increase the adoption of ITs in the firms. Hence the relationship between the availability of information technology and collaboration with other firms locally and internationally was tested using the chi-square test. The chi-square revealed that the relationship between the availability of information technologies and collaboration was not significant. The results also revealed that the relationship between use of the internet and collaboration was not also significant. This was surprising given the fact that a large proportion (79%) of firms

collaborated locally and about a third (32%) collaborated internationally. It would have been expected that such collaborations would encourage a greater adoption of ITs. The indication therefore is that the kind of collaborations which these firms had (which did not require any significant adoption of IT) were probably weak collaborations. A study of the kinds of collaborations which architectural firms have may further elucidate this.

IT and the Performance of Firms

The influence of the performance of the firms on IT adoption was also examined. Performance was measured by the firms themselves in relation to the profits of the

firms in the last two years. The tests show that the performance of the firms were significantly related to the availability of ITs ($\chi^2 = 27.78, df = 6, p = 0.05$). Figure 17 shows that ITs were highly available in most of the firms that indicated very good performance while ITs were poorly available in firms which were not performing well. Similarly the performance of the firms were also significantly related to use of the internet ($\chi^2 = 22.65, df = 4, p = 0.05$). There was a low use of the internet by all the firms where the performance not so good and the internet use was high in most of the firms that were performing well (Fig. 18).

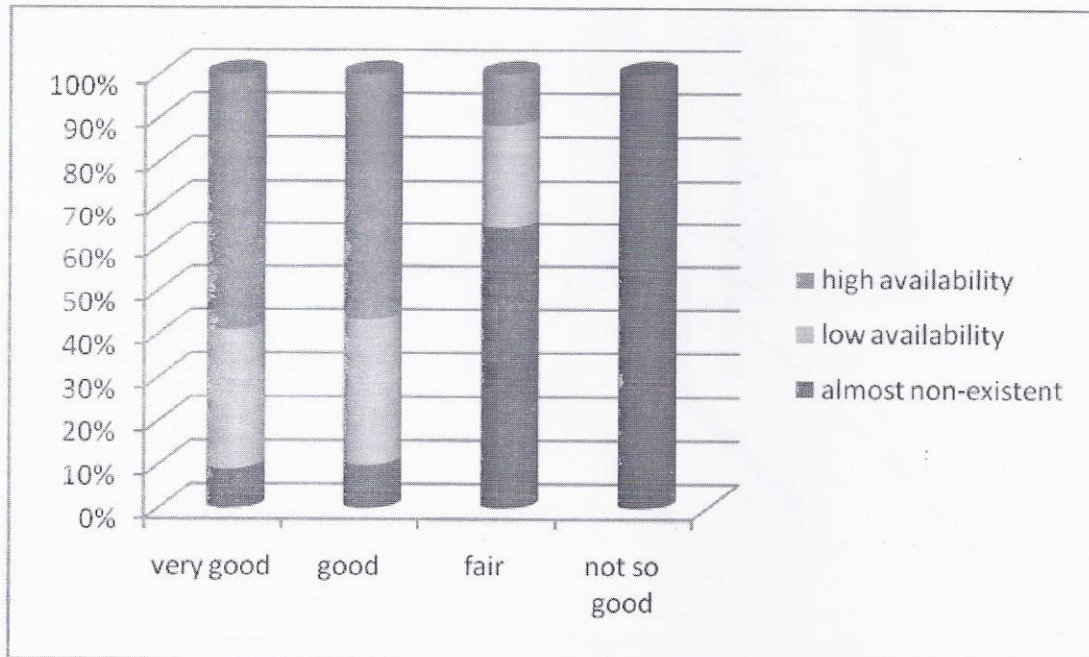


Figure 17: Firm Performance and the Availability of IT

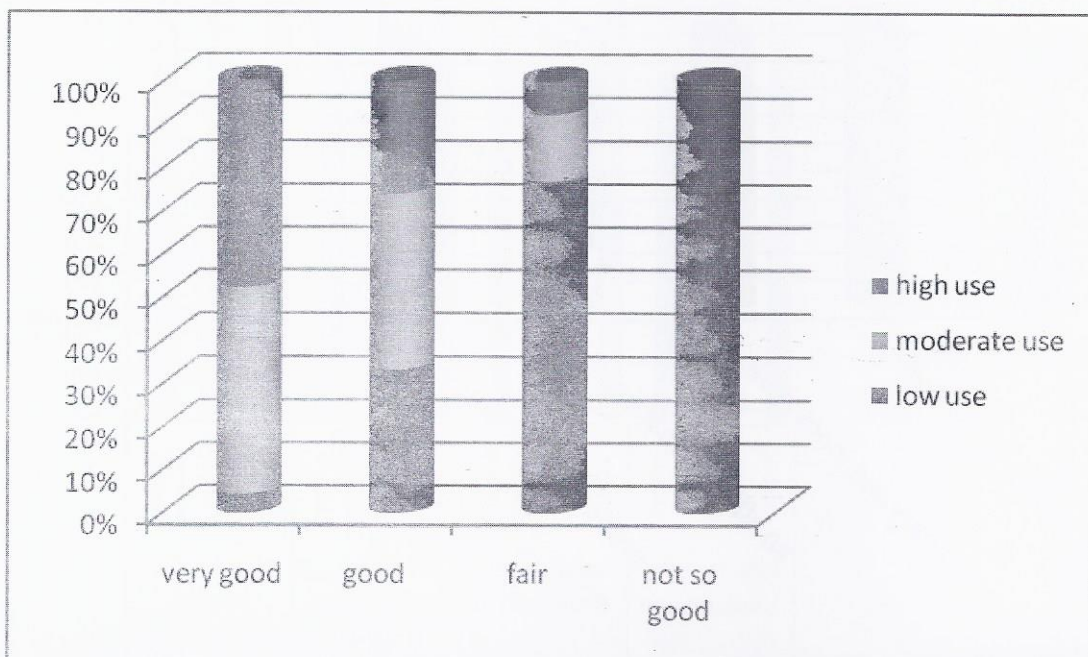


Figure 18: Firm Performance and the Use of the Internet

It thus appears that a high performance (in terms of profit) of the architectural firm was associated with high availability of information technology facilities and high use of internet facilities. This finding was not surprising because firms which are doing well are expected to be financially strong to adopt ITs more easily than firms which are not performing so well. This is consistent with findings in the literature because profits is another way of measuring a firm's size; and if firm size is correlated with IT adoption, the firm's profit (and performance) should also be related to IT adoption.

IT and the type of Principal

It appeared that the characteristic of the principal influenced the availability of IT and the use of the internet. There was a significant relationship between availability of IT and the type of principal ($\chi^2 = 8.39, df = 6, p = 0.05$). Information Technology (IT) facilities were highly available in most of the architectural firms where the principal was described as a mentor (Figure 19). The use of the internet was also significantly related to the type of principal ($\chi^2 = 7.15, df = 6, p = 0.05$). The use of the internet was high in most of the firms where the principal was a mentor

(Fig. 20). It is surprising that most of the firms led by productivity oriented and visionary/innovative leaders recorded a low availability of IT and even a higher proportion of these firms recorded low internet use. The reverse was the case with the firms led by efficient managers. Although a few of the firms led by these efficient managers recorded a high availability of ITs, more of the firms used the internet.

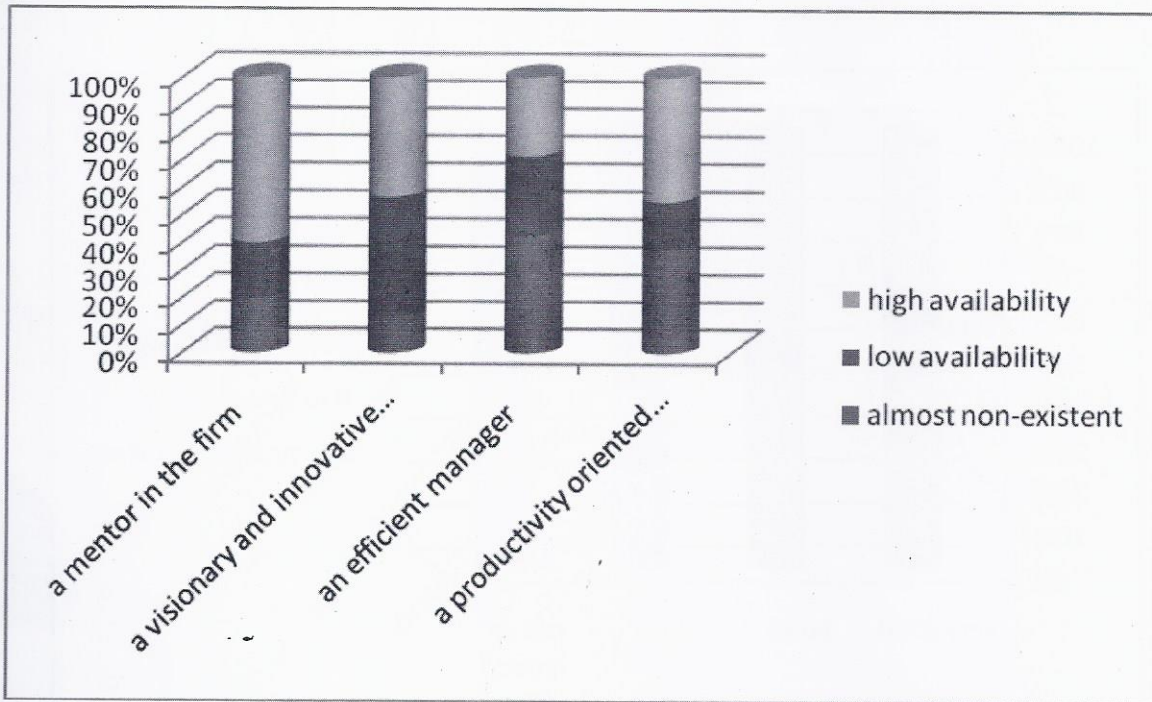


Figure 19: Availability of IT and the type of the Principal

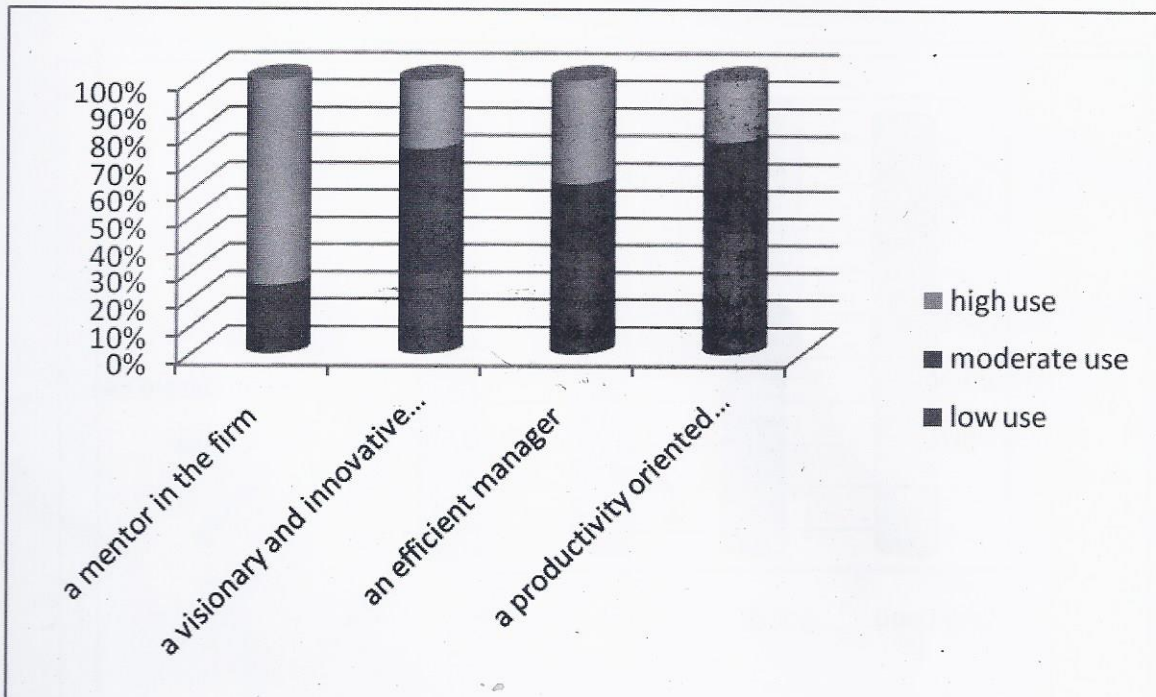


Figure 20: Use of the Internet and the type of the Principal

IT and the Clientele of the Firms

The role of an external factor, clientele, on the adoption of IT was examined. There were significant relationships between all the types of clientele and the availability of IT. The survey found that the availability of ITs was highest when firms that had no individual local clients, when most of their clients were local organizations and when most of their clients were foreign

individuals (Figure 20). On the other hand, IT was poorly available when the firms had few or no private organizations as clients. This means that having private organizations and foreign clients encouraged the firms to adopt IT more. There were also significant relationships between all the types of clientele and the use of the internet. The use of the internet was also high in most of the firms with no

individual local client (figure 21). However it is surprising that the use of the internet was generally lower for firms no matter the other types of clientele they had. Nevertheless, it appeared again that when most of their clients were private organizations the use of the internet was moderate. Indeed the types of clientele appeared to indicate the levels of IT adoption within the firms.

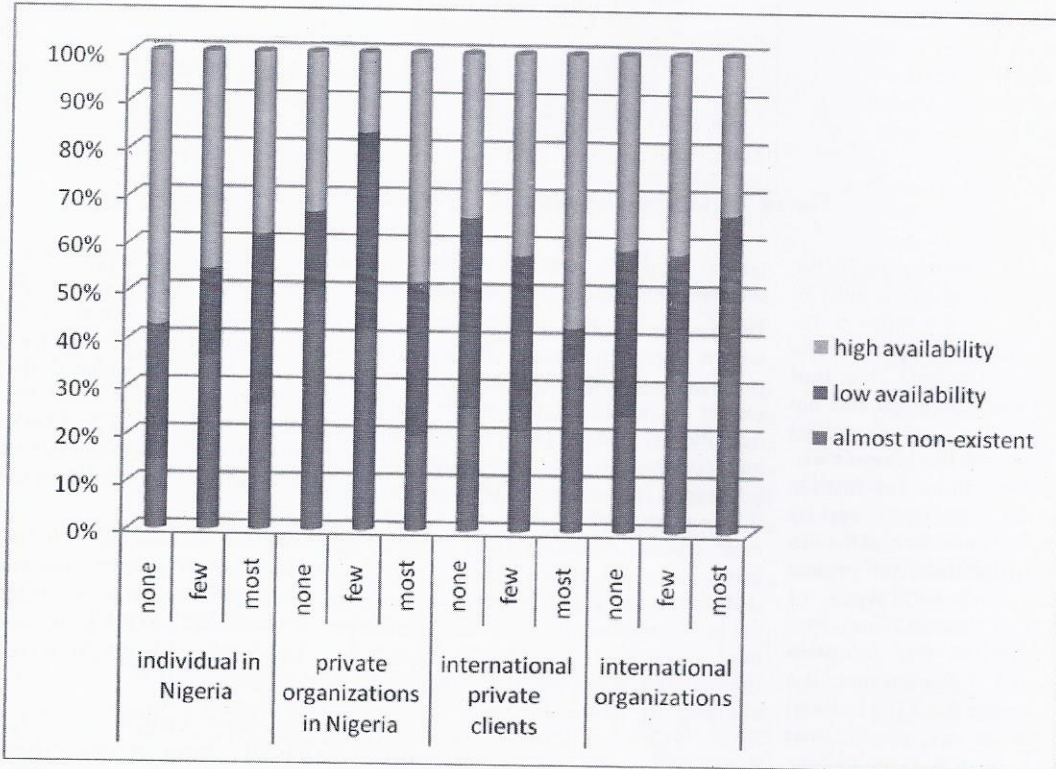


Figure 21: Availability of IT and the Clientele of the Firms

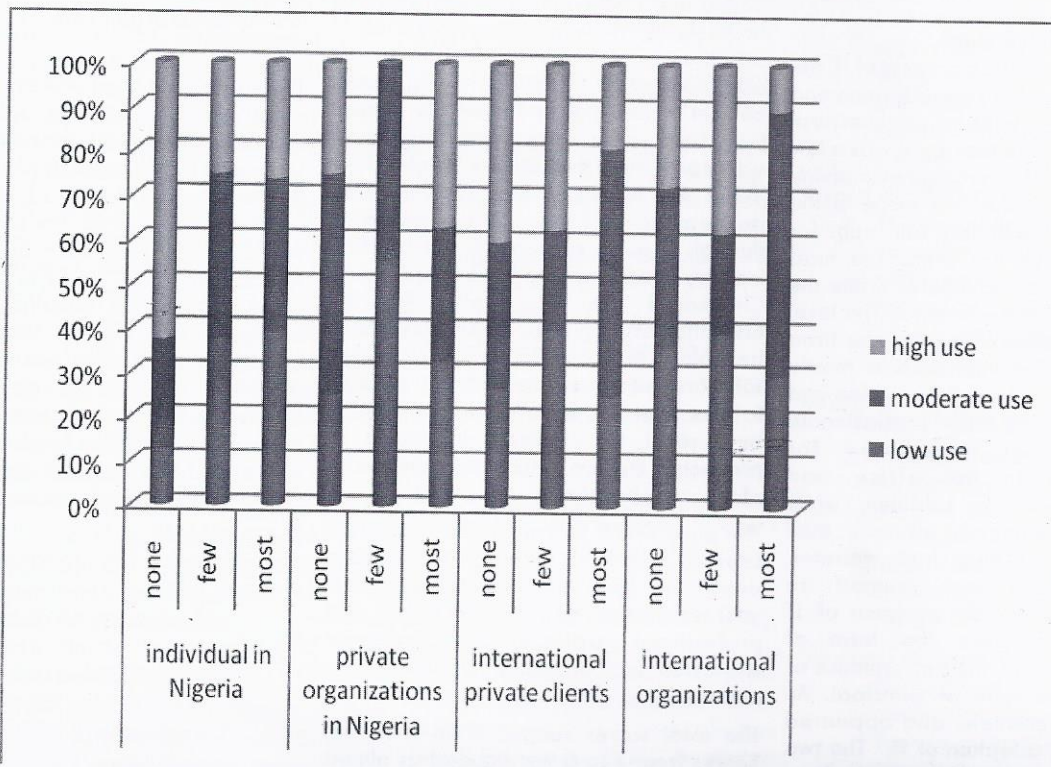


Figure 22: Use of the Internet and the Clientele of the Firms

Types of Firms based on Information Technology Profiles

It was of interest to classify the firms into types. This was done empirically. The rationale was that it would be possible to

understand the differences between the firms and what differentiates them from each other. To do this a two-step cluster analysis of the 14 variables used in investigating the information technology

profiles of the firms was carried out using the log-likelihood distances between groups.

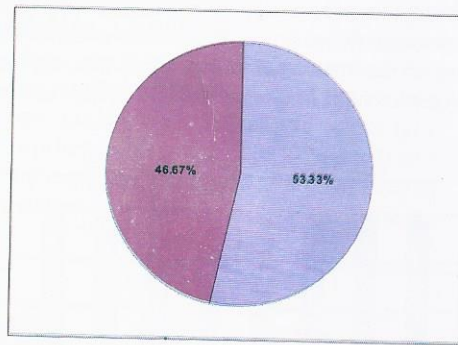


Figure 22: Cluster distributions of firms based on IT profiles

The variables that were responsible for the clusters included the level of availability of the internet, the use of the internet for design tasks and project management. The first cluster where a little more than half (53.33%) of the firms belonged did not use the Internet for design tasks, or project management. In addition the Internet was poorly available in the firms. The firms in the second cluster were characterized by high availability of the internet and the use of the internet for design tasks and project management. In sum, two types of architectural firms exist and the differentiating factor is the adoption (availability and use) of the internet. The first type of firm (where 53.33% belong) could be referred to as *low internet adopters* while the second type (where 46.67% belong) could be called *high internet adopters*.

Summary and Conclusions.

This study examined the adoption of IT, the factors which influenced the adoption and consequently, the types of architectural firms. The study found that there was a low level of adoption of IT because *availability of IT*, which is just the first stage in the adoption process, was only fair/poor for more than half of the firms. The most available IT was the computer, while the least available was the internet. The level of use of the internet in most of the firms was moderate. The internet was mostly used for sourcing design information and correspondence with other professionals. The internet was least used for communications in the office and managing projects. In addition, while almost all of the firms had electronic mail addresses, only a third had websites. Certain internal factors seemed to be related to the levels of adoption of IT observed. These were the form of ownership of the firm, the performance of the firm and the type of principal. An external factor, clientele, also appeared important to the adoption of IT. The two types of firms were identified. They differed on the basis of how available the internet was and what they used it for. The

types of firms were the *low internet adopters* and the *high internet adopters*.

The results of this study have provided insight into the state of professional practice in architecture. It has shown the extent to which architectural firms are adopting IT. These results have significant implications for the profession. If the profession is to make significant progress, IT is one aspect in which this progress is most crucial. Although some growth has been witnessed, as the comparison of the data in this study with previous data shows, the levels of adoption of IT is still far below that which will give the profession of architecture a competitive advantage or improve its professionalism both in the local building industry and globally. Furthermore, the new and better IT innovations which are emerging are posing new challenges for the practice of architecture, making higher levels of IT adoption a necessity. Certainly, the adoption of IT requires a significant amount of investment. The results showed that firms that were performing well adopted IT more than those which were not. What this means is that the improved performance of the firms probably through a good economy in the building industry would improve the adoption of IT. Challenges are also posed for the education of architects. Architects need to be trained in more than the use of design software but to have an IT driven attitude to the practice of architecture. This is because it has become important to produce IT literate architects as the results of this study has shown.

This study was exploratory. The aim was to provide insight. It is expected that more in depth the level of availability of the internet studies of the profession and professional practice will provide deeper understanding of many of the issues examined.

The total scores ranged from 3 to 12. Scores from 3 to 6 were coded as almost non-existent, 7 to 9 were coded as fair availability, while scores of between 10 and 12 were coded as high availability.

The responses of each of the firms on how often they used the internet for the tasks were added to give the level of use of the internet for each firm. The totals ranged from 7 to 21. The values between 7 and 11 were coded as low use of internet facilities, values between 12 and 16 were coded as moderate use and values between 17 and 21 were coded as high use of internet facilities.

Individual local ($\bar{\epsilon}^2 = 6.55$, $df = 8$, $p = 0.05$), local private organizations ($\bar{\epsilon}^2 = 8.06$, $df = 8$, $p = 0.05$), international individual ($\bar{\epsilon}^2 = 7.12$, $df = 6$, $p = 0.05$), international organization ($\bar{\epsilon}^2 = 2.97$, $df = 6$, $p = 0.05$)

Individual local ($\bar{\epsilon}^2 = 6.38$, $df = 8$, $p = 0.05$), local private organizations ($\bar{\epsilon}^2 = 7.65$, $df = 8$, $p = 0.05$), international individual ($\bar{\epsilon}^2 = 6.46$, $df = 6$, $p = 0.05$), international organization ($\bar{\epsilon}^2 = 12.16$, $df = 6$, $p = 0.05$)

The confidence level was set at 95% and variables of importance to the formation of clusters were determined using the chi-square test. The cluster distribution pattern is presented in figure 23. A two-cluster solution was obtained. The pie chart shows that 53.33% firms were assigned to the first cluster, and 46.67% firms to the second cluster. A discriminant function analysis, shows that 98.2% of the architectural firms could be correctly classified through the cluster analysis, suggesting that the two-cluster solution was internally valid. This favourable validity test provides substantial support for the resulting taxonomy of architectural firms.

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