ARCHITECTURAL PRACTICES AND THEIR USE OF IT IN THE WESTERN CAPE PROVINCE, SOUTH AFRICA

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SUMMARY: *The application of Information Technologies (IT) is moving forward with tremendous speed affecting all industries and professions; our building profession is no exception. To identify the extent of IT application in the building construction context of South Africa, a survey was conducted in the year 2000; it included IT as one of the many topics investigated. The Western Cape Province (WCP) was selected as the first subject of the ambitious national survey. The survey provides insight into the particular patterns in IT applications within the local architectural industry of the WCP and tracks its implications in terms of human resources and technical needs. This research paper presents a focused perspective of the findings of the survey on the local practices; their general profile, their computer technology profiles, their particular applications of technology and finally the effect of computer use on the profitability and cost reduction of their practices.*

The data presented in this paper highlights the high numbers of small-sized offices as a general characteristic of the local profile. Although a good percentage of these small offices seem to have a high need and use for IT applications, larger-sized offices are totally computerised and are all networked as well. The use of computers is clearly concentrated in three areas: administration, communication in addition to the core activity of construction drawings production. The survey reveals a major dependency on computer-aided-design (CAD) software where its use extends, in most cases, to clients' presentations. This dependency makes high demands on staff and principals' literacy and on the high competency levels needed for their use of technology. On the financial effect of IT use, many practices are not fully convinced that there is an actual reduction in their running costs. The exception occurs in the case of practices run by principals who use computers themselves; they have a positive perception of the financial benefits of technology.

This research establishes a baseline from which to scale the progress in the use and application of IT in the architectural profession, being a key player in the construction industry. It serves as a measure for future surveys of the other provinces. It is hoped that it provides a foundation for many assumptions made by practitioners, technologists, consultants and educators of this field.

KEYWORDS: *Architecture - South Africa, Architectural Practices, Building Construction, Computer-Aided-Design (CAD), Survey – Cape Town.*

1. INTRODUCTION

The last decade witnessed a phenomenal growth in the use of computer technology at all levels of the architectural profession. More architects are being convinced with the technology and its enhancements to their architectural work. They are starting to accept, plan and budget for the use of Information Technology (IT) as an integral part of their practices. Indications show that the technology is no more considered an excessive expensive luxury tool, but rather a necessity that offices are starting to invest in both human resources and in financial terms. Using the Canadian construction industry as an example, in a recent mail survey conducted over architecture, engineering and construction firms, the highest ratio of computers to employees was in fact found

among architectural practices, (Rivard, 2000). Also, in the United Kingdom, a report reveals the rapid growth in the use of IT applications in design practices that outpaced the construction industry, (Howes, 2000). Looking at South Africa, this paper will demonstrate that IT in architecture is equally pivotal.

Our profession is undoubtedly one of the main users and beneficiaries of computer technology. This fact is well established and recognised by the architectural community and manifested in several ways, as the data will reveal. A local architect affirms: “Our ability to perform as professionals under the increasingly pressured and specialised world that we find ourselves in is directly dependant on our ability to best integrate and exploit the opportunities that exist on the information superhighway,” (Illingworth, 1999).

On the local front of the Western Cape Province (WCP) in South Africa, the gathered data actually compares to the international findings in many aspects that will be identified in the successive sections. Serving as a brief background on the locality, the city of Cape Town falls under the jurisdiction of the WCP. It has a population of 2.7 million people, (CSS, 1997). Cape Town and vicinity is a first grade holiday resort and tourist destination, (City of Cape Town, 2001), a major business center and the second major port in South Africa after Durban). The province has a thriving agriculture based industry particularly with its prominent wine lands. It also enjoys a good education system recognized in the African continent. Three universities offer higher degrees along with two technikons, which compete for graduating quality technologists in most fields. In general, the province is a key player in politics, commerce, industry and education on a national level; hence, its selection for this survey will provide a fair indicator to the national trends.

2. DATA COLLECTION METHODOLOGY

In order to obtain an informative scale of how technology is perceived in the local industry and how it is actually being utilised in the profession, a questionnaire was designed to include these topics among others and was conducted in March 2000. The target for the questionnaire was the principal of every architectural practice registered with the Cape Institute of Architects (CIA); there were 316 firms in total. The survey was conducted in confidentiality and the data gathered is used for research purposes.

The intention was to use the "Total Design Method" (TDM) for mail questionnaires where attention is given to every administrative detail that might affect the response behavior, (Dillman, 1978). Due to time and financial constraints not all the guidelines of the method were followed. Nevertheless, careful consideration was taken in the design of the questions' content and their order, making a clear distinction between the different topics. Also, the design of the cover for the questionnaire received close attention where a related architectural graphic theme was used appropriately in combination with a short statement about the purpose of the questionnaire.

The design of the questionnaire booklet was simple, using A-5-sized sheets for easy handling. The questions were direct with mostly multiple-choice-type responses. Space was adequately provided for any additional comments or information that was not part of the answers provided. Following another TDM criteria, the questionnaire was sent by mail with return postage provided, to relieve the respondent from any entailed expenses. The package also included two letters. The first letter was from the researchers serving as an introduction and the second letter was from the CIA in support of the questionnaire. These letters provided extra support for the survey and positively influenced the return rate.

The setup of the questionnaire included ten categories covering most of the details relevant to the local industry profile. However, this paper mostly introduces the data gathered from the following four categories: 1) General Information, 2) Education, 3) Office Organisation and 4) Computers.

The questionnaire was addressed to the sole partner in the practice or to the first name that appeared on the list obtained from the CIA. This was meant to ensure a reliable and precise overall understanding of the office operation. Despite the time restraint that is usually attached to personnel at the top management levels, the response rate was close to 40 percent. From the 316 registered firms, 108 firms completed and returned the survey, an additional six firms had moved, with no forwarding address, and another four had retired.

This relatively high percentage reflects the efforts made to provoke the professionals' interest in responding to the questionnaire. One of the key elements was the inclusion of a brief insert inside the monthly CIA newsletter, in the month prior to sending out the survey. It mentioned the purpose of the study while encouraging architects to respond. Other efforts included personal contacts and telephone calls, as well as the mailing of a

reminder/thank-you card three weeks after sending the questionnaire; serving the dual purpose for those who did not respond and those who did. This good response is also attributed to the fact that this kind of study was a new initiative and many professionals in the architecture field were looking forward to the results as indicators of their industry.

3. DATA PRESENTATION AND ANALYSIS

To examine the architectural practices' use of IT, a "General Profile" of these practices is first introduced. It comprises a general review of the size, age, main projects and the academic profile of staff working in these practices. This section proceeds from the general to the more focused profile of "Computer Technology". Their use of the technology and the areas of concentration are examined. A closer look at the particulars of "Computer-Aided-Design" (CAD) applications is then presented. The section ends with the perception of IT in financial terms where its effect on "Office Management" is investigated. In many cases, the influence of one criterion is obvious on another criterion and the presentation of many of these relationships unfolds some interesting findings.

3.1 GENERAL PROFILE

To get a clear perspective of the profession in the WCP area, the data in this sub-section reviews the following general criteria:

1) Size of firm
2) Age of firm
3) Project Types
4) Employees' Academic Background

3.1.1 Size of Firms

Reviewing the data collected about the size of firms, there is a wide range that extends from a one-person-office to an office of more than 30 staff-members (including principals) as shown in Fig. 1. There is a high percentage of small-sized offices in the area, about 62 percent, where the number of employees does not exceed five people. This figure is relatively close to the international figures. In comparison, a Canadian survey indicates 56 percent of the total architectural firms are small-sized offices with less than five employees, (Rivard, 2000). It illustrates the nature of the architectural services and indicates the viability of running small offices where they could be easily sustained by a few members of staff.

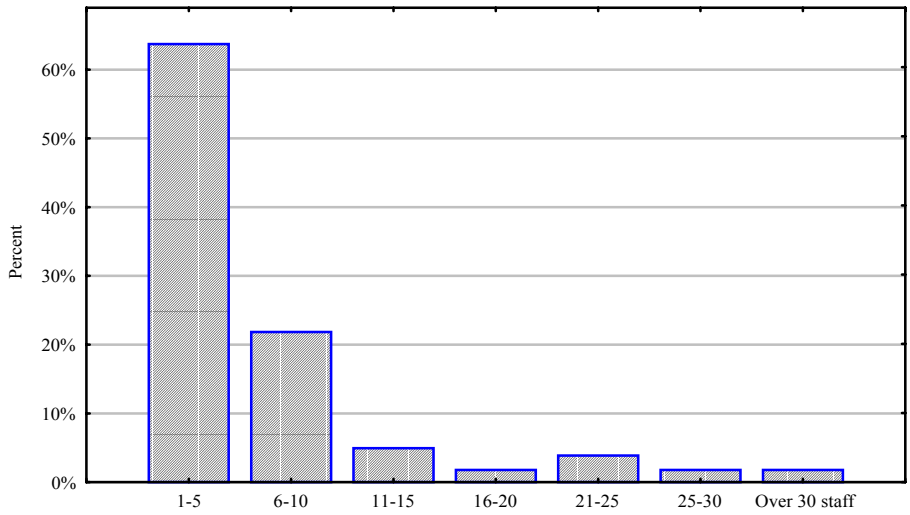

FIG. 1: Size of Firms (in terms of Staff)

3.1.2 Age of Firms

Architectural firms in the WCP, for the most part, have been in operation for a lengthy period of time. The oldest responding firm that is still in operation was established in 1892, and in contrast, the youngest operating one was established in 1999. Fig. 2 shows the highest percentage of firms (35percent) occurring at the 5-15 years category, indicating the stability of these practices after the initial “teething” period. From another perspective, the average age of the firms is calculated to be 16.85 years, which means that the average firm in the area was established before computers became such dominant tools in the local architectural industry. Generally, in South Africa, IT has started to be extensively used at all levels of production in the past decade; its earlier use was limited to administrative tasks and operations. Whether the stability of practices will be affected by the increasing adoption of IT will remain to be seen in the future, presenting itself as another point of research.

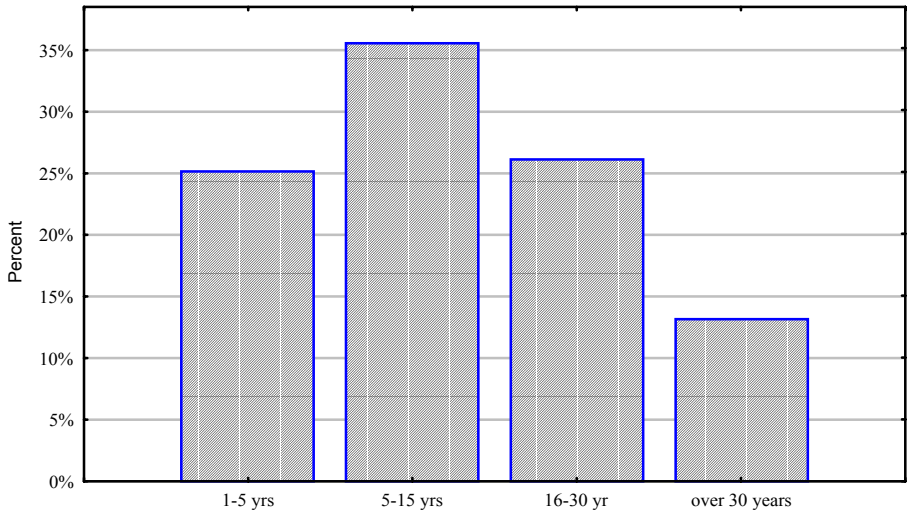

FIG. 2: Age of Operating Firms (in Categories)

3.1.3 Project Types

The work of these offices varies considerably by type. However, there are some areas of concentration. Although some offices rank more than one area as being the main source of projects, they show that the residential building type ranks the highest source of work at 58 percent. Commercial buildings ranked second with 44 percent. Seven percent of the firms ranked religious buildings as one of their foremost sources of work. It is noteworthy that these categories are not mutually exclusive; the respondents were allowed to check more than one area if applicable as their most important source of work.

3.1.4 Employees' Academic Background

The academic profile of the staff in the area, Table 1, shows that the highest percentage (39 percent) comes from the "Registered Architect (w/Bachelor's)" category. The second highest is concentrated in the "Technologist (w/Diploma)" category with 32 percent. This combination is common to the architecture profession noting that small offices constitute over 60 percent of the total number of firms. Design creativity is no longer the only criteria for a successful career in architecture. In today’s aggressive market architectural practices cannot survive on creative talent alone, but require a mix of talent and sharp business savvy, supported by the effective use of efficiency- and profitability-boosting design technology, (SA Architect, 1999). There is more need for technologists than architect trainees.

TABLE 1: Staff Academic Levels Attained

Degree	Number	Percent of total
Architect (registered) with Diploma	18	4
Architect (registered) with Bachelor	186	39
Architect (registered) with Master's	17	4
Architect (registered) with other	7	2
Architect trainee with Diploma	11	2
Architect trainee with Bachelor	49	10
Architect trainee with Master's	1	0
Architect trainee with other	2	0
Technologist with Diploma	150	32
Technologist with Bachelor	19	4
Technologist with Master's	0	0
Technologist with other	17	4
TOTAL	477	100

3.2 COMPUTER TECHNOLOGY PROFILE

The local practitioners have different concepts of how to best utilise IT serving the interest of their work. This section will present the findings of the survey in the following basic criteria:

1) General Use of Computers
2) Areas of Main Use of Computers
3) Principal's Use of Computers
4) Use of Network Environment

It will then proceed with the analysis of the relationship between suspected influential variables, namely:

5) Use of Computers VS Size of Office
6) Use of Computers VS Principal's Use of Computers
7) Use of Networks Environment VS Size of Office
8) Use of Networks Environment VS Principal's Use of Computers

3.2.1 General Use of Computers

"Computers when fully and meaningfully implemented in an architectural practice, available and accessible to all, utilised in more than a word processing, electronic draughting facility, offer South African architects an opportunity to redeem their professional status, compete profitably in the risk taking commercialisation of shelter provision and truly launch the unique South African creative skills on the global market," (Illingworth, 1999). In support, the WCP was found to have 83 percent of the firms using computers for architectural purposes while 11 percent are considering them in the "near future". Fig 3 also shows that only 3 percent are not using or considering the use of the technology now and do not approve of them for architectural work.

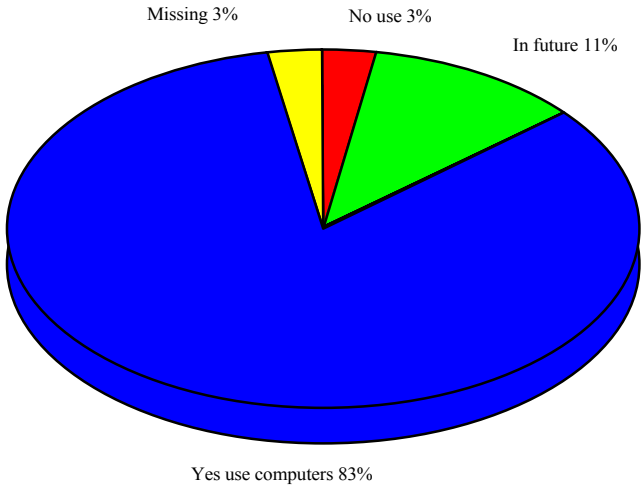

FIG. 3: Firms Using Computers for architectural purposes

3.2.2 Areas of Main Use of Computers

The use of computers in each firm varies and their capacity is noticed to be fully utilised in some areas while it is less exploited in others. To the formerly reluctant body of architects, the use of computers was not considered beyond the administration tasks in the recent past. In one view, the automation of the drawing production did not appeal to the "old school" as an alternative to the elaborate and original hand drawing production. The mechanical look of the drawings, at first, was a setback where the "character" was lost. In another view, computers make it difficult to recognize errors. In a practitioner's words: "With the advent of CAD and computerization, I'm fearful that architects are going to lose intuition … CAD drawings are so convincing because of the precise lines and neat lettering … Often mistakes are present and it's hard to find them since everything looks so wonderful and orderly," (Rosenfeld, 1997). Nevertheless, under the pressures of time efficiency, the competitiveness with mass production and the need for repetitive use of previous layouts and details, the benefits of the technology outweighed the disadvantages. It has translated to a high percentage of major dependency on digital information and production in general, in addition to the general administrative and communication use.

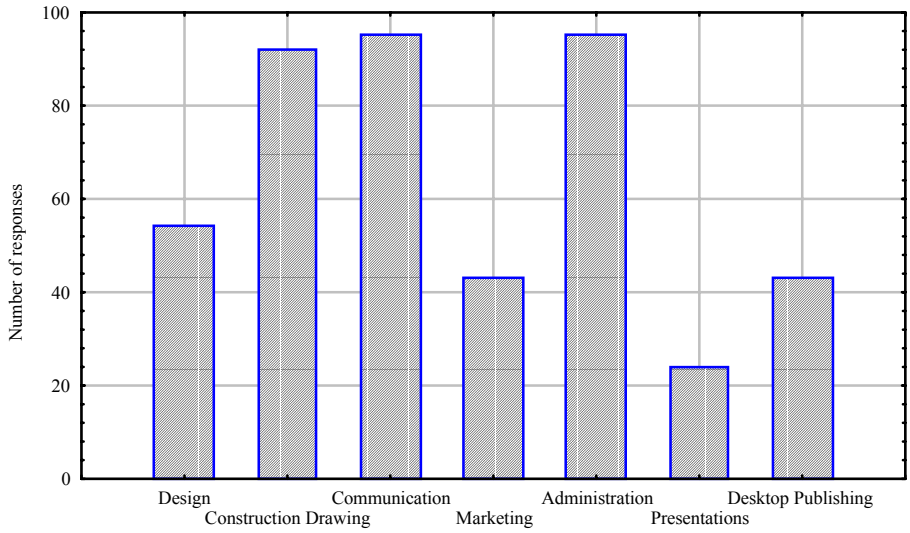

FIG. 4: Areas of Main Use of Computers (categories are not mutually exclusive)

In the WCP, the use of computers in the areas of Office Administration and Communication represents the highest two among the other uses (95 percent, see Fig. 4) as expected. The third highest main area in which offices use computers is the area of Construction Drawings production with 92 percent. Not many offices are shown using computers in the Presentations area, which could be a factor of the complexity of the application and perhaps the larger investment in software, hardware and skilled staff needed to operate such applications.

3.2.3 Principal's Use of Computers in Architectural Work

There is an awareness of the benefits of IT applications in the professional work among the principals. Fig. 5 shows that 51 percent of the principals use computers themselves in architectural work, while 43 percent indicated a negative answer. The latter figure could be an indicator of a high percentage of computer illiteracy or a general disinterest among the top management levels in the offices in its use, or both factors combined. Nevertheless, one has to consider the average age of the firms in the WCP being 16.85 years, which in some way excuses the non-familiarity of the principals with the new tools of technology.

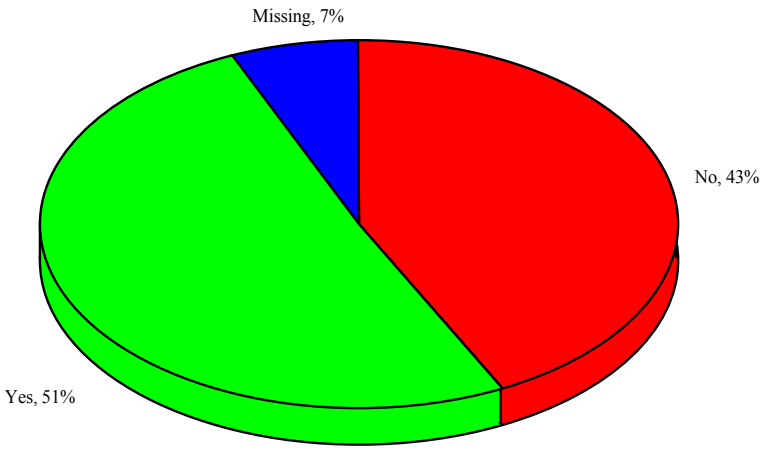

FIG. 5: Percentage of Principals using Computers for Architectural Work

3.2.4 Use of Network Environment

On one hand, networks provide an easy way to co-ordinate and exchange text documents and large drawing files and on the other hand, the initial expenses that are inevitable in setting up a local area network (LAN) could be prohibitive. However, the network environment offers long-term savings and that is recognised by the architectural practices; 56 percent of the offices are networked, see Fig. 6. From a networking administration perspective, there is less maintenance of individual machines with individual programs and problems, in addition, the update of software is less time-consuming using one feeding point (server). Printing is also much easier in a network environment where individuals could be working on their stations, meanwhile sending their files for printing across the network.

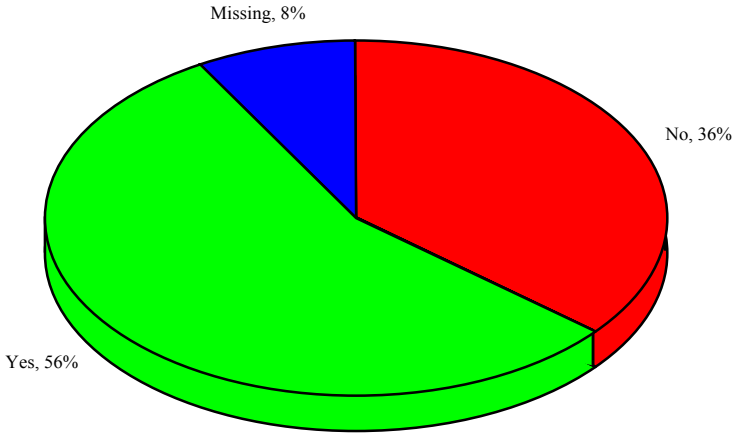

FIG. 6: Percentage of Offices using a Network Environment

3.2.5 Use of Computers VS Size of Office

The size of the office is detected as a factor in the overall use of computers among the local practices. The relationship between the office use of technology and its size is the subject of Fig. 7. Offices of less than 5 employees have 50 percent using computers in one area or another, while offices of 11 or more staff members are all using computers in their practice with no exception.

Familiarity with the computer capabilities is obviously perceived as a factor affecting the size of the office now, and as predicted by an academic/practitioner in the States it will be more dramatic in the future. "We could imagine an eventual practice profile that omitted the drafting level almost entirely, with each staff member doing schematic, design development, and construction documentation on his or her projects, creating a project integration that had inherent communication efficiency and delegation of responsibility," (Pressman, 1977).

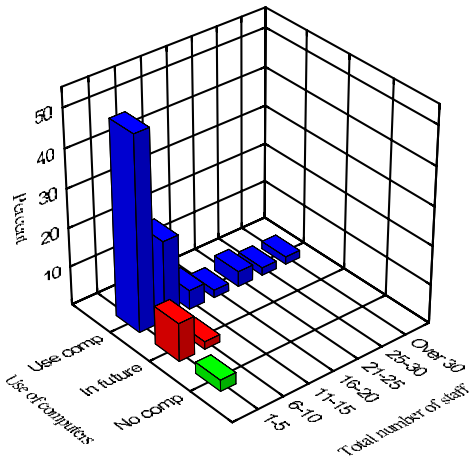

FIG. 7: Percentage of General Use of Computers with respect to the Size of the Office

3.2.6 3.2.6 Use of Computers VS Principal's Use

In Fig. 8, there appears to be an interesting relation between the general use of computers in the office and the principal's use of computers. Around 53 percent of the offices that use computers are managed by principals who themselves use the technology; a normal assumption corresponding to the general premises, "… it is our responsibility to empower ourselves with the skills and knowledge in order that we might best direct and lead our employees," (Illingworth, 99). That knowledge certainly contributes to the adoption of the technology in practice. Interestingly, 36 percent of the offices are using computers while their principals are not. In addition, a

higher percentage for those who are considering the use of computers in the future comes from offices whose principals are not using them.

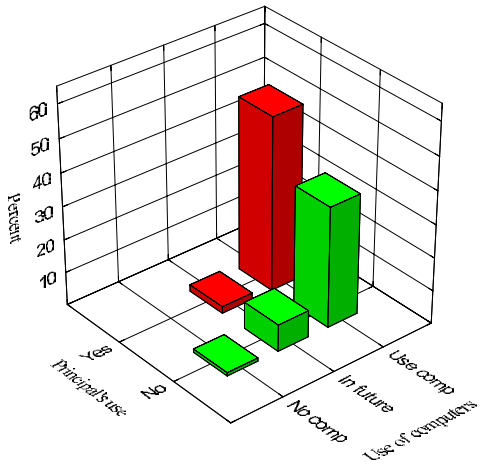

FIG. 8: Relation between the General use of Computers in the Office and the Principal's Use

3.2.7 Use of Networks VS Size of Office

As expected, small-sized offices of five staff members or less that are networked constitute 29 percent while those that are not networked in the same category have a higher figure of 33 percent, see Fig. 9. These figures are reversed in the next category of offices with 6-10 staff members, where the networked offices represent a higher percentage than offices that are not using the network environment. There is a noticeable overwhelming response from larger offices of 11 or more staff indicating a 100 percent implementation of networks in their practices.

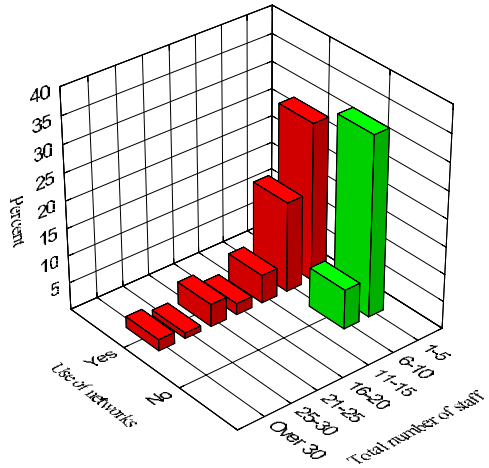

FIG. 9: Relation between Use of Networks and Size of Office

3.2.8 Use of Networks VS Principal's Use of Computers

The majority of offices that use a network environment in fact have principals using computers for architectural purposes. Fig. 10 indicates 34 percent of the total number of offices uses networks and are managed by principals who use computers versus 26 percent with principals who do not. It indicates that the practical knowledge of the principals in the technology area is not as crucial as one would assume. This knowledge and use of technology by the top management, however, could be a factor that influences the direction the offices take towards computerisation.

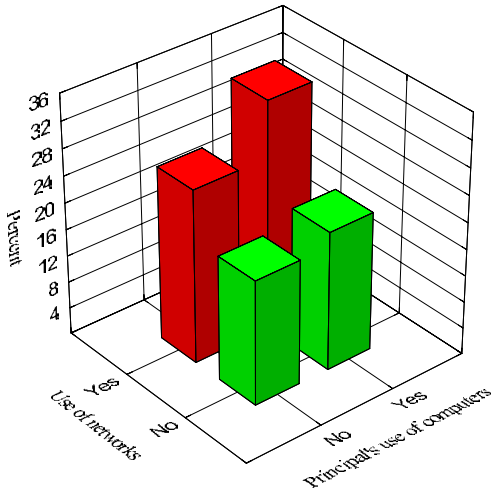

FIG. 10: Percentage of Firms using networks with respect to their Principal's Use of Computers

3.3 APPLICATION OF COMPUTER-AIDED-DESIGN (CAD)

One of the three highest areas of computer use is the area of drawing production, as demonstrated earlier in Fig. 4. It is not a unique phenomenon. It is one of the main areas of focus of any architectural practice; "the core activities of architectural practice are design, representation and communication," (Pressman, 1997). Design certainly requires a more specialised use of the technology, i.e.: CAD, and in this section data will be presented regarding its implications of using CAD on both the staffing and technological aspects. It first examines current staff literacy in CAD and the influence of CAD knowledge on the hiring patterns in these offices. It will then examine the relation between the two variables, the current staff literacy and the CAD requirement for future employment. In addition, an overview of the most used CAD packages is presented. As another core activity is presentation, the paper will examine the effectiveness of the technology in the client presentation area and its relation with respect to the size of the office.

3.3.1 Staff Literacy in CAD

The heavy dependency on computer production naturally dictates high levels of proficiency with CAD among the architectural staff. As the majority of offices use computers in their work, one expects to find that they have the highest percentage of staff conversant with CAD, being a fundamental tool for architectural production. However, Fig. 11 shows that only 27 percent of the offices have a high CAD literacy among their staff; with 81-100 percent of their staff literate in CAD, and 13 percent of the offices with 61-80 percent literacy. These two figures add up to 40 percent offices with staff CAD literacy of more than 61 percent. This is a relatively low percentage considering that as many as 83 percent of offices use computers (Fig. 3), of which 95 percent use them in drawing (Fig. 4). This discrepancy could be contributed to the additional percentage of non-technical staff, i.e.: administrative, those do not really need this special knowledge for their work. At the other end of the spectrum lies a relatively high 20 percent of the firms with no one conversant with CAD. These trivial findings could serve as indicators to a market that might be under-serviced by CAD-literate employees.

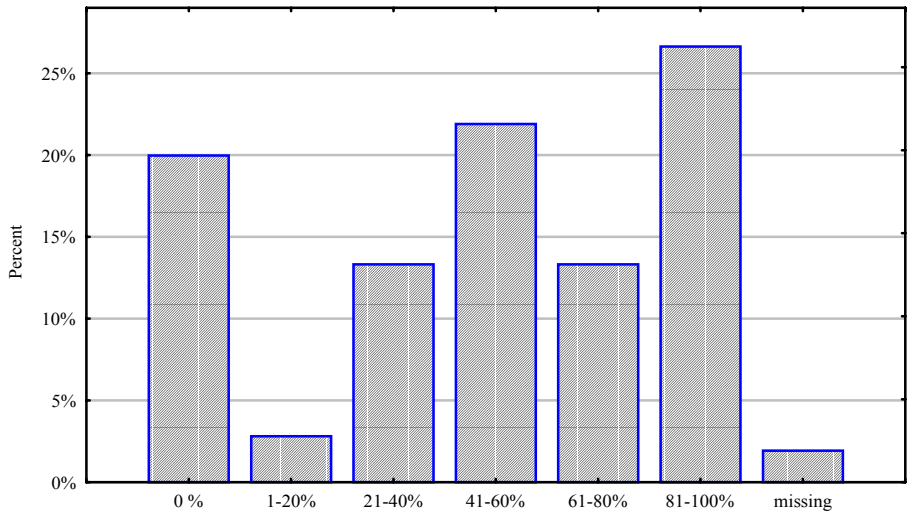

FIG. 11: Percentage of Staff Literacy in CAD

3.3.2 CAD Requirement for Employment

Supporting CAD and its benefits to the profession, a professor in architecture, states that "…computer and related electronic technologies support a work environment that is substantially more powerful and flexible than the traditional medium of drawing for both the conceptualization and realization of projects," (Nordhaus, 1997). Computer literacy reinforced by any CAD program knowledge is proven highly desirable among local practices. Around 53 percent of the total number of employers indicate that job opportunities within their firm require "experienced" knowledge of CAD applications, see Fig. 12. An additional 25 percent require "some knowledge" from their job applicants. These two figures combined produce a sizable majority of 78 percent requiring experienced or some CAD knowledge for employment. It confirms that learning CAD is a paramount skill for the new graduates and almost a requirement for entry into the job market.

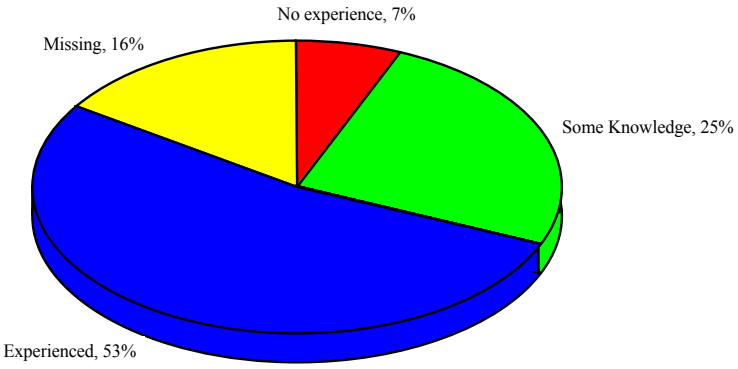

FIG. 12: Percentage of Offices requiring CAD Literacy for Employment

3.3.3 CAD Requirement for Employment VS Staff Literacy

The data demonstrates that offices that require CAD knowledge for employment mostly have a high percentage of staff literacy in the software, as per Fig. 13. A similar pattern is observed among the offices that require some knowledge of CAD for their employment where the literacy in CAD is more or less evenly distributed among their staff members, which is expected.

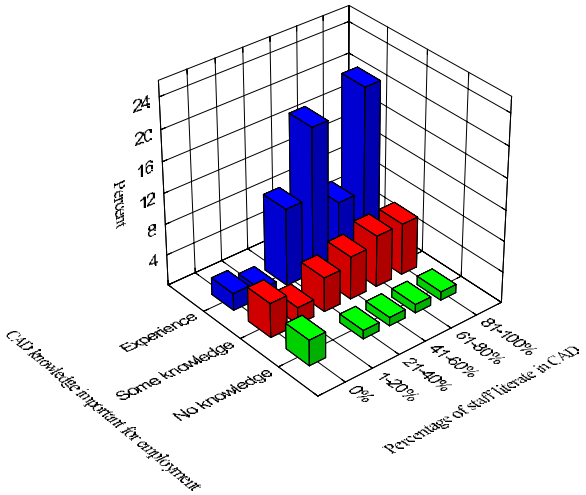

FIG. 13: Percentage of Firms requiring CAD for Employment with respect to their Current Staff Literacy

3.3.4 CAD Software

Because of the variety of software packages produced in the IT industry for design and drawings purposes, it was useful to get accurate information about the popular package in the Western Cape region. The survey, as per Fig. 14, indicates that 43 percent of the firms use "AutoCAD" as their choice of Computer-Aided-Design (CAD) software application. The second most popular CAD software is "Caddie" at 20 percent. Other programs such as ArchiCAD (7 percent) and Microstation (4 percent) are also used but to a lesser extent. In the "other" category, programs listed were Genesis, Drawbase, TurboCAD and Corel.

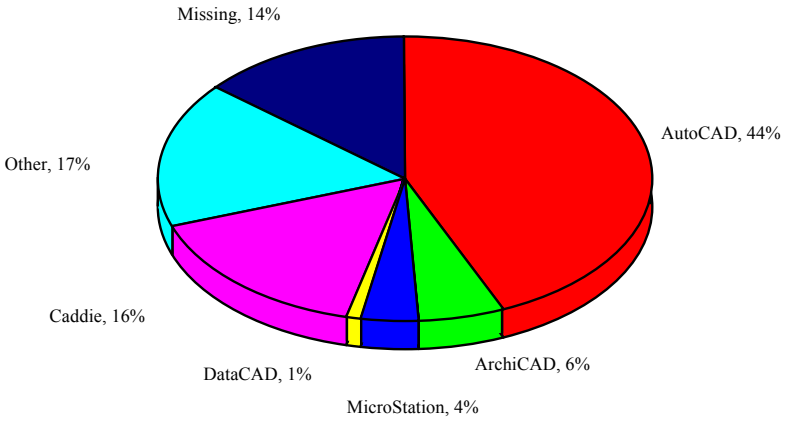

FIG. 14: Popular CAD Software Packages

In Canada as well, a survey indicated the popularity of AutoCAD and AutoCAD Lt. capturing 65 percent of all firms using CAD. Their next most popular software was also indicated to be Microstation with 16 percent of users, (Rivard, 2000). Comparing these figures to another survey in Scandinavia, again it showed AutoCAD as the prevailing program among the three European countries' construction industries: Denmark, Finland and Sweden, (Howard et al, 1998).

3.3.5 Computer Presentations

In an essay, Professor Nordhaus describes the application of new technology and the way design has evolved noting the considerable impact it has on representation as an essential component of the design process. He sees "the ability to quickly tailor a visual representation to meet the needs of a client, and change it at the push of a button, eliminates many of the limitations of paper presentations," (Nordhaus, 1997). The computer, in his view, provides the means to develop a comprehensive electronic model of a project. That computer-generated model

could essentially incorporate every attribute, i.e.: geometry, materials, structure, texture, color, costs and specifications. The majority of our local offices take advantage of these benefits and enhancements.

FIG. 15: Principals who think Computer Presentations Offer a Better Understanding to their Clients

On the local scene, there is evidence that investments made in technology are well spent when it comes to presentations, see Fig. 15. The figures show that 47 percent heads of offices are convinced with the effect of computers in presenting their ideas and concepts competently and clearly to their clients. This manifestation certainly expands on the use of technology and its versatility in the profession.

3.3.6 Computers Presentations VS Size of Office

Adding the size of the office as a factor, there is evidence that most larger-sized offices over 16 staff are quite satisfied with the effectiveness of using computer presentations for their clients, as shown in Fig. 16. In small-sized offices, however, the distribution of numbers is almost equal among those who use it for presentations, those who do not and those who do not think they are effective in that area.

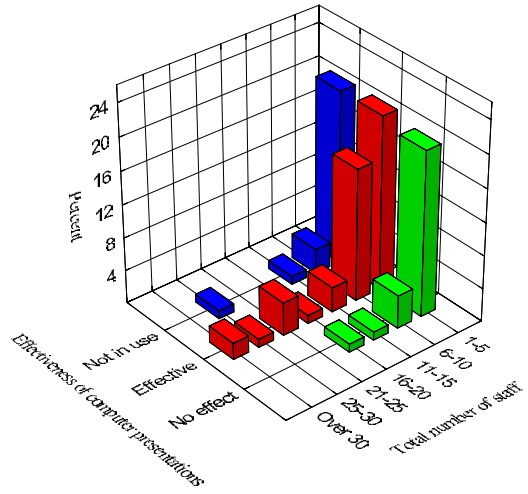

FIG. 16: Relation between Perception of Computer Presentations Effectiveness and Size of firm

3.4 Computers and office management

In the broader sense, architecture brings together art and science to produce a physical building that satisfies the needs of its users. It is nevertheless a business. Like any other business, profit has to be made for the business to survive. “The profession is not enhanced by a magnificent design concept and shoddy practice,” (Eribes, 1997). This section deals with technology and its effect on two aspects of office management: staff employment and cost reduction. Then it relates the principal's use of computers and the use of networks on cost reduction.

3.4.1 Effect on staff employment

In looking at the effect of having computers in the office on staff employment, the responses indicate a general indifference where no definite increase or decrease in hiring resulted from the use of computers. The only exception, as per Fig. 17, occurs in the employment of "architects," where it shows a clear increase in "less" hiring of 12 percent while there are only 4 percent offices who indicate hiring "more" architects. Meanwhile, the overall majority, with more than 50 percent of the respondents, indicates that having computers in the office made no difference in their employment trends, where no hiring policies were affected positively or negatively.

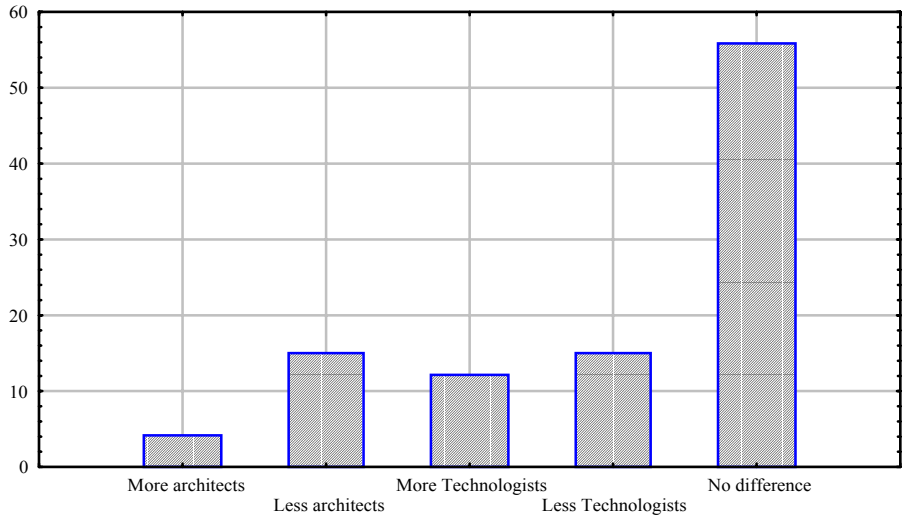

FIG. 17: Effect of IT Use on Staff Employment Trends

3.4.2 Effect on cost reduction

Regarding the contribution of technology to the reduction of running costs of the firm, a generally positive response of 31 percent versus a 24 percent negative one is indicated in Fig. 18. As indicated earlier, offices use computers extensively in communication where some of the cost reduction scenarios could be understood. Letters being replaced by e-mails and drawings exchange done electronically versus mailing a printout are certainly outcomes of the use of technology. In the drawing production area, it has already been established that the repetitive use of some early details could reduce production time, hence, cost. Also, in the writing of specifications where many parts could be repetitive, computers offer an efficient medium. One of the case studies presented in Pressman's book on Professional Practice explains that, in their practice, they usually have standard specifications that they are able to use and edit. "This is done by the project architect, who has a full sense and flavor of the design and the drawings," (Rosenfeld, 1997). The specifications are continually evolving and are developed by the architects in the office who are responsible for the project. These uses certainly contribute to the general reduction of running costs.

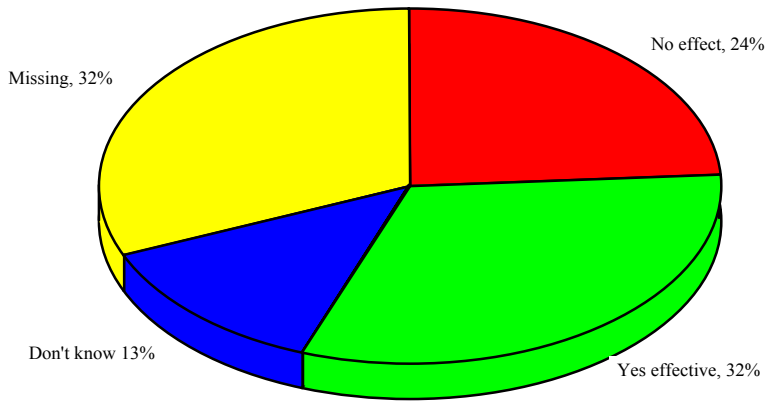

FIG. 18: Effect of IT Use on Cost Reduction

3.4.3 Relation between cost reduction and principal's use

It is generally perceived that offices that are managed by principals, who use computers themselves are quite aware of the reduction in running costs, see Fig. 19. There is a predominant percentage (32 percent) among respondents who use computers that indicates a positive effect of IT use on the running costs of the practice. The data also shows an equally divided opinion among those principals who do not use computers; the highest being in the category of those who do not use computers yet see it as an ineffective tool in financial terms (19 percent).

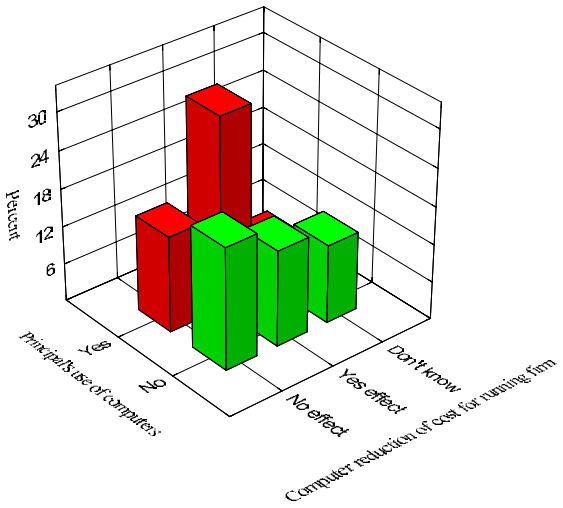

FIG. 19: Relation between Principal's Use of Computers and Cost Reduction Perception

3.4.4 Relation between cost reduction and the use of networks

The following figure (Fig. 20) examines the cost effectiveness of using networks. Over 32 percent of the offices are using networks and are aware of their cost reduction influence. However, a close 25 percent of the offices are using networks but do not think they contribute to any cost reduction. It is therefore deduced that using a network environment is not the major factor in the perception of cost reduction of the practice. Offices that are not using networks and think it reduces the costs, interestingly, are more than those who think its use has no effect.

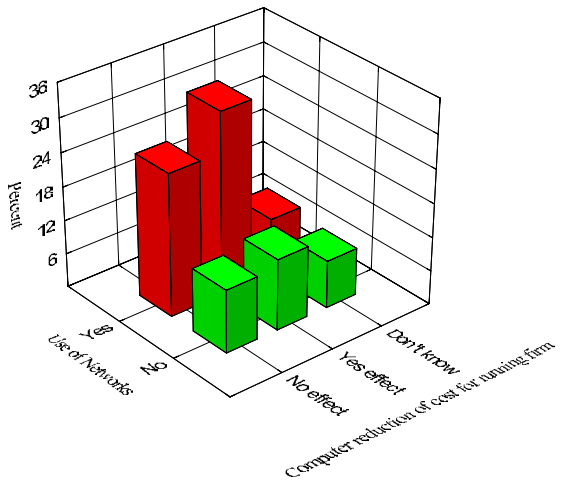

FIG. 20: Use of Networks and Cost Reduction

4. Conclusion

The application of Information Technologies in the building profession is evolving in different paces, whether in the construction management, quantity surveying or the architectural field. Architecture, being a design/construction field, displays a rising interest in IT applications in a wider range of activities: from design drawings to construction drawings' production, from communication with clients and consultants to clients' presentations throughout the different phases of building delivery. Using the local industry of the WCP as the subject of this research, this paper identifies some general and some local trends to use as a "bench mark" for the South African architectural practices. The survey covered all its architectural firms, gathering information about many critical areas among which the subject of this paper: the “computer technology” area and the extents of its use in the various offices.

Most of the local practices have been in business for many years, and have made the necessary changes to accommodate the new age. Currently, there are a substantial number of offices that use computers in different capacities. The majority of those who are not using them are definitely considering their use for the future. This translates into the expected awareness of IT and its advantages in the building industry.

In seven areas cited for hi-tech use, the highest usage was directed towards the administrative tasks in which the technology offers outstanding efficiency and flexibility in word processing and in spreadsheets and databases. Equally in extensive use was the instant communication capability that the technology offers. The power of reaching many destinations instantly and efficiently presents itself as a cost-effective tool. These two areas of administration and communication in addition to the core of the business area, construction drawings' production, all form the three major uses for computers in the architectural practices around the WCP.

The area of projects' presentations is a particular area of interest for architects. There was an overall satisfaction with the digital effects and the computer-generated presentations. In order to ensure that designs meet the approval of the respective client, serious efforts are usually exerted in the presentation of the project. Larger-sized offices are often users of the technology in client presentations as they are convinced it offers a better understanding of the projects. As generally known, clients are able to “see” the finished product instead of “imagine” it. Computer graphics, in the authors' opinion, is a sophisticated application. With the “walk-through” feature and the colourful display on a computer or TV screen and the instant manipulation of shapes and forms, it brings to life aspects of the project that no two-dimensional drawings could fulfill. Its modeling capabilities offer much more to the presentation than a man-made model. Lighting effects are simple to achieve and viewing the building at different times of the day and year is easy to generate.

When the hiring trends were investigated, the expected need for expertise in the area of computers was again displayed. It is clear that there is a requirement for good operating knowledge in the area of computers from job applicants. Job opportunities lie in the knowledge of several architectural applications on top of the technical knowledge. The versatility of the graduate, nowadays, includes computer as much as architecture skills, which puts added pressure on the older graduates to upgrade their skills. On a parallel thought, as more offices are being connected via a networked environment, there is obviously a greater need for compatibility between the employees’ computer skills. Using the (LAN) network allows staff to share documents and exchange drawings electronically; hence, standardisation of these exchanges is of foremost importance.

As in other parts of the world, there is a predominant software that is preferred locally and that is AutoCAD. This program is also being taught in several educational institutions as part of their graphics presentations' curriculum. There is a common set of features and tools for design and construction drawing production that the software offers which encourages its adoption in that manner.

In spite of many heads of firms accepting the technology and aware of its potential for their purposes, the numbers of those who actually use it themselves for architectural production are staggeringly low. The majority, though, requires specialised knowledge from their job applicants; i.e.: CAD fluency. They are principals of mostly networked offices as well and are mostly convinced with the computers' capabilities in client presentations. It is an interesting phenomenon that non-users of technology are the top managers who are providing the support necessary for their offices to move forward in that direction.

In line with common observations of practices around the world, the Cape Town region is similarly putting emphasis on the use of IT and the architectural profession relies heavily on its application in all aspects of

practice. This questionnaire presents a good starting initiative and will need to extend over other regions in South Africa. Knowing more about the current status of the advent of IT on the scene will certainly provoke constructive competition among practitioners. It will also confirm hiring requirements for new graduates, it will guide educational curricula and will help all related disciplines to co-ordinate and build a common IT platform for their effective dialogue.

5. Acknowledgements

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