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Information and communications technology, virtual offices and telework

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Contents

1 Introduction

The managing editor of Career Success, a national subject journal for administrators, commissioned this applied research project with a special request to investigate the concept *virtual office* (VO). During the investigation, a completely new concept of work emerged that is closely related to the VO, namely *telework*. This new administrative scenario emerged in enterprises owing to the influence of technological developments that drastically changed the traditional office environment. The interrelation of the two concepts led to the investigation of both. In this article the focus is on a demarcated selection of findings, namely basic information on the VO and the facilitative role of information and communications technology (ICT) with special reference to a remote or flexible workforce and relevant training needs.

The following research questions were identified:

- Is the business sector in the South Africa aware of the nature and implications of telework as proven in other parts of the world, and is it receptive to the VO concept?
- Will it be possible to implement the VO in South Africa as extensively and with the

same success rate as in the rest of the developed world?
- Will South African managers be able to manage diversity, as well as virtual reality, where ICT is concerned?

2 Definitions

The VO is an ICT-supported worksite situated outside the traditional office where people (both male and female) from all professions are involved with work associated with a traditional office. The term 'virtual' refers to the use of technology (Bredin 1996:3) and involves a computerized interconnection where networks have access to the same information space (Barnatt 1995:83). It also describes an entity that exists in fact, but not in name, and where space and geographic locations are no longer important, as evidenced by global collaborations (Roy 1997:1).

This new scenario in administration has initially been referred to as the VO or telecommuting. Jack Niles, a rocket scientist working on Nasa satellite communications projects, invented the term 'telecommuting' in 1974 while he was stuck in traffic on his way to his office (Langhoff 1996:17,18). Academics in the USA (Garud 1997) have concluded that both these terms are misleading and non-descriptive and *telework* or *teleworkers* were found to be most adequate. 'Tele' means distance, and combined with 'work' it implies work that is executed from a distance or away from the traditional office. Companies that employ teleworkers are referred to as *virtual organizations*. Universities and colleges providing on-line academic programmes are referred to as *virtual universities* and *colleges*. A teleworker is defined as a person who works at home or at an alternative workplace apart from the corporate office during business hours, one or more days per week or month, while still maintaining the status of full-time corporate employee (Miller 1997:14).

3 Problem statement

This investigation aimed to identify the causes of the workplace transformation, as well as how it was or could be practically applied in small, medium and micro enterprises (SMMEs) in South Africa.

The subproblems were the following:

- Specifying and defining VO-related terminologies
- Determining the socio-economic benefits generated by VOs and telework
- Determining the socio-economic disadvantages generated by VOs and telework
- Investigating the role of ICT as a facilitator to telework and the VO concept
- Identifying the role of human resources in flexible work options
- Investigating VO ergonomics
- Exploring the role of training institutions that use a remote workforce for both employers and employees; as well as the need to adjust syllabi at higher education institutions (HEIs)
- Investigating a paradigm shift in management styles as a result of a remote workforce
- Investigating the infrastructure necessary to support flexible work options
- Determining the necessary selection criteria and implementation process to launch and maintain a telework programme in a company
- Investigating the financial and legal aspects, as well as company policies relevant to adopting a flexible work options programme.

Figure 1 indicates the interrelated areas of investigation (shaded in grey) that have been included in this research project.

Figure 1 Holistic model of research project in relation to sub-problems

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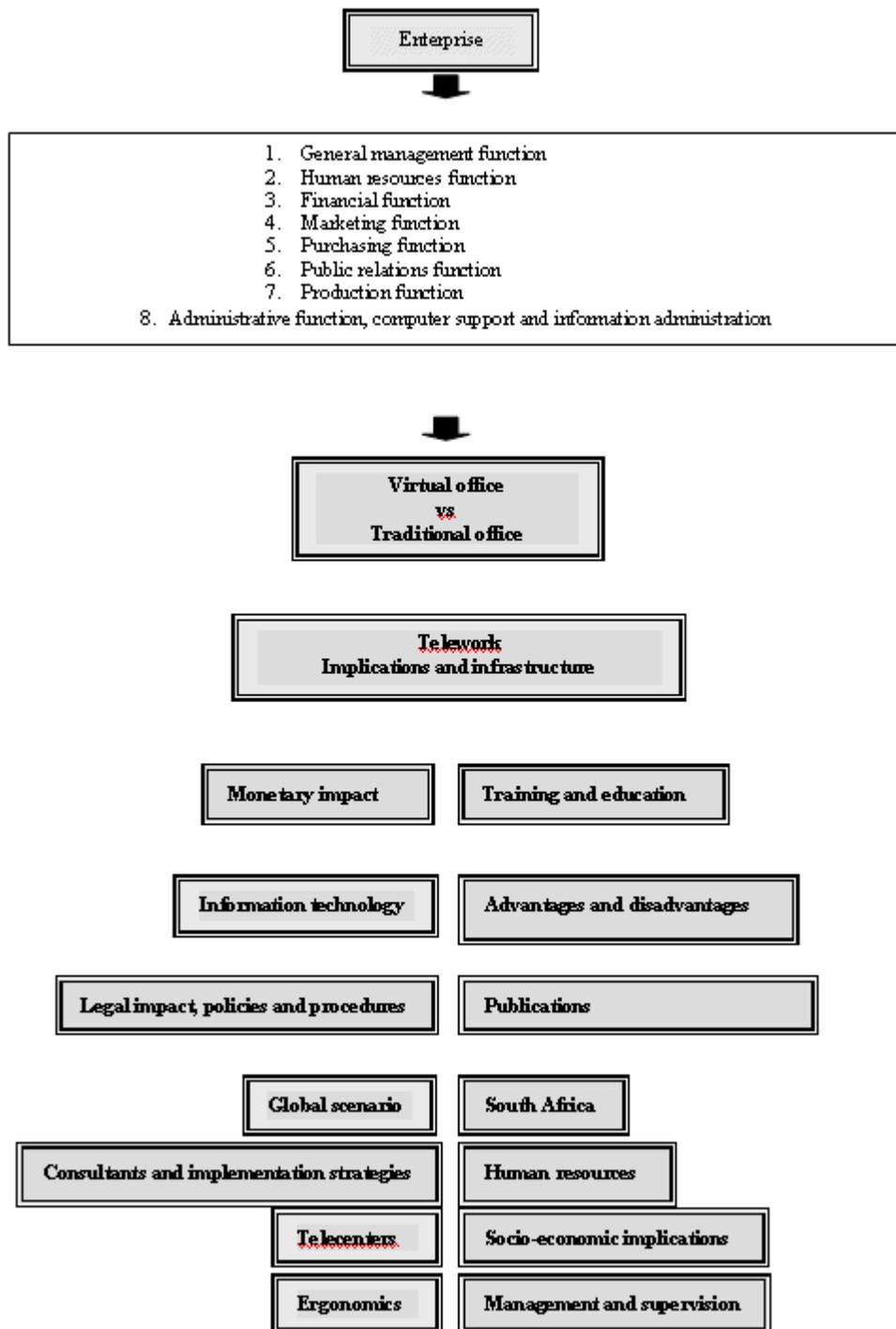
4 Research methodology and data analysis

4.1 Pilot study

In 1997, a pilot study in the USA found that telework has been practised with phenomenal

success for more than a decade. In South Africa, no research has been conducted to establish the extent to which telework is practised, although Saffer (1999:44) states that during 1995 South Africa had at least 250000 self-employed home-based workers, with an annual growth rate of 5%. However, home-based self-employment is a completely different concept from telework. As part of the pilot study, the author conducted telephone interviews in South Africa with public relations officers and human resources managers of 14 large enterprises. Only two organizations confirmed that telework was successfully practised. Responses from the remaining 12 organizations ranged from shirking a perceived thorny issue, to ignorance and disinterest to acquire more information.

4.2 Primary sources

The following information sources were used:

a) Relevant international textbooks, as there are no South African textbooks available on the subject
b) International articles: newsletters, newspapers, journals, library databases, Internet and e-mail
c) International telework conference in Washington DC, 1998
d) USA case studies, personal and telephone interviews in the USA.

4.3 Secondary statistics

Relevant and current research results from secondary sources in the USA were extremely reliable and informative. However, South African companies were not willing to support a similar investigation.

The use of questionnaires as measuring instruments in companies abroad posed insurmountable logistical problems. Therefore, statistics were drawn from three secondary and a variety of other international sources.

A benchmark study was conducted at New York University Stern School of Business, where 10 large virtual organizations were screened (Dunbar and Garud 1997). Representatives from these companies described the steps that had been taken to implement telework in the USA, the technical resources deployed and the various results achieved in the process.

The *American Telephone and Telegraph company (AT&T)* conducted telephone interviews with 120000 households in the USA to obtain the results of behavioural attitudes based on national family opinion (NFO). The survey included respondents running a full-time or part-time business from home for a minimum of eight hours per week. Only respondents residing in the top 20 areas of dominant influence (ADIs) were screened. Five primary ADIs were identified: New York City, Los Angeles, Chicago, Philadelphia and Boston. The rest of the sample comprised teleworkers residing in the 15 remaining ADIs. Computer tabulations reflected the correct population representation of each ADI, which were statistically significant at the 95% level of confidence (Merchant 1995). Specific areas of investigation included work styles, habits, ergonomics, work arrangements, infrastructure, lifestyle, attitudes and reactions. Furthermore, 1005 interviews were conducted and tabulated of which a 100 were from each of the top ADIs.

According to Sears (1998, personal communication – susansears@att.com), AT&T is the world's primary voice and data communications company, serving more than 90 million customers. With an annual revenue of more than $51 billion and approximately 126000 employees, the company serves more than 280 countries and territories around the world. AT&T adopted a corporate telework policy in 1992 and today 55% of its workforce (36000)

is teleworkers.

During 1997, AT&T undertook another survey to obtain basic, updated information on telework. A random telephone survey of 11997 US households was conducted. Five hundred teleworkers were screened and in-depth interviews were conducted with another 400. The foci of this survey included life style impacts, career effects, isolation, trust, productivity and commitment to telework.

4.4 South African questionnaires

South African respondent groups included administrative personnel, employers in SMMEs countrywide and lecturers in commercial or business administration at technikons. Random sampling was used to select the groups and the quantitative method of data collection and processing was used. The author undertook an explorative and *ex post facto* investigation which was controlled through theoretical and empirical research. This included case studies that incorporated observation and interviews. Because of the lack of information in South Africa, the theoretical investigation used mainly American secondary statistics. However, the empirical investigation was conducted in South Africa. Questionnaires were used as measuring instruments to focus on behavioural and affective attitudes towards the VO and telework. Results were presented by means of descriptive statistics.

Questionnaires aimed to obtain information on geographic residence and demographics, awareness of different flexible work options, viability of flexible working in South Africa, perceived obstacles that could counteract progress and ICT training needs related to flexible working.

Table 1 reflects the number of questionnaires sent out and the feedback percentages. The reliability percentages indicate a highly significant feedback from lecturers at technikons and a significant feedback from administrative staff. The 5% of managers who responded represents 70 companies in South Africa and is also significant.

Table 1 South African sample groups and empirical response rates

	Respondent groups	Number of questionnaires sent out	Number of respondents	Reliability percentage
A	Traditional administrative staff	1400	164	11.7%
B	Managers of companies in South Africa	1400	70	5%
C	Lecturers at 15 technikons	15	9	60%

Countries have different economies and, therefore, different views on the definitions of SMMEs. According to quantitative measures in the USA, Japan and Europe, a small enterprise comprises fewer than 200 employees and a medium-sized enterprize between 200 and 500 employees. In South Africa, a micro enterprise comprises fewer than 5–10 employees, while a small enterprise has fewer than 50–100 employees. A medium-sized enterprise has between 100 and 200 employees (Badenhorst, Cronjé, Du Toit, Gerber, Krüger, Marais, Strydom, Van der Walt and Van Reenen 1997:451), while large enterprises

have more than 200 employees.

Qualitative measurement occurs when 'the size of the business is determined by market share, the number of employees and capital assets' (Badenhorst *et al.* 1997:451). Badenhorst *et al.* defines a small business as an enterprise that meets at least one qualitative criterion and two quantitative criteria. The qualitative criterion is that the business must be privately and independently owned, managed and controlled, but may have more than one branch or unit. The two quantitative criteria may include any of the following:

- An annual turnover of less than R2,5 million (1992 prices)
- Total asset value of less than R2 million (property and buildings excluded)
- Fewer than 50 full-time employees.

Figure 2 represents the 70 companies that were screened. According to South African standards, 1,4% of them were micro enterprises; 28,6% were small enterprises; 8,6% were medium enterprises and 60% were large enterprises. Some companies (1,4 %) did not indicate company demographics.

Figure 2 Size of South African companies screened
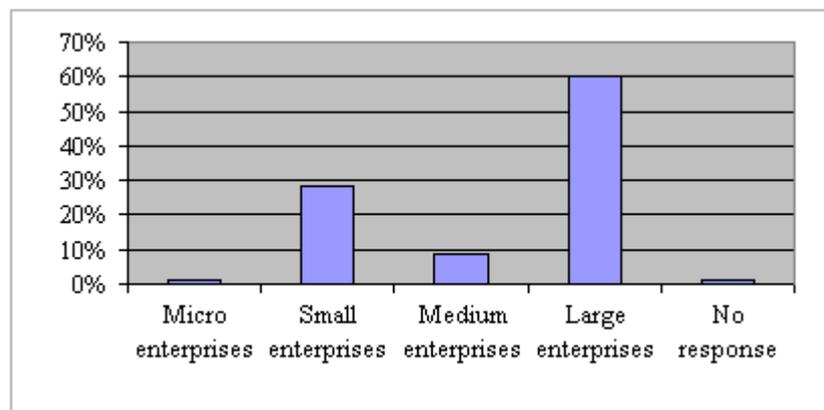
The demographic demarcation of companies was regionally representative and the opinions of respondent managers covered SMMEs inclusively. Micro and small enterprises were not as significantly represented as medium and large enterprises.

Data collection from the three groups of respondents covered the entire geographic area of South Africa. According to Figure 3, 51% of the administators were from Gauteng, 35% from the Cape Province and 14% from Mpumalanga, the North West (N.W.) Province, the Northern (N.) Province and Lesotho (one of the South African development countries or so-called SADCs). The demarcation of this sample group reflects a significant national geographic representation with the most significantly represented based in the most densely populated regions of Gauteng and the Cape Province.

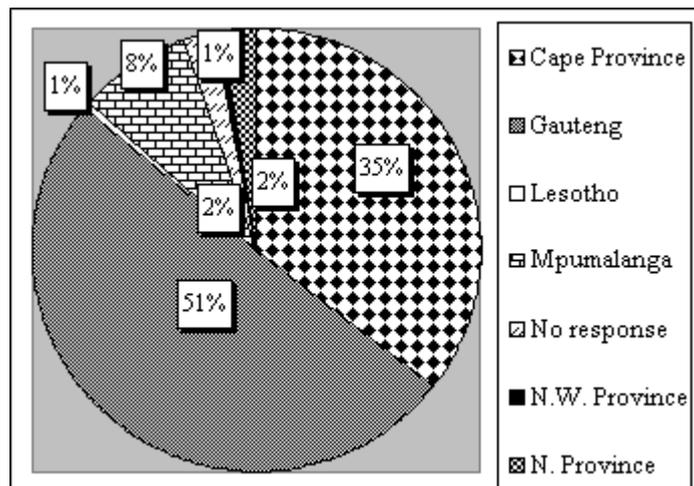**Figure 3 Geographic demarcation of administrative staff**

Figure 4 reflects the geographic demarcation of employers. Employers represented all regions in South Africa as well as one SADC.

A significant 74% represented Gauteng, while 26% represented the Cape Province, Lesotho, Mpumalanga, North West and Northern Provinces inclusively.

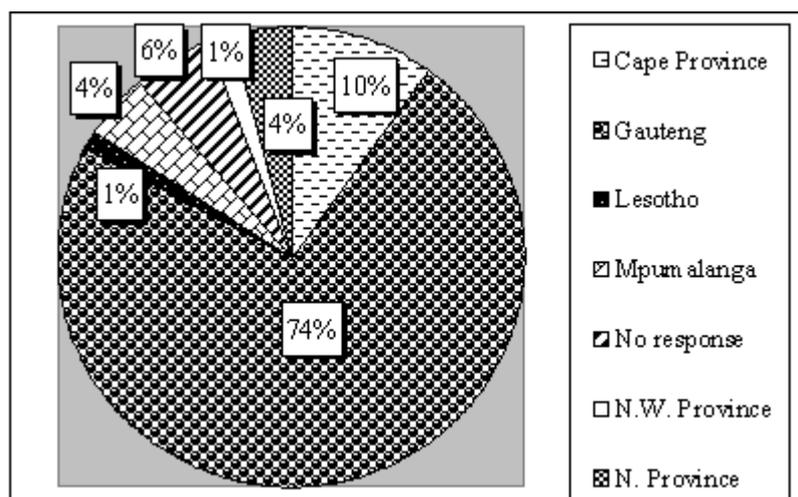**Figure 4 Geographic demarcation of employers**

Table 2 indicates the geographic demarcation of lecturers. The demarcation covered all regions in South Africa, and Wits Technikon (Gauteng), Port Elizabeth Technikon (Eastern Cape) and Pretoria Technikon (Northern Gauteng) were presented most significantly. The number of respondents from this group totalled 46. It was not possible to calculate the actual feedback percentage, because the number of possible respondents was unknown. Contact persons at the various technikons made and distributed photocopies of questionnaires. Nine out of 15 technikons (60%) responded, while 4.3% did not specify their affiliations.

Table 2 Geographic demarcation of lecturers at technikons

Variable	Frequency	%	Valid %	Cumulative %
No response	2	4.3	4.3	4.3
Belville	4	8.7	8.7	13
Technikon				

Free State	6	13	13	26.1
Cape Town	6	13	13	39.1
Technikon ML Sultan	10	21.7	21.7	60.9
Border Technikon	4	8.7	8.7	69.6
Wits Technikon	6	13	13	82.6
Port Elizabeth	1	2.2	2.2	84.8
Pretoria	1	2.2	2.2	87
Windhoek	6	13	13	100
Total	46	100	100	100

5 Theoretical framework and historical background

For the past nine decades, all stakeholders involved in administrative activities in trade and industry have worked according to a set routine. These activities were geographically located in the traditional office. Here, administrative staff normally had their own physical space, furniture and equipment, as provided by the employer.

According to recommendations to a parliamentary committee by Leuvenink (2002:4) of Business South Africa (BSA), South Africa needs a massive increase in opportunities as well as skills. Kritzinger (2002:4) of Oracle SA supports this view and notes that companies are moving away from an internal administrative corporate environment to one where employees can complete tasks themselves. Tasks are facilitated by ICT solutions and there is a focus on business intelligence throughout the entire organization. Companies are also becoming increasingly aware of a need for consolidation and it is of critical importance for ICT solutions to provide in this need.

5.1 Administrative function in relation to seven other business functions

There are eight business functions that facilitate the successful functioning of an enterprise and maximize the productivity of its human resources (refer to Figure 1). These functions, which are all interrelated and intrinsically bound, are (in no particular order) the:

- Management function;
- human resources function;
- production or manufacturing function;
- administrative, information or computer support function;
- public relations function;
- financial function;
- purchasing function; and
- marketing function.

Although the importance of all eight functions should be recognized on an equal basis, it can vary according to the *size* and *type* of the enterprise involved. The importance of the administrative, information or computer support function is as vital to the success of any enterprize as that of management or any other function. Only when the interdependence of the various functions and departments is recognized and used to its maximum, is synergistic functioning of an organization possible. Quite often, the administrative function in enterprises is not fully appreciated. Badenhorst *et al.* (1997:330) provide evidence of this in a process flow diagram of the steps in the purchasing cycle. The diagram outlines the groups and departments involved in purchasing, without giving an indication of the involvement of the administrative, information or computer support function, although, the documents generated in the latter department are mentioned.

The administrative, information or computer support function is the only business function that forms the *quintessential basis for information* on which all the other functions rest. *All company decisions are fundamentally based on the availability of information. All human resources in any enterprise need ready access to information.* Marx, Rademeyer and Reynders (1992:12,13) state that this function is the observation mechanism and binding factor in the entire organization. In addition, it

- is an aid in general management;
- renders the capacities for production resources;
- relates to the documentation of purchasing and marketing;
- renders information concerned with sales and costs;
- relates to job division and job preparation; and
- facilitates the drawing up of budgets and budget control.

Badenhorst *et al.* (1997:257) support this by stating that 'it is virtually inconceivable for an enterprise to function without a department supplying computer support'.

5.2 Domicile of the traditional administrative function

The traditional office or administrative environment facilitated the 'continued observance of customs and opinions from generation to generation' (Alswang and Van Rensburg 1986:933). Samuel (1994:46) quotes Houston (1982) when she describes the traditional office as 'so perfectly designed – so elegantly technological', that she could not imagine a planetary person working comfortably and productively there. She subsequently speculates whether this accurately depicted technology was an extension of a person or an employer, or whether it was just another example of people being the extension of the technology they have created. Kallaus and Keeling (1991:3) mention that traditionally 'the administrative office management functions were limited to basic clerical services and to office personnel'. However, ICT has changed this situation. Today any employee who occupies an office, irrespective of his/her hierarchical position in the company, and who collects and processes data through the use of ICT is involved in the administrative, information or computer support function.

6 Findings

6.1 Contemporary administrative, information or computer support environment

According to Kallaus and Keeling (1991:3), the quantum leap in the office environment is based on an 'increase in government regulations, a larger and more diverse work force, a growing economy and the development of new information technologies, such as the

computer'. Therefore, the 'one-department office concept gradually gave way to a broader, company-wide information management concept' where the role of the administrative staff expands to all the vital areas of work.

A study conducted in 1997 (Wells 1997:1) indicated that 42% of an interviewed 305 North American companies of various sizes had telework arrangements. This figure showed an increase of 33% from 1995. Miller (1998) states that telework facilitates new work style relationships between management and employees and that businesses rely heavily on competent teleworkers to meet the productivity requirements. He indicates that approximately half of the current USA teleworkers (±3,2 million) are employed by small businesses (fewer than 100 employees), while about 1,8 million (24%) is estimated to work for large companies (1000 or more employees).

6.2 Flexible labour force

Russell (1996:iii) defines flexiplace as 'any location other than an employee's normal duty station'. The job may be performed in a car, in an aeroplane, at a client's site or any place where circumstances are appropriate. It may consist of a room; part of a room, a hallway, a modified garage or any other space the employee prefers and where ICT combines personal style. The most important factor is the location of the work, not the work itself.

According to this research, teleworkers operated from an office or from their own homes. They commuted only for meetings and connected only through technology. Flexible working implied bringing the work to the worker – not the worker to work. Workers were in a corporate office, but worked at home part of the week or spent most of their time with clients and rarely worked in corporate offices. This work arrangement offered flexibility in determining when, where and how a job was performed. Traditional working hours did not apply, as long as a standard number of work hours were completed in a specific (core) period during the day. Employees were normally required to be available during the core time, which was usually during the middle of the day.

During this research, it was found that telework existed in various countries:

- America: 1,1 million teleworkers with an annual growth rate of 15% (Goldman 1997:1 and Miller 1997:15)
- Japan: 680000 teleworkers – no estimated growth rate figures were available (Spinks 1997:9)
- Canada: 650000 teleworkers – this figure was expected to double by the year 2001 (Fortier 1997:13)
- Europe (United Kingdom, Germany, France, Italy and Spain): 1,25 million teleworkers – over 40% were interested in taking up telework at some stage in the near future (Empirica 1995).

No surveys had been conducted in South Africa to establish the extent to which telework was practised, although Saffer (1999:44) states that, during 1995, South Africa had at least 250000 self-employed home-based workers, with an annual growth rate of 5%.

6.3 Why telework was invented

Langhoff (1996:20) gives the following reasons why private and public organizations are increasingly adopting telework as a business strategy:

- Global competition and a need for 24-hour customer support, thereby improving customer service\

- ICT innovations and employees' desire for increased flexibility
- The need to reduce overhead expenses
- The ability to attract a wider range of workers, including physically disabled persons, parents with young children, people with elderly care responsibilities and members of dual-career families
- Less traffic on the roads, less air pollution and lower fuel consumption
- Teleworkers work longer hours and more days than the average employee – there is a 30% increase in productivity
- Teleworkers continue to work despite minor ailments that might have kept them out of office – there is an 80% reduction in absenteeism.

It is estimated that 'one employee who works at home two days a week, saves a company $12000 a year. These savings result from increased productivity, reduced office space and lower turnover' (Langhoff 1996:20). The costs of relocation, estimated at about $80000 per employee, are also avoided.

6.4 Technology as facilitator to telework

ICT is closely linked to information. It refers to 'new machinery or products, new processes, methods and even approaches to management that bring about change in the environment' (Badenhorst *et al.* 1997:70). ICT facilitates the reception of data that subsequently provide the necessary information. Table 3 lists technology that is used for the execution of administrative duties.

Table 3 Information communication technology as listed by Valenté *et al.* (1995:23)

The personal computer (PC)	Electronic whiteboards
E-mail	Portable translators
Cellular telephony	Scanning devices or voice recognition as
Voicemail (mailing per satellite)	opposed to keyboards
Laptop computers and/or notebook computers	Company, national and global networks
Electronic databases	The Internet
Video phones	Videoconferencing
Remote microphones	Standard and customized software packages
Electronic dictionaries	Electronic diaries
Teleconferencing	Wireless applications (WAP)
	Facsimile modems or machines.

7 Contemporary information and communication technology

Software companies and suppliers of hardware and office ergonomics quickly recognized the promising market created by telework. Programmers, interior decorators and technical experts produced innovative software, hardware, office décor and furnishings to complement and support the execution of telework. Gates (1996:250) is of the opinion that countries 'that move boldly and in concert with each other will enjoy economic rewards'.

According to Barnatt (1995:78), almost 66% of small-office home-offices (SOHOs) are equipped with a computer, printer and a cordless telephone, while 40% have facsimile machines and modems. Approximately 25% have copy machines, cellular telephones and voicemail facilities. About 30% of SOHO users are subscribers to on-line network services.

An interesting fact is that a significant 20% of respondents have employees working for them in their SOHO, while 38% has other family members actively involved in the business.

Electronic links bring people together in virtual networks when they need to interact. Characteristically, a virtual organization relies on cyberspace, which is activated through computerization and telecommunications, and exclusive existance across conventional organizational structures (Barnatt 1995:83,85).

7.1 Communication

O'Connell (1996:52) states that communication is the binding factor that integrates VOs. Powerful networks and sophisticated telecommunication provide the technology that every employee should have easy access to – whether at the SOHO, the corporate office, a telecenter or any other place where the job has to be performed. IBM estimates that it may cost approximately $5000 more to equip a mobile worker than a corporate employee, owing to the need for connectivity that should include at least two telephone lines and a cellular telephone.

O'Connell (1996:53,54) states: 'There is a loss of spontaneity of communication which must be replaced with structure, therefore regular scheduled telecommunications meetings (telephone, e-mail, facsimile, voicemail, etc.) or effective audio meetings are vital.' Face-to-face scheduled corporate meetings are important tools to maintain corporate and social relationships and should not be neglected. Berger (1998:20) describes the biggest advantage of electronic communications as being able to connect from South Africa to an e-mail address in New York, for example, and to receive four responses in less than twelve minutes.

8 Software

Customized software packages facilitate global telework interconnection and the following examples must be mentioned:

8.1 Voicemail

This tool is necessary for every teleworker who is often unable to answer the telephone immediately. A software package (SoloPoint) offers a solution to the problem of having to decide whether or not a call should be answered immediately. It is called Voicemail Enhancer and facilitates the use of a three-way calling service from the local telephone company. When there is no answer to a call, the voicemail facility is activated, as well as a speaker in the SoloPoint device. The recipient can listen to the message and decide whether to answer or let the voicemail device continue to record the message. The caller is unable to detect this intervention (Langhoff 1998:36).

8.2 Customized telework software

Groupware enables teleworkers to download files from the corporate office to the VO and vice versa. Features of this software package (pcAnywhere) include sending and receiving facsimiles and telephone calls, synchronizing files with the corporate office PC and accessing corporate files and computer applications from the home PC. It also allows the teleworker to monitor work, create daily status reports for the manager and keep record of incoming and outgoing telephone calls and facsimiles (Symantec 1998).

8.3 Electronic bulletin board system (BBS)

BBSs offer another way of managing teleworkers. Unibase offers a facility that sells data-entry services to organizations that collect information on hand-written forms, but that store the data on computers. Completed forms are scanned and forwarded to Unibase where software programs organize the documents into bundles. The bundles are then distributed through the company's BBSs to teleworkers – many of whom work at night. Teleworkers download the files and convert the data to a typed format, which is then ready for the customer's computer databases. When this routine is completed, the teleworkers log back into the BBS and return the files. The BBS allows managers to monitor the progress of assignments (Mangelsdorf 1995:107). Unibase managers (Utah, USA) use BBSs to assign projects to their 2000 teleworkers and to monitor their progress. The $30 million company uses four BBSs to manage their daily internal operations.

8.4 Dictation, voice or speech recognition and translation

Speech recognition software interpretates words by comparing them to both a speech file and a dictionary of words to make a correct match. This facility can make the keyboard optional and maybe even obsolete. This may benefit millions of PC users who lack proper keyboard skills. Speaker-independent speech systems, however, require a large database of speech files to determine words more accurately. Continuous speech recognition could increase productivity by allowing the speaker to dictate and speak commands in a natural voice that the computer will 'understand'. The vocabulary needed for general use is around 200000 words and the processing power will have to increase significantly. One example of such a user-friendly dictation and voice control program is the Dragon System's DragonDictate for Microsoft Windows 95 to 98, of which version 2.52 has 30000 words in its vocabulary. Speech Magic, from Philips, contains 64000 words stored in random access memory (RAM) with an additional 44000 words stored on the hard disk drive (Freed 1997:76,79).

IBM's ViaVoice package contains a vocabulary of 50000 words. Greyling (1999:5) explains that as long as one's speech is clear, the speaker can dictate at a normal talking speed. Also, the number of misinterpreted words will be minimal. The user configures the software according to software commands, which offer certain commonly known navigation commands such as 'cut and paste' and different fonts. It also allows the dictator to edit text while dictating to keep track of text as it appears on the computer monitor (Langhoff 1999:20).

8.5 Networks

Computer networks use telephone companies' telephone lines and switches. These networks, known as Integrated Systems Digital Networks (ISDN), transfer data five to 10 times faster than traditional telephone lines. ISDNs are integrated with telecoms and various other information technologies and represent the teleworker's lifeline to the corporate office. Various network systems are available:

Local area network (LAN)
An organization's LAN allows users to access its e-mail, facsimiles and voicemail through a remote log-in support system of the corporate network. Data can be transmitted between computers, workstations and other devices that are located within a compact area such as a corporate office (Sanders 1988:319). Workers require LAN connections to their office PCs when they work at the corporate office. They must also be able to access information and messages in a centralized inbox when they log into the network. According to Miller (1997:16), managers in the USA increasingly use LANs to make telework easier. Instead of asking for equipment to support telework, managers install networks for business purposes within the office. Once they are in place, telework is just a natural extension.

Wide area network (WAN)
The WAN connects nodes in widely dispersed geographic areas such as cities, states and countries. LANs are often integrated into WANs to allow remote employees access through a second telephone line or a high-speed bridged WAN connection, which supports sophisticated technologies such as interactive desktop videoconferencing. A Minnesota brewing company reported that since installing its LAN in 1992, it has become the fastest growing company in its segment. Sales in 1994 reached $33 million, tripling the company's revenue of the previous year. The network enabled it to handle its orders competently, 'turning its finished-goods inventory 20-plus times per year' (Goldhirsh Group Incorporated:1995). It was estimated that the company has spent approximately $400000 on computer resources since 1992, and the network has enabled it to limit its number of employees.

Metropolitan area network (MAN)
Derfler (1997:82) predicts that in five to 10 years' time, service companies might be able to offer MAN services to compete with Internet service providers.

Internet and intranet
The Internet is an extension of a 1960s USA government project that was used solely for computer science and engineering projects. It was used as a vital communications link between far-flung project collaborators and was virtually unknown to outsiders. In 1989, the USA government decided to stop funding the project and this led to its commercial successor, the Internet.

The Internet provides visual and easily navigated publishing. Integrated with e-mail, it can be used to build a very powerful information system. Miller (1997:15) states that the Internet is the single most important development in the world of computing since the PC was introduced in 1981. Thirty-five per cent of teleworkers use the Internet, including 31% who use it regularly at home.

In 1999, a study was conducted to investigate why enterprises in South Africa still doubted Internet possibilities (Du Plooy 1999:8). The study found organizations to be uninformed and afraid and therefore still clinging to the *status quo* concerning ICT. The study also found that in America the percentage turnover of the Internet has bypassed television as an advertising medium by far. During 1997, the Internet lowered the American inflation rate with 2%, because of monetary savings due to timely purchasing.

Organizations acquire Web sites because they perceive them as a business norm. It is clear that the South African Web domain merely consists of an 'Internet presence' where marketing and communication possibilities are not nearly used to their full potential. Du Plooy (1999:8) stresses that Web site design involves more than just technical and graphical capabilities and that there is a big difference between a 'Web site and an effective Web site'. Web sites must be updated continually to be competitive.

In addition to the Internet, the intranet is an important communication channel between employees and an organization's database, enabling employees to be efficient in finding required information. The primary features offered by an intranet include corporate document management, e-mail and information publishing. Isbell (1999:5) reports that the intranet improves productivity, collaboration and the uninterrupted flow of information between departments in an organization. It is fast becoming the most important method of knowledge distribution across companies and the cost of an intranet investment can be recouped within the first couple of months.

Electronic mail (e-mail)

This facility does not only reduce the use of paper, but also increases the speed and immediacy of messages. This concept alters the way in which teams of employees operate together. It also enables colleagues to stay globally connected (Barnatt 1995:83).

8.6 Videoconferencing

This technology allows meetings to take place in cyberspace and participants around the world may be included on-line. In countries where telework is in full progress, support systems supply advice and guidelines on the arrangement and presentation of a videoconference. ETA Audiovisual (1999) states the following:

'Videoconferencing enhances understanding and streamlines the decision making process by offering advantages such as significant time saving, reduction in travel expenses, distance learning and training opportunities, minimal disruption to schedules and timetables, an aid to timely and critical decisions, provision of a facility to share data or graphical information and an easy and convenient channel through which clients can be contacted.'

8.7 Teleconferencing

Teleconferencing is one of the mainstays of teleworking. It can be used to launch products, to assist with distance training or media briefings, for problem-solving meetings, information-sharing events, team social activities and status sessions. A teleconference is easy to arrange; it requires no special equipment accept access to a telephone connection. It is very cost effective compared to the cost of business travel. Langhoff (1999:10,11) states that according to a '1998 survey of business travel by Runzheimer International, a domestic three-day business trip averages $1037, and the cost of an average seven-day international trip is $3542'. However, 12 participants located around the country can meet for an hour for approximately $200 in a teleconference without staying overnight. The same meeting will cost about $6000 if attended face-to-face.

8.8 Commuter telephony integration

Howard (1997:41) predicts that in 15 years' time all telephones will be cordless. Computer supported telephony applications (CSTA), telephone switches and computer telephony integration (CTI) allow an organization to completely integrate its telephone system with the corporate computer and network systems. The number of incoming calls can be detected and verified in the corporate database. The system can then forward the call to the appropriate employee, even if that employee is a teleworker. When the employee picks up the telephone, a soft copy (computer monitor version) of a client's record is displayed. This contributes to more effective time management and organizational efficiency. This facility mimimizes data entry errors because it is unnecessary to enter the data into the system a second time. Outgoing calls can also be controlled and audited with call accounting software that provides the company with detailed reports of calls made, as well as the account holders to whom calls should be charged to. This will obviously reduce the abuse of telephone facilities so often reported by companies in general (Harbison and Dunham 1996:88).

9 Hardware

Challenging new technologies promise to change the administrative scenario progressively. Drastic increases in bandwidth capacity are expected within the next 15 years. Connectivity to the corporate office will become a richer experience with new software applications, fast action speeds and compatible hardware to complement the interrelated information system.

9.1 Computers, central processing units (CPUs), monitors and keyboards

This research found that teleworkers normally chose to use a laptop or notebook computer as their primary computer. This appliance was connected to a large monitor or to the corporate network at the office. A laptop has a comprehensive unit consisting of a printer, facsimile facility and even a modem to connect to telephone lines. It is predicted that within the next 15 years, a typical laptop or notebook will be no smaller than an A4 paper size and will be much thinner and lighter than it is now.

9.2 Cellular telephony

Cellular telephones are part of the many technologies that are transforming telecoms. The satellite system has the most potential to recruit subscribers, and telephone manufacturers are currently working on a combination of satellite telephony and networks. According to Joubert (1997:22), 70% of all business calls on a fixed line are unsuccessful the first time around, usually because the person is at another location. However, with cellular telephony a person and not a location is contacted, increasing the success rate of a telephone call. Apart from its time-saving benefits and usefulness as a valuable emergency tool, cellular telephony also provides a mechanism for managers to keep track of teleworkers. A cellular telephone connection can also be converted into a mobile office via a connection to a laptop computer and a facsimile modem, allowing the sending and receiving of data. It also has little downtime and takes less time to fix than regular telephone lines.

10 Training

Figures 5 to 9 and Tables 4 to 14 illustrate the opinions of three South African respondent groups pertaining to the necessity and types of training needed to successfully implement flexible working modes.

Figure 5 indicates that a cumulative 84,2% of employees experienced a need for more training (*quite, very and most*).

Figure 5 Additional training needed as specified by employees
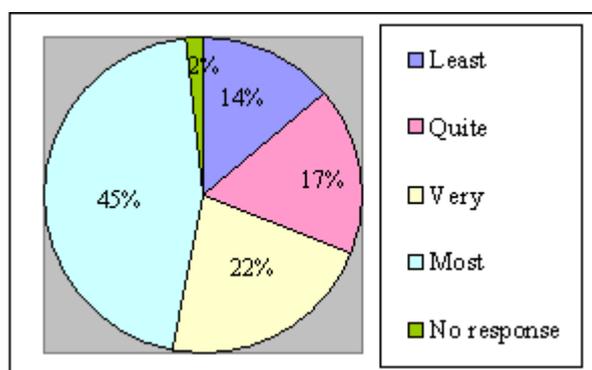

Table 4 illustrates that the area in which training was most needed was electronic communications (17,1%) and not computer training as is popularly believed. However, a significant 26,2% of employees believed that a need for combined training existed in computer, electronic communications and office management.

Table 4 Interactive table projecting types of training needed as specified by employees

Variable	Frequency	%	Valid %	Cumulative %
Computer training (C)	20	12.2	12.2	12.2
Electronic communications (E)	28	17.1	17.1	29.3
Office management (O)	19	11.6	11.6	40.9
C and E	7	4.3	4.3	45.2
C and O	20	12.2	12.2	57.4
E and O	18	10.9	10.9	68.3
C, E and O	43	26.2	26.2	94.5
No response	9	5.5	5.5	100
Total	164	100	100	

Figure 6 reflects that managers had almost the same significant need for more training (88,5%; *quite, very and most*) as employees (Figure 5).

Figure 6 Additional training needed as specified by employers and managers
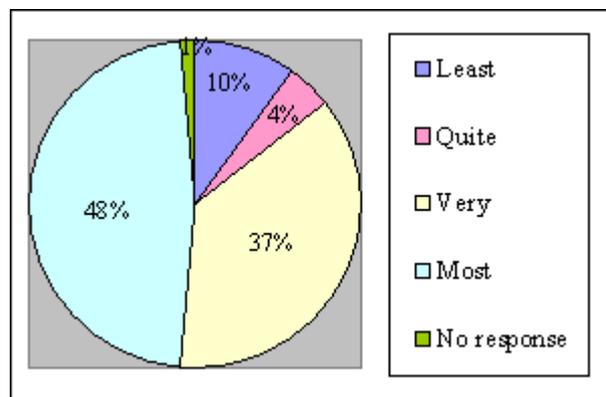

Table 5 indicates that the type of training needed most was electronic communications (11,4%), with a similar significant indication of 47,1% for combined training where all administrative proficiencies were included.

Table 5 Interactive table projecting types of training needed as specified by employers and managers

Variable	Frequency	%	Valid %	Cumulative %
Computer training (C)	3	4.3	4.3	4.3
Electronic communications (E)	8	11.4	11.4	15.7

Office management (O)	5	7.1	7.1	22.8
C and E	9	12.9	12.9	35.7
C and O	5	7.1	7.1	42.8
E and O	3	4.3	4.3	47.1
C, E and O	33	47.1	47.1	94.2
No response	4	5.7	5.7	100
Total	70	100	100	

Figure 7 shows a similar need for more training, namely a significant cumulative 87% (*quite, very and most*).

Figure 7 Additional training needed as specified by lecturers of commercial instructional offerings at technikons
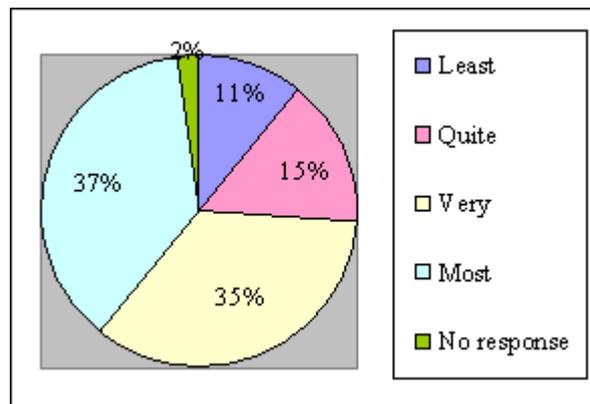

Figure 8 shows that the types of additional training required also have a similar pattern to that of the previous two respondent groups: 13% indicated electronic communications and a very significant cumulative of 65,2% indicated a combination of all three areas in administration.

Figure 8 Needs analysis for additional training as specified by lecturers
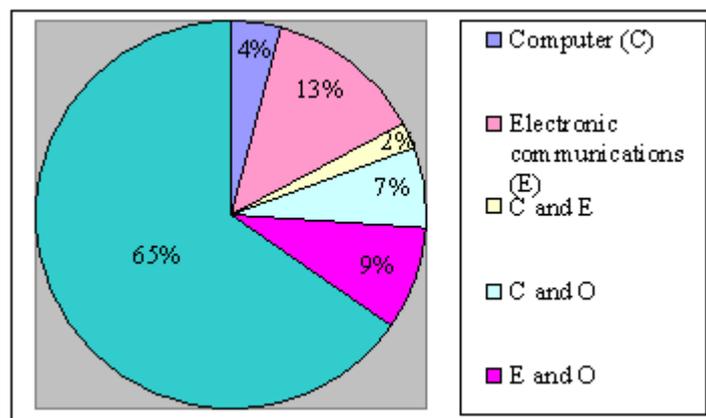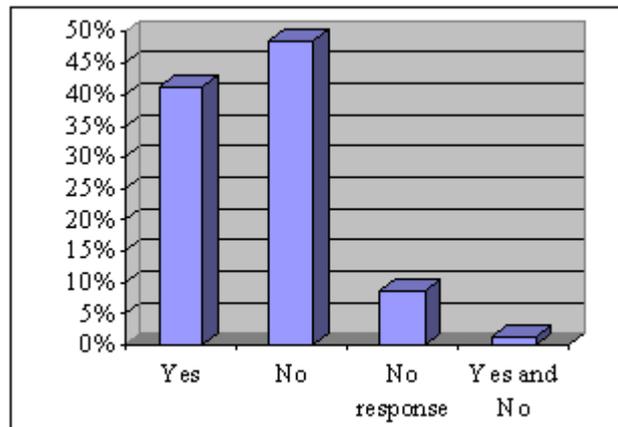

Figure 9 and Table 6 illustrate the opinions of managers and lecturers on the relevance of current training offered by technikons in the field of ICT.

Figure 9 Relevance of current training as specified by employers and managers

A very significant 48,6% of South African managers indicated that they were not satisfied with the relevance of ICT training offered at technikons (Table 6).

Table 6 Relevance of current training as specified by lecturers

Variable	Frequency	%	Valid %	Cumulative %
No response	2	4.3	4.3	4.3
Yes	18	39.1	39.1	43.5
No	26	56.6	56.6	100
Total	46	100	100	

An even more significant 56,6% of lecturers supported the opinion reflected by managers.

The author investigated whether lecturers believe that training could be offered on-line. Table 7 reflects a very significant negative attitude, as 58,7% said 'no'. Since there were no 'yes' or 'no' variables in the questionnaire, no significance can be attached to the related response as indicated in Table 7.

Table 7 Possibility of on-line versus on-site training as forseen by lecturers

Variable	Frequency	%	Valid %	Cumulative %
No response	1	2.2	2.2	2.2
Yes	16	34.8	34.8	43.5
No	27	58.7	58.7	95.7
Yes and No	2	4.3	4.3	100
Total	46	100	100	

Tables 8 to 14 list possible reasons for lecturers' aversion to on-line training.

Table 8 shows that a significant cumulative 65,2% (*quite, very and most*) of respondents believed that the absence of expertise makes on-line training impossible in South Africa.

Table 8 Absence of expertise as possible reason for aversion to on-line training

Absence of expertise	Frequency	%	Valid %	Cumulative %
Answered yes	14	30.4	30.4	30.4
Least	0	0	0	30.4
Quite	3	6.5	6.5	37
Very	11	23.9	23.9	60.9
Most	16	34.8	34.8	95.7
No response	2	4.3	4.3	100
Total	46	100	100	

Table 9 shows that a significant cumulative 60,9% (*quite, very and most*) of respondents blamed a lack of facilities for their aversion to on-line training.

Table 9 Absence of facilities as a possible reason for aversion to on-line training

Absence of facilities	Frequency	%	Valid %	Cumulative %
Answered yes	14	30.4	30.4	30.4
Least	0	0	0	30.4
Quite	9	19.6	19.6	50
Very	3	6.5	6.5	56.5
Most	16	34.8	34.8	91.3
No response	4	8.7	8.7	100
Total	46	100	100	

Table 10 indicates that a significant cumulative 56,5 % (*quite, very and most*) of respondents believed that resistance to change is a possible reason for aversion to on-line training.

Table 10 Resistance to change as a possible reason for aversion to on-line training

Resistance to change	Frequency	%	Valid %	Cumulative %
Answered yes	14	30.4	30.4	30.4
Least	3	6.5	6.5	37
Quite	6	13	13	50
Very	7	15.2	15.2	65.2
Most	13	28.3	28.3	93.5
No response	3	6.5	6.5	100

Total	46	100	100	

Table 11 shows that more than half of the respondents (54.4%, *quite, very and most*) indicated a fear of failure as a possible reason for resistance to on-line training.

Table 11 Fear of failure as a possible reason for aversion to on-line training

Fear of failure	*Frequency*	*%*	*Valid %*	*Cumulative %*
Answered yes	14	30.4	30.4	30.4
Least	3	6.5	6.5	37
Quite	5	10.9	10.9	47.8
Very	13	28.3	28.3	93.5
Most	7	15.2	15.2	91.3
No response	4	8.7	8.7	100
Total	46	100	100	

A highly significant cumulative of 66,5% (*quite, very and most*) of respondents experienced a fear of the unknown as a possible barrier to the success of on-line training.

Table 12 Fear of the unknown as a possible reason for aversion to on-line training

Fear of unknown	*Frequency*	*%*	*Valid %*	*Cumulative %*
Answered yes	14	30.4	30.4	30.4
Least	3	6.5	6.5	37
Quite	5	10.9	10.9	47.8
Very	14	30.4	30.4	78.3
Most	7	15.2	15.2	91.3
No response	3	6.5	6.5	100
Total	46	100	100	

Table 13 illustrates that 58,6% of respondents viewed fear of social isolation as a barrier to on-line training.

Table 13 Fear of social isolation as a possible reason for aversion to on-line training

Fear of social isolation	*Frequency*	*%*	*Valid %*	*Cumulative %*
Answered yes	14	30.4	30.4	30.4
Least	3	6.5	6.5	37
Quite	6	13	13	50

Very	7	15.2	15.2	65.2
Most	14	30.4	30.4	95.7
No response	2	4.3	4.3	100
Total	46	100	100	

A very significant cumulative 32,6% (*quite, very and most*) of respondents indicated that their aversion to on-line training did not stem from the fact that it is not required by commerce and industry.

Table 14 Business requirements as a possible reason for aversion to on-line training

Not required by business	*Frequency*	*%*	*Valid %*	*Cumulative %*
Answered yes	14	30.4	30.4	30.4
Least	9	19.6	19.6	50
Quite	7	15.2	15.2	65.2
Very	4	8.7	8.7	73.9
Most	4	8.7	8.7	82.6
No response	8	17.4	17.4	100
Total	46	100	100	

Tables 8 to 14 clearly indicate the seven variables that can be listed in order of importance as follows:

1. Not required by business
2. Fear of failure
3. Resistance to change
4. Fear of isolation
5. Absence of facilities
6. Absence of expertise
7. Fear of the unknown

Variable 1 emphasizes the needs of the business sector, while absence of facilities and expertise highlights the demand for physical equipment and training expertise. Variables 3 to 6 provide insight into the reasons why people may resist imminent ICT changes.

11 Results

A major banking group in South Africa, Absa, proved its innovative spirit by considering the implementation of a pilot programme to test the viability of telework for the company. According to its initial cost-benefit analysis, the implementation of telework could result in a cost saving of 38% in office space, furniture, parking and support staff. It has been established that it costs the company approximately R19000 to equip one office per full-time employee (D. Farrell, personal communication July 2000).

The author initially advised Absa on the possibilities of telework as well as the implementation processes. Absa targeted specified business units for a pilot programme and questionnaires were sent out to test employee and line manager attitudes. This was part of the first phase of a three-phase process consisting of pre-, in-progress and post-implementation. An implementation model was drafted according to the modus operandi in the USA. The model was subsequently refined to synchronize with the South African corporate arena.

The author also developed a research project entitled Contextual implications of ICT facilitating flexible work options in SA and identified 10 research areas that are expected to be completed within five years. These areas will be covered in seven Master's and three Doctorate degrees.

12 Conclusion

The major benefit of the ICT revolution is that it empowers people toward ICT-oriented human resources. As more computers become connected to the information highway and software applications provide better solutions, the corporate world will have access to global information. When compared to the global telework scenario, it is evident that it could take a few years to implement all the major changes in South Africa because people often prefer to maintain the safe and familiar status quo. However, it comes natural to new generations to grasp and implement new ideas that result in beneficial paradigm shifts. The role of ICT is not to replace or minimize human involvement, but to provide more flexibility, productivity and efficiency.

Handy (1995:23,101,117) suggests three key principles for the successful implementation of telework:

- Work should be organized around processes, quality projects and target dates
- Minimizing non-value-adding activities should flatten the hierarchy
- Managers should make teams, not individuals, the primary building blocks of organizations

Public and private sectors should realize that they have a quintessential role to play in South Africa to facilitate global competitiveness, and that effective implementation of the necessary strategies is essential. If Africa is to escape its poverty and create new ways of conducting business, ICT will have to play a major part.

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