FINANCIAL IMPACTS OF CHANGING TECHNOLOGY ON BUSINESS
CASE STUDY: HYFLO SOUTHERN AFRICA (PTY) LTD

by

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Thesis submitted in fulfilment of the requirements for the
M Tech: Business Administration

in the
FACULTY of MANAGEMENT
at the
CAPE PENINSULA UNIVERSITY OF TECHNOLOGY

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CAPE TOWN
December 2005

I, Pierre de Wet, hereby declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

ABSTRACT

The era known as the Industrial Revolution was a period in which fundamental changes occurred in agriculture, textile and metal manufacture, transportation, the social structure and economic policies. The large number of unskilled people provided cheap labour and was used as easy replaceable tools. Employees have since become companies' most expensive "assets".

The Internet was originally designed for military applications. The US military wanted a network that could withstand a terrorist attack and still work if important communication areas had been destroyed. The Internet, also known as the giant network of networks, has become a major catalyst for electronic business. The Internet caused the shape of companies to change and the way they conduct business. For example the Internet enabled companies to be run from home and changed the old companies' structures. Sending data via a network is a lot faster and less expensive than making a telephone call or sending a messenger. Businesses have become more dependent on the Internet to generate revenue. E-commerce refers to the buying and selling of goods and services on the Internet and reduces the cost of doing business. The down side is that companies are also more exposed to inherent security risks. New technology with old methods of working is also no longer feasible.

Many clerical tasks disappear and both the job functions of staff and the supervisory functions and procedures change. Information technology (IT) is increasing productivity, and thus, for a given output, a smaller number of people are employed. Increasing numbers of workers are retrenched when still in mid-career because labour is a most expensive commodity. The reduction in overheads and improved response of modern administrative systems increase the opportunities for organisations of all sizes to compete on an international level. One should also consider that companies may jeopardise their chances of competing internationally by under-investing in information technology (IT).

Integrated Services Digital Network (ISDN) is a digital dial-up, end-to-end connection service that provides voice, video, data or text facilities simultaneously and offers customers the flexibility and convenience necessary for successful communications and thus business

transactions.   Asymmetric Digital Subscriber Line (ADSL) technology works over the existing copper telephone lines to carry voice, data and video information.   It has a much higher transmission capability than ISDN.   Local Area Network (LAN) is a communications network that is restricted to a small geographical area, usually within a building or on a campus.   Alternatively a Wide Area Network (WAN) spans over a large geographical distance.

The purpose of this thesis is to investigate and determine the impact of changing IT on the company Hyflo SA (Pty) Ltd.   To gather appropriate information about this particular company, two questionnaires where given to the members of the top management of the Paarden Eiland branch.   The first questionnaire was designed to be answered by the managing director.   This questionnaire has a separate section D, which asks financial questions that only the managing director will have relevant answers for.   The second questionnaire was compiled to be answered by the department heads.   The questionnaires used "easy to understand" terminology in order to minimise any misinterpretations.   The questions were structured in such a way, to facilitate easy answering, by simply ticking the correct answer. The last section of the questionnaire dealt with the financial aspects of the company.

The foundations of Hyflo, one of the largest privately owned hydraulic engineering concerns in South Africa, were laid in 1954 when its founder, Mr. Ludwig Schwabe, foresaw the vital role hydraulics and pneumatics would play in the future industrial development and advancement of South Africa.   The management staff of Hyflo thinks that their work is highly dependent on computers and that the Internet is used mostly for research.   The company's website is mainly used to display the contact information of the company.   E-mails and cell phones are very vital communication tools in the company.   Of all the communication equipment, expenditure on computers and networks formed the biggest utilisation of the turnover each year.   Changing technology does have an impact on all departments of this company.

To Kylie and Nicole de Wet

ACKNOWLEDGEMENTS

I wish to thank:

- My supervisor, Daniel Woudberg De Goede, for his guidance, encouragement and support.
- My lecturers' in the Faculty of Management at the Cape Peninsula University of Technology, for their unstinting help.
- Staff of Hyflo Southern Africa (Pty) Ltd for the quick response to the questionnaires and for allowing me to interview them.
- My friends (too may to mention) for their support and understanding.
- My mother, Amanda de Wet, for being herself.
- *My fellow students Jacobus von Wielligh & Roger G. Skorbinski for support and assistance.*
- Lolita Skorbinski for linguistic revision.
- Mrs J.M.M. Smet for guidance and positive criticism on final layout of this thesis.
- Zaba Tshabalala of the library of the Cape Peninsula University of Technology, for assistance in finding references.

ABBREVIATIONS AND ACRONYMS

ADSL	Asymmetric Digital Subscriber Line
ARPA	Advanced Research Projects Agency
ATM	asynchronous transfer mode
COD	Cash on delivery
CPU	Central Processing Unit
DNS	Domain Name System
EDI	electronic data interchange
E-mail	Electronic mail
HTML	Hypertext Markup Language
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
IT	Information Technology
LAN	Local Area Network
Net	Internet
OSS	Open Source Software
PC	Personal Computer
RAM	Random Access Memory
SMTP	Simple Mail Transfer Protocol
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol / Internet Protocol
URL	uniform resource locator
VoIP	Voice over Internet Protocol
WAN	Wide Area Network
WWW	World Wide Web

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CHAPTER ONE

INTRODUCTION

1.1 TITLE

Financial impacts of changing technology on business.

1.2 CLARIFICATION OF BASIC TERMS AND CONCEPTS

In the text to follow many technical terms are used. To eliminate any misunderstanding of these concepts, a list of terms and definitions are given.

Asynchronous transfer mode (ATM) – A networking technology that parcels information into eight-byte cells, allowing data to be transmitted between computers from different vendors at any speed.

Bandwidth – The capacity of a communication channel as measured by the difference between the highest and lowest frequencies that can be transmitted by that channel. Usually measured in bits per second (bps).

Bit – A binary digit representing the smallest unit of data in a computer system. It can only have one of two states, representing 0 or 1.

Browser – Software which allows users to view HTML pages on the intranet or the World Wide Web in a user-friendly way. For example Netscape or Microsoft Internet Explorer.

Byte – A string of bits, usually eight, used to store one number or character in a computer system.

Cookie – On the Internet it refers to a piece of information sent by the Web Server to Web Browser that the Browser software is expected to save and to send back to the Server whenever the Browser makes additional requests from the Server.

Dedicated lines – Telephone lines that are continuously available for transmission by the lessee.

E-mail – Electronic mail is when text messages are send via a computer from one pe rson to another. One e-mail can also be send to many individuals at once.

Firewall – Hardware and software placed between an organisation's internal network and an external network to prevent outsiders from invading private networks.

Home page – A World Wide Web text and graphical screen display that welcomes the user and explains the organisation that has established the page.

Hydraulics – Science of the conveyance of liquids through pipes.

Internet – The vast collection of interconnected networks that all use TCP/IP protocols and that evolved from ARPAnet of the late 60s and early 70s.

Internet service provider (ISP) – A commercial organisation with a permanent connection to the Internet that sells temporary connections to subscribers.

ITC – Information Technology & Communication

Local area network (LAN) – A network that requires its own dedicated channels and that encompasses a limited distance, usually one building or several buildings in close proximity.

Login – Noun: The account name used to gain access to a computer system. Verb: The act of entering into a computer system.

Network – A group of computers linked to share the same data and other resources.

Open source software (OSS) – Software that is developed, tested or improved through public collaboration and distributed with the understanding that it will be shared with others, ensuring open future collaboration

Search engine – A tool for locating specific sites or information on the Internet.

Spam or spamming – An attempt to use a mailing list or other networked communications facility as if it was a broadcast medium by sending the same message to a large number of people who did not ask for it.

Spyware – Spyware is software installed on a PC to gather personal information about the user and to forward it to a point so it can be misused.

Surf or surfing – A term used to describe the act of using search engines to search for any information on the Internet.

Technology – The science studied of the industrial arts. For this paper technology refer to communication technology.

Packet switching – Technology that breaks blocks of text into small, fixed bundles of data and routes them in the most economical way through any available communications channel.

Virus – A program that can enter a computer or a computer network and damage the data that is held there. Viruses can either just be an irritation or can be of a destructive nature.

VoIP – Voice over Internet Protocol refers to the technology that allows you to make telephone calls using an Internet connection instead of a normal telephone line.

Wide area network (WAN) – A network that spans over a large geographical distance. May consist of a variety of cable, satellite and microwave technologies.

1.3 STATEMENT OF RESEARCH PROBLEM

Business companies are constantly implementing and upgrading their ITC systems due to rapid changes in these technologies. These technologies, if not applied appropriately, that is in a cost effective and efficient manner can have a negative financial impact on the business. The financial outlay should produce a corresponding increase in income and an improved customer service.

1.4 BACKGROUND TO THE RESEARCH PROBLEM

Many authors discuss the advantages and disadvantages of implementing new technologies in a business. All of these authors are used as references in the literature review. The biggest problem was to find literature that deals and discuss the financial impacts of these new technologies. It was even more difficult to find authors that deal with the financial impacts of constantly implementing new technologies.

In 1876 Alexander Graham Bell patented his telephone, built with the assistance of young self-trained engineer Thomas A. Watson. The telephone today is the most common form of communicating with anyone in the world. No business today can conduct transactions without the use of the telephone. Instead of writing a letter and posting it, you can pick up the telephone and ask the relevant questions or even do the transaction. Distance and delays in communication no longer restrict business.

Vietmeyer (1987:28-32) discusses in his article the whole development of the jet engine. Various inventors tried to manufacture the first jet engine during 1929 to 1940. None of these inventors were fully supported by their countries so development was slow. This resulted that jet engine technology was not available to be used in the Second World War. The war could have ended differently if jet engine technology was available then. Although the idea and concept of an airplane moving faster and higher than the normal propeller airplanes was developed because of war reasons, it benefited all the generations to follow. These jet engine airplanes were later adapted to move large numbers of people from one place to another in a much shorter time. These airplanes not only transport people, but goods as well. Companies are financially benefiting because air transport is a lot faster than rail, sea or land transport.

For example, projects that are dependent on parts can be completed in a shorter period of time and so the company can receive earlier payment. This will again have a positive impact on the company's cash flow.

The Internet was originally designed for military applications. The US military wanted a communications network that could withstand a terrorist attack and still work if key communication areas, for example the Pentagon, had been destroyed. The Internet, also know as the giant network of networks, has become a major catalyst for electronic business today. The Internet caused the shape of companies to change and the way they conduct business. Examples of this would be Internet banking and companies that only sell online such as Kalahari.net.

Telecommunications can be defined as the communication of information by electronic means, usually over some distance. Previously, telecommunications meant voice transmission over telephone lines. Today, a great deal of telecommunications transmission is digital data transmission, using computers to transmit data from one location to another. Currently the telecommunication revolution is spreading communication technol ogy and telecommunication services throughout the globe.

Most South African corporate clients in 1998 hardly ever requested data circuits (leased lines) higher than 64 kilo bits per second. Lately customers have become more bandwidth hungry and are requesting data circuits working at more than 2 million bits per second.

Some technologies have found new applications. The phone was originally designed to be a multi-tone telegraph machine. Since then it evolved to be able to transmit real time video for videoconferencing. Jet engine driven airplanes was designed to deliver fast air attacks in times of war. Today airplanes are used to transport people and goods much faster than sea (boats) or land (trucks or trains). The Internet was intended to be a secure communications network for the US government. Today some businesses are only a vailable on the Internet to trade. Without the Internet e-mail would not have been possible. E-mail has since almost replaced the post system. All of these technologies and many more caused the local economy

to become a global economy. Today no business can survive without accurate, fast and reliable information technology & communication (ITC) systems.

1.5 HYPOTHESIS

Change in technology has negative financial impacts on businesses .

1.6 OBJECTIVE OF THE STUDY

To find out what the financial impacts of changing technology are on businesses.

1.7 DELINEATION OF THE STUDY

This study will only be focused on a Hydraulic company in the Western Cape Region.
According to the Yellow Pages there are 56 companies that deal with Hydraulic related products in the Cape Peninsula. For this thesis a case study was done on the Paarden Eiland branch of Hyflo Southern Africa (Pty) Ltd.

1.8 SIGNIFICANCE OF THE STUDY

Technology is very fast-changing and influences the run of all businesses each day. The main idea is to see whether the changing technology has a large direct or indirect impact on the finances of the business. From the literature review one will notice that very little research was done specifically on the financial impact of changing technology.

In the Western Cape there are too many different types of businesses and for this reason this research will only focus on one sector of the business environment i.e. hydraulic companies. This research will however not only be to the advantage of hydraulic companies, but to all companies who use some form of technology in the normal run of business.

1.9 EXPECTED OUTCOMES, RESULTS AND CONTRIBUTION OF THE RESEARCH

The research will prove that ITC has a much bigger financial implication on businesses today than ever before. If the research proves this, then a business should make a much bigger

effort to implement new technology cost effectively; especially if the research proves that there is a direct or indirect influence between change in technology and profit.

1.10 FRAMEWORK OF THIS DOCUMENT

Chapter two is the literature review.

Chapter three forms part of the literature review and is a historical overview with emphasis of the industrial revolution.

Chapter four is also part of the literature review and describes the basic concepts of various communication technologies and how companies should implement them.

Chapter five is the research and design methodology section. An in depth look is taken at the reasoning of the various questions asked in the questionnaires.

Chapter six is the analysis of the results of the two questionnaires.

Chapter seven is the conclusion with the recommendations .

CHAPTER TWO

LITERATURE REVIEW

2.1   INTRODUCTION

The purpose of this chapter is to discuss the work of a variety of authors that deals with the same topic as this thesis.   The two chapters that follow are also part of the literature review. The impact of various technologies on businesses is almost limitless.   Technology does affect relationships between members of a business.   Information technology is increasing productivity and a reduced number of staff may be required and therefore fewer employees are guaranteed lifetime employment.   Telecommunications technology and networking are deeply embedded in the core processes of business and they require careful management and planning.   The reduction in overheads and improved response of modern administrative systems increase the opportunities for organisations of all sizes to compete on an international level.   By under investing in new technologies, companies may jeopardise their chances of competing internationally.   With new technologies come new threats.   New hardware and software might lead to better performance, but without enough planning and research money may be spend on products that have no positive effect on the performance of the business. Software developments or changes require retraining of staff and also create new problems.

2.2   LITERATURE

Much has been written about new developments in ITC (Information Technology & Communication), but not many authors discuss the importance and influence of changing ITC in business.   To following are the references that describe the impacts of changing ITC.

The introduction of technology may profoundly affect relationships between members of a business.   For example, when staff receive data and instructions from a computer model rather than from supervisors, supervisors may become redundant.   The removal of this managerial layer will have the effect of flattening the structure.   According to Mead (1994) the introduction of information technology (particularly in decision systems) has benefits such as improving personal efficiency and problem-solving; improving interpersonal communication,

by creating standard data and operating procedures; increasing organisational learning and understanding through experience; increasing organisational control.

IT (information technology) is increasing productivity, and thus, for a given output, a reduced number of staff may be required. This higher productivity and smaller work force has a multitude of consequences for management. These consequences may be that management may have to increase the pay structure to attract the qualified people to do the job; or revise the company structure and outsource certain projects to IT companies instead of employing new staff. Traditional, practical skills are disappearing and new conceptual skills are required. These skills are linked to information management and to operating in creative, flexible and less routine ways. As the skills are required by both non-management staff (information workers) and managers (knowledge workers), to an extent differences between these roles are diminishing. The importance of old organisational structures is reducing. Functions are more integrated, boundaries and ties less defined. Management of people is becoming less dependent on hierarchical authority and more dependent on leadership related to professional respect in a team culture (Jones, 1990).

Mead (1994) also mentions the switch in technological focus, coupled with "the far shorter shelf life of technological skills in the new industries which has many effects". Increasing numbers of workers are made technologically obsolete when still in mid-career. In order to stay in the workforce, they are obliged to retrain for other industries. Fewer employees are guaranteed lifetime employment; as lifetime employment declines, there is a corresponding effect on the cultural values in the work force (decreased long-term commitment and loyalty between employer and employee). As a result of this modification to the culture, job-hopping of employees increases. The increase in staff turnover will cause an increase staff training. New employees need to be trained in the company's processes and in their duties. There will also be an increase in salaries to attract the right qualified person for the vacant or new position.

Networked systems are fundamental to electronic commerce and electronic business. Companies, large and small from all over the world, are using networked systems and the

Internet to locate suppliers and buyers, to negotiate contracts with them, and to service their trades. The number of people using networks for research, organisational coordination, and control are multiplying. "Telecommunications technology and networking are so deeply embedded in the core processes of business today that they require careful management and planning." (Laudon, 2000:282). Companies can over or under spend on new communication systems. Companies do over invest on new communication technologies when it is not used to its fullest potential to increase the potential revenue. An increase in revenue may occur as a result of shortened processes or better communication with customers. By under investing the company may loose out on potential revenue as they will not be able to compete with competition as the overheads are too high or their marketing tools are better.

Brady (1992) mentions that there are business factors to consider when implementing office automation. The quality of documentation and c ommunication is an increasingly important factor in administrative systems. The reduction of tedious and repetitive clerical activities such as filing and re-filing increases productivity, while improved communication systems mean fewer delays in contacting other parts of the organisation. The power of modern office systems can provide greater scope for initiative. Integrated workstations and software systems make more effective use of human resources. Reduction in both space and people requirements make more effective use of expensive office space. This increase in productivity and reduction in overheads will also have a positive influence on the finances of the company. Modern communication systems enable documents to be transferred electronically and changed in format automatically to suit the particular method of operation and handling. The reduction in overheads and improved response of modern administrative systems increase the opportunities for organisations of all sizes to compete on an international level. The increased opportunities means that there will be an increase in potential customers which means there is an increase in potential turnover. Both the internal and external electronic mail systems improve the distribution of information around organisations and to or from organisations. Mass production of office automation systems components and the need to compete increase the use of office automation systems in various forms. The expanding use of IT in the office environment leads to dramatic changes in job functions. Many clerical

tasks disappear and both the job functions of staff and the supervisory functions and procedures change. In the end the company saves on salaries by the automation of tasks.

Fast changing technologies create new cost considerations, for example, changes in hardware design such as laptops and specialised writing pads and pens replacing conventional bulky computers and keyboards. Software developments or changes require retraining of staff and also create new problems for example viruses and industrial espionage. Online fraud, extortion, theft, vandalism, terrorism, child pornography, money laundering, identity theft and sabotage are some examples. Organised crime groups are stretching their tentacles into the cyber world. Today one should not only worry about being mugged on the streets, but being forced to pay protection money so that your online business (i.e. bank) is not attacked by highly skilled thugs (hackers) (Els, 2002c). All these things mentioned by Els (2002c) will have negative impact on the finances of the company. More money is spent on obtaining and maintaining better security systems. The cost of training the staff to work the new systems will also increase.

A new breed of ghost hackers has emerged world wide. They no longer hack for the fun of it but do it for financial gain and espionage. Companies are spending money on antivirus software and firewalls to protect themselves against these thieves. The 'I Love You' virus cost the world about $12 billion. Companies need to put the appropriate detection mechanisms in place to safeguard themselves from potential damage (Anon, 2002b). These mechanisms are only preventive and there is no guarantee that they will always work. Unfortunately they are an expense that all companies must incur. The importance of the information that must be protected will determine the amount of money spent on these security systems.

The Electronic Communications and Transactions Act (Act number 25 of 2002) is just one of the new laws companies should take note of. It is there to protect companies and individuals against hacking and deliberate infection by computing viruses (Els, 2002a). As per this Act, cyber inspectors can be appointed by the communications department. "They can monitor and inspect any website activities or transactions made on an information system in the public

domain." If they believe that unlawful activities have taken place, they can seek to have a warrant issued. The warrant allows them to enter your premises or access an information system that has a bearing on the investigation. Refusal to co-operate is punishable by a fine or a jail sentence of up to 12 months. However, they can only monitor and inspect websites and activities in the public domain, they may not inspect private information systems of a company beyond the website (Anon, 2003a). "The growth of e -mail usage is phenomenal. It . incorporates almost every aspect of doing business today and, as a result, has become crucial to manage the life cycle of corporate e-mail." (Vicente, 2003:32). Vicente (2003) mentions that because of the new Electronic Communications and Transactions Act, these corporate e - mail messages are now considered legal documents and must be stored in an archive that is well structured. The average size of data to be stored double each year, but e-mail storage increases threefold. This puts a big demand on the server storage space and makes it difficult to comply with the retention period of legal documents. Businesses will have to seriously consider the contents of this Act in order to adapt their IT policies accordingly, especially if e - mails will be permitted to be used as evidence in a court of law. As with any government Act, it would be best to employ a law expert to explain the contents and to assist with the drafting of the new company policies and this means the company will incur more expenses.

The advantages and disadvantages should be considered of installing new -sophisticated e-business technology. The company could save more by simply changing the way in which the staff works rather than installing new technology. Because of tough economic conditions and companies realising that e-business has not delivered amazing returns, companies are forced to look at what they have and to utilise it to the maximum. New technology with old methods of working is no longer feasible (Anon, 2002a). For example instead of only using Microsoft Excel to monitor stock totals, one can use it to show stock trends graphically and forecast what stock will be needed.

Companies may jeopardise their chances of competing internationally by under-investing in information technology. Usually firms do realise that technology can boost their global status, but a shortage of bandwidth, cost of hardware and software and lack of skilled technicians, are all constraints (Anon, 2002c). Updating software and training/retraining of

staff cost money. With Telkom still having most of the communication monopoly in South Africa, the cost of implementing valuable communication technologies is just too great for small businesses.

The government has commissioned research to be done in the field of mobile technology that could be used to deliver information to South Africa (Anon, 2003b). The possibilities of this technology are virtually endless. Visualise a complete mobile office, conducting any and all business anywhere in South Africa. The installation time for a data "line" can change from 20 plus days to one day. Some of these technologies will be discussed in chapter four of this thesis. Although this technology is new in South Africa, other countries have been using it for a while. Tanni Grey-Thompson would be a perfect example of someone who is taking full advantage of this technology. She is Britain's leading Paralympics sports star and makes use of computer technology since her coach, Jenni Banks lives in Australia and the pair communicate via the Internet. Cyber-coach Jenni Banks is able to monitor Tanni's heart rate and blood levels from across the globe. 'Virtual' training schedule information, Microsoft's technology, allows Tanni wireless remote access to her diary details and e-mail from her business management company, so that she can keep up to date with any changes as she travels to different venues. She can also e-mail Banks for coaching advice, and send digital video images of her performance to her coach for comment (Sweet, 2003).

According to Storey (1999), companies need to be certain that the technology they are using is the right mix for the way they conduct business. The systems used must be used efficiently and the information generated must be accurate and on time to meet the needs of the business. New hardware and software might lead to better performance, but without enough planning and research money may be spend on products that have no positive effect on the performance of the business. A business case should be generated to assist with the analysing the benefits versus costs of the new system. This justification will help to focus on why the new system will be better than the way things are currently done. Resistance to change is the biggest contributions to failure of new IT systems.

According to Kelly (2005b:55) the CPU (Central Processing Unit) speed is not the only

decisive factor for buying a new PC (Personal Computer). Most consumers have a misperception that the higher the processor speed the superior the PC. The way CPUs are designed currently the speed is only a partial factor to deliver performance to the user. Currently Intel's Pentium 4 processor top speed is 3,8 GHz and AMD's clock speed is only 2,6 GHz. According to the benchmarks run by Toms Hardware (www.tomshardware.com) both processors perform the same. The main difference between these processors is the efficiency. Unfortunately processor companies are not numbering their products with actual processor speeds and are not using the same numbering systems. This makes it almost impossible to compare Intel with AMD without checking the benchmarks on the Internet. Kelly also mentions that buying a new PC does not have to be so complex. First decide on how much money can be spent and what the purpose of the new PC, before sourcing it. If the new PC is only going to be used for Internet, then a low end one will be sufficient. If the PC is going to be used for heavy processing as manipulating digital images or videos a higher end PC would be the best. The simplest and cheapest way for anyone to improve the performance of an existing PC is to increase the memory (RAM – Random Access Memory). Most new operating systems perform better with more than enough memory than with minimum required RAM.

Els (2004:55) mentions that in-car entertainment used to mean a tape deck with tweeters in front and some big speakers in the boot. Today in-car entertainment market implies video game screens in headrests or roof-mounted DVD players or satellite radio and soon even Internet access on the dashboard. It is a huge industry and these days it is not only the R 700 000 Land Rovers that do have DVD players, but even the Tazz drivers use it to entertaining the kids in the backseat. Some vehicles electronics is very complex and should only be worked on by trained professionals. Currently the cost of satellite navigation in SA is inflated because of the monopoly held by German manufactures. The companies Tier One and MapIT (part of MapStudio) will go into partnership and hopefully bring down the cost of satellite navigation. Technology is moving fast and it is not possible to know what will be next. Companies will benefit from satellite navigation in more than one way. The driver will always be able to see the shortest route to his destination. No time is wasted on searching for customers. That means the drivers or sales reps will be more productive. Less fuel is used

on driving which means a reduction on overheads.

In 2003 Microsoft was the preferred operating system on all PC's and had 93,8 % of the market (Els, 2003c:61). Apple and Linux each had less than 3% of the market. The slow rate of adopting alternatives to Windows is somewhat due to unofficial agreements between the PC manufacturers and Microsoft. The lack of technical support for open source systems is the main reason why Windows is still sold off the shelf with every new PC. All computers need to work of an operating system.

The biggest threat to PC users is not only viruses but the infection of spyware (Kelly, 2005a:36). It is estimated that about two thirds of all PCs are infected. Spyware is software installed on a PC to gather personal information about the user and to forward it to a point so it can be misused. The ABSA incident ("...the case involves the unauthorised removal of R500,000 from bank accounts run by an estimated ten separate Absa customers in South Africa's Western Cape Province" (Leyden, 2003)), is a clear example of what spyware can do. The keystrokes of various Internet banking clients were recorded and used for money embezzlement. Spyware is normally written in such a way to entice the potential victims to install it by promising to optimise the performance of the PC or the chance to win prizes. The spyware is an integral part of applications that might appear valuable. It is recommended that one should use more than one anti-spyware tool to ensure nothing is missed. Only well known software (as listed in chapter four section 4.9.1) should be used as spyware writers use fake removal tools to insert their systems onto users' PCs. Companies will need to spend more money on their IT security systems. No company can afford personal or confide ntial information to be misused as this can lead to unnecessary law suits or loss of faith from existing customers. Possible preventative measures will be discussed in chapter four section 4.9.1.

Spamming is the practice of sending unsolicited e-mails or other electronic communications (Laudon, 2000:136). "Worldwide statis tics show that spam constitutes more than 40 % of all e-mail traffic." (Ebersöhn, 2004:76). Because of this increasing problem, companies need to increase the size of their various communication channels. This increase in communication

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cost causes an increase in the total overheads of a company. Various ways to prevent spam is discussed in section 4.9.2 of chapter four.

2.3 CONCLUSION

In this chapter various literature were discussed that deals with the impact of various technologies on business. Technologies affect all aspects of the business. It causes the company structure to change as some functions become redundant due to automation. Management and supervisor positions are replaced with computers and software. Lifetime employment is decreasing as workers become "technology obsolete" very quickly. Companies are forced to outsource certain functions instead of e mploying or training more people to do the new functions. With new technologies come new threats. Before the use of e-mails and the Internet by businesses the terms virus, spam and spyware had no meaning. Each one of them causes companies world wide each year millions of Rands due to their destructive "nature".

Big companies that supply these communication technologies are preventing growth for their customers who are dependent on ITC technologies. These products are too expensive to be used by everyone or are designed not to be compatible with their rival competitors' products.

Resistance to change is the biggest contributions to failure of new ITC systems. Companies need to invest in new Information Technology & Communication systems. By doing this they will be able to compete in a global environment. By over investing in ITC, companies might develop financial difficulties. By under investing they might not be able to be competitive. Finding the correct balance is the problem.

CHAPTER THREE
HISTORICAL OVERVIEW

3.1 INTRODUCTION

This chapter forms part of the literature review and is mainly for background information to the reader. The purpose of this chapter is to highlight some of the changes in technology that took place during and after the Industrial Revolution. These changes not only caused companies to be formed, but caused them to change as well during this period. Changes in the agriculture, textile, mining and architecture sectors are discussed. The effect of these changes on the working conditions of the employees is also looked at. The development of the railroads, steamships, electric power and the telephone is also examined under there own headings.

3.2 INDUSTRIAL REVOLUTION

"The era known as the Industrial Revolution was a period in which fundamental changes occurred in agriculture, textile and metal manufacture, transportation, economic policies and the social structure in England" (Montagna, 2003).

The changes of the Industrial Revolution mainly occurred during 1760-1850. There was an increase in the supply of food and raw materials because of new developments in agricultural techniques and practices. There was also an increase in production, efficiency, profit and commerce because of changes in organisations and technology. These were all conditions that promoted the beginning of the Industrial Revolution. Many of these conditions were so closely interconnected that an increased activity in the one encouraged an increase in activity in another (Montagna, 2003).

3.2.1 Agriculture

Between 1760 and 1830 the English countryside was transformed. The open-field system of cultivation was replaced with compact farms and enclosed fields (Anon, 2003c).

Agriculture was an essential source of raw materials for the textile industry. The production of wool, cotton and food crops increased. This increase in the agricultural sector can be credited to the enhanced techniques and practices developed during this period. Stronger farm equipment was made from metal, where previously it was made out of wood (Montagna, 2003).

The rotation of nitrogen-fixing and cereal crops removed the need for leaving a third or half the land uncultivated with each planting. Jethro Tull (1674-1741) and Lord Townshend promoted the significance of root crops. Tull's seed drill planted the seeds below the surface of the ground out of reach of the birds and wind. This allowed many more seeds to germinate. Townshend was well known for his cultivation of turnips and clover and introduced the four-course rotation of crops (Anon, 2003c).

Robert Bakewell (1725-1795) led the way in the field of systematic stockbreeding. Before Bakewell, sheep had been valued for wool and cattle for strength. Bakewell selected his animals and interbred them. He taught how to breed for food quality and his methods were especially successful with sheep (Anon, 2003c).

These changes made it possible to feed all of the people that were attracted to the industrial centres and sustain an adequate workforce (Montagna, 2003).

3.2.2 Textiles

Before 1760 people manufactured textiles at home. It was a time-consuming procedure from raw material to the end product. Women and children performed most of the stages of manufacturing. The running of the textile industry was complex and inefficient before mechanisation. Merchants distributed the raw material to the spinners and weavers who lived far away from each other and this caused some variation to the end product (Montagna, 2003).

Some problems were experienced by the textile industry. One cotton loom used the resources of four spinners. One woollen weaver needed ten people to prepare the yarn. Spinners were

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usually busy, but weavers were sometimes unproductive, because of a shortage of yarn (Anon, 2003c).

John Kay's flying-shuttle (one weaver could do the work of two) and Lewis Paul's roller spinner (which made spinning more efficient) were the forerunners in supplying new technology to the textile industry (Montagna, 2003).

In 1771 Richard Arkwright's water frame produced yarn (Anon, 2003c). Arkwright obtained the financial support to build his water-powered factory from Samuel Need and Jedidiah Strutt. The factory was located in Cromford and employed more than 600 employees. The machine spun the cotton thread faster than human hands could supply the carded and combed raw material (Montagna, 2003).

James Hargreaves patented the spinning jenny. On the jenny, one operator could spin many threads simultaneously. In 1779 Samuel Crompton combined the jenny and the water frame in a machine known as Crompton's mule. By 1784 it was already possible to print patterns on the surface of cotton or linen by means of rollers (Anon, 2003c).

The employees did not accept the new machines that were used and they expressed their displeasure by rioting. These new inventions that were perfected and put to use led to huge changes in the world of work. The new factory systems took over the old way of manufacturing at home. It was cheaper to employ women and children and there were no regulations in place for working conditions. These factories were large, dusty, badly illuminated and ventilated and dangerous (Montagna, 2003).

3.2.3 Working conditions

"If the conditions in which people lived in these factory towns were considered bad, then the conditions in which they worked can be appropriately characterised as being horrendous." (Montagna, 2003).

A normal workday was 12 to 14 hours with few breaks in between. The workers were forced to work six days a week in extreme temperatures. The factories were filthy, had poor lighting and the windows and doors were locked. The adult factory worker hardly died because of starvation; the risk of dying was much higher because of the horrifying housing conditions and bad sanitation. The hygiene problems were due to the poor water source (water was normally drawn from wells or rivers) and the inadequate sewer systems. Children died from various diseases and malnutrition (Sophie, 2003).

Factory Acts were enacted by Parliament to regulate the number of hours men, women and children worked. The way the work was performed was transformed by the factory system. Factory workers were viewed by their employers simply as hands. Workers slowly began to grasp the power they could have if they unified and embarked on a lengthy struggle to obtain the right to form recognised unions. The laid back policy of the government soon changed as the strength of the unions increased (Montagna, 2003).

3.2.4   Coal mining

Working conditions and practices in the coal mining industry in the 18th and 19th centuries were very dangerous and most of the jobs could be termed hazardous. Coal was moved mainly by muscle power. Animals, men, women and children were used. Children were more popular because of their size. Later miners started using ponies and carts on rails to speed up the movement of coal (Montagna, 2003).

Coal was a substitute for wood stoves and used in the manufacture of bricks, dyed glass and also used to heat homes. With the invention of the steam engine, more coal was needed, so more and more mines were dug. This also meant that more workers were required (Sophie, 2003).

The whole mining industry became more productive because of improved tunnel ventilation; improved underground and surface transportation; the use of gunpowder to blast away at the coal seams; and improved tunnel illumination through the use of safety lamps (Montagna, 2003).

3.2.5 Architecture

As the inflow of workers to the main centres caused the cities to become overcrowded, multi-storeyed apartment buildings were built to house these people. Buildings became more modernised and in London they produced very robust apartments of 5 or 6 stories high. The most extravagant building was the construction of the Crystal Palace in London, which was made out of iron and glass. It was a great symbol of the modern era (Sophie, 2003).

3.2.6 The steam engine

The steam engine provided a milestone in the industrial development of Europe. Thomas Newcomen built the first modern steam engine in 1705. Newcomen's idea was to put a vertical piston and cylinder at the end of a pump handle. Steam was put into the cylinder and then condensed with a spray of cold water. The vacuum created allowed atmospheric pressure to push the piston down. In 1763 an instrument maker by the name of James Watt, began to make improvements on Newcomen's engine. He made it a reciprocating engine, changing it from an atmospheric to a true steam engine. Watt also added a crank and flywheel to provide rotary motion. In 1774 the industrialist Michael Boulton took Watt into partnership, and their firm produced nearly five hundred engines before Watt's patent expired in 1800. Waterpower was still used, but factories were becoming more open-minded about using steam technology. Robert Fulton used one of Watt's engines on the steam vessel Clermont to sail up the Hudson river in 1807 (Anon, 2003c).

For industries to advance in production, they had to apply the huge power produced by the steam engine. The application of the steam engine in transport and industry caused a huge leap in industrialisation. The applications were almost infinite and it was responsible for lifting industries from childhood to adolescence (Montagna, 2003).

3.2.7 Financial considerations

People traded an environment in which they only worked enough to sustain themselves, for one of unsafe and hardworking conditions in factories. This influx of people caused the increase of unskilled labour in city centres. Suddenly the supply of labour was much higher than the demand of factories. The factory owners benefited greatly as this meant that wages

could be kept to a minimum, which in turn meant a larger profit for them. Labourers were viewed as another working tool and could be pushed to the maximum. If the "tools" broke, they could easily be replaced. Companies today have many more financial burdens caused by employees than companies in days gone by. At the time of the Industrial Revolution companies did not have financial burdens such as pension funds, medical aid, training unskilled labour or paying minimum wages.

3.3 RAILROADS

In the late eighteenth century the concept of transport via rail was already in use. Tramways, using cast iron rails, were used in a number of mines in England. By 1800 more than 200 miles of tramway were utilised by coalmines (Montagna, 2003).

The increase of trade caused an increase in demand for facilities to move goods from the factories to the ports or cities (Anon, 2003c).

The effort put into developing a practical method of rail transport between 1804 and 1820 was only partly successful. Richard Trevithick's steam locomotive, the New Castle, was too heavy for the rails, John Blenkinsop's locomotive used a toothed, gear-like wheel and William Hedley's Puffing Billy was used for hauling coal wagons from the mines (Montagna, 2003).

In 1829 a competition to determine the best type of locomotive was funded by the Liverpool and Manchester Railways. This competition took place on the Rainhill level at Lancashire from October 6 to 14, 1829. Three steam locomotives participated in the trials: Timothy Hackworth's "Sans Pareil", John Braithwaite and John Ericsson's "Novelty", and George Stephenson's "Rocket". The "Rocket" won the Rainhill Trials (Montagna, 2003).

By 1830 a railway was opened from Liverpool to Manchester. On this line George Stephenson's Rocket pulled a train of cars at fourteen miles an hour. The big railway growth in Britain took place between 1844 and 1847. By 1850 a network of railways had been built with the help of cheap iron and better machine tools. At this time railroad trains were capable

of travel of up to thirty to fifty miles an hour. The success experienced by the British was enough to encourage the construction of railroads in most European countries (Anon, 2003c).

Today companies still use or benefit from railroads. Big portion of the daily workforce use railroads as only form of transport between work and home. Companies also still use railroads to transport goods from point to point.

3.4   THE STEAMSHIP

Since 1770 numerous men have experimented with engines in boats. In 1811 the Comet that was built by Bell travelled for eight years from Glasgow to a port twenty-five miles away. There were two basic economic problems with steam vessels. The first problem was that to build and operate this self-propelled boat, was more expensive than to sail vessels. The second problem was the size of the boiler and machinery. It did not leave much room for passengers. The steamship had some irrefutable advantages. It could not get stuck, it was not powerless in a storm, and it could reach its destination under its own power. In the last half of the nineteenth century steamship traffic grew at an enormous rate. This was helped by major improvements in the hull design, engines, and fuel. By 1839 the propeller replaced the paddle wheel, steel replaced iron in the hull and multi-cylinder engines were obtainable (Anon, 2003c).

The steamship has since been replaced with bigger and better ships that make use of more sufficient fuels for example diesel or nuclear power.

3.5   ELECTRIC POWER

Michael Faraday demonstrated in 1831 how to produce electricity mechanically. Only in 1873 was the dynamo developed which could be used for long periods of time. High cost, small productive capacity and short transmission lines limited the use of electric power during the nineteenth century. Generators using falling water in the mountains of south-eastern France and northern Italy produced the only cost-effective electricity up to the 1900s. Italy had a lack of coal, which is why Rome soon had electricity in every village. In 1890 Florence showed off the world's first electric streetcar. Electrification of Europe proceeded rapidly in

the twentieth century. By 1936 Great Britain's electric grid covered their country completely (Anon, 2003c).

3.6   THE TELEPHONE

Alexander Graham Bell (see figure 3.1) was born in 1847 in Edinburgh, Scotland (Anon, 2004b).

The telegraph and telephone are both wire-based electrical systems. Bell's attempts to improve the telegraph system caused his success with the telephone system. The telegraph had been a reputable form of communication for 30 years when Bell started to experiment with electrical signals; it was limited to receive and send one message at a time. Bell's wisdom of sound allowed him to imagine the possibility of transmitting multiple messages over the same wire and at the same time using harmonics as a possible solution. The principle used for his "harmonic telegraph" was that several signals could be transmitted across the same wire at the same time, even if the signals differed in pitch (Bellis, no date).

Figure 3.2 displays a duplicate of Bell's first telephone through which speech sounds were first transmitted electrically in 1875 (Bellis).

On 10 March 1876 Alexander Graham Bell spoke his first words to his assistant Thomas A. Watson who was in the next room. Bell uttered his first words, "Mr. Watson -- come here -- I want to see you" (Bellis).

The first telephone exchange was put up in New Haven Connecticut in 1878. "By 1884, long distance connections were made between Boston, Massachusetts and New York City." (Anon, 2004b)

Alexander Graham Bell would never have been able to imagine that telephone lines would be able to transmit video images across the world in almost real time. "Since his death in 1922, the telecommunication industry has undergone an amazing revolution. Bell's 'electrical speech machine' paved the way for the Information Superhighway." (Anon, 2004b)
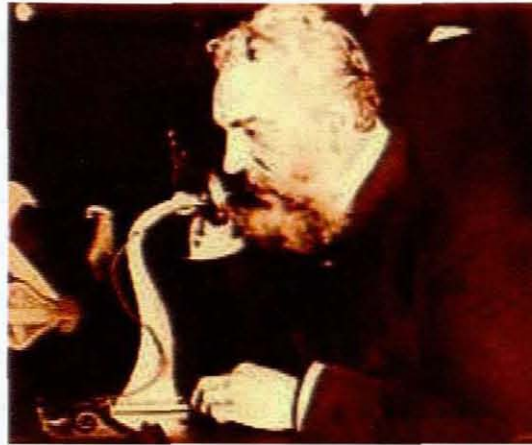
Figure 3.1 Alexander Graham Bell
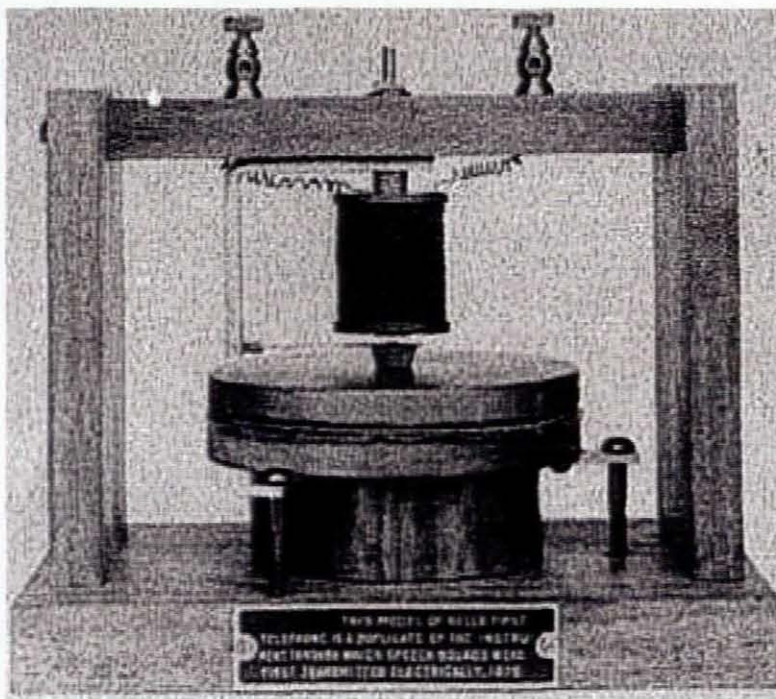
Figure 3.2 Model of Alexander Graham Bell's Telephone

3.7   CONCLUSION

The purpose of this chapter is the give the reader background information on how and when technology had impacts on companies in the past with reference to the Industrial Revolution era.   As can be seen, technology not only caused companies to change, but also caused companies to form.   It can also be seen that all these technologies had direct and indirect impacts on each other, for example the steamships caused the increase in demand for coal, which in return caused an increase in the productivity in coal mining.   The influx of people in city centres caused an increase in demand for cheaper food.   The increase in farming productivity supplied the necessary food for these new workforces.   The invention of the telephone would have been impossible without the invention of electricity.

These interlinking of different technologies influencing each other can still be seen with today's latest inventions.   For example the Internet promoted dot com companies to form. Without the Internet voice over IP would not have been possible.   The Internet Protocol (IP) also made communication between networks easier and caused networks to change.   These technologies will be discussed in the next chapter.

CHAPTER FOUR

COMMUNICATION TECHNOLOGIES AND THEIR APPLICATIONS

4.1   INTRODUCTION

The previous chapter discussed how technology caused companies to form and change.   In this chapter only some of the various communication technologies are discussed.   It would be almost impossible to mention all of them as there are too many.   The Internet is one of the communication technologies that had and have the biggest impact on companies.   E-commerce is the "new" way to do business transactions via the Internet.   The normal PSTN (Public Switch Telephone Network) also changed.   It went from an analogue system to a digital system called ISDN (Integrated Services Digital Network).   The old copper wires of these telephone networks where also better utilised to connect much faster to the Internet via ADSL (Asymmetric Digital Subscriber Line).   Internet protocols are used on networks to form Intranets.   These new type of networks also have the capability to carry voice.   With all new technologies come more possible problems such as spam and spyware.

4.2   INTERNET

4.2.1   Background of the Internet

The Internet began as a U.S. Department of Defence network to link scientists and university professors around the world.   This network was not centralised which made it less vulnerable in wartime and against terrorist attacks (Laudon, 2000:292).

The Advanced Research Projects Agency (ARPA) funded the experiment in which the use of packet-switching technology was researched.   In 1969 the network called ARPANet became operational with four nodes; UCLA, Stanford Research Institute, the University of California at Santa Barbara, and the University of Utah (Moore, Pritsky, Riggs & Southwick, 2002).

The ARPANet was successful and reliable with long distance networking.   In 1972 ARPANet demonstrated to the public and connected fifty universities and research facilities (Stanek, 1998).   It spanned the continental U.S. by 1971 and had connections to Europe by 1973

(Moore *et al*, 2002).

The first host-to-host communications protocol introduced in the ARPANet was called the Network Control Protocol. This protocol could not keep up with the growing network traffic load. In 1974 a new protocol was proposed and implemented throughout the ARPANet based on the Transmission Control Protocol (TCP) and the Internet Protocol (IP). This protocol is generally referred to as TCP/IP. Although TCP was initially defined in 1974, the most common versions of TCP and IP were developed in 1981. In 1982, the U.S. Department of Defence (DOD) declared that TCP/IP would become the new standard ARPANet protocol suite. The official switch occurred on 1 January 1983 (Moore *et al*, 2002).

Today Internet Protocol (IP) continues to be the cornerstone of the Internet and is used to help route information to computers all over the world (Stanek, 1998).

In 1983 the Domain Name System (DNS) was developed. Prior to this system all ARPANet hosts had to know the name and address of all other hosts. The DNS translates mnemonic names which people use into IP addresses that computers use to transport data across the network. This system was therefore vital to the growth of the network and for businesses to maintain their presence on the Internet (Moore *et al*, 2002).

The ARPANet was split into two sections. The one section still called ARPANet was used to interconnect research and academic sites. The other network called MILNET, was used to transport military traffic and formed part of the Defence Data Network (DDN) (Moore *et al*, 2002).

The National Science Foundation (NSF) had set up its network to connect five supercomputers. The possibility of high-speed connections made NSFNET very popular. It was so popular that by 1990 most of the network traffic was on NSFNET and the U.S. government decided to shut down ARPANet (Stanek, 1998).

Several new tools were used for organisation of information and searching of file archives on the Internet. In 1992 the World Wide Web (WWW) was formulated as a means to interconnect these dissimilar sites. In 1993 the National Centre for Supercomputer Applications (NCSA) supplied the first popular WWW browser called Mosaic (Moore *et al*, 2002).

TCP/IP proved its might by mid 1994. At this point the Internet had in excess of three million host computers that consisted of nearly 30 000 networks in more than 65 countries. Towards the end of 1994 Mosaic Communications was formed but renamed Netscape Communications the following year when they went public. Netscape supplied approximately 60 to 70 percent of all browsers by the end of 1995. Microsoft's control of the desktop software forced its Internet Explorer to become the most preferred browser which has an influence on the design of web sites and which server software is used (Moore *et al*, 2002).

According to Laudon (2000:292) it is fairly easy to connect to the Internet. One only requires a computer with a modem and a monthly fee paid to an Internet Service Provider (ISP). The ISP sells temporary connections to the Internet via its own permanent connection. The Internet is owned by no formal organisation and each ISP is responsible for its own infrastructure to the Internet.

Businesses have become more dependent on the Internet to generate income. They are also more exposed to in-built security risks. Home users also use the Internet to find information, to buy products and to communicate. Most of the time they are not aware of the security and legal consequences of their activities (Moore *et al*, 2002).

4.2.2   Internet Tools

4.2.2.1 Electronic mail (e-mail)

According to Blake (1997:442) the simplest way to communicate via the Internet is to use electronic mail. Laudon (2000:293) mentions that organisations use e-mail to aid communication between employees, offices, customers and suppliers. Researchers also use e-mail to share ideas, information and documents. Distance between researchers is no longer a

problem and combined research and writing is possible. The Internet is a vital e-mail system because it connects people and brings about an increase in productivity. The cost of an e-mail is a small fraction of the cost to post normal mail. Storing documents electronically also takes up less space.

To send mail one needs to address it to a specific person in a particular domain (Blake, 1997:442). Blake (1997:442) gave the following address as an example: rblake@niagarac.on.ca "rblake" refers to a specific person, "niagarac." refers to a computer at Niagara College, "on." indicates that the college is connected to ONET, a network that connects government and educational sites in the province of Ontario, and "ca" shows that the country is Canada.

The application called Simple Mail Transfer Protocol (SMTP), which is part of the TCP/IP suite, is used by Internet mail (Blake, 1997:443). With the proper software it is fairly easy to attach files to e-mails and then to send it to a predefined group or a specific person (Laudon, 2000:293).

4.2.2.2 World Wide Web (WWW)

The World Wide Web (WWW) is a linked database system developed at the European Particle Physics Laboratory (CERN) in Switzerland. It was used as a means to retrieve scientific documents (Blake, 1997:444).

The web is a system with generally accepted principles for storing, retrieving, formatting, and displaying information. It combines text, hypermedia, graphics, and sound while making it easy to link resources that are half-a-world apart. It is based on a standard Hypertext Mark-up Language (HTML), which formats documents and includes dynamic links to other documents and pictures stored in the same or remote computers. The user only needs to point at a highlighted key word or graphic, click on it, and instantly the user is transported to another document (Laudon, 2000:296).

Browsers using the HTML standard are given access to millions of web sites by using hypertext's point-and-click system to navigate from site to site on the web. The back arrow

button allows users to retrace their steps, navigating back, site by site (Laudon, 2000:296). The straightforwardness of the WWW is the main reason for its growth in popularity. With web browser software users can view text and graphics, hear sound, watch video clips and download files as required (Blake, 1997:444).

Commercial companies are using the web to set up home pages (Blake, 1997:444). A home page is a text and graphical screen that exhibits information about the company and will guide the user to other pages of the company. Together all these pages of the company are known as the web site. Most web sites supply various ways to contact the company or an individual (Laudon, 2000:296). Some of these pages may include downloadable files (i.e. audio or video clips) and convenient links to other organisations in the same field (Blake, 1997:444). The communication standard used to transfer pages on the web is called hypertext transport protocol (Http). Http characterises how messages are configured, transmitted and interpreted by web servers or browsers. The user must specify a uniform resource locator (URL) to access a web site which points to the address of a specific resource on the web (Laudon, 2000:296).

The web has many search tools (also known as search engines) to assist users to find home pages and information. An example can be found at the following address: http://www.yahoo.com (Blake, 1997:444).

4.2.2.3 Telnet

Telnet allows users to log on to distant host computers; it is almost as if the user were sitting at a terminal in the same building as the computer. These computers are accessible via modem or the Internet (Blake, 1997:443).

Telnet is therefore ideal for people who prefer to work from home or are out on the road (Laudon, 2000:295). People out of the local telephone calling area will also find Telnet to their advantage (Blake, 1997:443).

There are many Internet sites that permit public access to their computing resources. For

instance, some university computers permit public access to library catalogues and other information (Blake, 1997:443).

Telnet will use the computer address supplied by the user to locate the computer to which the user would like to connect (Laudon, 2000:295).

4.2.2.4 File-Transfer Protocol (FTP)

A vital use of the Internet is to transfer files from one computer to another. Internet file transfer protocol (FTP) is part of the TCP/IP protocol suite and is used to transfer files or data (Blake, 1997:443).

All the user need do is log on to the remote computer where the files are stored. After they have logged in, the user can access and move around the directories that are accessible for FTP users (Laudon, 2000:295). The user can then transfer all the files they require by using the "get" command (Blake, 1997:443).

4.2.2.5 Usenet Newsgroups

Usenet newsgroups are worldwide discussion groups in which people share information and ideas on specific topics. Discussion usually takes place on large electronic bulletin boards (Laudon, 2000:294).

Newsgroups form a system known as Usenet which is not actually part of the Internet, but the two networks are linked. Users can read messages and post their own messages on the news group. Users can also use e-mail to respond individually to a person who posted a message (Blake, 1997:443).

Approximately 20 000 groups exist discussing almost any conceivable topic. Each Usenet site is financed and administered independently (Laudon, 2000:294).

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4.2.3 Intranet

These days, organisations could use Web technology to design their own private networks which are called intranets. This internal network provides access to the employees to all types of data inside the corporation. Intranets combine existing company infrastructure with Internet connectivity standards and software used for the World Wide Web. The main advantage for using intranets is the networked applications compatibility with all kinds of computers throughout the organisation. The primary difference between the Internet and the intranet is the Internet is open to everyone whereas the intranet is private and protected from the public. Intranets are protected from outsiders by using firewall security systems that consist of hardware and software put in place between the organisation's internal network and the external network. Intranets use the same HTML software to program web pages and web browsers to brows the pages as the Internet (Laudon, 2000:298).

4.2.4 Extranet

Some organisations are giving limited access to their internal intranets to outside users. These intranets are called extranets. The companies normally use firewalls to limit the access to the internal data and to keep it protected. For example, the company may allow their best customers access via the Internet to the intranet to attain information and special features about products. Extranets are also useful for companies that work together in a joint venture (Laudon, 2000:299).

4.3 ELECTRONIC COMMERCE (E-commerce)

"E-commerce (electronic commerce) is the buying and selling of goods and services on the Internet, especially the World Wide Web." (Anon, 2004a)

4.3.1 Advantages and disadvantages of e-commerce

E-commerce reduces the cost of doing business. Sending data via a network is a lot faster and less expensive than making a telephone call or sending a messenger. The biggest concern with e-commerce is security. The Internet is a public domain and many users are unwilling to send personal or sensitive information, as parties with criminal intent might intercept it.

Many companies are trying to resolve the security problems because many organisations still want to take advantage of e-commerce's benefits (Slater, 1999).

4.3.2 Business-to-consumer e-commerce

The web has become the major channel for business-to-consumer e-commerce. A good example would be Amazon.com. At this site consumers can purchase a variety of products by using their credit cards. These goods will then be delivered to the consumer a few days later. Conducting individual stock trades, transferring money from cheque accounts to savings accounts or tracking an overnight package delivery via the Internet, are other examples (Slater, 1999). By early 1999 the forecasted e-commerce revenues for business were billions of dollars and the stocks of companies were increasing fast although many so-called "dotcom" retailers disappeared in the economic shakeout of 2000 (Anon, 2004a).

4.3.3 Business-to-business e-commerce

Electronic data interchange (EDI) is a set up for exchanging business information over private networks. It speeds up the exchange of information and automates certain functions between companies which frequently do business with one another. EDI can be used in many other mechanisms for business interaction such as electronic catalogues and electronic payment systems. The web plays an increasing role, just as it does in consumer e-commerce. For example the office supply provider puts an ordering page on the company's intranet (Slater, 1999). The web also makes available a 24-hour display of the products and an instant way to contact the right people in a company for more information (Anon, 2004a).

4.4 INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

"Integrated Services Digital Network is a universal digital network that provides integrated voice and data on common telephone company facilities." (Held, Friend, Fike, Baker, Bellamy, Luecke & Battle, 1994).

The basic ISDN interface uses two 64 kilo-bits per second (kb/s) B channels plus a 16 kilo-bits per second (kb/s) D channel for network signalling. The two B channels can be combined to give a data rate of 128 kb/s (Blake, 1997:371).

ISDN is a digital dial-up, end-to-end connection service that provides voice, video, data or text facilities simultaneously and offers customers the flexibility and convenience necessary for successful communications (Telkom, 2004).

Currently there are two kinds of ISDN access, basic rate (2 channels) and primary rate (30 channels). The digital channels in these access services can be used simultaneously or independently. For example, for basic rate service the user can make or receive a phone call, send or receive a fax and surf the Internet at the same time. Only two of the previously mentioned services can take place on one line simultaneously. This service will provide the user with high speed, capacity and productivity. The digital transmission means that voice and sound are crystal clear with no noise or static on the line (Telkom, 2004).

4.5 ASYMMETRIC DIGITAL SUBSCRIBER LINE (ADSL)

Laudon (2000:273) mentions that ADSL technology works over the existing copper telephone lines to carry voice, data and video. It has a much higher transmission capability than ISDN. It can download data up to 9 mega-bits per second and upload up to 640 kilo-bits per second. It is mainly used for high speed connection to the Internet.

When Telkom (2004) first introduced ADSL to the South African market, the download capacity was capped at 512 kb/s and the upload capped at 256 kb/s. There are various reasons for this, but they are not the aim of this study. Telkom has recently introduced a cheaper ADSL access product called HomeDSL 384. With this product you can download up to 384 kb/s and upload up to 128 kb/s. ADSL has a few advantages; the user pays a fixed monthly rate as there are no calls that need to be paid as with ISDN. The connection speeds are a lot higher. It works simultaneously over the existing telephone line, so the user can still make a call or send a fax while online.

4.6 NETWORKS

4.6.1 Local Area Network (LAN)

"Local Area Network is a communications network that is restricted to a small geographical area, usually within a building or on a campus, and that has cabling normally installed and/or controlled by the organisation that operates the network." (Held *et al*, 1994).

Most academic institutions have one or more local area network. For example all of the individual workstations in a computer lab may be linked to a central computer called the file server. This server holds the software to be used to connect terminals to the network printer. A well structured LAN will be able to allow several users to use the same software at the same time and even to work on the same documents. Information can also be moved from one kind of document to another (Blake, 1997:422).

According to Blake (1997:423) there are many ways to build networks. Combinations of the following topologies are normally used.

4.6.1.1 Star

In a star network separate terminals are connected directly to a central computer. The central computer can be a mainframe or minicomputer or a dedicated microcomputer known as a file server. Each of the connections to a network, regardless of its type, can be referred to as a node. A typical star network is shown in figure 4.1. The star is the oldest network topology. The disadvantage of this system is that if the central computer fails, the whole network goes down. It is viable for a star network to have an active or passive hub at the centre of the star instead of a computer. The hub connects all of the nodes together but does not necessarily control the network (Blake, 1997:423).
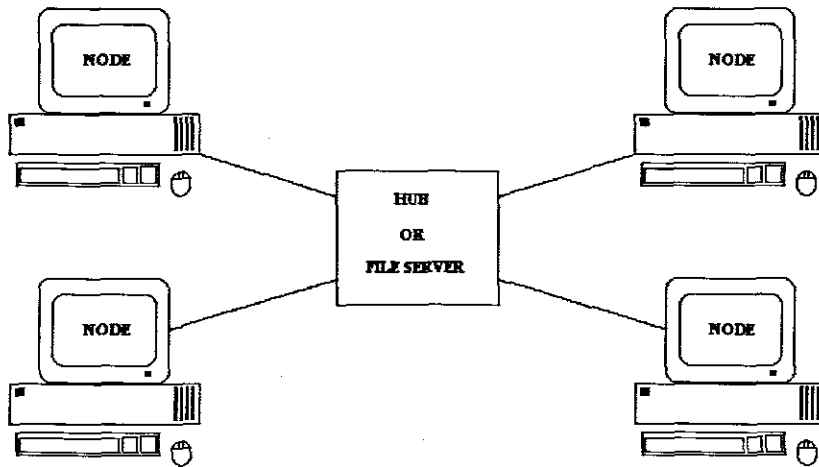
Figure 4.1 Star Network

4.6.1.2 Ring

Figure 4.2 shows a typical ring network. Each node is connected to the next one via a cable. When a node receives a message it passes it to the next node around the ring. The next node does the same action and the signals usually move only in one direction. The network will not be able to function if one of the nodes is disconnected. Communication in a ring network is organised by a technique called token passing. A short message called a free token is sent around the ring. When the token reaches a node with data to send, the node changes the token to a busy token. This busy token is then sent to the next node followed by the message. Messages are divided into short sections called packets. Each node examines the data packet to establish whether the message is intended for it. It then sends the packet to the next node. This process goes on until the packet reaches the original node. The originating station then changes the token to a free token and passes it to the next node. The free token is passed on until another node wants to send data. This type of network can waste a lot of time, especially when traffic is light, as the node needs to wait for a free token even if there is no other traffic (Blake, 1997:424).
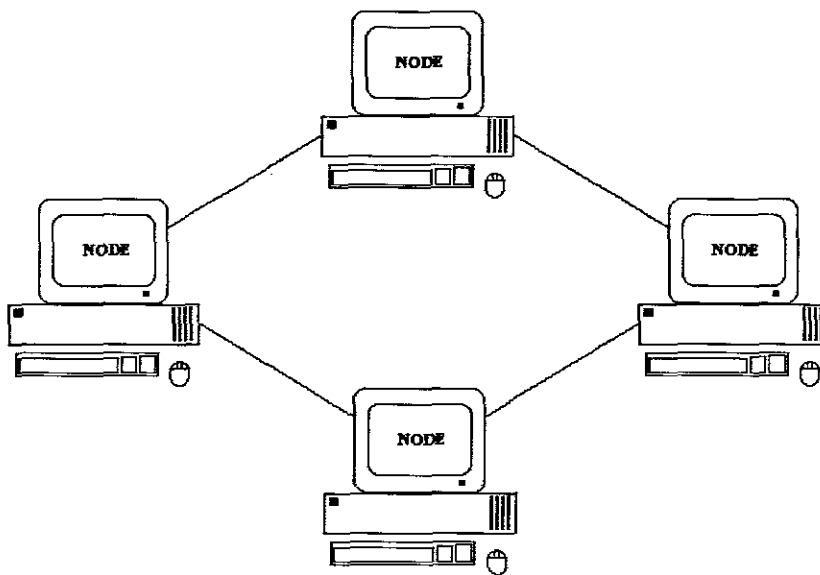
Figure 4.2 Ring Network

4.6.1.3 Bus

Figure 4.3 shows a network topology known as a bus. Each node is connected to the same line. This line can be twisted-pair wiring, coaxial cable, or even optical fibre. The wiring can be to a large extent simpler than with the star or the ring topology. This system is less centralised than the star and it needs no special provisions to allow it to continue to function when an individual node fails, as with the ring. The only problem with the bus topology is that all traffic shares the same channel. One method is to use token-passing similar to that in ring networks. The token is sent to each node in turn according to a programmed table. A more common method is called CSMA/CD, which is short for carrier sense multiple access with collision detection. The network terminals monitor the line for data. When the line is not busy, the node with data to send simply transmits. All the stations receive the data and determine from the address on the packet whether the data is intended for it. If the address does not match, the packet is simply ignored. If more than one node transmits at the same time conflict will happen and all packets will be worthless. All the transmitting nodes will detect this error and will stop sending. Each of them will wait a random amount of time to retransmit the data (Blake, 1997:424-425).
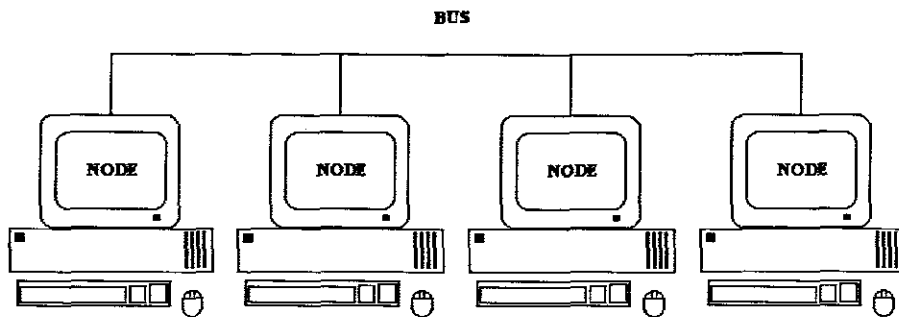
Figure 4.3 Bus Network

4.6.2 Wide Area Network

"Wide Area Network is a telecommunications network that spans a large geographical distance. May consist of a variety of cable, satellite, and microwave technologies." (Laudon, 2000:271).

Nearly all wide area networks utilise lines provided by telephone companies. There are three basic ways of organising the lines. Dedicated, leased lines can be used, or lines can be shared by using either circuit switching or packet switching (Blake, 1997:435).

4.6.2.1 Leased Lines

The simplest system is for lines to be leased from telephone companies on a monthly basis. The cost depends on the data rate and the length of the line. Leased lines are most suitable when data must be transferred between two centres on a continuous basis (Blake, 1997:435).

Telkom (2004) have a variety of leased line products. They also use a range of technologies, but they sell a service and not a technology to the customer. One of these services is Diginet. Diginet is a dedicated, synchronous data transfer service. It provides 24 hour, secure, high quality, point-to-point service over a digital transmission network. It is intended for customers who make use of their data network for applications which need constant bandwidth for a big portion of the day. It offers speeds from 2400 bits per second to 2048 kilo-bits per second (kb/s).

4.6.2.2 Circuit Switching

The second way to arrange a wide area network is to use circuit switching. This method is very similar to placing a call on the ordinary switched telephone network. The connection is made only when a station has data to transmit. Wide area network circuit switching uses digital lines, making modems unnecessary, and can operate at much higher data rates than an ordinary dial-up line with a modem (Blake, 1997:435-436).

4.6.2.3 Packet Switching

Packet switching is the third way to organise the connections of a wide area network. Packets are short bursts of data which start with a header that includes the address of the node to which the packet is being sent. Each station of a wide area network (WAN) has an address, and packets of data can be addressed to it from any other station. The network is designed to automatically select the best route, which is not necessarily the shortest distance between the two nodes. If the shortest route is busy, a packet may be sent via a longer route. Packet-switched networks are often visualised as a "cloud" with various nodes connected to it (Blake, 1997:436).

Packets may be delivered out of sequence, but this is not a problem as each packet's header includes information which allows the system to rearrange the packets in the correct order. The most important advantage of packet switching is redundancy. A malfunction in the network will not prevent packets from reaching their destinations as there should always be an alternate route in case of problems (Blake, 1997:436-437).

Telkom (2004) has a few products that use different packed switching technologies. The products Frame Express use Frame Relay technology and ATM Express use ATM (Asynchronous Transfer Mode) technology. Both of these technologies can be represented as a "cloud" as previously mentioned by Blake (1997:436). Frame Relay is a wide area networking technology based on a packet-orientated communication system. ATM Express is a digital transmission service for Wide Area Networks providing speeds from 2 Megabits per second up to 155 Megabits per second. The service provides a medium for companies to

transmit high volumes of virtually error-free information at high speeds over their Wide Area Network with high quality and reliable connections.

4.7 CELLULAR PHONES

Cellular telephones are also known as mobile telephones. They use radio waves to communicate with the closest radio antenna (also know as towers) (Laudon, 2000:266).

Cellular repeaters are restricted by range using low power, but they still need to be elevated to minimise radio shadows caused by buildings. The concept here is to use many small repeaters instead of one high power repeater. These repeaters are located in a grid pattern similar to that of figure 4.4. Each repeater is accountable for its own cell. These cells are shown as hexagons but in reality the antenna pattern is more circular and overlap each other. The main advantage for using low power transmitters is that frequencies can be re-used over short distances (Blake, 1997:738).

Figures 4.5 and 4.6 display one of these cell sites which can be seen at the Bothasig exchange. Some of these antennae are "hidden" from the public eye as they are fabricated to look like trees.

"The cellular telephone infrastructure was developed for voice transmission, but it is being enhanced for two-way digital data transmission." (Laudon, 2000:266).
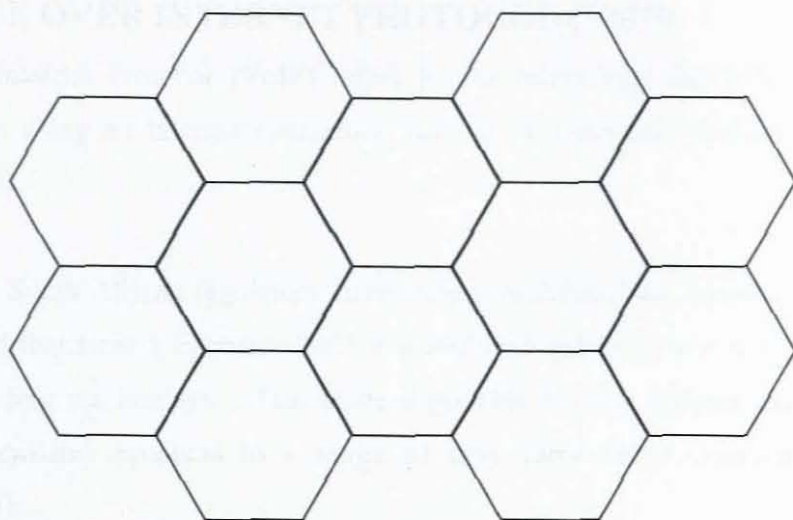
Figure 4.4 Basic cellular patterns
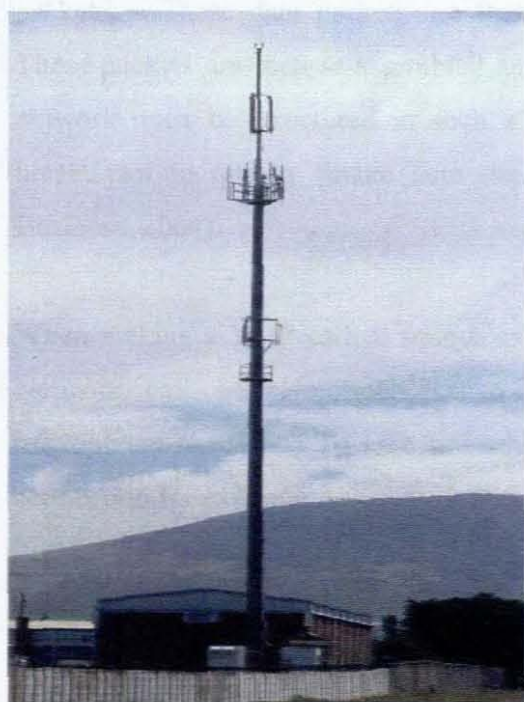
Figure 4.5 Cell site

Figure 4.6 Close up of the same cell site

4.8 VOICE OVER INTERNET PROTOCOL (VoIP)

"Voice over Internet Protocol (VoIP) refers to the technology that allows you to make telephone calls using an Internet connection instead of a normal telephone line." (MWEB Business, 2004).

Until now, the South African regulatory environment prohibited the introduction of VoIP. It was announced that from 1 February 2005 it would be legal to do any voice calls via any IP network, including the Internet. This made it possible for any Internet Service Provider to expand their existing products to a range of new value-added voice services (MWEB Business, 2004).

4.8.1 In-depth look at VoIP

Voice over Internet Protocol is the digitising of the analogue voice signal to digital data packets. These data packets are then transported via an Internet Protocol (IP) network. These packets are then re-assembled and converted back to an analogue voice signal. The network must be structured in such a way to give voice traffic precedence to ensure no breakdown in quality (make sure the voice is not broken speech or delayed) (MWEB Business, 2004).

When making a VoIP call, it sounds exactly like a normal PSTN (Public Switch Telephone Network) call. It also allows you to make a call directly from the computer by using the microphone headset. To take full advantage of VoIP you will need a broadband Internet connection for example ADSL (ISP Data, 2004).

4.8.2 Advantages of VoIP

The main reason for making use of VoIP is cost savings. It is also not only for huge companies, but gives small-to-medium businesses the chance to benefit from considerable telecommunications cost savings as well as improved business efficiencies (MWEB Business, 2004).

VoIP is digital and offers new features that is not currently available with the traditional PSTN. Times spend (no more per second billing) on the telephone and the location you are phoning to, are no longer cost factors. This is only true if the location is also makes use of VoIP (ISP Data, 2004).

Companies with wide spread offices or who make lots of international calls should invest in this technology (MWEB Business, 2004).

4.8.3   Disadvantages of VoIP

Voice over IP does not work over poor quality networks. The network also requires enough bandwidth capacity to carry the voice (MWEB Business, 2004).

During power failures the VoIP service might not work as where the PSTN does work. Connecting to the local emergency service might also be a problem as they will not be able to determine your location as can be done with caller line identification of the PSTN (ISP Data, 2004).

4.9   PROBLEMS WITH TECHNOLOGY AND SOLUTIONS

4.9.1   Spyware

As mention in chapter two, Spyware is software installed on a PC to gather personal information about the user and to forward it to a point so it can be misused.

The following is some indications that the PC might have spyware on it (Kelly, 2005a:36):

- Browser windows open when the browser isn't running.
- Browser windows open spontaneously when the browser's running.
- Ad windows reopen when closed.
- Multiple browser windows open and take over the screen.
- Simple pop-up blockers won't stop the pop-up ads.
- Start menu, desktop, home page and favourites are modified.
- System seems slow; inspection of processes shows a lot of idle system activity and

network activity, especially when the browser's in use. Browser ceases to work or can only access a specific site, such as a shopping system.

- The user receives solicitations to install helper applications, tune up their PC, fix security problems, which look like "official" notifications.

- Web pages will be modified with unexpected links, text and pictures altering or overlaying the displayed page.

At the following web sites spyware removal tools can be found (Kelly, 2005a:36):

- AdAware (www.lavasoft.de)
- Microsoft (www.microsoft.com/spyware)
- Spybot Search & Destroy (www.spybotsafer-networking.de)

4.9.2 Spam

The first way the spammers get hold of an e-mail address is called "e-mail harvesting" (Ebersöhn, 2004:76). Spammers use software called "search ware" that use "search bots" that surf the net to retrieve addresses from public forums for example Web sites, chat rooms and newsgroups. The best way to prevent that these search bots to get hold of an e-mail address is not to give it to anyone via chat forums or newsgroups or any other "public" places on the Internet and never show an e-mail address on a Web site.

The second way is called "dictionary attacks" and this is when a program generates possible e-mail addresses by combining names, letters or numbers into many variations (Ebersöhn, 2004:76). The spam is then sent to these "potential" e-mail addresses. This is a very imprecise way and creates many nonworking e-mail addresses that will be rejected by the recipient's e-mail server as non-existing. Short e-mail addresses are more susceptible to such assaults. Avoid using short e-mail addresses to prevent this from happening.

Companies should invest in anti-spam software that is able to detect and block e-mails from spammers (Ebersöhn, 2004:76). When forwarding e-mails, it is good practice to delete the top e-mail addresses (of all the recipients who received the mail with you) to prevent possible spammers to use it. Be careful of installing or downloading software from the Internet as it

might contain spyware. Do not open spam e-mails as they will receive a "read" message. Most e-mail software does have a setting that can be set to first ask before it sends such a message.

Most spam e-mails do have an "unsubscribe" link at the bottom of the mail. One should never click on it as this link normally takes you to a site where you are asked to enter your e-mail address to unsubscribe. Your e-mail address then gets distributed to other spammers. Also never reply to any spam.

When you have to give an e-mail address and you do not trust the site, rather give a free e-mail address. Anyone can create a free e-mail account at for example Hotmail.com. Another option is to use free e-mail forwarding services for example SpamEx (www.spamex.com).

4.10 CONCLUSION

The Internet's applications changed over the years. It went from a government funded project to a new way to communicate to a new way of doing business. Companies' structures changed and went from local to international markets.

Networks changed to Intranets by using Internet Protocols that made the interlinking of networks much easier. It also made networks more user-friendly for the end users.

Voice over Internet Protocol (VoIP) is fairly new in South Africa, but has proven itself all over the world. It promises a large possible cost saving for medium to large companies that take advantage of it. ADSL is the technology that will provide the broadband bandwidth for VoIP.

CHAPTER FIVE

RESEARCH DESIGN AND METHODOLOGY

5.1 INTRODUCTION

In order to study the financial effects of changing technology on businesses, questionnaires were administered at the Paarden Eiland branch of Hyflo Southern Africa (Pty) Ltd. This company is one of 56 hydraulic companies in the Cape Peninsula therefore the industry is very competitive. The purpose of this chapter is to indicate the methodology followed to gather information for this research project.

5.2 HISTORY OF THE HYFLO GROUP

Although the name "Hyflo" may not mean much outside the Fluid Power Industry, it is well known in South African engineering circles and in fact, has become synonymous with hydraulic and pneumatic engineering countrywide.

The foundations of Hyflo - one of the largest privately owned hydraulic engineering concerns in the country - were laid in 1954 when its founder, Mr. Ludwig Schwabe, predicted the vital role hydraulics and pneumatics would play in the future industrial development and advancement of South Africa. Ludwig Schwabe was one of two shareholders of the Diesel Electric Cape Group, an organisation which operated in the automotive industry distributing Bosch Automotive Products among other things. He persuaded the other shareholder to establish a hydraulic division which concentrated on importing and marketing hydraulic components, hoses and fittings for various applications in the agricultural, fishing and industrial sectors. This division grew from strength to strength and in 1967, it was separated from the Diesel Electric Cape Group and an independent company known as Hytec (Cape) (Pty) Ltd was formed.

The promotion of hydraulics and pneumatics in South Africa became Ludwig's personal challenge and under his guidance, the company soon became a leader in its field of expertise. It became known not only as an importer and stockist of renowned hydraulic products such as

BOSCH, WEATHERHEAD, HYDRECO, and CHAR-LYNN, to mention a few, but also as a reliable engineering company, capable of designing and executing complex projects in the hydraulic field.

In 1977 Ludwig Schwabe acquired the entire shareholding of Hytec (Cape) (Pty) Ltd and the company was renamed Hyflo Cape (Pty) Ltd. The company expanded steadily around the country, eventually creating the Hyflo Group.

Hyflo continued to grow and a number of important agencies were added to its range such as FLENDER, BENTELER, VOSS, STAUFF, HMT, ITR-SAIAG, SAFEWAY, HYDRAFORCE, RAHMER & JANSEN and EPE. Hyflo also became the exclusive South African distributor for SMC Pneumatics, Japan. This company is internationally recognised as the leading manufacturer of pneumatic equipment.

In addition to a countrywide distributorship network, branches were established in Johannesburg, Bellville, Durban, Bloemfontein, Port Elizabeth, Boksburg and Windhoek. The majority of the premises from which the branches operate are owned by the Schwabe Family.

Broadly speaking, Hyflo's areas of business can be summarized as follows:
- The sale of hydraulic and pneumatic components, i.e. pumps, motors, valves, cylinders, hoses, hydraulic pipes and fittings;
- Design, production and sale of complete hydraulic and pneumatic systems, including power-packs and other equipment, where detailed planning, advice and service are required;
- Installation, commissioning and after-sales service of the above systems and applications;
- Spares and repair service for all equipment sold and manufactured by the Hyflo Group.

The great number of diversified projects that Hyflo has been and is involved in, bears witness to the important role Hyflo plays in the field of hydraulics and pneumatics in South Africa.

Hyflo is now firmly established countrywide with its customer base distributed across the entire spectrum of the South African economy.

Quality has always been of prominent importance to the Hyflo group and this is evident in the product ranges that it represents. In 1998/1999 Hyflo was certified to the ISO 9001/9002 Quality Management System, which expects all employees to follow the laid down procedures and work instructions.

Hyflo's contribution to the South African industry is manifold. On the one hand it offers the it's clients a direct link to world class technology, as found in Europe, the USA and Japan. On the other hand as a South African organisation, Hyflo develops and adapts hydraulic and pneumatic systems that comply with and satisfy requirements unique to the South African environment. Hyflo is large enough to take on projects of any size, but small enough to be flexible. Hyflo is geared for and committed to the challenges that lie ahead - it offers a promising and rewarding future to all its dedicated and conscientious employees.

Figure 5.1 displays the locations of the different branches of the Hyflo group in Southern Africa. There are eight branches within the borders of South Africa and one located in Windhoek. The Hyflo group organisation chart can be seen in figure 5.2. Currently the Paarden Eiland branch employs 110 employees.
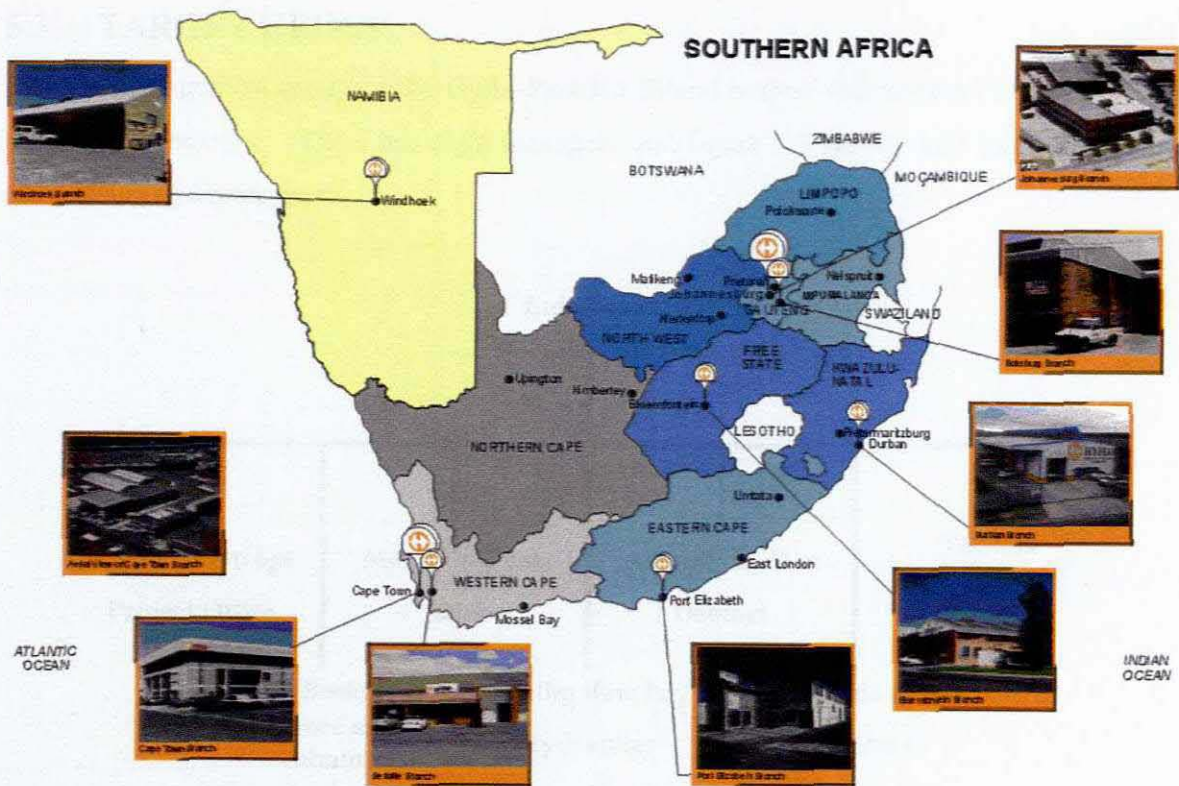
Figure 5.1 Branches of the Hyflo group (source: from the Hyflo website).
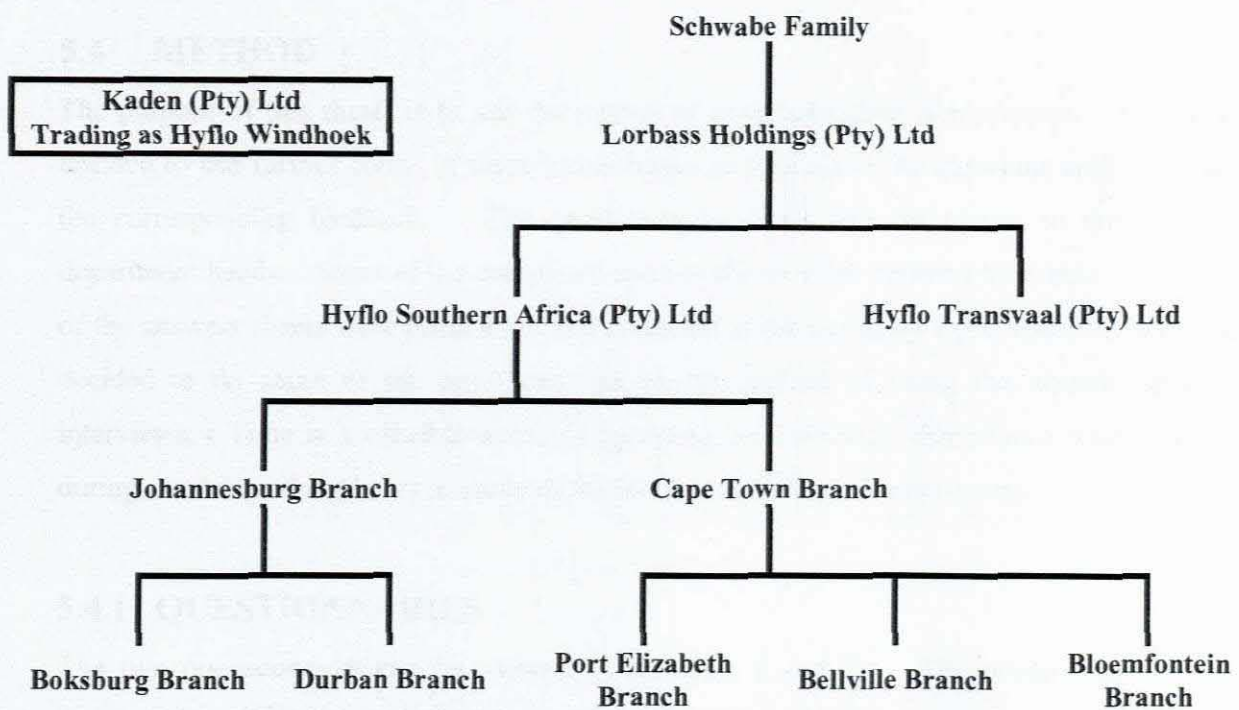
Figure 5.2 Hyflo group organisation chart.

5.3 TARGET GROUP

The top management group of the Hyflo Paarden Eiland branch was targeted for purposes of these questionnaires. There are eight managers and figure 5.3 shows their names and their corresponding departments.

Luis Sousa
Managing Director

Angus Beveridge

Project Office

Meno Hoffman

Sales

Amanda de Wet

Debtors

Theresa Parsraman
Finance

Jan Boshoff
Finance and Admin

Philip Fouche

Hydraulics

Hildegarde Crous

Creditors
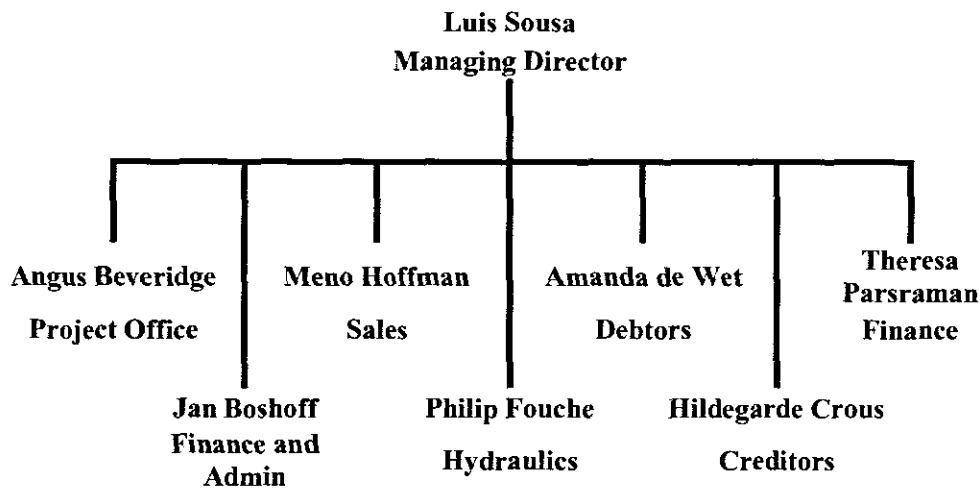
Figure 5.3   Hyflo Paarden Eiland branch management structure

5.4 METHOD

The purpose of this thesis is to see the impact of communication technologies. So it was decided to use various forms of these technologies to administer the questions and to receive the corresponding feedback. The questionnaires were sent by e-mail to the relevant department heads. Some of the completed answer sheets were returned by e-mail. The rest of the answers sheets were printed out and collected at the company's premises. It was also decided to do some of the interviews via phone, instead of using the normal personal interviews. Time is a valuable asset, so by doing this minimum disturbance where caused during normal working hours as some of the interviews took place after hours.

5.4.1 QUESTIONNAIRES

The two questionnaires can be viewed in annexure I and II. The questionnaires were developed according to the guidelines written by Gillham (2000) and Welman (2001). The

first questionnaire (QI) is ten pages long and was designed to be answered by the managing director only. This questionnaire has a separate section D, which asks financial questions that only the managing director would have relevant answers for. The second questionnaire (QII) is four pages long and was compiled for the department heads. The questionnaires used "easy to understand" terminology in order to minimise any misinterpretations. The questions were structured in such a way so as to facilitate easy answering by simply ticking the correct answer (multiple choice). There are similarities between the two questionnaires, but the only key difference is section D of the questionnaire I (QI). This section deals with the financial aspects of the company. A five point summated attitude scale where used for some of the questions (for example question six in questionnaire one). Open-ended questions were also used to allow new ideas or topics to be incorporated into the thesis (for example question eight in questionnaire one).

The answers of the managing director and the seven department heads are summarised in annexure III. Microsoft Excel was used to compile the graphs, figures and tables to assist with the statistical analysis.

5.4.1.1 Questionnaire I (QI)

The purpose of section A was to obtain background information of the company. The background information consists of the company name, address, contact number, how many branches and the number of employees.

Section B provided more background details about the managing director of the Paarden Eiland branch. The background information included years of service (5.2) and whether computers and software are used to make decisions (5.4). The general knowledge questions (6.1 to 6.4) were meant to determine if the person who answered the questionnaire would be able to answer the rest of the technical questions and if the answers would be valid for the study. Questions 5.3 and 7 are to determine how much of the managing director's role is dependent on computers and other technologies.

Section C (questions eight to ten) was compiled in such a way as to determine which communication technologies are used; who is making use of them and what they are used for. Question 11 was asked to identify the areas of the company that was and is affected by changing technologies. Question twelve was mainly asked to determine the respondents' mindsets towards different statements made. An attitude scale was used here with five intervals, where the one side of the scale is "strongly disagree" and the other side is "strongly agree". Question 13 was asked to establish the company's policy for replacing their computers. The computer is a very common business tool, but sometimes the importance of it is only realised when the computer breaks down.

Section D (questions 14.1 to 14.11) referred to all the financial questions of the company. For each question a table was given with a choice of possible answers, to facilitate easy analysis. The answers also had to be based on the last ten financial years. These answers were used to draw graphs with Microsoft Excel. The answer tables (except for 14.10) had five intervals with 20 per cent increments for the financial answers.

5.4.1.2 Questionnaire II (QII)

The purpose of questions one to five was mainly to collect background information about the department heads who answered the questionnaire. Their names, contact numbers, positions, years of service and department names were collected here. The contact information was used to do telephonic interviews with some of the department heads. The years of service helped to establish if the company has a high staff turnover in the management structure.

Question 6 is the same as QI 5.3

Question 9 is the same as QI 7.

Question 8 (8.1 to 8.4) is the same as QI 6 (6.1 to 6.4).

Question 10 is the same as QI 8.1.

Question 11 is the same as QI 8.3.

Question 12 is the same as QI 11.

Question 13 (13.1 to 13.6) are the same as QI 12 (12.1 to 12.6)

The last question (no14) was open ended. It gave the individual department heads the opportunity to list all other technologies they felt had had a big impact on the company.

5.4.2 INTERVIEWS

Semi-structured personal and telephonic interviews (partly structured interviews as described by Welman (2001)) were held with the managing director and three department heads. A semi-structured interview is when a list of questions is followed, but not necessarily in sequence. This type of interview also allows questions to be asked that are not listed and allows general discussions to take place. These interviews only took place after the completed questionnaires were received back from the company. The main reason for these interviews was to clarify some of the answers given. An appointment was made with the managing director for a personal interview. Before this meeting most of the discussions and communication took place via the telephone or e-mail.

A problem was encountered with the answers to the financial questions section (questions 14.1 to 14.11) of the first questionnaire, for example question 14.3. In this question the managing director was asked to give the percentage of turnover utilised on new computers & networks for the last ten years. The answers sheet was ticked as follow:

Year	0-20%	21-40%	41-60%	61-80%	81-100%
1994	X				
1995	X				
1996	X				
1997	X				
1998	X				
1999	X				
2000	X				
2001	X				
2002	X				
2003	X				

The intervals used were 20 per cent; unfortunately these intervals were too big. Most of the answers ticked fell between the 0 to 20 per cent region. It was impossible to observe any trend in the data for the ten year period which was recorded. During this meeting the managing director decided to give more accurate percentages to assist with the analysis.

These percentages can be viewed in annexure III. A general discussion followed after all the relevant questions were answered. Topics such as the future of the company, the use of e-commerce and telecommunication trends were discussed.

The department head interviews took place on different times of the day. Some of these interviews took place telephonic after normal working hours. These discussions took less than ten minutes as it was merely to clarify some of the open ended questions answered for example questions ten and fourteen of the second questionnaire (QII).

5.5   SUMMARY

This chapter dealt with the research and design method followed.

Hyflo was started in 1954 by Mr. Ludwig Schwabe and is one of the largest privately owned hydraulic engineering concerns in the South Africa.

Only eight managers of the Hyflo Paarden Eiland branch were targeted for purposes of the questionnaires. The first questionnaire (QI) is ten pages long and was designed to be answered by the managing director only. This questionnaire has a separate section D, which asked financial questions that only the managing director did have answers for. The second questionnaire (QII) is four pages long and was compiled for the department heads.

Semi-structured personal and telephonic interviews were held with the managing director and three department heads. The department head interviews took place on different times of the day. Some of these interviews took place telephonic after normal working hours.

CHAPTER SIX

RESULTS OF QUESTIONNAIRES AND INTERVIEWS

6.1   INTRODUCTION

Chapter five described the various techniques used to gather new information for this research. In this chapter the results of the interviews and the questionnaires are analysed and discussed.

6.2   RESULTS

6.2.1   Years of service (QI 5.2 & QII 4)

Most of the employees in the managerial positions have many years of service.   Their years of service ranged from 1.6 to 26 years.   The average years of service are just over 13 years. These people have been around long enough to see the impact of various technologies over the last ten years.   This is also an indication that the staff turnover in the managerial positions is low, except for the hydraulic, finance and finance & admin managers.   The previous manager of the hydraulics' department left after 12 years.   Only financial manager positions seem to have a high staff turnover.   After this study was done, both financial managers left their positions in this company for better prospects.   The company still values their employees and reward long-time service with 10, 20 and 25 years service bonuses.
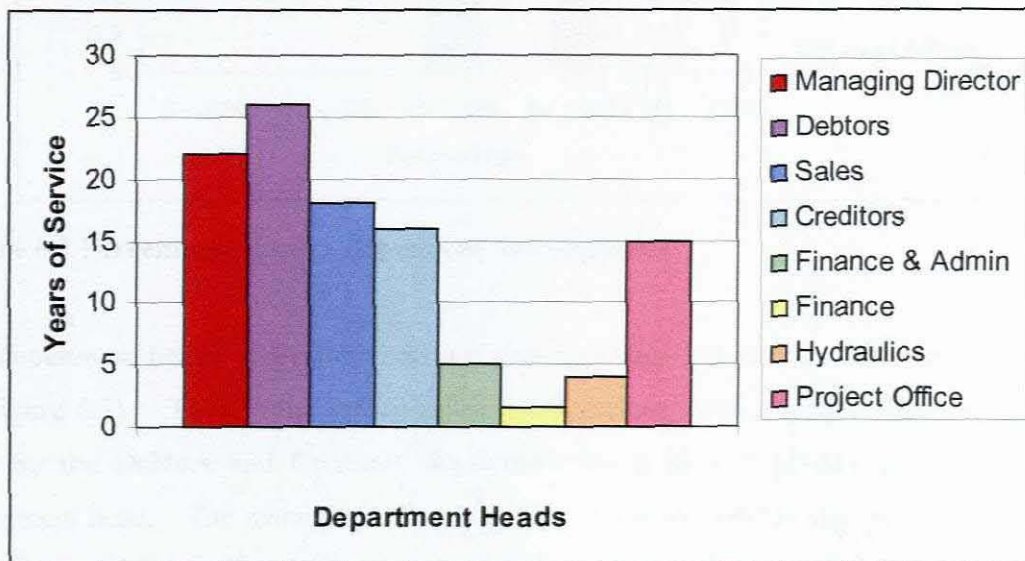
Figure 6.1 Years of service

Each department was given a colour to assist the reader with comprehension of this thesis. The years of service of each department's head can be viewed in figure 6.1.

6.2.2   Computers (QI 5.3, QI 5.4, QI 7, QII 6, QII 7 & QII 9)

Figure 6.2 clearly indicates that all management staff feels that their work is more than 40 per cent dependent on computers.   According to the managing director computers and software are also used in decision making, for example Microsoft Excel would be used to draw graphs. These graphs will display possible business trends for example sales and strategic decisions can be made accordingly.   The Finance and Debtors departments feel their work is more than 80 per cent dependent on computers.   The main reason for this is that most of their daily functions that used to be book and paper systems were replaced with software.   All of them feel computers are more a useful tool rather than a burden on their work load.
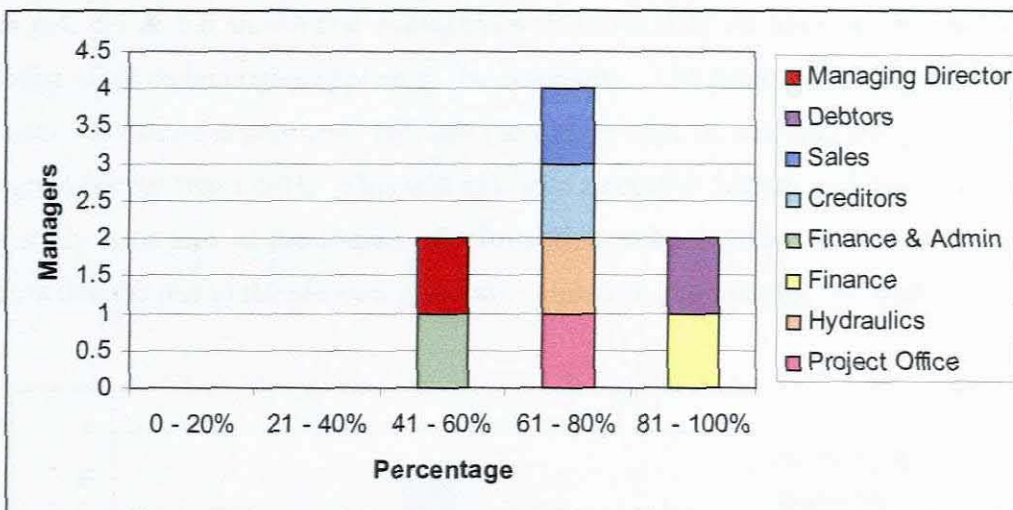
Figure 6.2 Percentage of work dependent on computers

The department heads' daily functions are also dependent on various other technologies (as per figure 6.3).   These other technologies could include from a simple financial calculator used by the Debtors and Creditors department heads or cell phones used by the Sales department head.   The managing director uses a handheld portable day planner.   These are just a few examples of the various technologies these managers use eash day.

57
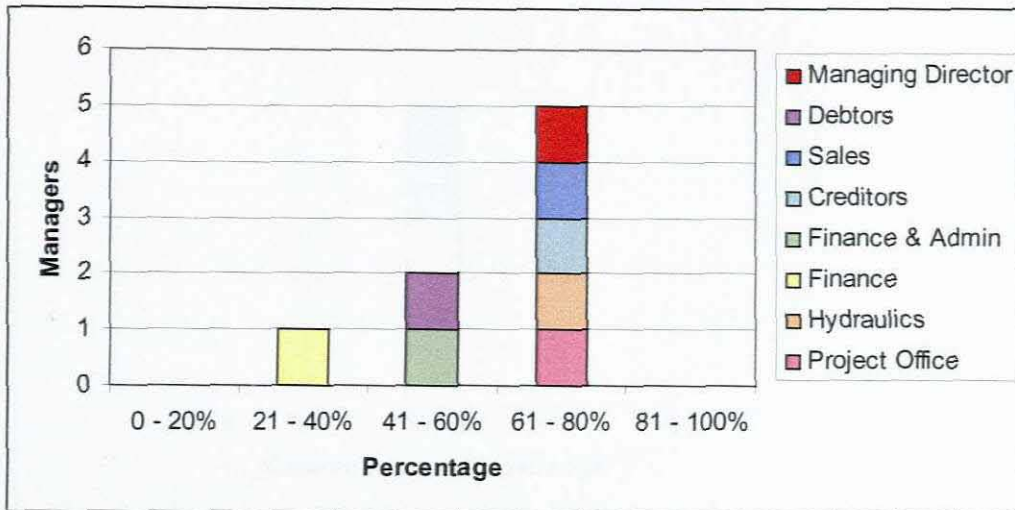
Figure 6.3 Percentage of work dependent on technology

6.2.3 General knowledge (QI 6.1 to 6.4 & QII 8.1 to 8.4)

Figures 6.4, 6.5 & 6.6 shows that management believes they all have an average or higher knowledge of all technologies applied in the company. The heads of the Debtors, Creditors and Finance & Admin departments feel that their knowledge of manufacturing technologies is not so good (as per figure 6.7). This will not have a negative impact on this study as the aim of this study is to look at the impact of information technologies. This is a good enough indication that the rest of the answers given are valid to be analysed for this study.
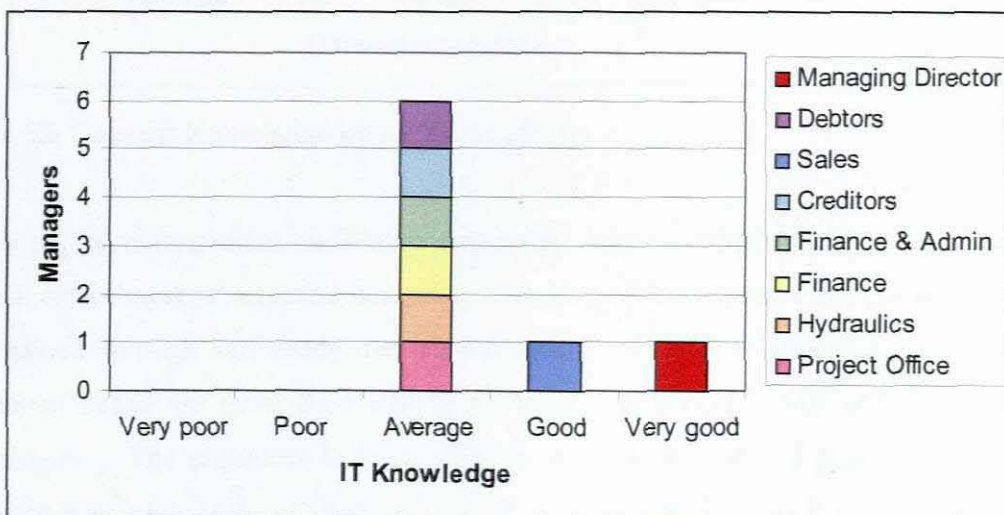
Figure 6.4 IT Knowledge
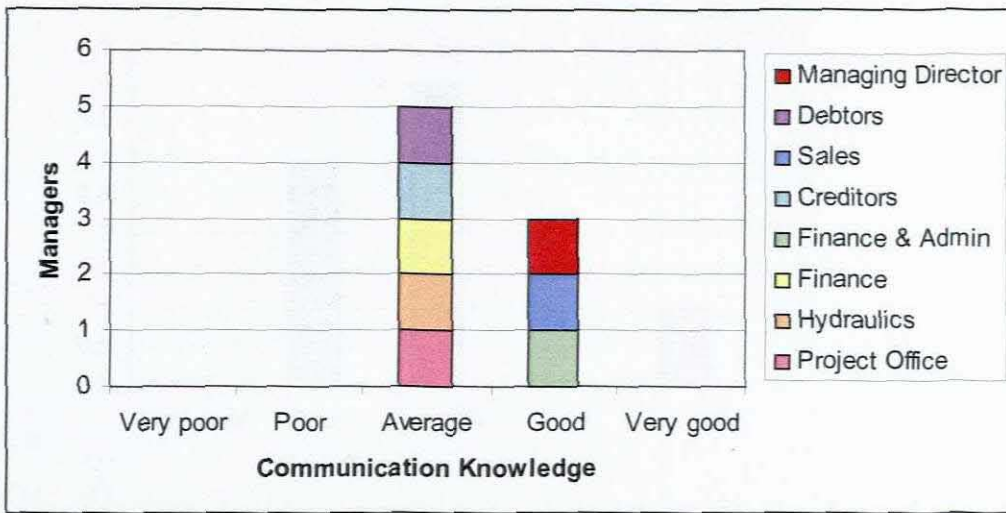
Figure 6.5 Communication Knowledge
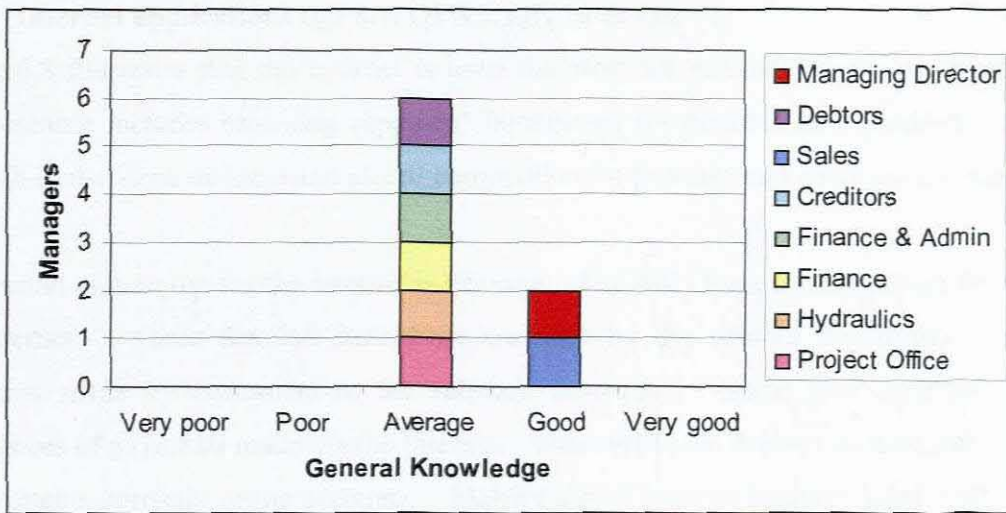
Figure 6.6 General Knowledge on all Technologies

Not all of the management staff have university degrees (which came to light during the personal interviews) or attended computer courses. So this means the general knowledge were gained through self study and figures 6.4 to 6.6 clearly indicates that the various department heads are more than willing to learn new concepts and applications for new technologies. The eagerness to learn without financial reward is a good type of company culture.
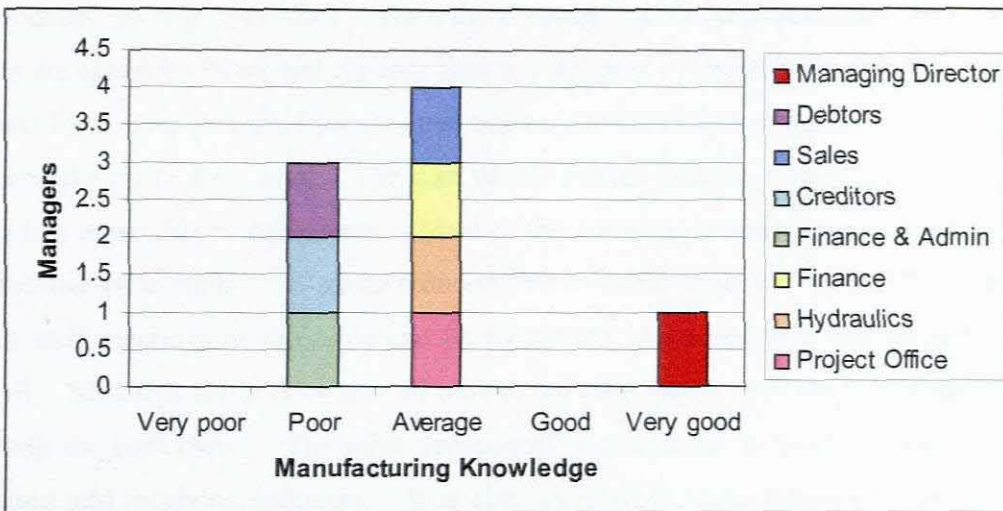
Figure 6.7 Manufacturing Knowledge

6.2.4 Internet applications (QI 8.1, QI 8.3, QII 10 & QII 11)

Figure 6.8 illustrates that the Internet is used the most for research by all of the managers. This research includes browsing suppliers' homepages for possible new products. Market research is also done on local and global competition for possible new products and services.

The second highest use for the Internet is banking. The daily bank statements are drawn from the Internet. These detailed statements are used by the debtors department to capture payments made by customers to the relevant accounts. Some customers e-mail their remittances of payments made via the Internet. This assists the debtors department to allocate the payments correctly to the accounts. Making use of Internet banking helps Hyflo to save unnecessary bank charges. For example to draw a bank statement from the Internet is free of charge while a service fee will be charged if drawing the same statement from an automatic teller machine. The creditors pay most of Hyflo's accounts via the Internet.

Although e-mails only came third according to figure 6.8 it is still a very vital communication tool as everyone in Hyflo has access to it. All of the management staff agrees that e-mails are used for the distribution of information inside and outside the company. This information can be anything from a photograph taken of the latest hydraulic installation on a ship to the minutes of the next staff meeting. Company news letters are no longer printed out on paper

or reproduced on copy machines. Here the company saves on printer paper and toner cost. E-mails are also a lot faster and cheaper than normal post. An e-mail with documents from the Cape Town branch to the Bloemfontein branch can take a few minutes, while using normal mail can take up to four days. The cost of the stamps and the possibility of the envelope getting lost must also be considered. Most of the company's notices are relayed to the staff with the use of e-mails. E-mails reduced the valuable time lost caused by unnecessary general staff meetings as the topic can be forwarded and a response can be given back, if required. Although Hyflo does not sell online, the sales department does communicate via e-mail with the customers. The sales department uses e-mails to facilitate sales by sending quotations and receiving enquiries. It is also accepted business practice of the creditors to forward the remittances (proof of payment) to the relevant suppliers. By sending these remittances via e-mail instead of a fax, the administration costs of Hyflo are reduced.

Company cell phone accounts are also downloaded from the Internet. This information is directly downloaded into Microsoft Excel and the relevant cell phone users can be approached if overspending has occurred.

A very interesting other use for the Internet is the credit bureau. Any prospective client who requires terms of payment other than cash on delivery (COD) with Hyflo Southern Africa Pty Ltd completes a credit application. The 30-day credit application form ensures that each party knows and understand their respective duties & obligations and is fully aware of the exact identity of the other. It is important to establish what legal entity the company is dealing with. Credit worthiness is becoming a vital part of the future's profitability of any company, as demand for money exceeds supply (people want to over spend). Hyflo Southern Africa (Pty) Ltd is a subscriber to TransUnion ITC (Pty) Ltd. This credit bureau was founded in 1968 and is a global company. They record information regarding default and judgments obtained against people and juristic persons (person who failed to pay when due). All information is compiled to provide a credit history on the relevant person. The debtors department uses e-mails to update information with the credit bureau. A template that was supplied is filled in with the relevant default and send via e-mail to the credit bureau. The debtors department also makes use of the Registrar of Companies (Internet address:

http://www.cipro.co.za) when considering to open new accounts. Basic information of any registered company can be found at this site. This information include enterprise name, registration date, business start date, enterprise type, registered address, postal address and more.

Using the Internet for advertising and e-commerce does not seem to have very high priority according to figure 6.8. This topic was brought up in the personal interview with the managing director. His explanation to this is that because the hydraulic environment consist out of too many variables, it is not possible to provide a customer solution online. It is not as simple as selling completed products, which are mass produced, where customisation is not required.

It is Hyflo's policy that only the management staff has access to the Internet. There are various reasons for this. The biggest one is to prevent the misuse of it. The Internet gives an individual access to a huge amount of information. Unfortunately the temptation to use the Internet for non work related issues can be sometimes just too high. The valuable work time spend on non work related "surfing" can have a negative impact on the productivity of the company. It is also not possible for the IT department to block all pornographic websites. So far there is not one filtering program that can guarantee a hundred per cent filtering of all unwanted material. Unfortunately the programmers/distributors of these unwanted materials have the same knowledge as the programmers who want to block it. Most companies including Hyflo regard pornographic material to fall under their sexual harassment policy. As a preventative measure against any possible harassment cases the company only gives access to individuals who need access for actual business related matters. The security system of any computer network is only as strong as its weakest link. Most viruses access networks via e-mail or while browsing the Internet. All incoming and outgoing mail travels via the Johannesburg branch. Here the content of the e-mails are scanned for possible viruses and inappropriate content as jokes, picture and executable files. All these security systems cost money and are put in place as preventative measures. The advantages of having this system in place outweigh the cost of it by far. All companies can not afford to lose their valuable information systems, as all companies are dependent on them.
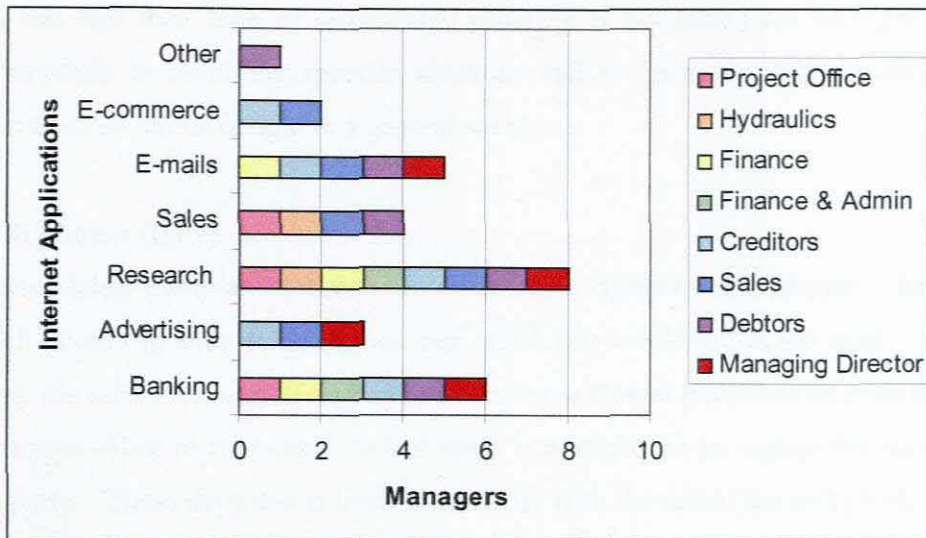
Figure 6.8 Internet Applications

6.2.5 Website (QI 8.2.1 & QI 8.2.2)

The company has a website (it can be viewed at the URL http://www.hyflo.co.za). The website is fairly fast to access and easy to use links. These links include background information on Hyflo, a branch map, product index, repairs and services, contact sales, downloads and feedback form. The background link displays a short summary of how Hyflo started and in what line of business they are in. The branch map shows all the contact information (telephone numbers and physical addresses) of the nine branches in Southern Africa. The product index lists all the different brands they support and supply. Repair and services explains the type of work they will attempt and what they have done previously. All the contact information of the sales departments are listed under the contact sales link. A detailed product list is available under the download section. Any potential customer can download the product brochures or catalogues. The feedback form gives the opportunity for any customer to give back any criticism should they have experienced any problems.

The main advantage of having a web site is that it gives potential customers 24 hour global access to the company's details. Hyflo saves money by posting the latest catalogue on the homepage instead of paying to have it printed and posted. This does also have a positive impact on the environment, as less paper is used. In the discussion with the managing director, it came to light that Hyflo does not want to do online selling via their website. The

reasoning was that their type of service and products is not suited for this type of trading (Hyflo specialises in providing specific solutions and not just providing general over the counter products as can be bought at a general store).

6.2.6 Cell phones (QI 9)

Management, sales, fitters and artisans are issued with company cell phones. Management can use cell phones to keep track of their personnel who work out on the road. Before cell phone days, the sales representatives had to drive to the closest payphone or even drive all the way back to the office to find out if certain stock is available or to request the manufacturing of certain parts. These days this is made a lot easier with the use of the cell phone. The man hours lost and the unnecessary use of fuel because of driving around is reduced and at the same time productivity also went up. Getting hold of personnel in times of emergencies is also made a lot easier.

6.2.7 Communication technologies used (QI 10)

Hyflo makes use of a variety of other communication technologies for day to day business. All of these technologies are discussed in the previous chapter. ISDN is used to do video conferencing with other branches. The cost of two long distance telephone calls is a lot cheaper than a plain ticket to have a one on one meeting with any of the other branch managers. ADSL is only used for Internet access. It is a fixed payment per month, so Hyflo can budget for this fix expense and there will be no surprising inflated accounts at the end of each month, normally caused by Internet dial up services. All the branches have local area networks. These local area networks are linked to one another with the use of leased lines to form a wide area network. This ensures that all the branches have access to the same customer database.

6.2.8 Aspects of the company influenced by changing technology (QI 11 & QII 12)

The management team clearly feels that all aspects of the business are affected by changing technology as can be seen by figure 6.9. The topics raised during the interviews held with the managing director and department heads on the ways the company changed due to changing technology are listed in the following bullet points:

- Old managers were not prepared to adapt to new ways of business. They have been replaced by younger and more qualified managers. These new managers are more open minded and are prepared to view any suggestions on improvements that are to the company's benefit. They also saw the need for new positions inside the company and therefore the structure of the company changed. For example the creation of the various departments head positions. To date no one in the company has ever been retrenched. People in redundant poisons were either retrained or given new responsibilities. Because of this retraining policy, Hyflo have so far not paid out any retrenchment packages.

- Sales used to be a complete paper system. The problems with a paper system, is the time and resources need to keep it accurate and up to date. With the old sales system there used to be many loop holes for possible corruption. Old paper sales systems were replaced with new tamper proof software systems to keep stock accurate and to prevent any possible corruption. These new systems make sales also simpler as the sales person can immediately see if the relevant stock is available in the store. These new systems also indicate well in advance what stock must be ordered. Immediate visualisation of stock trends helps Hyflo to spend less on expensive stock that is not used that often. This capital is used on stock with a much higher turnaround.

- Modern projectors are used with software such as Microsoft Power Point and Excel to facilitate presentations at meetings. The use of transparencies in meetings is almost a thing of the past. Microsoft Power Point wizards allow almost anyone with basic computer skills to create their own professional presentation. The money spend on stationery is also reduced because of this new technology implemented.

- Newly recruited staff who is qualified expects higher salaries for their knowledge. For example new mechanical engineering technikon students who are trained in operating the latest manufacturing equipment or know how to use the latest drawing package in design.
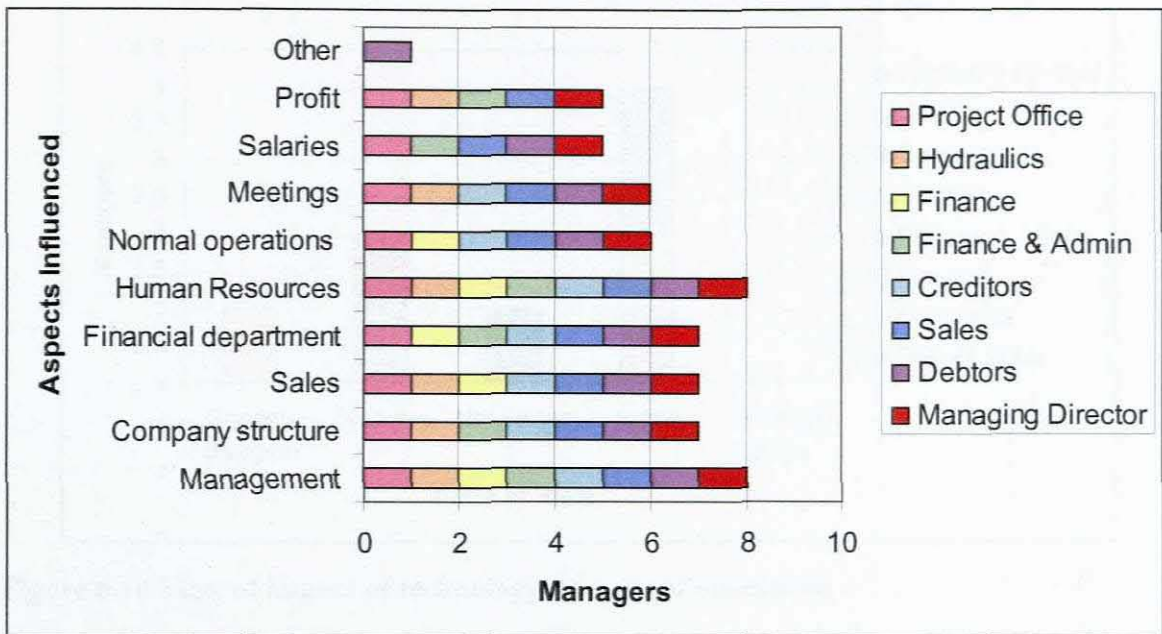
Figure 6.9 Aspects influenced by changing technology

6.2.9 Points of view of respondents (QI 12.1 to 12.6 and QII 13.1 to 13.6)

The following is the response on various statements made.

- **Changing technology causes the company to spend more money on normal operations.**

The four department heads of the following departments: Debtors, Finance, Finance & Admin, and Project Office all agreed with this statement (as per figure 6.10). In all departments of the company old equipment were replaced with new equipment. This new equipment did cause an increase in cost of normal operations. The long term benefit of this new equipment must be considered. The new hardware and software improved the productivity of the company. This increase in productivity outweighs the initial implementation cost. That is why the managing director and the department heads of the Creditors and Hydraulics departments do not agree with this statement.
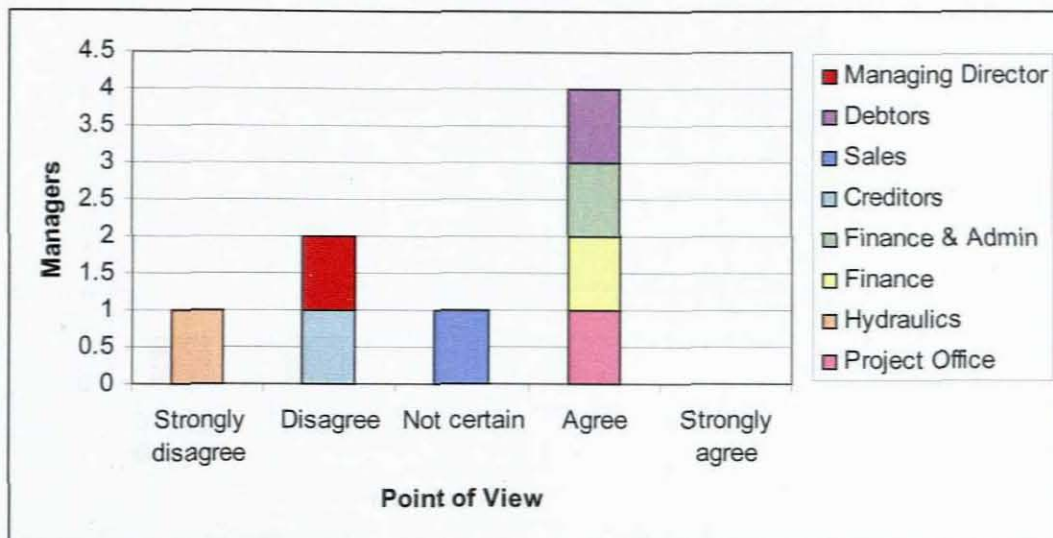
Figure 6.10 View of impact of technology on normal operations

- **The company is becoming more dependent on highly qualified staff, because of new technologies.**

Six out of eight managers agreed with this statement as can be seen in figure 6.11. The company had to decide to either employ a qualified network engineer to permanently maintain the network or outsource this function. Hyflo decided to outsource this function as it made more financial sense to do so. If the company employed someone permanently in such a position, they would have to pay for the highly competitive salary, pension, medical aid, sick and vacation leave.

Bullet points 1 and 4 of section 6.2.8 supports this statement as well. Hyflo had to employ new higher qualified managers and technical staff.
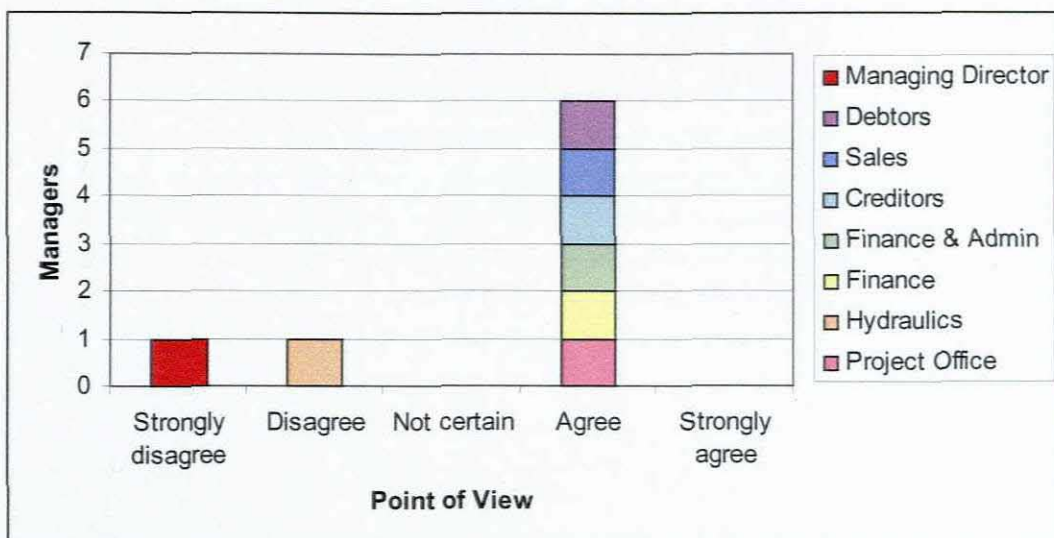
Figure 6.11 View of impact of technology on company dependence on qualified staff

- **Technology is causing the structure of the company to change.**

Almost everyone agreed with this statement (Figure 6.12). Some functions did become redundant due to new technologies. Hyflo used to employ a number of people who only did filing of paperwork for example invoices, job cards, credit notes and staff records to name a few. Most of these records are stored electronically these days and so the functions that were done by hand have since been replaced with software. New positions such as a network specialist, as mentioned before, were also created. Figure 6.13 shows how the Hyflo organisation looked like in 1990. Comparing this to figure 5.2, one will notice how the entire organisation changed over the last 13 plus years. Even the Paarden Eiland branch structure changed. In figure 5.3 one will notice a few more department heads than in figure 6.14. Hyflo Cape (Pty) Ltd was registered in 1966. It was re-registered in 1980 to Hyflo Southern Africa (Pty) Ltd.
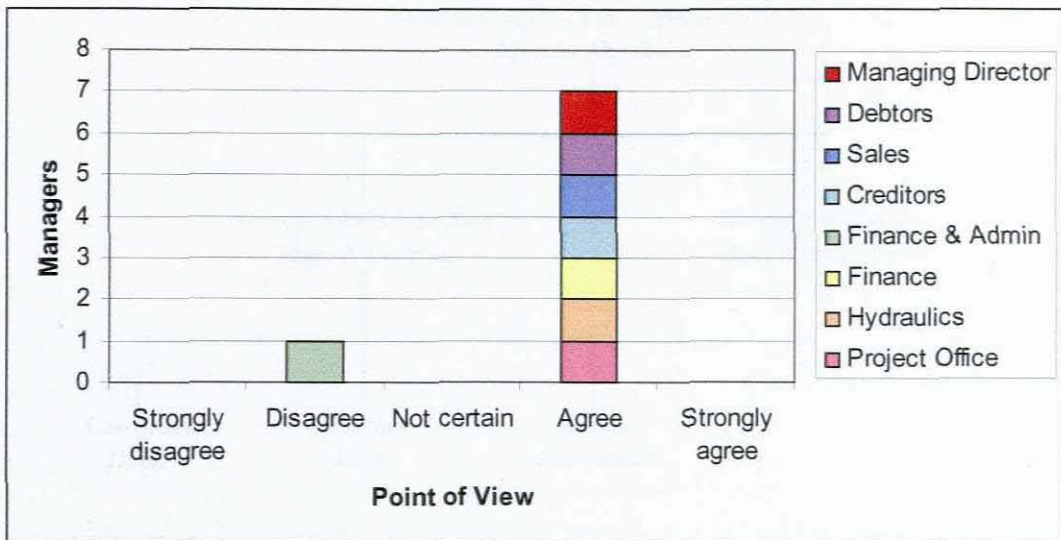
Figure 6.12 View of degree of impact of technology on company structure
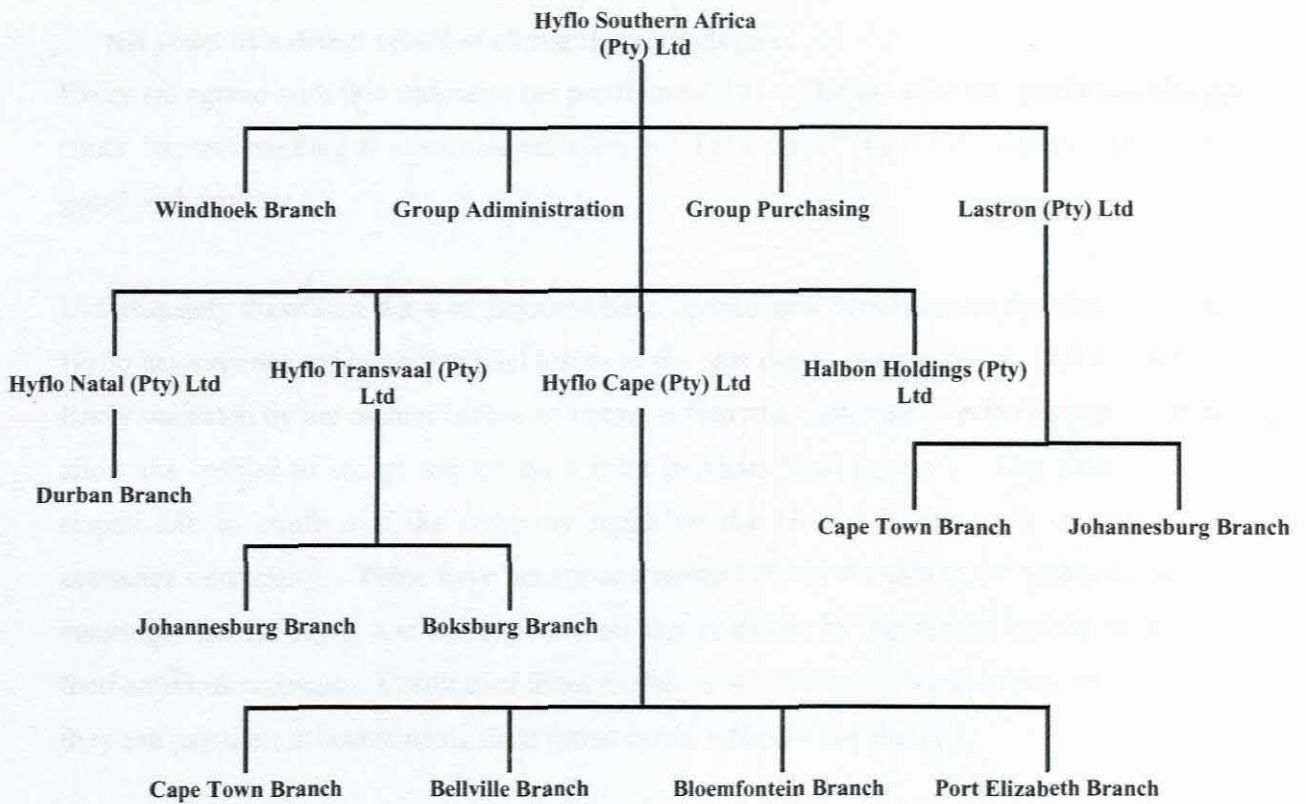
Figure 6.13 Hyflo group organisation chart in 1990
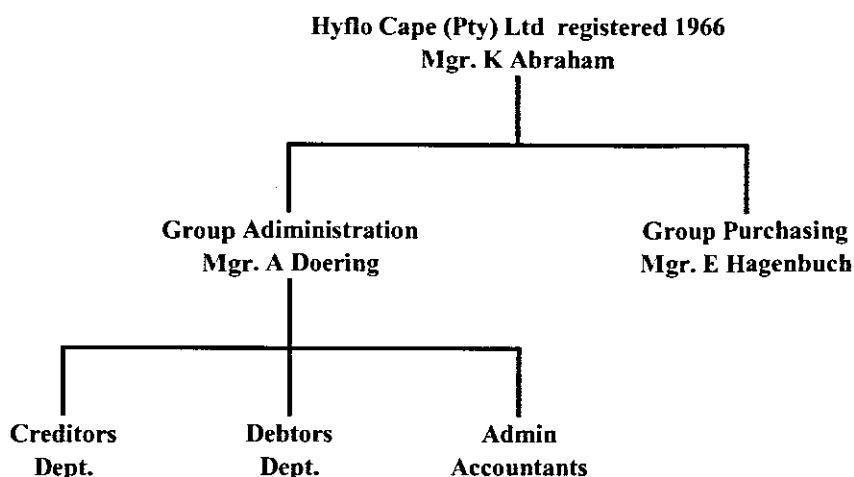
Figure 6.14 Hyflo Paarden Eiland branch management structure in 1990

- **The ways in which business transactions are conducted have changed over the last ten years as a direct result of changing technologies.**

Everyone agreed with this statement (as per figure 6.15). The use of debit, credit and cheque cards; internet banking & electronic transfers are a few "new" ways for customers to pay for goods and services.

Unfortunately these new ways of payment have opened new opportunities for embezzlement. Hyflo has experienced huge financial losses in the past due to cheque fraud. All cheques are firstly validated by the cashier before accepting it from the customer. Hyflo's system will not allow the cashier to accept any cheques from previous "bad payers". The cashier is also responsible to confirm if the company name on the cheque is the same as that of the customer's company. There have been many media articles discussing the safety of Internet banking. So far Hyflo has not experienced any problems in this regard mainly because of their antivirus software. Credit card fraud is also in the increase. Some customers do believe they can pay their accounts using their petrol cards, which is not allowed.

All sales are done electronically where it used to be a paper system (as mentioned in section 6.3.8). The software system gives the sales department access to the stock inventory. This information assist the salesperson with the sales as they can give the customer an exact quote

before any goods are supplied and or any work carried out. Each account has a master file where notes can be inserted for sales staff to view before executing orders. If it is a regular customer, sales will know if they are allowed to give trade discount or credit. The system will not allow the sales department to supply goods to customers who have reached their credit limit.

E-mails are also used to forward quotes to customers and receive quotes from suppliers. Quotes are still done via telephone and fax, but e-mails made the task more cost effective and easier.
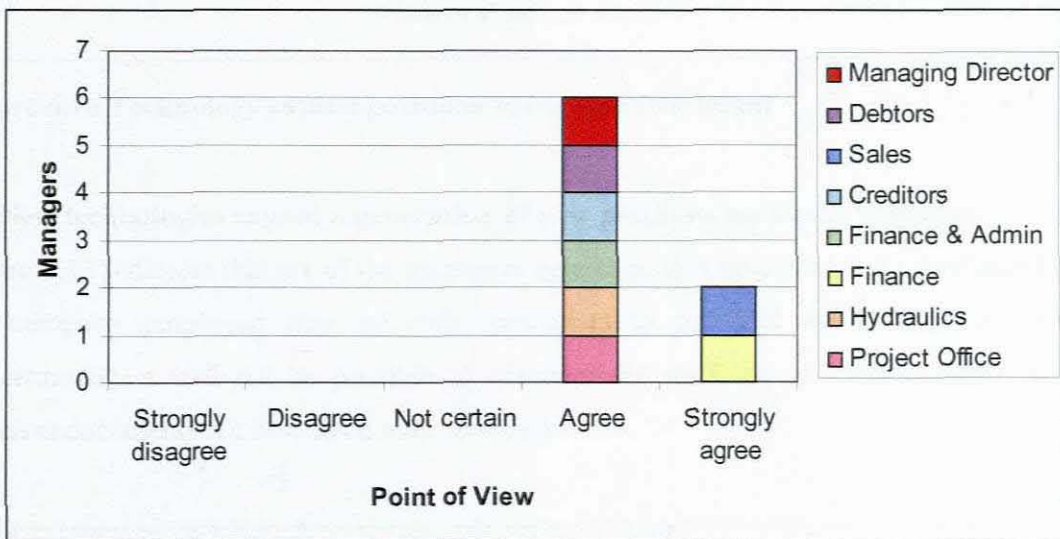
Figure 6.15 View of impact of technology on business transactions

- **New technologies caused positions in the company to become redundant.**

Figure 6.16 show that management feels that some positions in the company did become redundant. So far Hyflo has not retrenched any of their employees (as discussed in section 6.3.8) due to redundancy as the staff in such positions were retrained or given new responsibilities. The general impression received from the managers, in the interviews, is that Hyflo's employees are valued and all avenues are followed to keep them employed. So far Hyflo has not calculated the financial implications of retraining, creating new functions or remuneration packages as a result of these redundant positions.
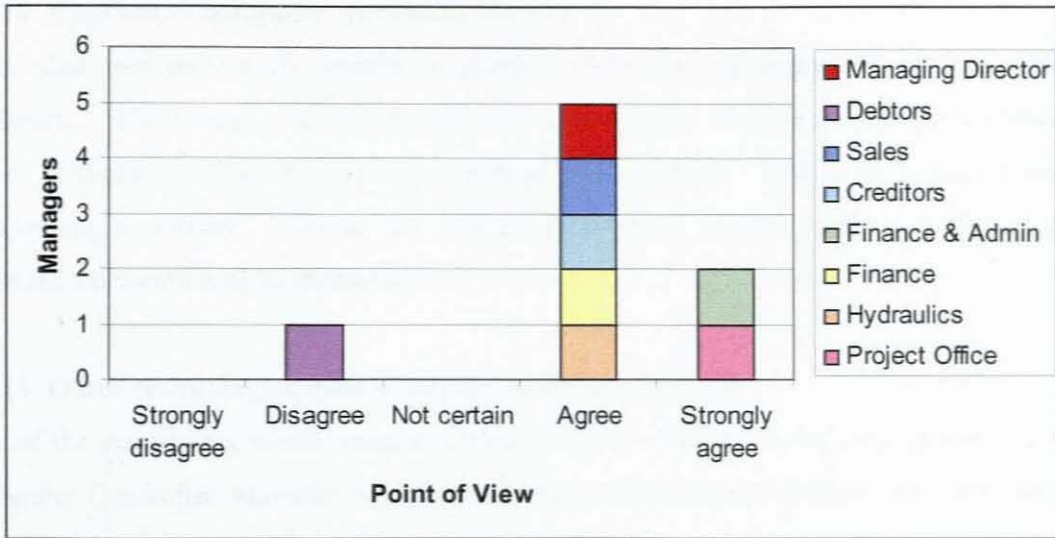
Figure 6.16 Technology caused positions to become redundant

- **New technologies caused a generation of new positions inside the company**

Figure 6.17 indicates that six of the managers agreed on this statement. As mentioned before the company employed new network specialists to run and maintain their networks. Unfortunately it will not be possible to compare the staff list of 1994 to 2003, as some business documents are destroyed after five years.
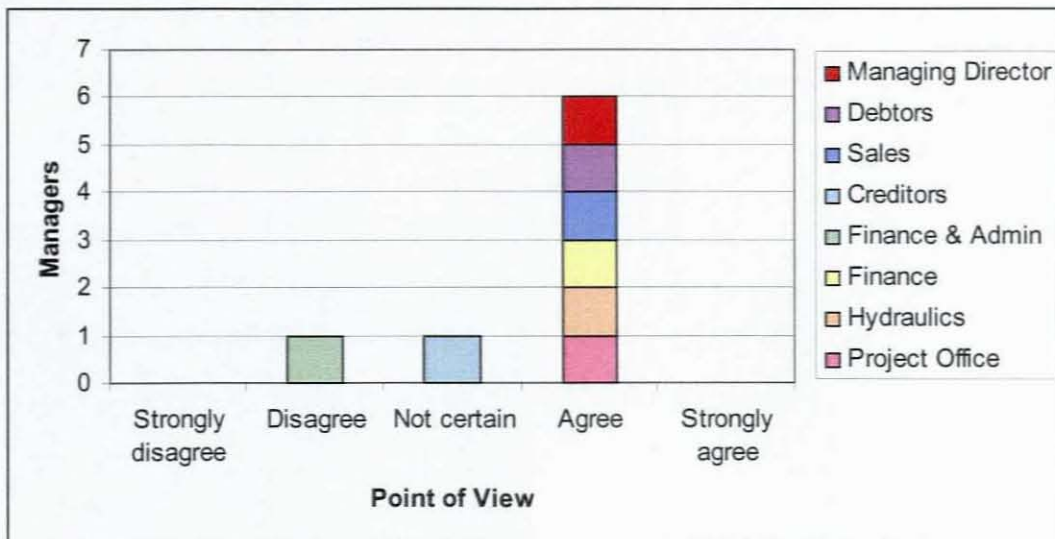
Figure 6.17 Technology caused a generation of new positions

6.2.10 Upgrade of computer hardware (QI 13)

Hyflo does not have a fix system in place to cater for the upgrading of their computer hardware. The owner of the company normally decides when these upgrades should take place. Otherwise computers are only replaced when needed. This is not a good system for maintaining a network. Under the recommendations of chapter seven a preferred way to maintain a network will be discussed.

6.2.11 Other technologies used inside the company (QII 14)

One of the department heads mentioned that Computer Added Design (Also know as CAD), Computer Controlled Manufacturing and Internet search engines all have an influence on the business. CAD replaced the old drawing boards and to alter designs in CAD is faster than redrawing the whole design on paper. Modern manufacturing equipment is all computer controlled. The design is fed into the machine electronically. This design is then turned into a machine code. For example this machine code will be used by the lathe to turn the part on its own without the assistance of the operator. Search engines as Google.com helps users to find information and topics on the Internet.

6.3 FINANCIAL ANSWERS AND ANALYSIS

6.3.1 Manufacturing and Administration cost (QI 14.1 & QI 14.2)

The managing director was asked to compare each years manufacturing and administration cost to the previous year. The result of this question was that for the last ten years there has been a decrease in manufacturing and administration cost due to implementing new equipment and technologies. This trend can be seen in table 6.1. The total decrease for the last ten years is 31 per cent for manufacturing cost and 38 per cent for administration cost. The average decrease per year for manufacturing cost is 3.1 per cent and for administration cost it is 3.8 per cent. The saving in administration cost is higher than in the manufacturing cost. The main reason for this would be that the equipment used in manufacturing (for example a lathe) is a lot more expensive than the equipment used in administration (for example a computer).

Year	Manufacturing Cost	Admin Cost
1994	0.00%	-10.00%
1995	0.00%	-5.00%
1996	-5.00%	-5.00%
1997	-3.00%	-5.00%
1998	-3.00%	0.00%
1999	-5.00%	0.00%
2000	-10.00%	-5.00%
2001	0.00%	-5.00%
2002	0.00%	0.00%
2003	-5.00%	-3.00%
Total decrease for 10 years	-31.00%	-38.00%
Average decrease per year	-3.10%	-3.80%

Table 6.1 Decrease in manufacturing & administration cost

6.3.2 Turnover utilised on various technologies (QI 14.3 to 14.8)

Of all the communication equipment, computers and networks used the biggest percentage of the turnover each year for the last ten years. Computers and networks are only upgraded as needed and there is no fixed plan in place for upgrades. In 1995 a new network system was implemented that explains the four per cent on the computers & network graph (figure 6.18). The percentage of turnover used for computers and networks were the highest in 1999 with five per cent. This five per cent is due to the purchase of new Printronix printers used mainly

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to print reports and statements.   In 2003 the company bought new network printers for the printing of invoices.
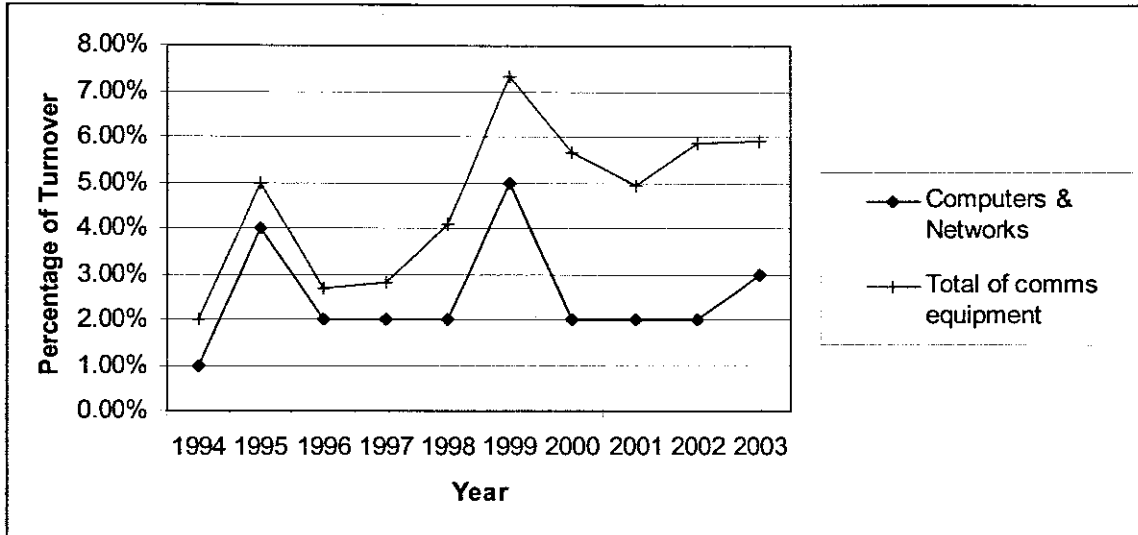
Figure 6.18 Percentage turnover utilised on Computers and Networks

Figure 6.19 show that manufacturing equipment has been taking a bigger slice of the turnover than all the communication equipment combined for the last three years.   The new manufacturing equipment included new expensive computer controlled CNC lathes. Manufacturing equipment is in general a lot more expensive than communication equipment.

Figure 6.20 indicates that cell phones only started to be a factor in 2000 when it utilised a small 0.4 per cent of the turnover that year.   It is at this time that Hyflo started to use cell phone as a business tool.   In 2003 cell phones were 0.37 per cent of the turnover.   Hyflo only got access to the Internet in 1998 (figure 6.20).   It utilised 0.5 per cent of the turnover for 1998.   The percentage stayed the same for 1999 and 2000.   In 2001 it went up to 1 per cent and stayed the same for the following two years.   Land lines are one of the oldest communication technologies used by Hyflo.   In 1994 it was 1 per cent of the turnover.   In 1993 it was 0.54 per cent of the turnover.   The 0.3 percent decrese between 1995 and 1996 might have had a small impact on the total communication cost decrese in the same period. For the last ten years (figure 6.20) cell phones, Internet or land lines never used more than 1 per cent of the turnover.
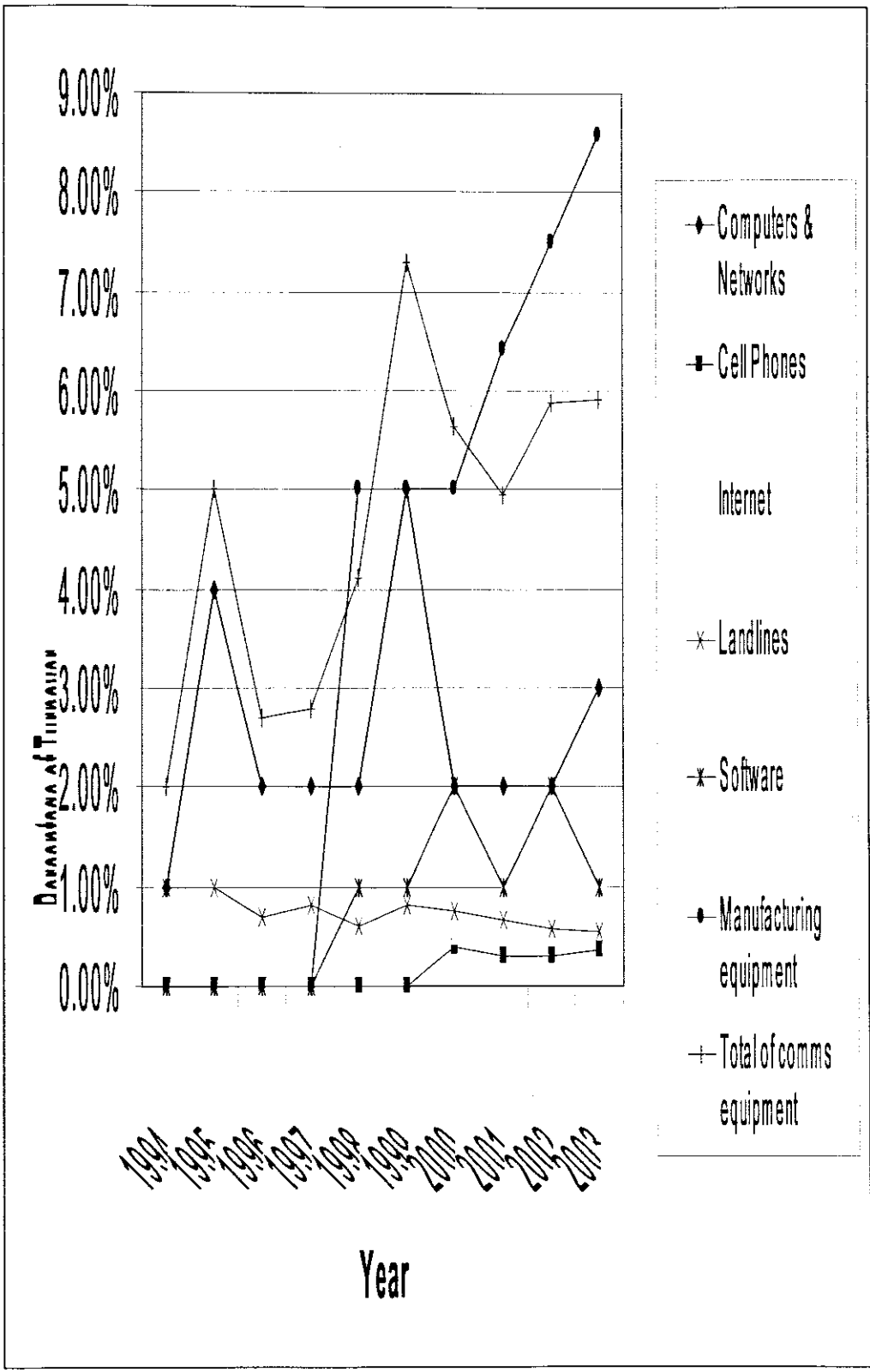
Figure 6.19 Percentage turnover utilised for various technologies
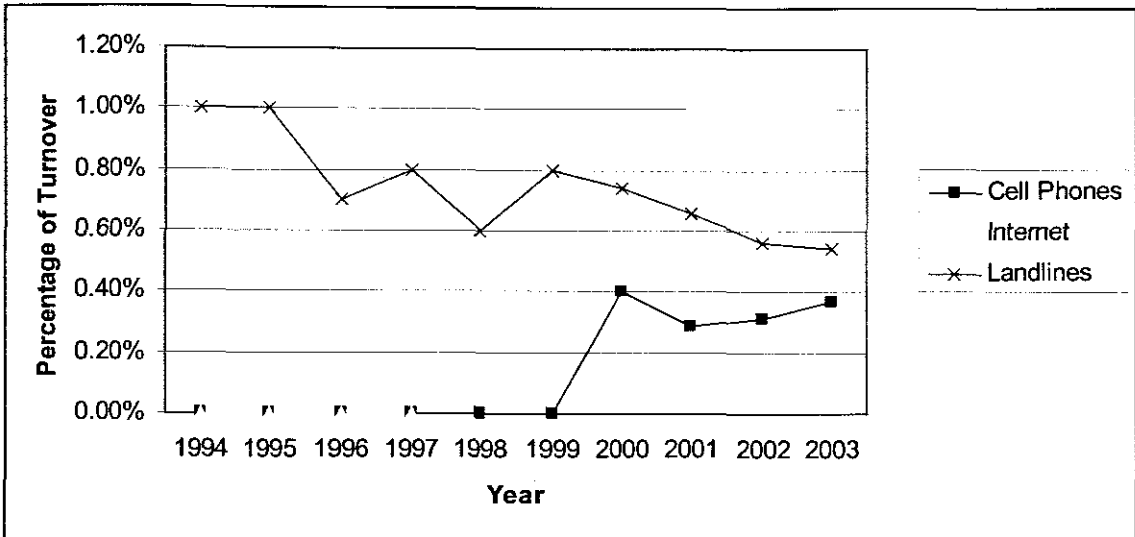
Figure 6.20 Percentage turnover utilised on Cell Phones, Internet and Landlines

Software (as per figure 6.21) never went over the 2 per cent margin for the last ten years. The slight increase of one per cent from 2001 to 2002 did cause the total cost of communication technology to increase the same period.
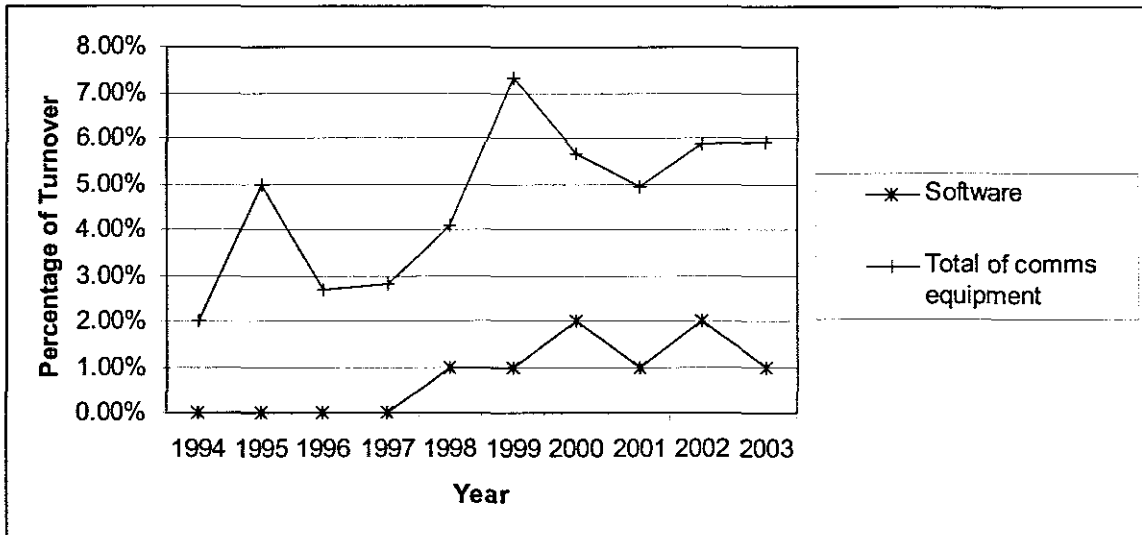
Figure 6.21 Percentage turnover utilised on Software

6.3.3 Change in retained income and turnover (QI 14.9 14.11)

The managing director was asked to compare each years retained income to the previous year and give the difference as a percentage. The percentage change in retained income is displayed in the first column of table 6.2. The red values indicate a percentage decrease and the green values indicate a percentage increase. He was also asked to state if these changes are due to buying or using new equipment (columns two and three in table 6.2).

In 1995 and 1996 0 per cent of the turnover was spend on manufacturing equipment (figure 6.19). Internet and cell phones have not been used by the company yet. The percentage turnover spend on landlines were 1 per cent in 1995 and 0.7 per cent in 1996 (figure 6.20). The only new equipment purchased in this period was the computer and network equipment that was 4 per cent of the turnover in 1995 (figure 6.18). This had a slight impact on the retained income of 1995 as it decreased by half a percent compared to the previous year. This same equipment had a positive impact on the retained income for 1996 as it increases by one per cent. This increase is an indication that the new computer and network equipment help the employees of Hyflo to become more productive.

Another increase in the retained income can be seen for 1999 and 2000. The five per cent of the turnover spent on new computer and network equipment had no negative visual impact on the retained income for 1999. This equipment with the purchase of new software (in 2000) must have a part in the five per cent increase in the retained income of 2000.

Year	Change in Retained income	Change because of Buying new equipment	Using new equipment
1994	-0.50%	Not sure	
1995	-0.50%	Not sure	
1996	1.00%		Yes
1997	-1.00%	Not sure	
1998	1.00%	Not sure	
1999	2.00%	Not sure	
2000	5.00%	No	
2001	-1.00%	No	
2002	-1.00%	No	
2003	-1.00%	No	

Table 6.2 Change in retained income because of buying or using new equipment

For the last question of questionnaire I, the managing director was asked to compare each year's turnover to the previous year and give the difference as a percentage. The response can be seen in table 6.3.

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Retained Income	-0.5%	-0.5%	1.0%	-1.0%	1.0%	2.0%	5.0%	-1.0%	-1.0%	-1.0%
Turnover	0.0%	5.0%	5.0%	8.0%	-1.0%	-5.0%	-5.0%	12%	14%	17%

Table 6.3 Percentage change in turnover & retained income

The last three years increase in Turnover is mainly because of the increased strength of the Rand. Although there is a double figure increase in turnover the last three years, there is still a decline of one per cent per year in retained income. One of the contributing factors for this might be the sudden increase in the purchase of new manufacturing equipment for the last three years as can be seen in figure 6.19. The total percentage turnover used on communication equipment must also be a factor, where it was just under five per cent in 2001 and almost six per cent in 2003. Table 6.2 states that no purchase of equipment for the last four years had an influence on the retained income of the company, but this is proved to be incorrect by looking at the gradient of the total communication equipment and manufacturing equipment graphs in figure 6.19. Both of these gradients are positive which indicates an increase.

6.4 SUMMARY

This chapter dealt with the case study of Hyflo Southern Africa (Pty) Ltd.

Internet is used the most for research by all of the managers. The second highest use for the Internet is banking. E-mail came third and is a vital communication tool as everyone in Hyflo has access to it and is used for the distribution of information inside and outside the company.

Of all the communication equipment used by Hyflo, computers and networks represented the biggest slice of the turnover each year for the last ten years.

All management staff feels that their work is more than 40 per cent dependent on computers. Computers and software are also used in decision making. The Finance and Debtors departments' functions are more than 80 per cent dependent on computers. Most of their daily book and paper systems were replaced with software. The general feeling among the managers is that computers are helpful tools.

The percentage of the turnover used by computers and networks has never been more than 5 per cent of the turnover. The total percentage of turnover utilised on all communication equipment came to its highest point in 1999 at 7.3 per cent.

Changing technology did not have such a large impact on Hyflo as originally anticipated.

The graphs of this chapter indicate that technology has an impact on all departments of this company.

CHAPTER SEVEN
CONCLUSION AND RECOMMENDATIONS

7.1   CONCLUSION

In the second chapter of this thesis various authors explaining the impact of technology on businesses.   It could be seen that technology affects all aspects of the business.   Company structures changes and some functions become redundant.   Companies are forced to outsource certain functions instead of employing new workers.   With new technologies come new threats.   Big companies that supply these communication technologies are preventing growth for their customers who are dependent on ITC technologies.   Resistance to change is the biggest contributions to failure of new ITC systems.   Companies need to invest in new Information Technology & Communication systems.

Chapter number three took a historical look at the Industrial Revolution.   This was the beginning point of companies.   At this time people started to centralise and trade their time for remuneration.   Other technologies such as the telephone, airplanes and railroads were also discussed.   All these technologies influenced businesses in either dictating their location or forcing them to adapt to the fast moving business environment.   As can be seen, technology not only caused companies to change, but also caused companies to form.   It can also be seen that all these technologies had direct and indirect impacts on each other.   These interlinking of different technologies influencing each other can still be seen with today's latest inventions. The leading example of this would be the Internet, which not only promoted dot com companies to form but without it, voice over IP would not have been possible.   The Internet Protocol (IP) also made communication between networks easier and caused networks to change.

Chapter four explained the various "new" communication technologies and their applications. This was done so that the reader of the thesis will understand the term used in the research. The Internet's applications changed over the years and are one of the communication technologies that had and have the biggest impact on companies.   Companies' structures changed and went from local to international markets because of the Internet.   E-commerce

reduces the cost of doing business. Voices over Internet Protocol also provide cost savings. Two of the main problems with the Internet and e-mail are Spyware and Spam. Both of these problems cause unnecessary expenses for businesses.

Chapter five dealt with the research and design method followed. Each question was discussed and motivated.

Chapter six dealt with the case study of Hyflo Southern Africa (Pty) Ltd. Changing technology did not have such a large impact on Hyflo as originally anticipated. It did have an impact though to some extent on all departments of Hyflo as can be seen on the graphs in the previous chapter. Of all the communication equipment used by Hyflo, computers and networks represented the biggest slice of the turnover each year for the last ten years. The percentage of the turnover used by computers and networks has never been more than 5 per cent of the turnover. The total percentage of turnover utilised on all communication equipment came to its highest point in 1999 at 7.3 per cent.

The hypothesis of the thesis is: "Change in technology has negative financial impacts on businesses". The "change" word actually means replacing old redundant equipment with new state of the art products. It also means acquiring new technologies that has never been available before. For this study "technology" refers to all available communication technologies. "Negative" describes the financial state of the company.

The hypothesis can be broken up in the following questions:
- Did this company spend money on new technologies? The answer would be yes.
- Did this cause an outflow of money? Yes it did.
- Did this outflow cause a negative impact? If one would consider the outflow of finances negative, then the answer would be yes.

By the answers above, one can say the hypothesis has been proven or met.

The purchasing of these new communication technologies did cause an outflow of finances in the company. But utilising these new technologies correctly had a much bigger impact on the company's finances.

7.2 RECOMMENDATIONS

Currently Hyflo upgrade computers and networks only when needed or when the owner of the company decides to do so. Hyflo needs to implement fixed yearly computer and networks replacement policy. It would be ideal for the company to replace all computers in a three year cycle. By replacing a third of all computers every year will guarantee a network that is reliable. The company will also be able to include this "expense" in the future business plans and budget for it. This will also prevent the sudden strains on the turnover every four years.

The advantages of on-line trading and e-commerce must be considered by all companies. The previous chapter clearly indicates that the company is not overspending on the Internet or tools of the Internet. The company does have a Website but they are not using this tool to its fullest potential. In this competitive age all companies must use all equipment to its fullest potential and capacity to stay ahead. Online selling of some of the standard products (for example a hydraulic pump or a type of pipe) would be one way of utilising the website better. Specific customer solutions will require one-on-one communication and will not be able to be sold in this way.

Sending the invoices and statements via e-mails to the customers should also be considered. This will reduce the paper, printer and posting cost of these documents. The company must also consider replacing other paper systems with electronic ones. These days it is possible to send and receive faxes electronically.

Currently Hyflo does have an Intranet, but it is not Web based. It is a virtual drive where some shared documents are stored. Hyflo should really consider improving their intranet. Access to more documents can be given on the intranet. This will even reduce paper cost. For example leave or over time forms can be made electronically. Electronic bulletin boards can also be made possible which displays the latest vacancies or news letters. The intranet

will also ensure that everyone have access to the latest documents as the harassment policy or the Labour Relation Act or the newest hydraulic parts specifications. Most human resource functions (for example requesting leave or payslips) can be done electronically, but this will require a high-quality Intranet with the relevant software (some companies use SAP).

The only positions that are outsourced by Hyflo, is their IT functions. The possibility to outsource other functions must be considered. The cleaning staff can be replaced by a cleaning company. By doing this Hyflo will save on the expensive labour cost to employ cleaning staff on a permanent basis.

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ANNEXURE I

Section A
The following questions are for background information of the company.

1.   Name of the company: Hyflo Southern Africa (Pty) Ltd

2:    Address of this branch: 50 Neptune street
                                   Paardeneiland
                                   7405
      Switchboard number: 021 514 3000

3.   How many branches does the company have? _____

4.   How many people does the company employ at this branch?

0 - 10	
10 - 100	
100 - 250	
250 - 500	
> 500	

Section B
This section is for background on the person who answers this questionnaire.

5.1   What is your current position in the company? _____

5.2   Years of service in the company? _____

5.3   How much of your work is computer dependent?

0 – 20 %	
21 – 40 %	
41 – 60 %	
61 – 80 %	
81 – 100 %	

5.4   Do you use computers and software to make decisions?

Yes	
No	

6.   Please rate your knowledge on the following:

6.1   General knowledge on Information Technologies

Very Poor	
Poor	
Average	
Good	
Very Good	

1

6.2 General knowledge on Communication Technologies

Very Poor	
Poor	
Average	
Good	
Very Good	

6.3 General knowledge on all Technologies

Very Poor	
Poor	
Average	
Good	
Very Good	

6.4 General knowledge on Technologies used for manufacturing

Very Poor	
Poor	
Average	
Good	
Very Good	

7. What percentage of your own role is dependent on technology?

0 – 20 %	
21 – 40 %	
41 – 60 %	
61 – 80 %	
81 – 100 %	

Section C
The following questions refer to the company.

8.1 The company uses the Internet for? (Select all that are relevant)

Do not use the Internet	
Banking	
Advertising	
Research	
Sales	
E-mails	
E-commerce	
Other (please specify)	

If any other uses not listed above please specify. _____

_____

8.2.1   Does the company have a Website?

Yes	
No	

8.2.2   If yes at 8.2.1, select from the following what the Website is used for.

Show company contact details for potential customers	
List all products and services	
Online trading – customers can purchase online	
Other (please specify)	

If any other uses not listed above please specify. _____

_____

_____

8.3.   The Company uses E-mails for? (Select all that are relevant)

Do not use E-mails	
Distribute information inside the company	
Distribute information outside the company	
Other (please specify)	

If any other uses not listed above please specify. _____

_____

_____

9.   Who in the company uses cell phones? (Select all that are relevant)

Do not use cell phones	
Management	
Sales	
Everyone	
Other (please specify)	

If any other users not listed above please specify. _____

_____

_____

10. Which of the following technologies do the company make use of for day-to-day run of business? (Select all that are relevant)

ISDN (Integrated Services Digital Network)	
ADSL (Asymmetric digital Subscriber Line)	
WAN (Wide Area Network)	
LAN (Local Area Network)	
Computers	
Dedicated lease lines (Data links between branches)	
PABX (switchboard)	
Other (please specify)	

If any other not listed above please specify. _____

_____

_____

_____

_____

11. Which of the following were/are effected because of technology that is constantly changing? (Select all that are relevant)

Nothing has been affected	
Management	
Company structure	
Sales (the way sales are done)	
Financial department (The way Debtors and Creditors do their work)	
Human recourses department	
Normal operation of the company	
Meetings (the way it is conducted)	
Salaries (Paying more for qualified staff)	
Profit	
Other (please specify)	

If any other not listed above please specify. _____

_____

_____

4

12. Please indicate if you agree or disagree with the following statements. (Only select one)

12.1 Changing technology causes the company to spend more money for normal operations.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

12.2 The company is becoming more dependent on highly qualified staff, because of new technologies.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

12.3 Technology is causing the structure of the company to change.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

12.4 The way in which business transactions are conducted have changed over the last 10 years as a direct result of changing technologies.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

12.5 New technologies caused positions in the company to become redundant.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

12.6   New technologies caused a generation of new positions inside the company

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

13.   How does the company change/upgrade the computer hardware?

Third of all computers annually	
All computers annually	
All computers per three-year cycle	
All computers per five-year cycle	
Only when needed	
Other (please specify)	

If any other not listed above please specify. _____

_____

Section D

14.   Select for each year the relevant answer and percentage.

14.1   Did manufacturing cost of goods increase or decrease because of implementing new equipment/technology?

Year	Increase	Decrease	0-20%	21-40%	41-60%	61-80%	81-100%
1994							
1995							
1996							
1997							
1998							
1999							
2000							
2001							
2002							
2003							

14.2 Did administration cost increase or decrease because of implementation of new equipment/technology?

Year	Increase	Decrease	0-20%	21-40%	41-60%	61-80%	81-100%
1994							
1995							
1996							
1997							
1998							
1999							
2000							
2001							
2002							
2003							

14.3 The percentage of turnover utilised on new computers & networks.

Year	0-20%	21-40%	41-60%	61-80%	81-100%
1994					
1995					
1996					
1997					
1998					
1999					
2000					
2001					
2002					
2003					

14.4 The percentage of turnover utilised on cell phones.

Year	0-20%	21-40%	41-60%	61-80%	81-100%
1994					
1995					
1996					
1997					
1998					
1999					
2000					
2001					
2002					
2003					

14.5 The percentage of turnover utilised on Internet and Internet related products.

Year	0-20%	21-40%	41-60%	61-80%	81-100%
1994					
1995					
1996					
1997					
1998					
1999					
2000					
2001					
2002					
2003					

14.6 The percentage of turnover utilised on landline phones.

Year	0-20%	21-40%	41-60%	61-80%	81-100%
1994					
1995					
1996					
1997					
1998					
1999					
2000					
2001					
2002					
2003					

14.7 The percentage of turnover utilised on new software.

Year	0-20%	21-40%	41-60%	61-80%	81-100%
1994					
1995					
1996					
1997					
1998					
1999					
2000					
2001					
2002					
2003					

14.8 The percentage of turnover utilised on equipment used for manufacturing of goods/products.

Year	0-20%	21-40%	41-60%	61-80%	81-100%
1994					
1995					
1996					
1997					
1998					
1999					
2000					
2001					
2002					
2003					

14.9 Comparing retained income of each year to the previous year. Indicate by how much it increased or decreased.

Year	Increase	Decrease	0-20%	21-40%	41-60%	61-80%	81-100%
1994							
1995							
1996							
1997							
1998							
1999							
2000							
2001							
2002							
2003							

14.10 Did this change in retained income happen because of buying new equipment or using new equipment?

Year	Buying			Using		
	Yes	No	Not sure	Yes	No	Not sure
1994						
1995						
1996						
1997						
1998						
1999						
2000						
2001						
2002						
2003						

14.11 Comparing turnover of each year to the previous year.   Indicate by how much turnover increased or decreased.

Year	Increase	Decrease	0-20%	21-40%	41-60%	61-80%	81-100%
1994							
1995							
1996							
1997							
1998							
1999							
2000							
2001							
2002							
2003							

Thank you for your time

ANNEXURE II

This questionnaire is for the department heads of the company.

1.   Name: _____

2.   Contact number: _____

3.   What is your current position in the company? _____

4.   Years of service in the company? _____

5.   Your department name? _____

6.   How much of your work is computer dependent?

0 – 20 %	
21 – 40 %	
41 – 60 %	
61 – 80 %	
81 – 100 %	

7.   Do computers make your work easier?

Yes	
No	

8.   Please rate your knowledge on the following:

8.1.   General knowledge on Information Technologies

Very Poor	
Poor	
Average	
Good	
Very Good	

8.2   General knowledge on Communication Technologies

Very Poor	
Poor	
Average	
Good	
Very Good	

8.3   General knowledge on all Technologies

Very Poor	
Poor	
Average	
Good	
Very Good	

8.4   General knowledge on Technologies used for manufacturing

Very Poor	
Poor	
Average	
Good	
Very Good	

9.   What percentage of your own role is dependent on technology?

0 – 20 %	
21 – 40 %	
41 – 60 %	
61 – 80 %	
81 – 100 %	

10.   What do you use the Internet for? (Select all that are relevant)

Do not use the Internet	
Banking	
Advertising	
Research	
Sales	
E-mails	
E-commerce	
Other (please specify)	

If any other uses not listed above please specify. _____

_____

_____

11.   What do you use E-mails for? (Select all that are relevant)

Do not use E-mails	
Distribute information inside the company	
Distribute information outside the company	
Other (please specify)	

If any other uses not listed above please specify. _____

_____

_____

12.   Which of the following were/are effected because of technology that is constantly changing? (Select all that are relevant)

Nothing has been affected	
Management	
Company structure	
Sales (the way sales are done)	
Financial department (The way Debtors and Creditors do their work)	
Human recourses department	
Normal operation of the company	
Meetings (the way it is conducted)	
Salaries (Paying more for qualified staff)	
Profit	
Other (please specify)	

If any other not listed above please specify. _____

_____

_____

13.   Please indicate if you agree or disagree with the following statements.

13.1   Changing technology causes the company to spend more money for normal operations.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

13.2   The company is becoming more dependent on highly qualified staff, because of new technologies.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

13.3   Technology is causing the structure of the company to change.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

3

13.4   The way in which business transactions are conducted have changed over the last 10 years as a direct result of changing technologies.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

13.5   New technologies caused positions in the company to become redundant.

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

13.6   New technologies caused a generation of new positions inside the company

Strongly disagree	
Disagree	
Not certain	
Agree	
Strongly agree	

14   Please list any technologies not mentioned above that you feel had a big impact on the company.

_____

_____

_____

_____

Thank you for your time

ANNEXURE III

Questions		Department								
		Project Office	Hydraulics	Finance	Finance & Admin	Creditors	Sales	Debtors	Managing Director	Total
4. Years of service in the company?		15	4	1.6	5	16	18	26	22	
6. How much of your work is computer dependent?	0 - 20%									0
	21 - 40%									0
	41 - 60%				1				1	2
	61 - 80%	1	1			1	1			4
	81 - 100%			1				1		2
7. Do computers make your work easier?	Yes	1	1	1	1	1	1	1	1	8
	No									0
8.1 General knowledge of Information Technologies	Very poor									0
	Poor									0
	Average	1	1	1	1	1		1		6
	Good						1			1
	Very good								1	1
8.2 General knowledge on Communication Technologies	Very poor									0
	Poor									0
	Average	1	1	1		1		1		5
	Good				1		1		1	3
	Very good									0
8.3 General knowledge on all Technologies	Very poor									0
	Poor									0
	Average	1	1	1	1	1		1		6
	Good						1		1	2
	Very good									0
8.4 General knowledge on Technologies used for manufacturing	Very poor									0
	Poor				1	1		1		3
	Average	1	1	1			1			4
	Good									0
	Very good								1	1

9. What percentage of your own role is dependent on technology?										Total
	0 - 20%									0
	21 - 40%				1					1
	41 - 60%					1			1	2
	61 - 80%	1	1				1	1	1	5
	81 - 100%									0

10. What do you use the Internet for?										Total
	Do not use the Internet									0
	Banking	1			1	1	1		1	1	6
	Advertising					1	1		1	3
	Research	1	1	1	1	1	1	1	1	8
	Sales	1	1			1	1			4
	E-mails			1		1	1	1	1	5
	E-commerce					1	1			2
	Other							1		1

11. What do you use E-mails for?										Total
	Distribute info inside the company	1	1	1	1	1	1	1	1	8
	Distribute info outside the company	1	1	1	1	1	1	1	1	8
	Other						1	1		2

12. Which of the following were/are effected because of technology that is constantly changing?										Total
	No effect									0
	Management	1	1	1	1	1	1	1	1	8
	Company structure	1	1		1	1	1	1	1	7
	Sales	1	1	1		1	1	1	1	7
	Financial department	1		1	1	1	1	1	1	7
	Human Resources	1	1	1	1	1	1	1	1	8
	Normal operations	1		1		1	1	1	1	6
	Meetings	1	1			1	1	1	1	6
	Salaries	1			1		1	1	1	5
	Profit	1	1		1		1		1	5
	Other							1		1

13.1 Changing technology causes the company to spend more money for normal operations										Total
	Strongly disagree		1							1
	Disagree					1			1	2
	Not certain						1			1
	Agree	1			1	1		1		4
	Strongly agree									0

Question	Response										Total
13.2 The company is becoming more dependent on highly qualified staff, because of new technologies	Strongly disagree									1	1
	Disagree		1								1
	Not certain										0
	Agree	1			1	1	1	1	1		6
	Strongly agree										0
13.3 Technology is causing the structure of the company to change	Strongly disagree										0
	Disagree				1						1
	Not certain										0
	Agree	1	1	1		1	1	1	1		7
	Strongly agree										0
13.4 The way in which business transactions are conducted have changed over the last 10 years as a direct result of chaning technologies	Strongly disagree										0
	Disagree										0
	Not certain										0
	Agree	1	1		1	1		1	1		6
	Strongly agree			1			1				2
13.5 New technologies caused positions in the company to become redundant	Strongly disagree										0
	Disagree							1			1
	Not certain										0
	Agree		1	1		1	1		1		5
	Strongly agree	1			1						2
13.6 New technologies caused a generation of new positions inside the company	Strongly disagree										0
	Disagree				1						1
	Not certain					1					1
	Agree	1	1	1			1	1	1		6
	Strongly agree										0

| Year | Implementing new equipment caused | |
	Manufacturing Cost	Admin Cost
1994	0.00%	-10.00%
1995	0.00%	-5.00%
1996	-5.00%	-5.00%
1997	-3.00%	-5.00%
1998	-3.00%	0.00%
1999	-5.00%	0.00%
2000	-10.00%	-5.00%
2001	0.00%	-5.00%
2002	0.00%	0.00%
2003	-5.00%	-3.00%

% Turnover utilised on					
Computers & Networks	Cell Phones	Internet	Landlines	Software	Manufacturing Equipment
1.00%	0.00%	0.00%	1.00%	0.00%	0.00%
4.00%	0.00%	0.00%	1.00%	0.00%	0.00%
2.00%	0.00%	0.00%	0.70%	0.00%	0.00%
2.00%	0.00%	0.00%	0.80%	0.00%	0.00%
2.00%	0.00%	0.50%	0.60%	1.00%	5.00%
5.00%	0.00%	0.50%	0.80%	1.00%	5.00%
2.00%	0.40%	0.50%	0.74%	2.00%	5.00%
2.00%	0.29%	1.00%	0.66%	1.00%	6.43%
2.00%	0.31%	1.00%	0.56%	2.00%	7.50%
3.00%	0.37%	1.00%	0.54%	1.00%	8.57%

| Year | % Change in | |
	Retained Income	Turnover
1994	-0.50%	0.00%
1995	-0.50%	5.00%
1996	1.00%	5.00%
1997	-1.00%	8.00%
1998	1.00%	-1.00%
1999	2.00%	-5.00%
2000	5.00%	-5.00%
2001	-1.00%	12.00%
2002	-1.00%	14.00%
2003	-1.00%	17.00%