

UNIVERSITY OF KWAZULU-NATAL

A study of challenges faced by the global paper industry

by

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DECLARATION

This research has not been previously accepted for any degree and is not being currently considered for any other degree at any other university.

I declare that this Dissertation contains my own work except where specifically acknowledged

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ABSTRACT

This dissertation is a study based on the effects of electronic technology, the environment and globalisation on the global paper industry. The study aims to illustrate the effect that each of these aspects have towards the threat of diminishing paper consumption and to thereafter draw certain conclusions and propose recommendations to those within the paper industry.

E-Commerce and related innovations such as the electronic supply chain are transforming the pulp and paper industry by reducing the need for paper, thereby cutting costs, reducing inventory and opening up new business developments. The effects of the changing world will have a major impact on the paper industry. The external drivers of change in the pulp and paper industry are increasing environmental concerns, global economic fluctuations, digitalisation and demographic changes and skills shortages.

Pulp and paper production, consumption and wasting have numerous negative environmental and social impacts. The pulp and paper industry is amongst the world's major generators of air and water pollutants, waste products, and the gases that cause climate change. It is also one of the major users of raw materials, including fresh water, energy and forest fibres.

The pulp and paper industry is entering a new era of business evolution driven largely by consolidation of industry, globalisation and competition. These market drivers are compelling the pulp and paper industry to place greater focus on cost efficiency. This focus is creating a new challenge for the organisation by way of information technology.

The study entailed research by means of a questionnaire, each consisting of twenty eight questions, incorporating a combination of both closed and open-ended questions. Data was obtained from thirty respondents.

Quantitative research was chosen over qualitative research as this methodology offers a high level of measurement precision and statistical advantage. Quantitative methods ensure a greater level of reliability of data. Research using quantitative methodology also eliminates or minimises the subjectivity of judgement.

Further research was suggested and included conducting a qualitative study, exploring the aspect of diversification and understanding the recycling sector of the industry.

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Introduction

1.1 Overview

This dissertation is a study based on the effects of electronic technology, the environment and globalisation on the global paper industry. The study aims to illustrate the effect that each of these aspects have towards the threat of diminishing paper consumption and to thereafter draw certain conclusions and propose recommendations to those within the paper industry.

The forest, wood and paper industry is an international leader, globally competitive and an essential contributor to the economy. The vast range of products made possible by this industry is safe, functional and in many instances essential to the everyday requirements of individuals and firms. In the home environment, paper based products provide the bases for communications (books, newspapers, notepaper and artwork), convenience and enhanced sanitary conditions (paper towels, facial tissues and disposables). Speciality papers provide protection to machines and to individuals by way of seals, gaskets and filters. Paper and paperboard packaging materials offer protection and conservation to all types of products. Trees provide the most significant raw material for the paper industry (Internet 1).

In spite of the success of the forest, wood and paper industry, the industry has severe challenges ahead in meeting the evolving standards of society, while at the same time remaining economically viable and globally competitive (Internet 1).

These impacts on the pulp and paper industry therefore compel those within the industry to charter a course by putting measures in place in an attempt to meet the challenges head-on. Executives are therefore forced to change direction in the pulp and paper industry by projecting themselves and their organizations into the future, creating a new path from where they are now to where they want to be some years down the road.

Every company encounters occasions in which it needs to adapt its strategy to shifting industry and competitive circumstances, newly emerging buyer preferences and requirements, the initiatives of rival firms to grab increased market share, the appearance of new opportunities and threats, advancing technology, and other significant events which affects its business (Thompson and Strickland, 2003).

1.2 Problem statement

1.2.1 Electronic Technology

At the World Print and Communication Congress 2005, (Internet 2), a board member, of the Federation of International Print Publications said: “I would love to be able to say print will be with us forever, but the future of print depends on the future of reading.” His view is that lower consumption of print media is because of the invasion of alternative media and in 20 years from now, people will receive their news online and e-books shall overshadow paper.

At the same conference (Internet 2), the president of a consulting firm specialising in marketing and technology issues in the graphic arts and electronic industries said: “In the newspaper business, readership is declining. Readers tend to be older. The youth tend to get their information in different ways, chasing advertisers into other mediums. But newspapers do remain an important advertising vehicle. One trend is that newspapers have become thinner and smaller in size.” He is of the belief that the industry is under attack for the following reasons:

- The consolidation / losses incurred to other communications media,
- The news for conventional printed media is not good, with readers ageing and young readers not being acquired,
- Office printing is a severe threat in the future,
- Advertisers and other communicators have more selection than ever before and therefore need to stand on their toes to compete,
- The youth seem to have a preference to get their information in many other ways,

- There is a long way to go in freedom of the press when 64% of the world's press is not free,
- Information technology provides a benefit to society; however, it also steals from society at the same time.

Paper manufacturers are required to become more aware that they are not only competing against each other to sell their specific paper, but are fundamentally competing with alternatives – from television and radio, to the internet, e-mail, movie screens, billboards and airport hoardings, DVD's, computer games, and word-of-mouth marketing (Internet 2).

1.2.2 Environmental concerns

Pulp and paper production, consumption and wasting have many negative environmental and social consequences. The pulp and paper industry is amongst the world's foremost generators of air and water pollutants, waste products and the gases that cause climate change. The industry is also one of the largest consumers of raw materials, including fresh water, energy and forest fibres. Forests that are necessary for clean air and water, wildlife habitat, climate protection, spirituality, recreation and indigenous peoples' cultural survival-including old-growth and other ecologically important forests-are being logged for fibre; in many places they are also being cleared for replacement by plantations that have reduced ecological value and employ toxic chemical herbicides and fertilizers. The pulp and paper industry also has negative consequences on the health, well-being and stability of local communities. In North America the bulk of paper products are buried in landfills or burned in incinerators, resulting in substantial pollution, forest destruction and major climate change impacts (Internet 3).

1.2.3 Globalisation

Economic and technological developments are steering the world towards a global marketplace. Economic transformation is making international trade more accessible and enhanced technology is contributing to increased communication (Internet 4).

Technological advances have decreased the costs of freight transportation and communication to the degree that it is in most cases considered feasible for a company to position different production processes in various countries. Liberalisation has had the effect of governments refusing to protect domestic markets from foreign imports through import tariffs or import quotas (Internet 5).

Globalisation poses both a major threat and a major opportunity, more especially in developed countries. Firms that previously benefited from relatively safe domestic markets now find themselves faced with the likelihood of new competition from companies that had previously not marketed its products in that part of the world. Globalisation has essentially made global competition imperative for survival (Internet 6).

Goods produced in one part of the globe are becoming available in other parts of the world. Globalisation provides consumers the option of purchasing pulp and paper products from anywhere in the world, hence requiring paper manufacturers to enhance quality, production efficiency and flexibility to stay competitive.

1.2.4 Substitute products

The competitive advantage that exists in the paper industry is faced with the threats of substitution products; with almost all of its products being available as substitutes. Table 1.1 summarises this view.

Table 1.1: Substitutes to paper grades

Grade Category	Substitutes
Containerboard	Re-usable shipping containers
Packaging grades	Flexible packaging
Printing and writing papers	Electronic communications
Newsprint	Electronic communications

Source: Cenatempo and McNutt, Internet 21 (Adapted)

1.2.5 Critical research questions

In view of the pulp and paper industry being faced with certain challenges that may possibly affect the sustainability of some of the players within the industry, four questions arise:

- Is the paper industry threatened by electronic technology, environmental impacts and globalisation?
- What are the effects of electronic technology, the environment and globalisation on the global paper industry?
- What measures should firms within the pulp and paper industry put in place to “bullet proof” the business against these challenges?
- Is diversification an option to be considered by paper companies?

1.2.6 The method of tackling the problem

The study entailed research conducted by means of a survey questionnaire, each consisting of twenty eight questions, incorporating a combination of both closed and open-ended questions.

Quantitative research was chosen over qualitative research as this methodology has potency in numbers and exemplifies the many advantages of quantitative research. Being a numbers-based research discipline, quantitative research statistically quantifies customer attitudes, behaviour, and performance. Utilizing a series of tests and techniques, quantitative research will often yield data that may be extrapolated or generalised to a larger population. For the reason that it is so profoundly rooted in numbers and statistics, quantitative research has the capability to effectively translate data into quantifiable charts and graphs. Factual examples have shown the success of quantitative research in quantifying product awareness, establishing customer profiles, and determining market size (Internet 23).

1.2.7 The purpose of the study

The purpose of the study is to investigate and formulate recommendations to challenges faced by the global paper industry.

The objectives of this study are:

- To determine whether the relationship the global paper industry has with electronic technology, environmental impacts and globalisation is a real concern.
- To determine consumers preferences between conventional methods, in respect of books, newspapers, periodicals and reports in comparison to electronic technology.
- To understand the impact of e-technology on paper consumption.
- To identify the environmental and social impact caused by the paper industry.
- To evaluate the impact of globalisation on competitiveness of players within the paper industry.
- To determine whether diversification is an option for manufacturers within the paper industry.

1.3 Structure of the Research

This study comprises of six chapters. A synopsis of the remaining chapters follows.

Chapter 2: Literature review

This chapter comprises of a theoretical discussion on the challenges facing the paper industry.

Electronic technology challenges

E-Commerce and related innovations such as the electronic supply chain are transforming the pulp and paper industry by reducing the need for paper, thereby cutting costs, reducing inventory and opening up new business developments. The effects of the changing world will have a major impact on the pulp and paper industry.

The external drivers of change in the pulp and paper industry are increasing environmental concerns, global economic fluctuations, digitalisation and demographic changes and skills shortages (Internet 7).

Environmental challenges

Pulp and paper production, consumption and wasting have numerous negative environmental and social impacts. The pulp and paper industry is amongst the world's major generators of air and water pollutants, waste products, and the gases that cause climate change. It is also one of the major users of raw materials, including fresh water, energy and forest fibres. Forests that are necessary for clean air and water, wildlife habitat, climate protection, spirituality, recreation and indigenous peoples' cultural survival - including old-growth and other ecologically important forests-are being logged for fibre; in many places they are also being cleared for replacement by plantations that have reduced ecological value and employ toxic chemical herbicides and fertilizers. The pulp and paper industry also has negative impacts on the health, well-being and stability of neighbouring communities. In North America the majority of paper products are buried in landfills or burned in incinerators, with the resultant effect being substantial pollution, forest destruction and major climate change impacts (Internet 3).

The pulp and paper industry may be considered as contributing to more global and local environmental problems than any other industry in the world. Paper manufacturers reach deep into species-rich forests for virgin timber, razing trees, polluting waterways and destroying precious wildlife habitat in the process. Pulp and paper mills that use virgin timber are foremost generators of hazardous air pollutants, including dioxins and other cancer-causing chemicals. The pulp and paper industry is also considered the third largest industrial emitter of global warming (Internet 8).

Globalisation challenges

The pulp and paper industry is entering a new era of business evolution driven largely by consolidation of industry, globalisation and competition. These market drivers are compelling the pulp and paper industry to place greater focus on cost efficiency. This focus is creating a new challenge for the organisation by way of information technology (Internet 9).

Globalization is a complicated occurrence and its consequences are often indistinct. Globalization brings with it winners and losers as well as promises and threats. While trade benefits all participants; and with globalization being correlated to higher overall economic growth, it is of little solace and consolation to an employee who is displaced due to foreign competition. It is devastating to communities when major firms move their operations offshore (Shenkar and Luo, 2004).

Chapter 3: Research Methodology

This chapter discusses the reason for choosing this method of study, the research methodology and research design.

The study entailed research by means of a survey questionnaire, each consisting of twenty eight questions, incorporating a combination of both closed and open-ended questions.

Quantitative research was chosen over qualitative research as quantitative methodology has potency in numbers and exemplifies the many advantages of quantitative research. Being a numbers-based research discipline, quantitative research statistically quantifies customer attitudes, behaviour, and performance. Utilizing a series of tests and techniques, quantitative research will often yield data that may be extrapolated or generalised to a larger population. For the reason that it is so profoundly rooted in numbers and statistics, quantitative research has the capability to effectively translate data into quantifiable charts and graphs. Factual examples have shown the success of quantitative research in quantifying product awareness, establishing customer profiles, and determining market size (Internet 23).

Chapter 4: Data presentation

This chapter presents the data collected.

Having applied the research design and processing the data obtained, the results using the SPSS package and Microsoft Excel were generated.

Descriptive and inferential statistics are used to present the data. Descriptive statistics used to present the results in this study include frequencies and percentages. Graphical illustrations have been used to depict the data in a frequency and percentage method. Inferential statistical methods used are chi-square and Kruskal-Wallis tests. An analysis of responses to the open ended questions is also included.

The respondent's views on whether electronic technology posed a threat to the paper industry were varied and ranged between the older generations having preference for paper based copies to there being no challenge in the short to medium term but in the long term there would be a tendency towards digitalisation. Certain respondents were also of the view that paper consumption per capita had not decreased, instead it is going up. A respondent commented that the younger generation was not interested in "news" but preferred enjoying the portability of e-media such as i-pods, cellular phones, the internet and laptops with 3G cards.

In the questionnaire, when respondents were asked their views on whether environmental concerns were regarded as a major challenge to the paper industry, the responses included “there was a lot of capital expenditure required for the creation the zero emission mill” and “the paper industry is being careless to what is happening to the environment”. Certain respondents stated that paper industries were on a drive to reduce environmental effects mainly due to pressure from the relevant authorities and environmentalists. Another view was the concern regarding the inefficient use of energy and high dependency on inorganic chemicals to make paper. A further response was that customers are becoming more environmentally aware and demanding process changes and ‘green’ products.

The respondent’s views on whether globalisation posed a threat to the paper industry were varied and ranged from customers can get the paper cheaper from other countries and would import rather than support their home industries to it doesn’t matter as paper production cost in China is the same as in the USA after factoring in transport and distribution costs. A respondent stated that this challenge was experienced first hand as third world countries had low labour costs and poor environmental focus and could therefore sell the product cheaper in the same market. A further response was globalisation is being considered a major challenge because companies are trying to gain market share in other areas due to their own areas being traded by other global companies.

Chapter 5: Data Analysis

The data has been analysed in relation to the problem statement and critical questions outlined in section 1.2.5; which entailed the effects of electronic technology, environmental impacts and globalisation on the global paper industry and the measures that organisations within the industry have to put in place to bullet proof the business. The interrelationship between these factors together with an analysis of the respondent’s views is the basis of the analysis.

In response to questions on whether electronic technology, the environment and globalisation posed a major challenge to the paper industry, 34.5% of the twenty nine respondents that answered all three questions, agreed with all three questions and 48.3% agreed with two of the three statements. Considering that almost 83% of the respondents agree with at least 2 of the statements, the results overwhelmingly indicate that the threats are a reality to the paper industry.

Chapter 6: Conclusion and Recommendations

This chapter forms a “golden thread” between the research objectives and the outcome thereof. The extent to which the critical research questions in section 1.2.5 is also discussed.

In response to questions on whether electronic technology, the environment and globalisation posed a major challenge to the paper industry, 34.5% of the twenty nine respondents that answered all three questions, agreed with all three questions and 48.3% agreed with two of the three statements. Considering that almost 83% of the respondents agree with at least 2 of the statements, the results overwhelmingly indicate that the threats are a reality to the paper industry.

Limitations of the study included choosing participants primarily from the pulp and paper industry, questionnaires were completed by the participants in their personal capacity, certain questions baffled the participants and as such they were unanswered, questionnaires were not handed to be completed by any directors of companies and the study lacked personal interviews with the participants.

Further research was suggested and included conducting a qualitative study, exploring the aspect of diversification and understanding the recycling sector of the industry.

1.4 Conclusion

This chapter served as an overview of the challenges facing the global paper industry; electronic technology, environmental impacts and globalisation.

The quantitative study entailed research by means of a survey questionnaire, each consisting of twenty eight questions, incorporating a combination of both closed and open-ended questions.

The questions that were required to be answered in this study are the effects of electronic technology, the environment and globalisation on the global paper industry; the measures that should be in place to “bullet proof” the pulp and paper industry against these challenges and whether diversification is an option to be considered by paper companies.

The responses from participants by means of the questionnaire were varied and included a change in strategy required by the paper industry due to the challenges of e-technology, the environment and globalisation to there being no serious threat to the industry in the short term.

Chapter two comprises a detailed literature review of the challenges facing the global paper industry within the framework of electronic technology, the environment and globalisation.

The importance of a literature review is its appeal in the contextualisation of the study and to define the gap occupied by the research. The literature review is also defined as being a key factor when explanation of the data is required. The relevance of the findings in the study in relation to the existing body of literature is also incorporated in a literature review (Henning, van Rensburg and Smit, 2004).

2

Literature Review

2.1 Introduction

This chapter focuses on literature surrounding the effects of electronic technology, the environment and the effects of globalisation on the global paper industry.

The forest, wood and paper industry is a global leader, internationally competitive and an important contributor to the economy. In spite of the success of the forest, wood and paper industry, it has significant challenges ahead in meeting the changing standards of the world while simultaneously remaining economically viable and globally competitive (Internet 1).

The paper industry's most important asset, an abundant and low cost raw material base, is being challenged by developments both nationally and internationally. More demanding environmental requirements are also a major burden that the industry must bear. Global competition has forced rationalization of the industry's long-range, generic research capabilities, making scarce resources too valuable to be wasted with replication of effort (Internet 1).

A literature review is the basis of this study. The importance of a literature review is its appeal in the contextualisation of the study and to define the gap occupied by the research. The literature review is also defined as being a key factor when explanation of the data is required. The relevance of the findings in the study in relation to the existing body of literature is also incorporated in a literature review (Henning, van Rensburg and Smit, 2004).

2.2 Electronic Technology

Magazines and newspapers are engaged in battle, fighting an invasion of alternative media that is threatening the very survival and consumption of print in the future. There are two notable trends in the print industry that are turning printing on its head; the world is showing preference to digitalisation and the world is showing preference to colour (Internet 2).

The ‘world is showing preference to digitalisation’ is characterised by the advances in technology, giving rise to a new form of communication medium.

The digital economy relates to an economy that is based on digital technologies, including digital communication networks (the Internet, intranets, extranets, and private VANS), computers, software, and other related information technologies. This type of economy is also sometimes called the Internet economy, the new economy or the Web economy. In this new economy, digital networking and communication infrastructures make available a global platform over which people and organisations interact, communicate, collaborate and search for information (Turban and King, 2003).

The platform referred to by Turban and King (2003) includes the following characteristics:

- An enormous array of digitizable products-databases, news and information, books, magazines, TV and radio programming, movies, electronic games, musical CDs, and software-that are delivered over a digital infrastructure any time, anywhere in the world.
- Consumers and businesses conducting financial transactions digitally through digital currencies or financial tokens, carried via networked computers and mobile devices.
- Microprocessors and networking capabilities embedded in physical goods such as home appliances and cars.

Rapid advances in new digital technologies have made it possible for media to place their content online in a variety of methods. Media companies have been merging in an attempt to develop vertical integration for content and distribution across all types of media. The strategy of the media company of today is to collect previously disparate media and in the course of organizational and technological convergence, generate synergy that formulates a positive contribution to the financial results of the organization (Rayport and Jaworski, 2003).

2.2.1 The Economics of Digital Systems

The economics of E-Commerce are based on principles that differ from those underlying traditional markets. These E-Commerce principles are based on information and network economics. The following graphically depicted examples explain the concepts.

2.2.1.1 Products' Cost Curves

The average-cost (AVC) curve of several physical products and services is U-shaped (Figure A). This indicates that, at first, as quantity increases, the average cost declines. However, as quantity increases even more, the cost begins to escalate due to increasing variable costs (especially administrative and marketing costs) in the short run, when production capacity is fixed.

In contrast, the variable cost per unit of digital products is very low (in most cases) and almost fixed, irrespective of the quantity. Therefore, as illustrated in Figure B, total cost per unit will decline as quantity increases, as the fixed costs are spread (prorated) over more units. This relationship results in increasing returns with increased sales (Turban and King, 2003).

Figure 2.1: Cost Curves of Regular and Digital Products

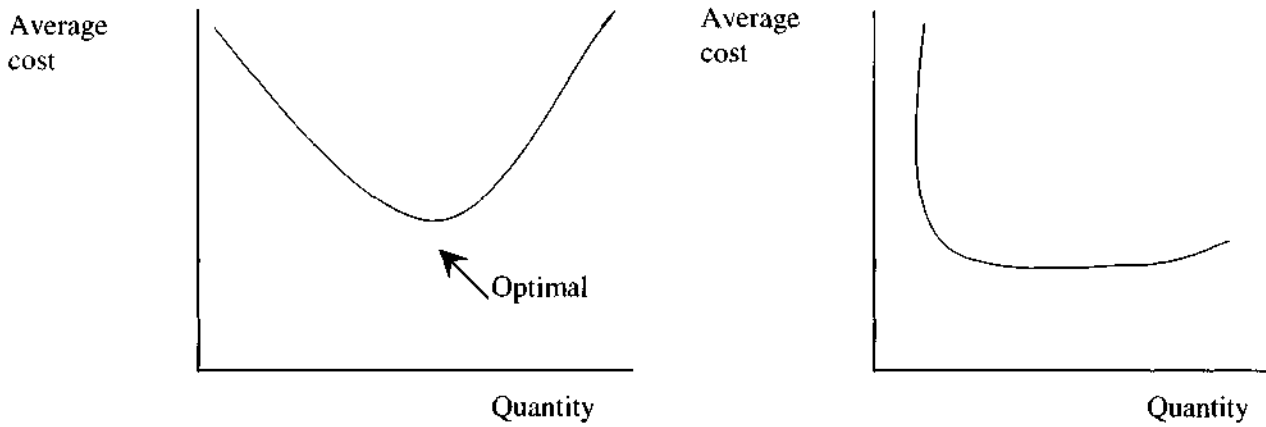


Figure A: Regular Products

Figure B: Digital Products

Source: Turban and King (2003), Page 23

The comparison between the cost curves of the regular products (Figure A) and the cost curves of the digital products (Figure B), reveal that the average cost of digital products are lower than that of regular products.

2.2.1.2 Other Cost Curves

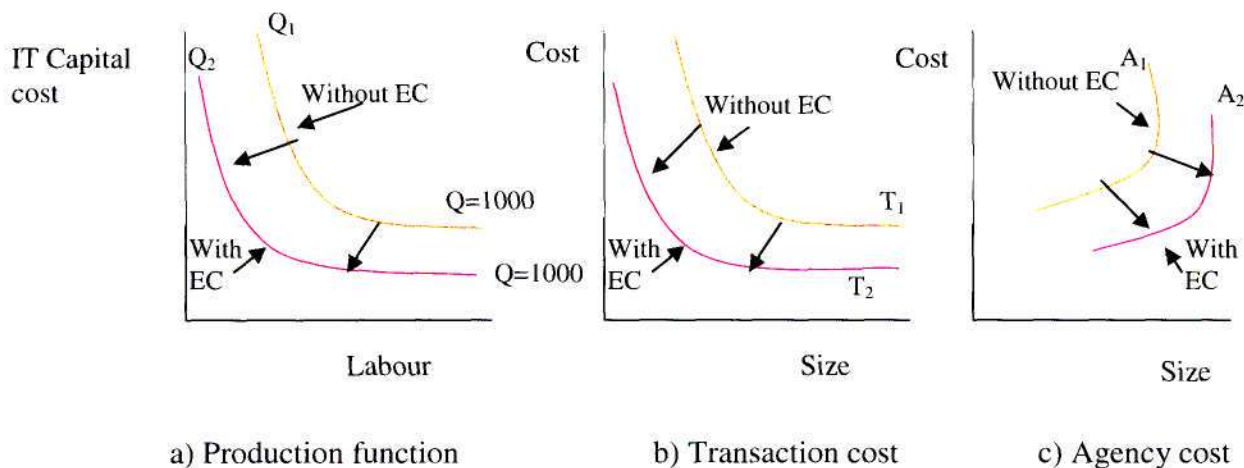
E-Commerce has other economic advantages over traditional commerce. In Figure C, three cost components, the production function, transaction costs, and agency/administration costs and the effect of E-Commerce on each is illustrated.

The production function is shown in Figure 2.2 (a). It indicates that for the same quantity of production, Q , firms can either use a certain amount of labour or they can invest in additional automation (they can substitute information technology capital for labour). For example, for a quantity $Q=1000$, the lower the amount of labour needed, the higher the required information technology investment. When E-Commerce enters the picture, it shifts the function inward (from Q_1 to Q_2), lowering the amount of labour and/or capital needed to produce the same $Q=1000$.

The economics of the firm's transactions costs are shown in Figure 2.2 (b). Traditionally, to enable a reduction in these costs, firms had to increase in size (as illustrated in curve T_1). In the digital economy, the transaction cost is moved inward, to point T_2 . The resultant effect of this move is that e-commerce enables a firm to benefit from low transaction costs with a smaller firm size or to benefit from much lower transactions when the size of the firm increases.

Agency costs are illustrated in Figure 2.2 (c). In the "old economy," administration costs (A_1) increased with the size of the firm, hindering firms from growing too large in size. In the digital economy, the administration cost curve is moved outward, to A_2 . This means that as a result of e-commerce, firms are able to expand their operations without significant increases in administrative costs.

Figure 2.2: The Economic Effects of Electronic Commerce



Source: Turban and King (2003), Page 24

The curves evaluate the costs between e-commerce and without e-commerce. The economic effects of the cost curves demonstrate the reduction in input costs as a result of utilising an e-commerce infrastructure. A reduction in input costs has the effect of increasing the profitability of the firm. The fundamental accounting requirement of a firm is to ensure a profitable and a sustainable trading position. The cost curves depict the nature of the costs and the resultant shifting thereof that give rise to lower input costs. The shifting of the cost curves results in higher profits for the firm that utilises e-commerce.

The benefits of electronic commerce are divided into the following categories (Beynon-Davies, 2004):

- **Cost savings**
This refers to efficiencies within the framework of decreased logistic costs, decreased postal costs, decreased storage costs and decreased personnel costs.

- **Time savings**
These are efficiency gains and include faster lead times to markets, suppliers and customers. Time savings also include increased flexibility as well as a reduction in delivery time and generation of payments.

- **Connection improvements**
Disintermediation impacts both efficiency and effectiveness.

- **Quality improvements**
Efficiency and effectiveness improvements are realised in the areas of access to new markets, formulating methods of marketing the latest goods and services and the overall enhancement in supply-chain relationships.

- **Strategic improvements**
This category includes increased efficiency and effective organisational forms and conducting business on a global platform.

Electronic Commerce may become a significant global element within ten to twenty years. The task facing each firm is how to put together the components that will enable the organisation to gain competitive advantage by using electronic commerce. Major companies such as Schwab, IBM, Intel and General Electric are rapidly moving in the direction of becoming fully digitalised. The major characteristics of such a company are shown in table 2.1 where a digitalised company is compared to a brick and mortar organisation (Turban and King, 2003).

Table 2.1: Digital vs. Brick-and-Mortar Company

Brick and Mortar Organisations	Digital Organisations
<ul style="list-style-type: none"> • Selling takes place in physical stores. 	<ul style="list-style-type: none"> • Selling takes place online.
<ul style="list-style-type: none"> • Selling of tangible goods. 	<ul style="list-style-type: none"> • Selling of digital goods.
<ul style="list-style-type: none"> • Internal inventory/production planning required. 	<ul style="list-style-type: none"> • Online collaborative inventory forecasting.
<ul style="list-style-type: none"> • Paper-based catalogues. 	<ul style="list-style-type: none"> • Electronic catalogues.
<ul style="list-style-type: none"> • Physical marketplace. 	<ul style="list-style-type: none"> • Market space (electronic).
<ul style="list-style-type: none"> • Use of VANS and traditional EDI. 	<ul style="list-style-type: none"> • Use of the Intranet and extranets.
<ul style="list-style-type: none"> • Paper-based billing. 	<ul style="list-style-type: none"> • Electronic billing.
<ul style="list-style-type: none"> • Paper-based tendering. 	<ul style="list-style-type: none"> • Electronic tendering.
<ul style="list-style-type: none"> • Mass production. 	<ul style="list-style-type: none"> • Mass customisation, build-to-order.
<ul style="list-style-type: none"> • Limited advertisement. 	<ul style="list-style-type: none"> • Explosive marketing.
<ul style="list-style-type: none"> • Huge amount of capital is required for mass production 	<ul style="list-style-type: none"> • Minimal capital required for build-to-order.
<ul style="list-style-type: none"> • Large fixed cost required for plant operation. 	<ul style="list-style-type: none"> • Minimal fixed cost required for plant operation.

Source: Turban and King (2003), Page 33

2.2.2 Comparison of online catalogues to paper catalogues

Online catalogues are the equivalent of paper based catalogues, the objective of which is to display the supplier's goods and services. The online version usually contains a colour image of the goods, a description of the goods, including the price thereof as well as the material composition of the item (Laudon and Traver, 2002).

In 2003, San-Francisco based ForestEthics launched an environmental campaign against the catalogue industry by awarding the catalogue industry the “Most Wasteful Forest Destroyer’ award at the industry’s annual convention. Annually, catalogue retailers mail out approximately 17 billion catalogues. This equates to 59 catalogues for every man, woman and child in the United States. Almost none of this paper contains any recycled content. This means that annually, more than eight million tons of trees go directly into catalogues, 95% of which are discarded or recycled without having been read (Internet 20).

Catalogues truly do offer one-stop shopping – destroying endangered forests and burdening the already overflowing landfills in one fell swoop, stated Todd Paglia, the Director of The Paper Campaign at Forest Ethics. The current practices of the catalogue industry are blatantly unacceptable. We’re telling the catalogue industry to exit from endangered forests and maximise the post-consumer recycled content of its products (Internet 20).

The advantages and disadvantages of online catalogues are tabulated in table 2.2 (Turban and King, 2003).

Table 2.2: Comparison of Online Catalogues to Paper Catalogues

Type	Advantages	Disadvantages
<ul style="list-style-type: none"> • Paper Catalogues 	<ul style="list-style-type: none"> • Easy to create without advanced technology. • Reader is able to read a catalogue without a computer system. • More portable than an electronic catalogue. 	<ul style="list-style-type: none"> • Difficult to update changed product information without delay. • Only a limited number of commodities can be displayed. • Restricted information through photographs and textual description is available.

<ul style="list-style-type: none"> • Online Catalogues 	<ul style="list-style-type: none"> • Simple to update product information. • Possible to integrate with the purchasing process. • Excellent search and comparison capabilities. • Able to provide timely and up-to-date product information. • Provision for globally broad range of product information. • Possibility of adding voice and animated pictures. • Long-term cost savings. • Relatively easy to customize. • More comparative shopping is possible. • Ease of integrating order processing, inventory processing and payment processing to the system. 	<ul style="list-style-type: none"> • No opportunity for advanced multimedia such as animation and voice. • Complicated to develop catalogues; large fixed costs. • There is a need for consumer skill to deal with computers and browsers.
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Source: Turban and King (2003), Page 64

2.2.3 Electronic Banking

Despite the consequences of format, electronic payments are extremely cheaper than issuing paper cheques. Electronic payments are convenient for customers and have the potential of saving businesses money. Distribution of invoices, statements and cheque payments in its traditional format costs more than utilising electronic commerce to do so. There is also a significant impact on the environment by utilising online technology. Trees are required to make paper and along with the energy costs associated with the manufacture of paper, there is a positive spin-off to the environment by utilising less paper products (Schneider, 2006).

2.2.4 Advertising and Online Publishing

With the objective of attracting advertising income, magazines and newspapers have also set up sites on the Web. Several online periodicals include traditional advertisements as well as icons, which display an advertiser's logo, and when clicked with a mouse, send a user across the Web to the advertiser's Web site (Kalakota and Whinston, 1997).

Advertising is the driver of the print industry and the print industry needs to start working more closely with the media and marketers in order to maintain sustainability (Internet 2).

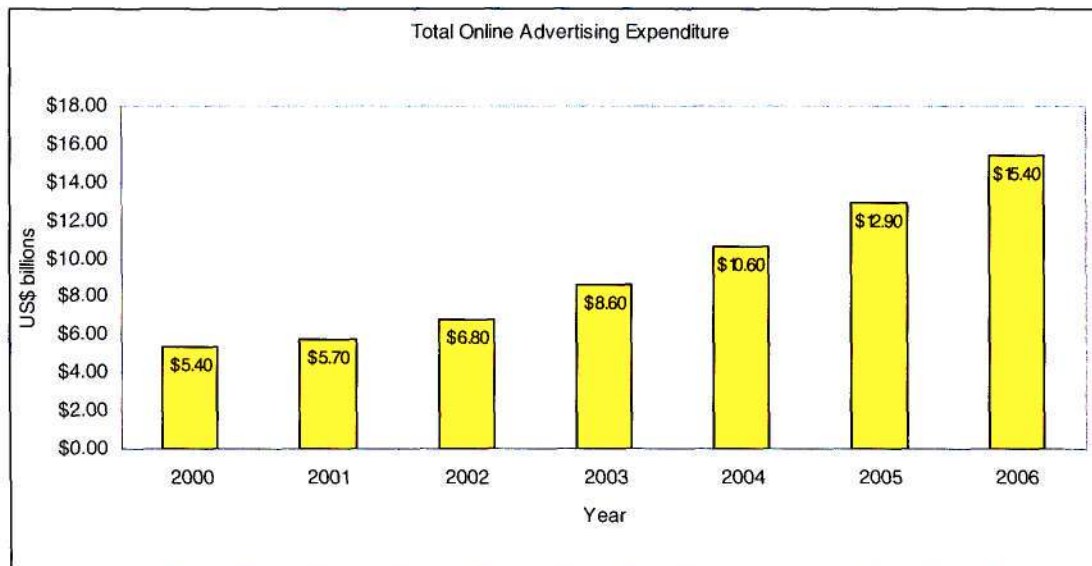
Technological advancement complemented with the digital revolution has forced players within the paper industry to put measures in place in order to maintain sustainability.

Kalakota and Whinston (1997) explain that firms are now willing to spend more on advertising as the benefits outweigh the costs:

- *Shorter access times.* As more bandwidth becomes available, users will spend a larger proportion of their time on Web sites and less time waiting to access them.
- With more time to draw users' attention, advertisers should be willing to pay more per user to place their icons in online periodicals.

- *Increasingly convenient access to information.* As the amount of online information increases, it should be increasingly important for advertisers to get users to their sites speedily, leading them to pay more for placement in online periodicals.
- *Increasingly valuable information.* Product enhancements are enhanced through online advertising. With more information available, the purchasing decision is supposed to be cheaper and more purchases should occur.

Figure 2.3: Total online advertising expenditure



Source: Laudon and Traver (2002), Page 414

Figure 2.3 illustrates the growth of online advertising expenditure. In 2000, online advertising expenditure was US\$ 5.4 billion and six years later, the expenditure almost tripled to US\$ 15.4 billion. This is clearly indicative of the growth in online advertising.

Online advertising has advantages and disadvantages in comparison to conventional advertising. The greatest advantage of online advertising is the capacity to target advertisements to narrow segments and to track the performance of advertisements in real time. Online advertisements also create greater depth for interactivity between the potential customer and the advertiser. The disadvantages of online advertising include costs versus benefit and a tool to accurately measure its results (Laudon and Traver, 2002).

Turban and King (2003) cite the advantages of Internet advertising compared to traditional media in table 2.3.

Table 2.3: Advantages and Limitations of Internet Advertising Compared to Traditional Media

Internet	Traditional media
<ul style="list-style-type: none"> • Internet advertisements are available 24 hours a day, 365 days a year, and costs are the same, regardless of audience location. • Accessed primarily because of interest in the content, so market segmentation opportunity is big. • Opportunity to create one-to-one direct marketing relationship with customers. • Multimedia will increasingly produce more attractive and compelling advertisements. • Distribution costs are low (just technology costs), so reaching millions of customers costs the same as reaching one. • Advertising and content can be updated, supplemented or changed at any time, and are therefore constantly up-to-date. • Response and results are immediately quantifiable. • Logical navigation: one may click when and where one wants to, and one may spend as much time as one wants on the site. 	<p>Magazines</p> <ul style="list-style-type: none"> • They unique opportunities to segment markets, both demographically and psychographically. • Advertisements can be studied and reviewed at leisure. • High impact can be accomplished with good graphics and literate, informative copy. <p>Newspapers</p> <ul style="list-style-type: none"> • High 'single day' reach opportunity. • Reader often shops for specific information when purchasing. • Available in a portable format.

Source: Turban and King (2003), Page 174.

Schneider (2002) argues that electronic commerce provides consumers with an easy way to customize the level of detail in the information they obtain about a potential purchase. Rather than waiting days for the mail to bring a catalogue or product specification sheet, or even minutes for a fax transmission, consumers can have instant access to detailed information on the Web.

2.2.5 Online publishing and E-books

Online publishing refers to the electronic delivery of newspapers, magazines, books and news over the Internet. It is interrelated to worldwide dissemination of knowledge and advertisement. Publishers of conventional hard-copy media have expanded to add online operations. Magazine and newspaper publishers such as Ad Week, PC Magazine, the Wall Street Journal and the Los Angeles Times now all use online publishing to disseminate information online. Chicagotribune.com (the online version of the Chicago Tribune) provides not only the paper's hard-copy issue online free, but in its soft-copy version, it publishes supplementary news details, jobs, housing listings and information on community service. Online publishing includes material either received free or by subscription fee; at times such material may be customised for the recipient. The possibility of new interactive technologies and other Internet applications are expected to stimulate the growth of online publishing. E-book is a book in a digital form that may be read on a computer screen, including a hand-held computer. An increasing number of online publishers are producing e-books (Turban and King, 2003).

The amazing aspect about electronic text is that it takes up virtually no room, in both a physical and digital sense. If one has a storage card, one can walk around with at least a dozen books, and possibly many more than that. One may not have a storage card and may still walk around with a reasonable collection of books, depending on the book size and available memory. In several situations, carrying a single book creates some discomfort. In contrast, the storage abilities of most e-books allow readers to carry a reasonable quantity of reading material in an electronic medium. The electronic format also has the advantage of being able to be read in a variety of lighting conditions (Internet 7).

Most Palm computers have back lighted screens making it possible for the reader to read an e-book in most low or no light situations, such as the subway, during night time road trips, or in one's bedroom when one doesn't want to disturb the other (Internet 7).

2.2.6 E-Payments

Collecting revenue from sales is imperative in operating a business. E-Commerce generates some unique methods for merchants who want to reliably and efficiently collect revenue from customers and for customers who would like a reliable, trustworthy way to pay for goods and services online. The emergence of e-commerce has created new financial requirements that in many cases cannot be effectively fulfilled by traditional payment systems (Laudon and Traver, 2001).

An electronic payment is a financial exchange that occurs online between buyers and sellers. The content of this exchange is generally in a form of a digital financial instrument; such as encrypted credit card numbers, electronic cheques or digital cash. The factors that are stimulating awareness amongst financial institutions in electronic payments are: decreasing of technology costs, reduced operational and processing costs, and increasing online commerce. The need to reduce costs is a major reason for the increase in electronic payments. Cash and cheques are extremely expensive to process, and banks are seeking less costly alternatives. Banks and retailers want to wean customers away from paper transactions because the processing overheads are both labour intensive and costly (Kalakota and Whinston, 1997).

Kalakota and Whinston (1997) explain some of the problems and limitations experienced with traditional payment methods:

- Lack of convenience. Traditional payment methods generally require that the customer leave the online platform and use the telephone or send a cheque to make payment to the supplier.

- **Lack of security.** In order to make a traditional payment over the Internet, the consumer has to provide card/payment account particulars and other personal information online. Outside the Internet arena, providing the card/payment details over the telephone and/or by mail leads to security risks.
- **Lack of coverage.** Credit cards are accepted at certain merchants only.
- **In its existing form, cheques are inadequate for real-time payments.** Online payments are instantaneous.

In contrast to traditional payment methods, hereunder are certain alternative online methods:

- **Digital cash** (sometimes called e-cash) was one of the first forms of alternative payment methods developed for e-commerce (Laudon and Traver, 2001).

Electronic or digital cash combines computerised convenience, security and privacy that vastly improve on paper cash. Digital cash attempts to replace paper cash as the principal payment medium in online payments (Kalakota and Whinston, 1997).

- **Electronic cheques** will facilitate new online services by allowing new payment flows, enhancing security at each step of the transaction by means of automated validation of the electronic signature of each party and facilitating payment with Electronic Data Interchange (Kalakota and Whinston, 1997).
- **Credit cards** are at present used by online shoppers for the majority of their Internet purchases. Paying for online purchases is as easy and convenient as paying in an offline store (Schneider, 2002).

- **Digital accumulating balance payment systems** allow customers to make payments on the internet, accumulating a debit balance for which a bill is generated at the end of the month (Laudon and Traver, 2001).
- **Online stored value systems** allow the customer to transact online and generate payments to merchants and other individuals based on the amount stored in the online account created for that purpose (Laudon and Traver, 2001).
- **Smart cards** are another form of stored value systems based on credit card sized plastic cards that have chips which store personal information. Smart cards have the capacity of holding 100 times additional data than a credit card. Smart cards are more secure than conventional credit cards because the information stored on the smart card is encrypted (Schneider, 2002).
- **Debit cards** at the point of sale are used similarly to a credit card. The funds are however, transferred from the customer's bank account directly into the merchant's bank account (Kalakota and Whinston, 1997).

2.2.7 Media Economics

Rapid advancement in digital technology has allowed media companies to place their content in an online version. These options range from streaming-media technology to playing audio and video clips over a narrowband feed.

Table 2.4 tabulates the hours spent per year per customer per media for the years 1992, 1997 and 2002 in the United States.

Table 2.4: Hours spent per year per customer per media

Media and year	1992	1997	2002
Television	1,510	1,561	1,571
Radio	1,150	1,082	1,040
Recorded music	233	265	289
Daily newspapers	172	159	152
Consumer books	100	92	97
Consumer magazines	85	82	79
Home video	42	50	58
Movies in theaters	11	13	13
Video games	19	36	46
Consumer online	2	28	49
Total hours per person	3,324	3,368	3,398

Source: Rayport and Jaworski (2003). Page 418

Within the categories of newspapers, books and magazines fewer hours are spent by the consumer on an annual basis when the years 1992 and 2002 are compared. On the other extreme, there has been an exponential growth in time spent in the category of consumer online (2 hours per year in 1999 compared to 49 hours per year in 2002) (Rayport and Jaworski, 2003).

With the increased usage of the Internet, newspapers have hurriedly created a web presence, the objective of which is to capture a share of this growing audience. By the year 2001, greater than 1,200 newspapers in North America had an online product, ranging from classifieds to reproductions of the entire newspaper (Rayport and Jaworski, 2003).

Even though magazines do not face the threat from the Internet that newspapers do, magazine houses have acknowledged the importance and relevance of online content. Research conducted previously shows that a magazine could spike interest in a relevant website and that a partnership with a similarly named website can create a demand in subscriptions for the magazine (Rayport and Jaworski, 2003).

In the year 2000, experts predicted that a shift in the book industry would occur in the advent of the electronic platform. A change from a “print and distribute” model to the Internet’s “distribute and print” model was foreseen. It was predicted that consumers could download a book’s content and read it off an e-book device. However, these predictions have come about slower than anticipated. The e-book industry still has a convincing concept and while the e-book industry has a slower growth curve than originally expected, the concept is not discarded (Rayport and Jaworski, 2003).

2. 3 The Environment – An urgent problem

Ever since the creation of the Earth, change has been the rule rather than the exception on the planet’s continental and other land areas. Land areas are continually being transformed due to both tectonic forces (energy derived from the internal heat of the Earth) and exogenic processes (those that result from the action of wind, water, and ice and from human activities) (Johnson and Lewis, 1995).

The pulp and paper industry may be considered as contributing to more global and local environmental problems than any other industry in the world. Paper manufacturers reach deep into species-rich forests for virgin timber, razing trees, polluting waterways and destroying precious wildlife habitat in the process. Pulp and paper mills that use virgin timber are foremost generators of hazardous air pollutants, including dioxins and other cancer-causing chemicals. The pulp and paper industry is also considered the third largest industrial emitter of global warming (Internet 8).

2.3.1 Paper Consumption and Forestry Management

The method that forests are used and managed is extremely controversial and deforestation in tropical regions and the decline in ‘old growth’ forests are now acknowledged to be global problems (Internet 10).

Some of the major concerns and indecisiveness surrounding the forestry sphere are cited hereunder (Grieg-Gran, 1996).

- Definitions of sustainable forest management and forest stewardship: This involves the integration of performance standards – the need to achieve certain environmental, social and economic targets in the forest – with process standards.
- Quantity of natural forest to set aside for conservation: Deciding on the quantity of forest land to set aside is of lesser importance than making a decision on which are the critical levels of biodiversity and the critical types of biodiversity at each level.
- Appropriateness of clear-cuts: Research suggests that universal prescriptions against clear-cutting are inconsistent with ecologically-based management. From an ecological viewpoint, the decision on whether or not to clear-cut should be determined by factors such as the natural forest disturbance regime, the characteristics of key forest species and the nature of the land.
- Where plantations are appropriate: Objections to plantations are based largely on their perceived “monoculture” characteristics. The challenge is to introduce more diversity and resilience into plantation systems.

The loss of forests isn't the only concern. Deforestation has released an estimated 120 billion tons of carbon dioxide, the foremost global warming gas, into the atmosphere. The pulp and paper industry is the third-largest industrial polluter in both Canada and the United States, releasing more than 220 million pounds of toxic pollution into the air, ground and water annually (Internet 12).

The focus of worldwide attention on tropical forests has arisen because of the sheer diversity of purpose which they serve, the uniqueness of primary forest in evolutionary and ecological terms, and the accelerating threat to their existence. Tropical forests are the homeland of several indigenous people; they provide the habitat for widespread fauna and flora (biodiversity), which are valued in themselves, and are valued for educational, crop-breeding and medicinal purposes; they supply hardwood timber, and other forest products such as fruit, nuts, latex, rattans, meat, honey, resins, oil, etc.; they make available a recreational facility (e.g. "eco-tourism"); they protect watersheds in terms of water retention, flow regulation water pollution, and organic nutrient cleansing. They also act as a store of carbon dioxide so that, while no net gains in the flow of carbon dioxide accrue to forests, carbon dioxide is released, and a cost ensues, if deforestation occurs. Forests also put right carbon levels in secondary forests and in reforested areas. Finally, they also provide a possible regional microclimatic function (Adamowicz and Boxall, et al, 1996).

Deforestation is at present proceeding at an unprecedented rate. In 1998, the World Resources Institute reported that 185 million hectares of tropical forests, an area approximately the size of Mexico, were destroyed from 1980 to 1995, as trees were cut for timber and to clear land for agriculture and development (Tietenberg, 2004).

Deforestation poses a significant threat to biodiversity as it destroys forest habitat. Pressures on forest habitat arise from logging activities and from the conversion of forested land to other uses. Logging activities not only remove trees that serve as habitat, but the associated activities (such as road building) can degrade the surrounding territory as well (Tietenberg, 2004).

Prevalence of widespread deforestation as emission-induced forest decline has also taken place in past centuries in regionally limited areas after the development of industry or near refineries. Growing industrialisation, associated with the construction of tall chimneys that enabled pollutants to be more broadly distributed, the deforestation has spread out in large areas since about the start of the 1970's (Schwedt, 2001).

Generally from a political viewpoint, this phenomenon is also termed 'new-type forest decline', and represents a disturbance of the entire relationship between soil, tree and air, or an illness which has befallen the entire ecosystem. One of the most severe consequences of this deforestation is the loss of the forest as a groundwater storage place. A damaged forest also binds less carbon dioxide, with a consequential impact on the greenhouse effect (Schwedt, 2001).

In Indonesia, the pulp and paper industry is destroying rainforest at such a swift pace that it will run out of timber by the year 2007. An area, the size of Belgium is depleted annually. No more than 10% of the trees harvested, are subsequently farmed (Internet 12).

Internationally, pulp for paper and other uses is taking an increasing share of all wood production, from 40% in 1998 to nearly 60% over the next 50 years. For the duration of this period, easily accessible and inexpensive sources of wood are disappearing. Due to the rising consumption of virgin forests in places as far apart as Canada and South East Asia, forest restoration has not been able to keep pace with the demand for wood products (Internet 12).

2.3.1.1 The potential of non-wood fibre

Non wood fibres are used to manufacture a range of grades of paper and paperboard and account for greater than half of the virgin pulp production in developing countries. Under existing agricultural practices and current processing technologies, non-wood fibres are by and large more polluting than wood, although less energy is required to pulp the fibre. The production of paper from non-wood fibres is typically more expensive than using wood. The development of cost-effective systems of improving effluent quality from non-wood mills is urgent and would reduce the pollution burden (Grieg-Gran, 1996).

2.3.2 Paper Consumption and Industrial Pollution

Ever since the late 1980's, considerable interest has been focussed on air and water pollution caused during pulp and paper making, particularly dioxins generated by traditional chlorine gas bleaching (Internet 10).

Major air emissions from pulp and paper manufacturing are reduced sulphur compounds, carbon monoxide, sulphur dioxide, nitrogen oxides, volatile organic compounds and particulates. In comparison to other industries, the pulp and paper industry is a considerable source of air emissions, although they are considered to be of less concern than waste water emissions (Grieg-Gran, 1996).

Air emissions from the pulp and paper industry are listed in table 2.5.

Table 2.5: Air emissions from the Pulp and Paper Industry

Pollutant	Effects	Source
Carbon dioxide	Greenhouse gas	Fuel combustion
Hydrogen sulphide	Rotten egg smell	Kraft process
Sulphur dioxide	Acid rain	Fuel combustion and pulping process
Volatile organics	Some toxic effects and precursors to the formation of ozone	Various
Chloroform	Toxic, possible carcinogen	Chlorine bleaching
Other organo-chlorines	Some highly toxic	Chlorine bleaching

Source: (Internet 14) Adapted

The most important source of sulphur dioxide is the combustion of fossil fuels containing sulphur. These are primarily coal and fuel oil, since natural gas, petrol and diesel fuels have relatively low sulphur content. Sulphur dioxide and other pollutants emitted at a high level may be transported over large distances by the atmosphere (Harrison, 1990).

During such transport processes, oxidation of sulphur and nitrogen oxides to sulphuric and nitric acids proceeds, hence giving rise to an “acid rain” dilemma at great downwind distances. Numerous environmental problems are associated with acid rain, including the killing of fish in acidified lake waters and the leaching of nutrients from soils (Harrison, 1990).

A few of the major environmental contaminants, (Internet 13) related to the pulp and paper industry, based on the process are:

- **Process: Pulping.** Sodium Hydroxide, Sodium Bisulfite, Sodium Sulfate, Calcium/Magnesium/Aluminium Bisulfites.
- **Process: Bleaching.** Chlorines, Hydrogen Peroxide, Acids, Ozone, Sodium Hydroxide/Hypochlorite/Dithionite.
- **Process: Additives – for fillers, adhesives, to improve strength and colour.:** Talc, Alum, Clay, Dyes, Pigments, Fuel oil, Alcohols, Wax emulsions, Ammonia, Starch, Silicones, Solvents, Recycled oils, Latex, Rosin, Acetates and Polyesters.

2.3.2.1 Liquid effluent

Attention has moved from conventional pollutants such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS) and colour to chlorinated organics and to dioxins and furans in particular, due to their apparent toxicity. In addition, a variety of other organic compounds are associated with effluents from both bleached and unbleached kraft mills as well as sulphite and mechanical pulping. These organic compounds are thought to be related to naturally occurring compounds present in wood fibre. Researchers have suggested that there may be reason for alarm about the chronic toxicity of such compounds, but speculation remains (Grieg-Gran, 1996).

A considerable amount of interest has been focused on the environmental impact of pulp bleaching using chlorine gas, compared to 100% substitution by chlorine dioxide (ECF) or alternatively the elimination of chlorine in any form (TCF). The accessible evidence implies that there is a no significant difference between ECF and TCF in terms of their effect on effluent quality (Grieg-Gran, 1996).

The environment can also be compromised with storage, transporting, loading and unloading of chemicals. Inadequate aboveground/underground storage tanks that hold fuel for on-site waste water treatment plants to chemical containers to transporting bleaches and other chemicals to pulp and paper mills – the potential for environmental exposures includes both on-site and off-site processes (Internet 13).

2.3.3 Paper Consumption and Waste

The short life span of paper means that the bulk of consumption rapidly turns into waste. Mass-balances in Germany suggest that a maximum of 10% of paper consumption is in the form of long-lived products, ranging from nothing for sanitary papers through to greater than half for speciality papers. This situation has become a major problem to governments faced with decreasing landfill availability and the rising costs of waste management (Internet 10).

Wasteful consumption is profoundly condemned by environmentalists and other pressure groups. Packaging has now become a serious target. Certain disposable paper products such as paper plates, tissues and nappies are seen by some as unnecessary. The disposability of paper products becomes particularly challenging in the light of new 'design for the environment' methodologies, which place a premium on product durability over the recyclability of materials, reducing the environmental advantage that paper has traditionally been seen to have over competing materials (Schmidt-Bleek and Tischner, 1994). Paper consumption associated with advertising and marketing (e.g. junk mail) is also regularly criticised (Internet 10).

Wastewater and by product disposal is a serious environmental problem. The pulp and paper industry makes use of large volumes of water. Controls are in place to make certain that waste water and by products from the pulping process do not get back into the environment as contaminants. Generally, pulp and paper mills do have waste water treatment plants on site, and sometimes have their own landfills (or use municipal landfills). However, if wastewater and sludge generated by pulp and paper mills do contaminate the environment, the result is extremely severe and includes toxic levels in fish, contaminated public drinking water and ground contamination (Internet 13).

Technological advances in the paper making process, waste treatment and environmental monitoring have led to numerous 'new' environmental problems associated with the manufacturing process (effluent discharge) becoming evident. For example, physiological changes in fish reproductive organs and hormone production consistent with oestrogenic pollutants have been observed (Internet 14).

The use of chlorine dioxide, the basis of ECF bleaching, has led to severe problems of chlorate production. Chlorate is a powerful herbicide that can harshly affect waterborne algae (Internet 14).

2.3.4 General areas of concern from pulp and paper manufacturing operations

2.3.4.1 General organic pollution and suspended solids

The most common organic pollutants in effluents are lost cellulose fibre, carbohydrate, starch and hemi-cellulose (or the organic acids resulting from their breakdown). The levels of these organic pollutants are measured by the Biological Oxygen Demand (BOD) or Chemical Oxygen Demand (COD). The demand for oxygen depletes that available to fauna and flora, thus having a detrimental effect on wildlife near to, and downstream from, effluent discharges (Internet 14).

High levels of suspended solids may be a cause of problems of both water opacity and blanketing of river or lake beds. Severe blanketing may also result in anaerobic decomposition beneath the blanket releasing hydrogen sulphide in the aquatic ecosystem.

These problems are reasonably localised. However, organic solids can also absorb a large quantity of the toxins present in mill effluents, such as resin and fatty acids and heavy metals. The result of this is that long-term effects may prevail over a wider area as a result of bioaccumulation and transportation all the way through the food chain (Internet 14).

2.3.4.2 Dioxins (PCDD) and Furans (PCDF)

Dioxins are exceptionally toxic, persistent and carcinogenic. Furans are chemically alike but an order of magnitude less toxic and less persistent than dioxins. The raw material type does not seem to significantly influence the amounts formed. Dioxins and furans tend to accumulate more in the pulp itself than in the effluent discharge.

This has led to apprehension and concern about dioxin levels in finished paper products and wastewater treatment sludge disposed of via landfill or incineration, as well as liquid mill effluents. Dioxins are also acknowledged to be present in mill flue gases (Internet 14).

Dioxins are organic chemicals, very much like the pesticide DDT, and considered by some to be the most toxic man-made chemical there is. Dioxin produced by the paper industry is a by-product of the chlorine and chlorine-based bleaching process (Internet 15).

Chlorine bleaching is a major source of the potent carcinogen dioxin, which is consistently discharged into rivers and streams with wastewater. As a result, dioxin is now ubiquitous in the environment, located throughout the world in air, water, soil and food (Internet 12).

Every woman living today carries some trace of dioxin in her breast milk. Dioxin is considered one of the most toxic substances ever produced, and has been known to cause cancer, liver failure, miscarriage, birth defects and genetic damage in laboratory animals (Internet 12).

The known effects of dioxins and furans on fish and mammals are wide ranging but any link to effects on humans is proving difficult to ascertain. This chemical is, however, suspected of causing miscarriages, birth defects, liver damage, skin complaints and behavioural and neurological problems. Bio concentration through the food chain, via fish, is a key concern (Internet 14).

2.3.4.3 Chloroform and other neutral chlorinated compounds

This group includes chloroform, chloro-acetones, -aldehydes and -acetic acids which are produced during the bleaching process but in lower concentrations than chlorophenolics. Whilst in the main, compounds in this group are non-persistent and non-bio accumulative, some are moderately toxic, mutagenic and/or suspected carcinogens.

The major anxiety and concern is the likely effect of human exposure to chloroform via drinking water and air (Internet 14).

2.3.5 Global warming

Greenhouse gases, one of the classes of global pollutants, absorb the long-wavelength (infrared) radiation from the earth's surface and atmosphere, trapping heat that would otherwise radiate out into space. The mix and distribution of these gases within the atmosphere is in no minute part responsible for both the hospitable climate on the earth and the rather inhospitable climate on the other planets. Altering the mix of these gases can modify the climate. Though carbon dioxide (an emission from pulp and paper manufacturing) is the most abundant and the most studied of these greenhouse gases, several others have similar thermal radiation properties.

The current concern over the effect of this class of pollutants on climate arises because emissions of these gases are escalating over time and changing their mix within the atmosphere. Evidence is escalating that by burning fossil fuels, levelling tropical forests, and injecting more of the other greenhouse gases into the atmosphere, humans are creating a thermal blanket capable of trapping an adequate amount of heat to increase the temperature of the earth's surface. Scientists currently envisage an increase in global mean temperature of between 1⁰C and 3.5⁰C. They expect the average rate of warming to be greater than any seen in the last 10,000 years. This is expected to trigger a rise of sea level from 15 to 95 centimetres (Tietenberg, 2004).

On a global scale, deforestation has resulted in a net release of carbon dioxide and other greenhouse gases into the atmosphere (Tolba, 1992).

2.3.6 Other environmental hazards

Some of the other environmental hazards (Internet 13) resulting from manufacturing in the pulp and paper industry are referred to hereunder:

- Contaminated wastewater – from process equipment, storm water runoff and cooling water.
- Improper disposal of solid waste.
- Storage tanks – including old storage yards.
- Chemical contamination.
- Historical spills and environmental contamination.
- Eliminating old processes.
- Soil and groundwater contamination.

A summary of the environmental and social impact of paper manufacturing is tabulated in table 2.6, entitled environmental and social impact of paper manufacturing.

Table 2.6: Environmental and social impact of paper manufacturing

Paper Cycle	Environmental Impact	Social Impact
Fibre supply	<ul style="list-style-type: none"> • Contribution to the carbon cycle. 	
Natural forests	<ul style="list-style-type: none"> • Loss of biodiversity, soil degradation, watershed destabilisation, clear cutting and 'forest mining'. 	<ul style="list-style-type: none"> • Local access/benefits, displacement of communities and recreation/aesthetics.
Plantations	<ul style="list-style-type: none"> • Excessive water consumption, low biodiversity and high external inputs. 	<ul style="list-style-type: none"> • Displacement of local people, conflicts over tenure and narrow access/uses and aesthetic uniformity.
Non-wood fibre	<ul style="list-style-type: none"> • Pollution. 	<ul style="list-style-type: none"> • Local livelihoods.
Recovered fibre	<ul style="list-style-type: none"> • De-inking, fibre fatigue and sludge. 	
Production	<ul style="list-style-type: none"> • High energy and water consumption. 	<ul style="list-style-type: none"> • Health and safety and employment.
Resource Use	<ul style="list-style-type: none"> • Air pollution (Sulphur dioxide), water pollution (BOD, COD, TSS, AOX, dioxins) and bleaching (ECF vs. TCF). 	<ul style="list-style-type: none"> • Health effects.
Distribution	<ul style="list-style-type: none"> • Energy consumption, air pollution. 	<ul style="list-style-type: none"> • Health effects, noise.
Consumption	<ul style="list-style-type: none"> • Source reduction, 	<ul style="list-style-type: none"> • Meeting basic needs, and

	choosing environmentally-friendly paper. Product reformulation (e.g. reduced brightness).	changing behaviour/lifestyles.
Waste	• Contribution to global warming.	• Public acceptability.
Disposal	• Composting	• Location.
Landfill	• Biodegradability, leachate, methane emissions.	• Spontaneous fires.
Incineration	• Air emissions (dioxins); ash.	• Location (Not in my backyard).

Source: (Internet 10) Adapted

2. 4 The Globalisation Challenge

The world is at present in the middle of a revolution that can be comparable to the Industrial Revolution in terms of its long span and consequences. This revolution is based on the globalization of tastes, production, labour markets and financial markets as a result of the advancements made in telecommunication and transportation. Globalization is a predestined phenomenon because with tastes converging, consumers throughout the world are demanding similar goods and services. Firms procure requirements from wherever in the world they are manufactured at an enhanced level or where they are available at a lower cost. In order to remain internationally competitive, these firms must invest capital and technology wherever they are more competitive. Globalization is imperative because it is required by international competition. However, blame is also being assigned to globalization such as increased world income inequalities, child labour, environmental pollution, and others; giving rise to an anti-globalization movement (Salvatore, 2005).

This movement blames globalization for an enormous amount of human and environmental problems around the world and for sacrificing human and environmental interests to the corporate benefits of multinational companies (Salvatore, 2005).

The pulp and paper industry is entering a new era of business evolution driven largely by consolidation of industry, globalisation and competition. These market drivers are compelling the pulp and paper industry to place greater focus on cost efficiency. This focus is creating a new challenge for the organisation by way of information technology.

Most pulp and paper industries are facing serious challenges in order to increase return on investment and improve capital utilisation. Firms are attempting to improve the efficiency of supply chains and hence, reduce working capital, increase transaction turnaround and improve inventory turnover. The pulp and paper industry has invested vast amounts of capital in information technology systems.

However, a large amount of these systems are old and complex and inflexible with regards to integration. This technology is also difficult to operate. Current business processes are difficult to streamline as this technology reflects procedures and policies of past organisations and business models.

Since the consolidation and globalisation of the pulp and paper industry, there has been mounting pressure to improve both the internal and external efficiencies thereof. In the larger pulp and paper mills, production monitoring systems consist of numerous systems, with the likelihood of some being purchased from different suppliers. Systems are often remote islands that are capable of managing information of its individual territory. These systems, however, lack the detailed information interrogation and sharing capability, which has resulted in an inflexible design of legacy systems. These legacy systems are costly to manage and complicated to enhance to meet business needs (Internet 9).

This situation has led to considerable investments in information technology and constant enhancements to the information technology environment; the objective being to meet efficiency challenges. Although many firms in the pulp and paper industry have invested in information technology, such as Enterprise Resource Planning systems, the return on investment is usually complicated to measure. System utilisation can be increased with the harmonisation of business processes. System integration also enhances efficiencies by supporting business requirements (Internet 9).

Hofstede (2001) states: “A more recent example of an industry where scale economies have encouraged internationalisation is the mobile phone market. The telecommunications industry is one in which companies need to make large infrastructure and network investments in order to function, but once the investment has been made the key to success is increasing customer volumes.”

Most firms in the pulp and paper industry have thus come to the conclusion that a radical rebuild and renewal of the entire information technology environment is necessary.

The circumstances for this have improved, largely due to a growing range of commercially available application platforms designed for the pulp and paper industry and the development of advanced integration and migration methods.

Both the upgrading and harmonisation of the firm’s information technology systems would pose a challenge as the business operations would have to continue as normal while simultaneously, core information technology systems and processes are enhanced (Internet 9).

The development of new technologies has colossally enhanced the globalization of media enterprises. The media industry is experiencing a phase of focusing on technical change. For firms in the media industry, the trends of integration of communication, Internet and the television represent both challenges and

opportunities. Once the platform of integration is created, global competition of content will become even more extreme (Internet 16).

The development of new technology has become a mechanism for media globalization; as a result of lower costs. As a new impetus, the Internet has changed and will continue to change the character of information commerce and people's lives in general. Regional barriers being broken down; and media contents reaching global readers, without establishing local platforms are but two of the consequences of the Internet (Internet 16).

2.4.1 Cultural diversity in the global context

Globalization is a phenomenon generated concurrently with the advent of new technologies, which erode barriers of time and space and the generalisation of the mechanics of free trade in a market of world proportions. Globalization on its own does not essentially entail the homogenisation of contents which threatens cultural diversity.

Globalization however, does have an adverse effect on the media industry through the following factors:

- The promotion of the concentration of firms as a way to achieve the required competitiveness in the international market.
- The elaboration of contents which please the general interests to the disadvantage of more particular tastes, thereby placing profitability before a quality product.

Notwithstanding the fact that in the medium term, traditional media will in all probability continue to have the greatest exposure in the dissemination of cultural values, digitalisation of the media opens up perspectives for the delivery of contents that translate to an escalation in the cultural diversity of the media. Digitalisation and convergence of the media offer new potential for increasing cultural diversity; such as the number of channels, the subscriber's direct access to the contents, enhanced

ability of dubbing and subtitling as well as new distribution channels for delivery of contents (Internet 17).

The Internet is a particularly suitable medium for the transmission of cultural contents. The Internet offers a range of choice to the public as well as access to the desired content is immediate (Internet 17).

Economic globalization is not a recent practice. Companies in the economically developed countries have for longer than the past five centuries been interacting on a trade basis with countries across its borders (Khor, 2001). In his 1776 landmark treatise, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Adam Smith from the United Kingdom introduced the doctrine of laissez-faire to international trade. 'Laissez-faire' means 'freedom of enterprise and freedom of commerce'.

Adam Smith advocated the fact that all nations would gain from unregulated, free trade that allow countries to specialize in products that they were the best acclimatised to because of inherent natural and talent advantages. This theory of trade is known as the Theory of Absolute Advantage.

The theory states that a countries import should consist of products manufactured more efficiently across its borders while exports should comprise of products manufactured more efficiently at home (Shenkar and Luo, 2004).

The fundamental nature of trade theory is that foreign trade – exports and imports – is derived from differences between the domestic and foreign prices of goods. In conditions of free trade (no restrictions on trade flows) the simple dictum applies that a country will not produce a good which could be bought cheaper elsewhere in the world (Du Plessis, Smit, et al, 1994).

The most significant aspects of economic globalization are the abolition of national economic barriers, the international broadening of finance, financial and productivity activities, and the increasing power of multinationals (Khor, 2001).

Michie (2003) cites the salient characteristics of globalisation as being categorised in two categories; qualitative and quantitative.

Qualitative:

- Breadth of change: The changes entail a variety of fields, such as the economy, society, population movements, business sector, politics, military and culture.
- Political basis: The process has been made stronger by the economic and social policies of deregulation and liberalisation now incorporating most countries in the developed and developing regions.
- Financial domination of the economy: Financial dominance has reached unprecedented levels in terms of intensity and financial activities in relation to the size of economies and also in terms of the number of countries involved in financial transactions.
- Social and organisational changes: Production decisions and operations in general have evolved largely as a result of technological advancements.
- Transnational corporations: The most important changes relate to the scheduling of production across countries.
- Technological basis of globalisation: The above changes would not have transpired on the scale that they have been had it not been for the electronic revolution. Electronic technology impacts every facet of the globalisation evolution, ranging from people movement, products, factors of production to the organisation of production. Enhancements and development have occurred in the technological arena as well as in the costs of transportation.

Quantitative:

- There has been an escalation in the *number of mechanisms* of interconnectedness across borders; ranging from the traditional trade flows to foreign investment and related incomes, to various types of collaborative business ventures.
- The *extensity* or geographical reach of interconnectedness has been increasing.
- The *intensity* of cross-border flows has also been escalating.

The interconnectedness between countries (Michie, 2003) results in an array of transactions and flows, of which the following are most prominent:

- “International trade in goods and services.
- Foreign direct investment
- Portfolio investment
- Profits, interests and dividends from the various types of foreign investment
- Inter-organisational collaborative partnerships
- Movements of people across borders for leisure or business activities or in search of jobs.”

In a competitive environment, survival and maintaining a profitable organisation within a country’s borders is difficult. Therefore, why does the need arise to increase the burden of pressure on the firm’s management by internationalising operations? The answer to this lies in the need to challenge the competition in order to achieve the objective of ensuring sustainability of the firm.

Selling the firm’s products or producing goods abroad, is regarded as a variation on an existing business strategy, pursued because existing markets or supply resources are inadequate or too expensive to maintain (Hofstede, 2001).

Measured in constant prices; the total value of world exports in 2000 more than tripled between 1980 and 2000, while foreign investment grew more than twenty-fold during the same period. This suggests that even a firm without international aspirations may soon find that its domestic market is under threat from foreign competition. Repeatedly this has happened to established but unsuspecting domestic firms that have been complacent in monitoring and reacting to foreign competition.

Globalization is often viewed as a threat, affecting even unbiased observers. The effort to fight it is however, easier said than done and probably without positive outcomes (Shenkar and Luo, 2004).

Instead of fighting globalization, it should be acknowledged, studied and the best ways of obtaining positive outcomes for the largest number of constituencies should be sought. Globalization produces winners and losers, and it supposedly comes at the cost of poorer countries.

A common complaint is that globalization deprives countries of their sovereignty. This allegedly occurs due to the increasing stature of international organizations such as the World Trade Organization whose members are not elected into office by popular vote and because to some, globalization means Americanisation and therefore a threat to their identity and values. Another complaint is that globalization enhances the monopoly strength of large multinational organizations. A further criticism against globalization is its unfriendly attitude towards the environment. Environmentalists conclude that firms relocate because they attempt to escape from the tough pollution rules in their home country. However, in reality, environmental compliance is only one of the many criteria taken into consideration when assessing investment and location decisions.

The globalization challenge is one of maintaining a sense of balance between the public interest and that of those who suffer its consequences in the short term.

Globalization is also associated with other negative consequences. Global capital flow results in less regulated emerging markets susceptible to fluctuations of international capital or foreign exchange markets (which could result in a financial or currency crisis) (Shenkar and Luo, 2004).

Globalization is a complicated occurrence and its consequences are often indistinct. Globalization brings with it winners and losers as well as promises and threats. While trade benefits all participants; and with globalization being correlated to higher overall economic growth, it is of little solace and consolation to an employee who is displaced due to foreign competition. It is devastating to communities when major firms move their operations offshore (Shenkar and Luo, 2004).

2.4.2 Local Solutions to Global Problems: Finnish Chemical Industry

Vornamo and Ahde (2006) explain the effects of globalisation on the Finnish Chemical Industry.

Globalisation is altering the operating environment of the chemical industry at an increasing tempo. Different stakeholders view the change differently. However, an opportunity to one may seem a threat to another. Collaboration and good judgement are requested if sustainable solutions are to be found for all stakeholders.

The pulp and paper industry, including pulp and paper chemicals sawmilling and other mechanical wood processing, forestry and associated industries form a powerful cluster in the Finnish economy. The might of this cluster was originally based on the country's forest resources, but the geographic proximity of the different divisions of the cluster nowadays requires more analysis.

The pulp and paper industry has been global for a lengthy period of time. This has been not only through exports but also because of production operations abroad that are owned by Finnish companies. Despite the escalating role of international facilities for Finnish companies producing chemicals for the pulp and paper industry, the core of these activities have remained in Finland.

More often than not, it is concluded that capital investment in new equipment and machinery is a leading factor in leveraging innovation. New, cheaper production methods translate into competitiveness.

Innovation does not take place without problems. One of the problems encountered is that of information flow. For the development of paper chemicals, it is insufficient to merely develop a relationship with the pulp and paper industry, it is also required that intimate knowledge of the industry's customers, such as printers is obtained. A further problem is who is responsible for financing the costs of innovation. The pulp and paper industry is by and large thought to be loath to pay more for new specialty chemicals that improves its products.

The industry prefers using old, cheaper chemicals as with change comes costs and risks. This translates to the fact that innovations which could benefit customers can be delayed, and the economic benefit to the chemical industry from its research and development efforts deferred as well.

Vornamo and Ahde (2006) pose the question: “Can the threat of globalisation be met through social innovation?” Besides product innovation and process or technical innovation, there exists a third class of innovation known as social innovation. Social innovation contributes to ensuring the mechanisms of society, the economy, labour and business work towards achieving synchronised efficiency.

One of the increasing challenges of the Finnish people that require social innovation to solve is that of getting old. Another problem is the importation of cheap industrial products from newly industrialised nations (Internet 18).

2.4.3 Interview- ex President of the Institute of Paper Science and Technology

In an interview conducted with Jim Ferris (ex president of the Institute of Paper Science and Technology), in 2003 by Solutions Magazine (Internet 19), one of the questions posed to him was “The paper industry and its educational/research institutions have been facing unprecedented challenges in recent years. How can each survive and thrive in the coming years?” His response follows:

“This is a question a lot of people are concerned about, and for good reason. All of our historical systems are becoming uneconomic in the face of globalization. I believe this is just part of the adjustment the entire U.S. economy must make to globalization, which is inevitable. Our industry is just one segment of the manufacturing economy that is going through the wringer and our first task is to realise and accept it. History is full of major periods of change and we are certainly in one right now, big time. To thrive and survive looks like a tough order to many organisations today, but some organisations will survive and some will thrive – albeit in an industry environment that is far different from our past. What needs to happen?”

“First, all parts of the paper industry and its supporting infrastructure, including the paper schools, must recognize and accept that disruptive change is upon us and to survive we must make changes we don’t like. The leadership of paper industry companies and associations all realise this, but a lot of people associated with them haven’t quite accepted it yet. No one is immune. We all need to get in the right frame of mind to seek out and welcome new ways of operating in this global economy.”

“Second, we must find a way to discuss what this industry and its support groups should look like in the future. It is reasonably clear that paper manufacture in the U.S. will be centered on a few large companies headquartered in the U.S. or elsewhere. But what should remain of the dedicated supplier base, the industry associations, and the paper schools? Industries can survive without them. But will the future U.S. –based industry be more competitive if at least parts of TAPPI, PIMA, NCASI, AF&PA, IPST and the paper schools survive? Once this wave of mergers and consolidations has passed, the real battle begins for the U.S. – based industry as it takes on worldwide competition full time. I believe the availability of shared resources to train people, focus issues, and improve base technology would be a tremendous help in that battle. Some of today’s leaders say we will rebuild these resources when the time comes. I see it more darkly: once these resources are gone they will not be replaced.”

“Industry leaders must overcome their current mindset, which is focused on vigorously competing with each other rather than working together. No one – especially an investor – is attracted to any company in an industry with sustained poor performance. Only by working together we can get through this period and have what it takes to thrive when the real battle begins. We have such a history of working together in this industry. It is very unfortunate that when we need to rely most heavily on working together as an industry, it seems to be going out of style.”

“Finally, we must increase our efforts to form partnerships with state and federal governments. As this industry is increasingly pressured economically by global competition, it threatens the large U.S. workforce that supports it.”

“There is tremendous rationale for state and federal governments to support new technology development to make this very large U.S. industry more competitive. A major focus for this must be created and I support the initial efforts to do this within AF&PA.”

“What will happen to the paper schools specifically depends on many factors and it is tough to project the outcome. However, I am certain that there will be fewer schools as enrolments drop and university provosts decide it is not worth the effort to continue a program. Also, larger companies and international companies have already shown they are less likely to support paper school foundations financially. Those of us in the academic sector see the major changes coming and most are waiting it out to see what happens. At IPST, we have chosen to merge with Georgia Tech to better position us for the broad-based, innovative research the industry needs to get out of this box, and to reduce the industry support costs for IPST’s operation. Every other paper school is considering its own options independently and the resulting industry resource in the future will be determined by these separate decisions.”

“However, none of this should reduce the long-term attractiveness of this industry to young people. It will remain a scientifically complex and challenging industry within which to make a good career producing products increasingly needed by society on a global basis. It continues to be based on a renewable resource and to produce recyclable products. Pulp and paper mills around the world will still require quality people trained in the unique processes of papermaking.

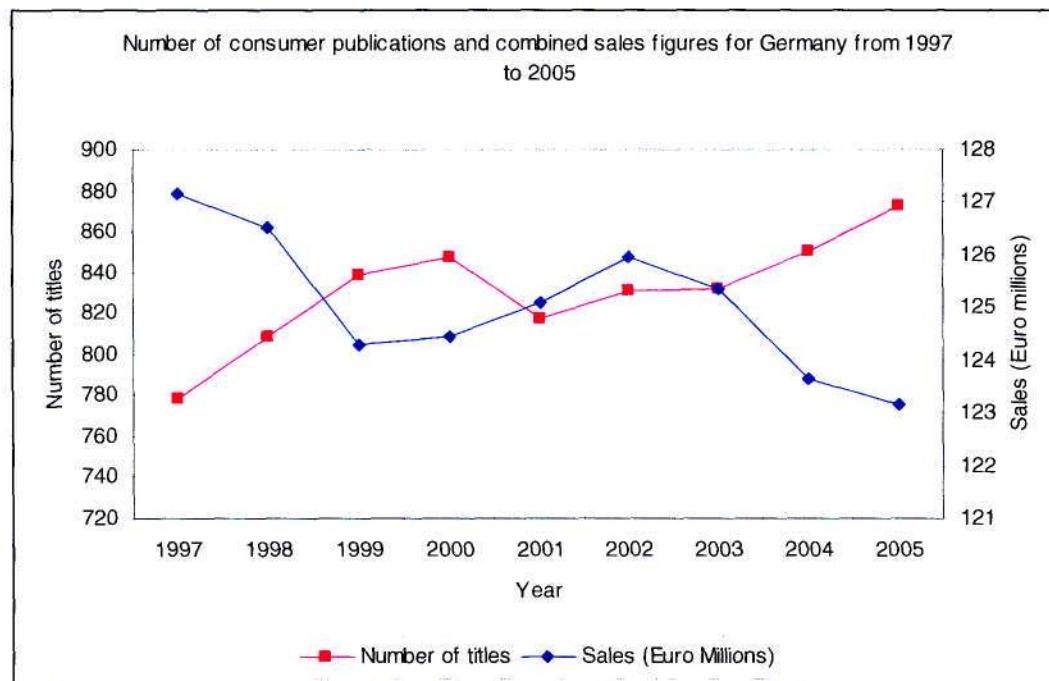
Here in the U.S., we have sustainable competitive advantages in our domestic market size and massive softwood forest resource. Where and how the students of the future will get their paper-based education is up in the air, but there will still be a few large schools offering this education when this is all over.”

2.5 Critical analysis of challenges faced by the paper industry in other countries

2.5.1 E-Technology

Against the background of the Internet discussion, the reality is that the percentage of newspaper and magazine reading population of the younger age groups has been steadily declining over the past ten years. The picture is certainly not optimistic when one considers the numbers of consumer publications available for Germany in figure 2.4.

Figure 2.4: Number of consumer publications and combined sales figures for Germany from 1997 to 2005



Source: *Pulp and Paper International*. Page 26. January 2007, Volume 49 Number 1

It is apparent that an enormous effort is required by publishers to retain their readership. A greater amount of titles are required, which are specifically targeted to certain groups of consumers. This effort by publishers results in increased costs of marketing technical production and although more titles are produced, sales revenue is on the decline (Toland, 2007).

A recent study by Red Door Consulting has concluded that younger demographic groups are heavy users of online media. New media is significantly more popular than print media (Toland, 2007).

Xerox Research Centre of Canada and California's Palo Alto Research Centre have prototyped an innovation known as 'erasable paper'. Printed images on this erasable paper disappear after 16 to 24 hours, thereby allowing the paper to be used more than just once. Xerox has estimated that approximately 40% of all documents printed on a daily basis are viewed just once. Xerox views the erasable paper as a sustainable innovation for itself as it would reduce the consumption of paper (Toland, 2007).

Toshiba has developed a printer that utilises 'paper' manufactured from polyethylene terephthalate that can be utilised up to 500 times. This innovation will reduce the carbon emissions of firms as the production process for the printer utilises a lower quantum of carbon dioxide as opposed to laser printers. The utilisation of less paper translates into lower pollution by means of reduced emissions from the paper making process (Toland, 2007).

2.5.2 Environmental concerns

The 'greenness' of the pulp and paper industry has also been under the spotlight in recent times. At a conference held in November 2006 in Brussels, the question of whether or not wood should be burned as fuel caused a debate that was described as being hot under the collar. It was illustrated at the same conference that the problems facing paper mills is as a result of the growth of the solid-wood bio fuels sector.

Certain delegates were of the belief that due to Europe's energy supply problems, the European Commission is prioritizing wood-for-energy over the interests of the pulp and paper industry (Toland, 2007).

In Belgium, sourcing timber for the pulp and paper industry is becoming increasingly difficult. Three reasons are cited for the shortage of wood in the market:

- Partially as a result of 1999's 'Hurricane' Lothar, the genuine impact of which is being experienced at present, there is 30% lower quantity of wood on the market.
- The demand for firewood has increased.
- There have been new developments of bioenergy plants that burn wood.

The consequence of wood shortage is a price increase. Wood has to be imported at usually higher prices (Toland, 2007).

In Uruguay, citizens are concerned about the environmental impacts of the construction of two pulp mills. People have protested against the construction of the pulp mills as well as Greenpeace activists have occupied the construction site (Internet 11).

There is an enormous amount of concern regarding the pollution from the pulp mills that the government of Argentina has taken Uruguay to the International Court of Justice in The Hague (Internet 11).

Pollution from the mills is not the only concern. The mills require wood grown from thousands of hectares of eucalyptus monocultures. These hectares of plantations require huge amounts of water and since the plantations have been established, there is a scarcity of water for the people (Internet 11).

2.6 The contribution of this research to the academic field

The research conducted forms the next academic step in exploring the challenges faced by the paper industry within the framework of electronic technology, the environment and globalisation; and formulating recommendations in an attempt to mitigate these challenges.

This study illustrates the relationship between these challenges and the long term sustainability of organisations within the paper industry by drawing upon South African respondents linked within this global milieu.

A search on the University of KwaZulu Natal's electronic libraries (Sabinet, Science Direct, Ebscohost and Jstor) had not revealed any research been previously conducted that resembled this study. This research is expected to fill that academic void that exists.

The forestry and forest industry compete in global markets. Until recently, success has been based on economy of scale, especially in the pulp and paper industry. However, this competitive advantage has been exploited already and new success requires new innovations that are needed to create the competitive advantage required in technology, products and markets. It is suggested that research and new knowledge are required at all levels within the pulp and paper industry (Internet 22).

The challenges being researched, the findings thereof and the recommendations formulated are expected to add to the body of academic knowledge by enabling organisations and other researchers to draw from this research in order to implement strategies based on the recommendations to ensure long term sustainability of organisations within the paper industry.

2.7 Conclusion

The discussion in this chapter revolves around the theoretical aspects of the research topic. The literature review provides the researcher with insight into making assessments of the research topic. The main objective of a literature review is to provide guidance in assessing the research problem.

The literature review begins with a discussion of the effect of electronic technology on the paper industry. Magazines and newspapers are engaged in battle, fighting an invasion of alternative media that is threatening the very survival and consumption of print in the future. There are two notable trends in the print industry that are turning printing on its head: the world is showing preference to digitalisation and the world is showing preference to colour (Internet 2).

The pulp and paper industry may be considered as contributing to more global and local environmental problems than any other industry in the world. Paper manufacturers reach deep into species-rich forests for virgin timber, razing trees, polluting waterways and destroying precious wildlife habitat in the process (Internet 8).

Pulp and paper mills that use virgin timber are foremost generators of hazardous air pollutants, including dioxins and other cancer-causing chemicals. The pulp and paper industry is also considered the third largest industrial emitter of global warming (Internet 8).

Nowadays, globalization allows investments, capital flows and emerging technologies to move with ease into countries where are expected to be productive. In a capitalist civilization, capital flows to those that are able to obtain the most amount of value from it. In the current global village, the competition for capital transpires internationally. With reductions in controls to capital flows, firms are at liberty to search for countries where the factors of production offer the best return to all stakeholders.

Chapter three discusses the research methodology of the research topic. The differences between qualitative and quantitative analysis is discussed. The chapter also describes the research design utilised, data collection method, sampling technique and ethical considerations.

3**Research Methodology****3.1 Introduction**

Detailed discussions of the challenges faced by the global paper industry have been the focus of the literature review. A profound intellectual comprehension of the literature is foremost in the contextualisation of the study to argue a case. This enables a proper design of the research problem and it also leads to integrity in the analysis of the data.

In this chapter, characteristics of quantitative research, including its strengths have been discussed. The differences between qualitative and quantitative research was presented as well as the reasons for choosing quantitative research for this study was explained. Thirty questionnaires are used as the data collection method. The participants were selected using the purposive sampling method. A detailed explanation, accompanied by an illustration of the components of data analysis, sourced from Denzin and Lincoln (1994) also forms part of the discussion.

3.2 Objectives of the study

The purpose of the study is to investigate and formulate recommendations to challenges faced by the global paper industry.

The objectives of this study are:

- To determine whether the relationship the global paper industry has with electronic technology, environmental impacts and globalisation is a real concern.
- To determine consumers preferences between conventional methods and e-technology.
- To understand the impact of e-technology on paper consumption.
- To identify the environmental and social impact caused by the paper industry.

- To evaluate the impact of globalisation on competitiveness of players within the paper industry.
- To determine whether diversification is an option for manufacturers within the paper industry.

3.3 Sampling Design

Cooper and Schindler (2003) explain that the fundamental idea of sampling is by selecting some of the elements in a population, conclusions may be drawn about the entire population.

3.3.1 Sample and population

A population element is the unit of study on which the measurement is being taken. A population is defined as being the total collection of all the elements about which one is required to make an inference (Cooper and Schindler, 2003).

The population of 1,100 in this study comprises of employees of SAPPI Saiccor, a division of SAPPI Limited, an international pulp and paper manufacturing company whom the researcher has regarded as being capable of providing the information required.

According to the judgement of the researcher, a sample of fifty individuals was adequate in providing the information required for the study. The richness of knowledge in the field of pulp and paper that these individuals boast made them exceptional participants for the study. Of the fifty individuals in the sample, thirty responded to the questionnaire.

3.3.2 Reasons for sampling

The reasons for sampling include lower cost, greater accuracy of results, greater speed of data collection and the availability of population elements (Cooper and Schindler, 2003). Sekaran (1992) states that in investigations concerning several hundreds or

thousands of elements, it would be practically impossible to collect data from or to examine every element. Even if this was possible, it would be prohibitive in terms of time, costs and other resources.

3.3.3 Sampling techniques

The two types of sampling techniques are probability and non-probability sampling. In probability sampling, the elements within the population have a known chance or probability of being selected as sample subjects. In non-probability sampling, the elements do not have a known or predetermined chance of being selected as sample subjects.

Probability sampling designs are used when the representativeness of the sample is important for the purpose of greater generalizability. When time or other aspects rather than generalizability are of crucial importance, non-probability sampling is usually used (Sekaran, 1992).

Greenfield (2002) states that probability sampling refers to sample designs wherein units are chosen by a certain probability mechanism, thereby allowing no possibility for subjectivity.

3.3.3.1 Non-probability sample techniques

Of the fifty people who were identified that could provide the required information to the study, thirty individuals responded to the questionnaire.

3.3.3.1.1 Purposive sampling

Purposive or judgemental sampling enables the researcher to use judgement in selecting cases that will provide the best approach in meeting the objectives. This type of sampling is usually used when the sample is small (Saunders and Lewis, et al, 2003).

Sekaran (1992) states that judgemental sampling is when participants are selected on the basis of their expert knowledge in the subject matter being investigated.

3.3.3.1.2 Quota sampling

Quota sampling is non-random and is usually utilised for interview surveys. This type of sampling is based on the assertion that the sample will be representative of the population as the variability in the sample for various quota variables is the same as that of the population.

The advantages of quota sampling relative to probabilistic techniques are reduced costs and the time taken to set up is generally quick (Saunders and Lewis, et al, 2003).

Sekaran (1992) states a disadvantage of quota sampling as not being easily generalizable.

3.3.3.1.3 Snowball sampling

Snowball sampling is often used when it is difficult to identify subjects of the desired population. The process of identifying subjects is to make the initial contact with one or two members and ask them to identify further cases. The new cases are also asked to identify new cases. The process ends when no new cases are given or until the sample size is as large as manageable (Saunders and Lewis, et al, 2003).

3.3.3.1.4 Convenience sampling

Convenience sample is chosen on the basis that it is simple to obtain and performs the task. This sampling type provides a swift and low-cost solution. It is however, prone to bias (Curwin and Slater, 2002).

3.3.3.2 Probability sampling

Table 3.1 compares the different types of probability sampling designs within the framework of description, advantages and disadvantages.

Table 3.1 Probability sampling designs

Type	Description	Advantages	Disadvantages
Simple random	Every element within the population has an equal chance of being selected into the sample.	Simple to implement with automatic dialling and computerised voice response systems.	A listing of population elements is required. Requires more time for implementation Larger sample sizes are used. Produces large errors. Expensive method.
Systematic	Chooses an element of the population at a beginning with a random start and following the sampling fraction selects every k th element.	Easy to design. Simple to use in comparison to the simple random. Easy to determine sampling distribution of the mean or proportion. Cheaper than simple random.	Periodicity that exists within the population may skew the sample and results. Should the population list have a monotonic trend, a biased estimate will result based on the start point.
Stratified	Divides the population into subpopulations or strata and uses simple random on each strata. The results may be weighted and combined.	The researcher controls the sample size in strata. Increased statistical efficiency. Generates data to represent and analyze subgroups. Allows the use of different methods in	Increased error will result if subgroups are selected at different rates. Expensive. Especially costly if strata on the population is to be created.

		strata.	
Cluster	The population is divided into internally heterogeneous subgroups. Some of them are randomly selected for further study.	Provides an unbiased estimate of the population parameters if done properly. Economically more efficient than simple random. Cost is lower per sample, especially in geographic clusters. Easy to perform without a population list.	Often lower statistical efficiency because of subgroups being homogenous rather than heterogeneous.
Double (sequential or multiphase)	The process includes collecting data from a sample by utilising a previously defined method. Based on the findings, a sub sample is selected for further study.	Costs may be reduced if the first stage results in adequate data to stratify or cluster the population.	Increased costs if indiscriminately utilised.

Source: Cooper and Schindler (2003), page 199 (Adapted)

A purposive sample of fifty individuals was utilised for the study. The richness of knowledge in the field of pulp and paper that these individuals boast made them exceptional participants for the study. Purposive sampling was utilised as the participants were chosen on the basis of their expert knowledge in the field of the paper industry.

3.4 Qualitative and Quantitative Research: Differences in Depth and Orientation

The difference between the qualitative and quantitative paradigms is observed in the search for quantity of understanding (quantitative) and for in-depth inquiry (qualitative) (Henning, van Rensburg and Smit, 2004).

The word qualitative emphasises processes and meanings that are not comprehensively examined or quantified in terms of quantity, amount, intensity or frequency. Qualitative research involves the socially constructed nature of reality, the intimate relationship between the researcher and what is being studied and the situational constraints that profile the inquiry. Qualitative research entails questioning social experiences as well as how this experience is given meaning. In contrast, quantitative research entails the measurement and analysis of causal relationships between variables; not processes (Denzin and Lincoln, 1994).

When quantitative research is being conducted, the focal point of the research is on control of all the parts in the behaviour and illustration of those participating. The parts of the phenomenon (variables) will be controlled and the research will be directed with a finely tuned focus on the manner in which the variables are associated. This control is designed by the qualitative researcher in the manner that the research and its instruments are designed. Participants are usually not permitted to communicate information that cannot be captured by the preset instruments (Henning, Van Rensburg and Smit, 2004).

Crabtree and Miller (1992) explain that qualitative methods are typically utilised for identification, description and explanation, while quantitative methods are frequently used for explanation-testing and control. Qualitative field research, the documentary-historical style and philosophical inquiry are ideal for the purpose of identification. According to Crabtree and Miller (1992), three types of description are identifiable; qualitative, quantitative and normative. Qualitative description, utilising qualitative methods, looks at the impact, differences, and perceptual experiences of occurrence. Quantitative description, found in descriptive statistics, refers to the distribution, frequency, prevalence, incidence and size of one or more phenomena. Normative description attempts to identify the norm and value of phenomena. The option of choosing quantitative or qualitative methods is dependent on whether the norms of interest are numerical or textual (Crabtree and Miller, 1992).

Green and Thorogood (2004) argue that although qualitative research has a propensity to make use of language data (written or verbal) and quantitative research is more inclined towards numerical data (as an example), this analogy is not always true. Several qualitative studies also use numerical data and language data is also used in quantitative research. Qualitative research usually has smaller sample sizes; however, it doesn't necessarily mean that any study that has a small sample is qualitative research.

Qualitative research differs from quantitative research in five considerable ways:

- Uses of positivism

Qualitative and quantitative points of view are created by the positivist and post positivist behaviour in the physical and social sciences. Positivists believe that there is reality that can be studied, captured and understood, while post positivists state that reality cannot be totally captured, it can only be approximated (Denzin and Lincoln, 1994).

Post positivism places reliance on a range of methods as a manner of obtaining as much of reality as possible. Simultaneously, emphasis is directed towards the discovery and authentication of theories. Traditional methods of evaluation such as internal and external validity are stressed as is the utilisation of qualitative procedures that align themselves with structured analysis (Denzin and Lincoln, 1994).

- Acceptance of post-modern sensibilities

Qualitative researchers who are aligned to post-structural and post-modern ideologies have discarded the utilisation of quantitative, positivist methods and assumptions. The researchers that are of this opinion maintain that positivist methods are but one way of reciting a story about society or the social world.

They argue that positivist methods are no superior or inferior to any other method; it is just a different result that is generated (Denzin and Lincoln, 1994).

This view, is however, not accepted by every person. Several individuals of the critical theory, constructivist, post structural and post-modern schools of thought fail to acknowledge positivist and post positivist principles when assessing their own study. These individuals regard the principles as unrelated to their study. They are of the opinion that these principles project only a certain type of science, a science which silences too many voices (Denzin and Lincoln, 1994).

These researchers therefore search for other methods to assess their study. These methods include verisimilitude, emotionality, personal responsibility, an ethic of caring, political praxis, multivoiced texts and dialogues with subjects. Positivists and post positivists response to this is that the study conducted by them is superior science, without individual bias and subjectivity. They regard postmodernism as aggression towards reason and truth (Denzin and Lincoln, 1994).

- Capturing the individual's point of view

The participant's viewpoint is of paramount importance to both the quantitative and qualitative researcher. The qualitative researcher, however, believes that he can obtain much more value by conducting intensive interviews and observation. Qualitative researchers consider quantitative researchers as relying on inferential empirical materials and can therefore not obtain the participants point of view. On the contrary, quantitative researchers regard the empirical materials created by interpretive methods as being untrustworthy, vague and biased (Denzin and Lincoln, 1994).

- Examining the constraints of everyday life

Qualitative researchers are inclined to align their studies to the social features of the environment. On the contrary, quantitative researchers abstract themselves from the environment and very infrequently do they study it. They base their studies on probabilities drawn from the study of large numbers of randomly selected cases. Qualitative researchers focus on case-based situations which direct their interests to the particulars of the cases (Denzin and Lincoln, 1994).

- Securing rich descriptions

Qualitative researchers argue that rich descriptions of the social world are important. On the contrary, quantitative researchers are less interested in this information. They would rather focus on nomothetic commitments (Denzin and Lincoln, 1994).

3.5 Data Collection

Data collection methods include face-to-face interviews, telephonic interviews, computer-aided interviews; questionnaires that are either personally administered, sent through the mail, or electronically administered; observation of participants and events with or without videotaping or audio recording and a range of other motivational methods (Sekaran, 1992).

Interviewing, administering questionnaires, and observing individuals are the three key data collection methods in survey research. Although interviewing has the advantage of flexibility in terms of adapting, adopting and amending the questions as the researcher conducts the interview, questionnaires have the advantage of acquiring data more proficiently in terms of researcher time, energy and expenditure (Sekaran, 1992).

Data sources are primary or secondary. Examples of primary data sources are individuals, focus groups and a panel of respondents organized by the researcher.

Secondary data sources include company records, government gazettes, and industry publications (Sekaran, 1992).

Surveys are a foremost form of quantitative research that does not entail any manipulation of participants or their circumstances in advance and are entirely dependent upon self-report information supplied by respondents. Surveys are differentiated in terms of their purpose, their administration and time span. They are also divided into descriptive and analytical exercises (Jenson, 2002).

A descriptive survey endeavours to record current conditions or state of affairs, e.g. public opinion polls provides information about people's attitudes on a specific subject. Analytical surveys also obtain descriptive data; however, it also endeavours to examine relationships among variables in order to test research hypotheses, e.g. a survey may assess the impact of an advertising campaign on brand awareness (Jenson, 2002).

3.5.1 Questionnaires

A questionnaire is a preformulated written set of questions to which respondents record their choice of answers, generally within rather closely defined alternatives. The questionnaire is considered an efficient method of data collection when the researcher is acquainted with what the requirements are and how to measure the variables of interest (Sekaran, 1992).

The widest use of questionnaires is made by the survey strategy. However, both experiment and case study research strategies may utilise these techniques (Saunders and Lewis, et al, 2003).

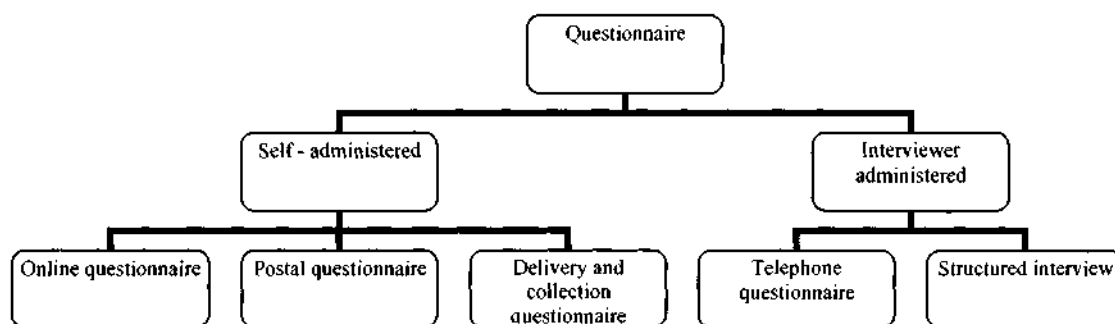
3.5.1.1 Types of questionnaire

According to Saunders and Lewis (2003), there are two types of questionnaire; a self-administered questionnaire and an interviewer administered questionnaire, as is illustrated in figure 3.1.

The design of the questionnaire varies depending on how it is administered and in particular the amount of contact the researcher has with the respondents (figure 3.1). Self administered questionnaires are generally completed by the respondents. Self-administered questionnaires are delivered and returned electronically utilising either e-mail or the Internet (online questionnaire), posted to respondents who return them by post after completion thereof (postal or mail questionnaires), or hand-delivered to each respondent and collected at a later stage (delivery and collection questionnaires). Structured interviews refer to those questionnaires where interviewer meets the respondents and asks the questions in a face-to-face manner. This method differs from semi-structured and in-depth interviews as there is a pre-determined set of questions from which the interviewer does not digress (Saunders and Lewis, et al, 2003).

In this study, a self-administered questionnaire was utilised.

Figure 3.1 Types of questionnaire



Source: Saunders and Lewis, et al (2003), page 282

3.5.1.2 Choice of questionnaire

The researcher's choice of questionnaire is influenced by a variety of factors related to the research questions and objectives. The following factors are considered most important.

- Characteristics of the respondents from whom the data is to be collected.
- The importance of succeeding to reach a particular individual as a respondent.
- The importance of receiving answers from respondents that are not contaminated or distorted.
- The sample size required as well as considering the probable response rate.
- Nature of questions that are required to be asked to collect the data.
- The number of questions that need to be asked to collect the data.

These factors may not apply equally to a questionnaire. For certain research questions or objectives, these factors may not apply at all (Saunders and Lewis, et al, 2003).

Table 3.2 shows the main attributes of questionnaires.

Table 3.2 Main attributes of questionnaires

Attribute	Online	Postal	Delivery and collection	Telephone	Structured interview
Population's characteristics for which suitable	Computer-literate individuals who may be contacted by e-mail or the Internet.	Literate individuals who may be contacted by post; selected by name, household, organisation, etc.		Individuals who may be telephoned; selected by name, household, organisation, etc.	Any individual, selected by name, household, organisation, in the street, etc.
Confidence that the right person has responded	High if e-mail is being utilised.	Low	Low, however, can be checked at	High	

			collection.	
Likelihood of contamination or distortion of the respondent's answer	Low	Contamination is possible if consultation with others take place.		At times, distorted or invented by the interviewer.
				At times, contaminated by consultation or distorted/invented by the interviewer.
Size of sample	Large sample size, can be geographically dispersed.		Dependent on the number of field workers.	Dependent on the number of interviewers.
Likely response rate	Variable, 30% reasonable within organisations, Internet 10% or lower.	Variable, 30% reasonable.	Moderately high, 30 to 50% reasonable.	High, 50 to 70% reasonable.
Feasible length of questionnaire	Conflicting advice; however, fewer screens to scroll is probably a better option.	6 to 8 A4 pages		Up to thirty minutes.
				Variable, dependent on the location.
Suitable types of question	Closed questions. Should not be too complex. Must be of interest to the respondents.	Closed questions. Should not be too complex. Simple sequencing. Must be of interest to the respondents.		Open and closed questions. Questions must be simple. Complicated sequencing is fine.
				Open and closed questions. Questions may be complicated. Complicated sequencing is fine.
Time taken to	2 to 6 weeks	4 to 8 weeks	Dependent	Dependent on the size of the sample,

complete collection	from time of distribution, depending on the number of follow-ups.	from time of posting, depending on the number of follow-ups.	on the size of the sample, number of field workers, etc.	number of interviewers, etc. Time to collect is slower than self-administered for the same sample size.	
Main financial resource implications	World Wide Web page design	Outward and return postage costs, photocopy charges, clerical support and data entry.	Field workers, travel, photocopy charges, clerical support and data entry.	Interviewers, telephone calls, clerical support. Photocopying and data entry if not utilising computer aided telephone interviewing (CATI). Programming, software and computers if utilising CATI.	Interviewers, travel, clerical support. Photocopying and data entry if not utilising computer aided personal interviewing (CAPI). Programming, software and computers if utilising CAPI.
Role of the interviewer/fieldworker	None		Delivery and collection of questionnaires, enhancing the participation of respondents.	Enhancing respondent participation, assisting the respondent through the questionnaire and answering respondent's questions.	
Data Input	May be automated.	Closed questions can be designed in order for responses to be entered		Response to all the questions captured at time	Response to all the questions captured at time

		using optical mark readers after the questionnaires have been received from respondents.	of collection utilising CATI.	of collection utilising CAPI.
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Source: Saunders and Lewis, et al (2003), page 284

Saunders and Lewis, et al (2003) explain that the choice of the questionnaire is also affected by the resources available, in particularly the following:

- The time available to complete the questionnaire.
- Expenditure related to data collection and entry.
- The availability of interviewers and fieldworkers to assist.
- Straight-forwardness of automating data entry.

3.5.1.3 Questionnaire design

A questionnaire should be designed with the focus being on three important design principles. These principles are the wording of the questions; the manner in which the variables will be categorised, scaled and coded after questionnaire responses are received; and the appearance of the questionnaire.

The principle of wording of the questions in the questionnaire refers to the appropriateness of the questions, the manner in which the questions are worded and the level of the vocabulary utilised, the type and form of the questions posed, the sequencing of the questions within the questionnaire and personal data asked of the respondents.

Appropriate principles of measurement are utilised to ensure that the data gathered is valid for testing the hypothesis. The scales utilised have to be suitable depending on the type of data that is required to be gathered. When the data is gathered, the integrity thereof is measured by the utilisation of tests of validity and reliability. Validity ascertains how well a technique, instrument or process evaluates a certain concept. Reliability determines how firmly and consistently the instrument taps the variable.

The data has to be collected in a style that translates into easy categorization and coding (Sekaran, 1992).

The general appearance of a questionnaire is as important as wording and measurement in the design of the questionnaire. The layout of the questionnaire for both self-administered and interviewer-administered questionnaires is important. Interviewer-administered questionnaires must be designed to ensure the reading of the questionnaire and the completion thereof is easy for the respondent. Self-administered questionnaires should be striking to persuade the respondent to complete the questionnaire. The questionnaire should also not appear too long (Saunders and Lewis, et al, 2003).

3.5.2 Interviews

Interviews can be structured, semi-structured or unstructured and can be used for the purposes of marketing, to gather political opinions, for therapeutic reasons or to generate data for academic analysis. The interview can be used for the intention of measurement or its scope can be the understanding of an individual or a group point of view (Denzin and Lincoln, 1994).

Green and Thorogood (2004) explain that a structured interview is an interview wherein the interviewer follows a set of questions in a specified order. Informal interviews are almost similar to natural conversations that happen fortuitously.

In a semi-structured interview, the person conducting the research sets the list of items in terms of the areas of discussion; the responses of the interviewee however, determines the types of information produced about those topics and the importance to each of them. An in-depth interview allows the interviewee adequate time to formulate their own versions of the issues important to them. A narrative interview means that the aim of the researcher is to facilitate the interviewee in reciting the story (Denzin and Lincoln, 1994).

Sekaran (1992) states the unstructured interview means that the interviewer does not enter the interview setting with a set of planned questions that will be posed to the participants. The objective of an unstructured interview is to identify certain initial issues in order for the researcher to formulate a good idea of the variables that require further in-depth investigation.

3.5.3 Other methods of data collection

Observational surveys refer to data being gathered without the use of interviews and questionnaires. This type of survey refers to data being collected by the researcher observing people in their natural working environment and recording their behaviour.

A projective method is a technique used to gather data that is rooted within the unconscious levels in the minds of the respondents. Motivational research is used by professionals by applying probing techniques in order to surface embedded thoughts and ideas from respondents. Some techniques used in this type of research include word-association technique and thematic apperception tests.

Focus groups usually comprise of approximately eight to twelve members and are able to provide a fairly reliable source of data within a relatively short period of time. The members forming the focus group are randomly chosen. A moderator coordinates the discussion regarding the question on hand (Sekaran, 1992).

3.6 Research instrument

A questionnaire was used as the data collection method for this study. A self administered questionnaire was considered as the most suitable instrument on the basis of low cost implications and the convenience of the respondents completing the questionnaire at their convenience. The questionnaire was hand delivered to participants within the researcher's place of employment and forwarded electronically to participants that were at locations away from the researcher.

A covering letter together with a consent form, wherein the purpose of the study was explained, accompanied the questionnaire. The letter also specified that the responses will be regarded as confidential and that the findings shall make no reference to participant's names. It was also stipulated that participation was voluntary and they may withdraw from completing the questionnaire at any stage.

The questionnaire which comprises of twenty eight questions has a combination of both closed and open ended questions. The respondents were asked three general information and twenty five specific questions. Questions one to three are grouped within the category of general information, questions four to twelve are grouped within the category of electronic technology, questions thirteen to twenty one are grouped within the category of environmental, questions twenty two to twenty seven are grouped within the category of globalisation and question twenty eight is categorised as a question on diversification.

A forced choice scale was also utilised, wherein choice one referred to strongly agree, two referred to agree, three referred to disagree and four referred to strongly disagree. The reason for using a forced choice scale and ignoring the neutral choice is that the study is of a strategic nature and as such if strategic decisions are to be made on the basis of the responses, the researcher is of the opinion that firm commitments to questions are more appropriate than being indecisive.

3.7 Pilot study

Cooper and Schindler (2003) states that pilot testing is intended to reveal errors in the questionnaire design.

The piloting stage of the survey questions refers to assessing the main elements of data collection. The piloting of a self-completion survey allows the researcher to obtain information on the appropriateness of the questions, the pre-defined response categories for each question and the manner in which the overall survey format and structure function (David and Sutton, 2004).

A pilot study of the questionnaire was conducted in order to refine the instrument. Five individuals participated in the pilot study. The pilot participant profile matched the study participant profile as the participants of the pilot study are from the sample. The instrument was discussed with the researcher's immediate manager in the workplace. The questionnaire was also discussed with four Masters in Business Administration graduates. The overall feedback was that the questionnaire was well designed. The changes requested were the yes and no choices had to be removed from the questionnaire as well as a forced choice be utilised wherein the neutral choice be excluded in order to provide more decisiveness in responses.

3.8 Reliability and validity

The reliability of a particular measure specifies the stability and consistency with which the research instrument is quantifying the concept and assists in determining the integrity of a measure (Sekaran, 1992).

Cooper and Schindler (2003) concur that within the framework of reliability, the concept of consistency emerges. A measure is reliable to the extent that it provides consistent results. Reliability is concerned with estimates of the extent to which a measurement is free of random or unstable error.

Reliability is established by carrying out repeated tests of phenomena and relationships between phenomena, by repeating the tests among different groups of individuals with the same results (Jensen, 2002).

Validity is defined as achieving confidence that what is being set out to be measured is actually measured and not something else. Different types of validity tests are utilised to determine the integrity of measures. These tests are content validity, criterion-related validity and construct validity (Sekaran, 1992).

The content validity of a measuring instrument is the degree to which it provides sufficient exposure of the investigate questions directing the study. Criterion-related validity demonstrates the success of measures utilised for prediction or estimation.

Criterion measures must also be analysed in terms of relevance, freedom from bias, reliability and availability. In order to assess construct validity, both the theory and measuring instrument utilised are considered. A researcher may decide to measure or infer the presence of abstract characteristics for which no empirical validation appears possible. Attitude scales, aptitude and personality tests form this category (Cooper and Schindler, 2003).

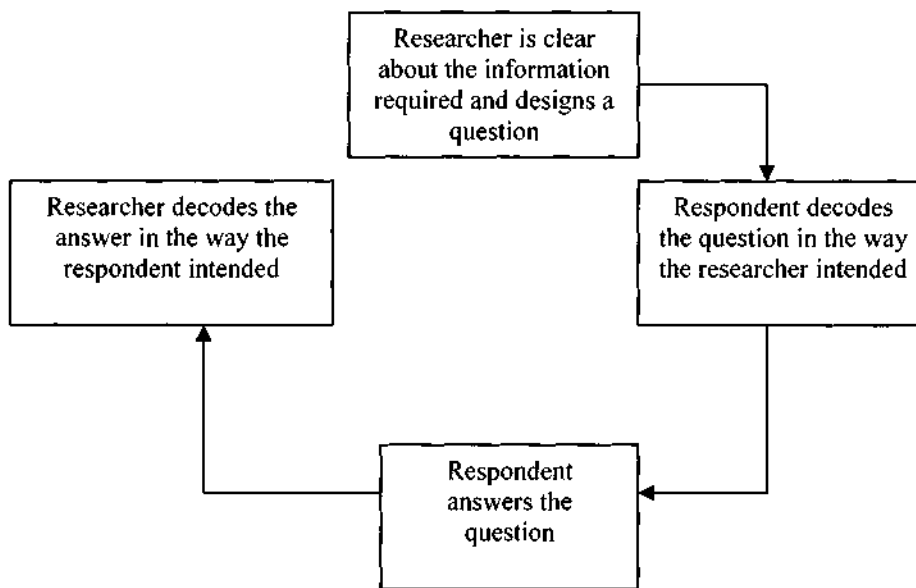
Saunders and Lewis, et al (2003) state that there are at least four stages that must emerge if validity and reliability is to exist. Figure 3.2 entitled stages that must occur if a question is to be valid and reliable illustrates the four stages that must exist if validity and reliability is to occur.

To establish validity, the researcher requested certain individuals in the paper industry to determine whether the questionnaire measures what it is required to do. Face validity was established.

Face validity presents a basic level of judgement that a measured variable actually measures the phenomenon it represents (Jensen, 2002).

Reliability was tested by asking certain individuals to complete the questionnaire for the second time. The results obtained similar and it was therefore concluded that reliability was established.

Figure 3.2: Stages that must occur if a question is to be valid and reliable



Source: Saunders and Lewis, et al (2003), page 292

3.9 Procedure

The questionnaire was hand delivered to participants within the researcher's place of employment and forwarded electronically to participants that were at locations away from the researcher. The questionnaire reached fifty people, who in the opinion of the researcher would have been able to provide meaningful responses to the study. Of the fifty people, thirty responded.

3.10 Responsibilities, Ethics and Values

3.10.1 Ethical considerations

In contrast to the circumstances in natural sciences, the focus of study in the social and behavioural sciences is humans themselves. Researchers conducting social and behavioural studies are therefore not at liberty in terms of the research procedures that may be performed. If valid conclusions are to be guaranteed, certain procedures may be required that are not ethically practical. Research participants are not obligated to the researcher in any manner and they are entitled to be treated with respect, dignity and courtesy (Huysamen, 2001). Denzin and Lincoln (1994) concur that since the objects of inquiry are human beings, extreme caution is to be taken to avert any harm to them.

Green and Thorogood (2004) argue that ethical practice is different in different situations and times and across different disciplines and as such it is then impossible and possibly undesirable to formulate a set of criteria that will make certain that a study is ethical if they are met. However, there are certain considerations that must be taken into account in the context of each study. This context includes certain frameworks that determine the types of research activity that may or may not be conducted:

- *Legal frameworks.* Legal requirements may have an impact on aspects such as data confidentiality and responsibility to certain groups of participants (e.g. children).
- *Disciplinary codes of practice* governing research activity. Research activities in certain professions (e.g. medicine), are usually governed by professional codes of ethics. Professional associations of social sciences also issue ethical instructions, which are however, advisor rather than mandatory.
- *Local cultural norms of ethical conduct* in both the fieldwork situation and the researcher's organization.
- *Formal ethical review*, via the ethics forum.

3.10.2 Principle of informed consent

Informed consent is the principle that participants are not coerced, persuaded or induced into research against their free will but their participation should be on a voluntary basis and on a full understanding of the repercussions of participation. Homan (1991: 71) in Green and Thorogood (2004); advocates that there are four parts to the concept of informed consent. Informed refers to disclosure to the participants of all pertinent aspects of what will happen; and also that they are in a position to comprehend the information. Consent refers to the participant being capable of making a logical decision about whether to participate, and that their approval should be voluntary rather than the result of intimidation or undue influence (Green and Thorogood, 2004).

Henning, van Rensburg and Smit (2004) concur that participants must provide informed consent to participate, i.e. the participants must be fully informed about the research in which the interview will be utilised. The participants are to know that their privacy and sensitivity will be safeguarded and what will happen to the data after recording. In the letter of consent provided by the researcher, the participant provides consent to these and other ethical factors.

Increasingly, ethics committees are compelling researchers to provide written evidence of informed consent (Green and Thorogood, 2004).

3.10.3 Gatekeepers

Gatekeepers refer to those who are in command of the researcher's access to the fieldwork site or to other participants, either formally, such as managers whose authority is required to gain access, e.g. to a medical facility; or informally, e.g. to assist in recruitment of hard to reach groups (Green and Thorogood, 2004).

Green and Thorogood (2004) further explain that although gatekeepers are a critical route for gaining entry to various settings, they are also influential on the participants and are frequently chosen for their persuasiveness or support for the research. A potential drawback of gatekeepers is that of undue pressure to participate and also of restricting who is invited to participate.

Although the use of gatekeepers to aid and legitimate access is necessary in numerous studies, the researchers should however, strive to ensure that participants are justly voluntary and that the sentiments of individuals or groups are not silenced by dependence on gatekeepers for contacts (Green and Thorogood, 2004).

3.10.4 Confidentiality

Conventional practice and ethical codes advocate the view that a range of factors are in place to safeguard the privacy and identity of research subjects. Bulmer (1982) in Denzin and Lincoln (1994) explains that identities, locations of individuals and places are concealed in published findings, data collected are safeguarded in an anonymized form and that all data held securely confidential (Denzin and Lincoln, 1994).

Green and Thorogood (2004) concur that social research ethics stress confidentiality as an imperative criterion for ethical practice. This requires that information obtained from research should not be disclosed in any other settings. Confidentiality refers to published accounts of research in which the identity of the sites and individuals should be protected. Names and other identifiers can be amended to protect the privacy of participants.

3.11 Data Analysis

3.11.1 Theoretical discussion on statistical techniques used for analysis

The analysis of data in the study is conducted within the framework of the following methods:

- Chi-square distribution

Chi-square tests can assume varying levels of complexity and may also be referred to names other than a 'measure of association'. At certain times chi-square tests are referred to as tests of 'goodness of fit'. The reason thereof is because the test can be applied to establish whether or not an observed set of frequencies matches an expected or desired distribution (Riley, Wood, et al, 2001).

Sekaran (1992) explains that the chi-square test is used with nominal data for a single sample or two or more independent samples. The function of the chi-square test is it tests for independence of variables.

- **Kruskal Wallis test**

The Kruskal-Wallis test is similar to the Mann-Whitney U test in that the cases in the various samples are ranked together in one series. However, unlike the Mann-Whitney U test, the Kruskal-Wallis test can be used to compare scores in more than two groups (Bryman and Cramer, 2001).

Sekaran (1992) explains that the Kruskal Wallis test is an alternative method to one-way ANOVA where normality of distributions cannot be assumed.

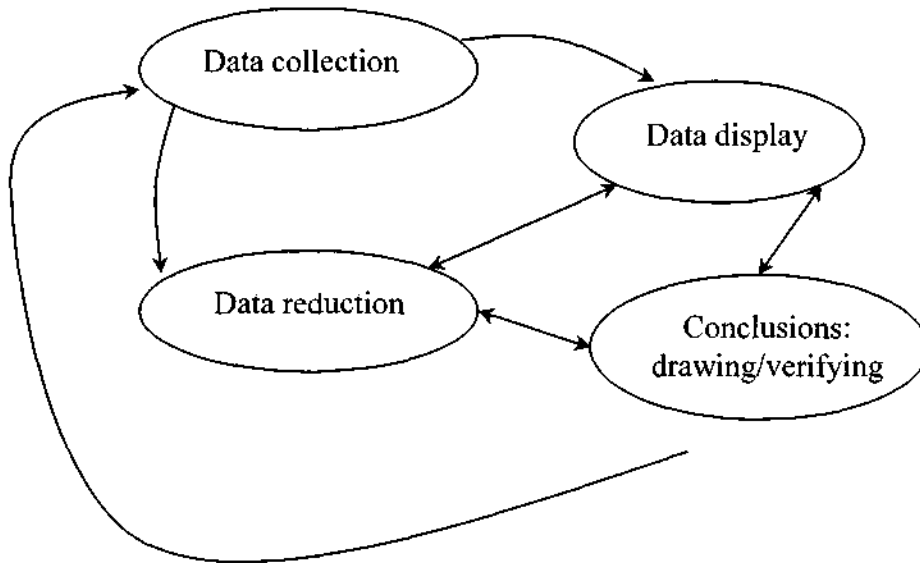
- **Mean (Arithmetic mean)**

The arithmetic mean is a method for measuring the average of a distribution (Bryman and Cramer, 2001).

3.11.2 Components of Data Analysis

Miles and Huberman (1984, 1994) in Denzin and Lincoln (1994) identify data analysis as having three linked sub processes; data reduction, data display, and conclusion/verification (figure 3.3). These processes arise prior to data collection, during study design and planning, during data collection as interim and early analyses are conducted; and after data collection as final products are approached and completed.

Figure 3.3: Components of Data Analysis: Interactive Model



Source: Denzin and Lincoln (1994), Page 429

- *Data reduction.* Data is reduced in an anticipatory manner as the researcher chooses a conceptual framework, research questions, cases and instruments. When the actual field notes, interviews, tapes or other data is available, data summaries, coding, finding themes, clustering and writing stories are all situations of further data selection and shortening.
- *Data display.* Data display is defined as an organised, condensed assembly of information that allows conclusion drawing and/or action taking. The researcher is required to distinguish a reduced set of data as a basis for applying thought about its meanings.

- *Conclusion drawing and verification.* This entails the researcher's involvement in interpretation, i.e. drawing meaning from the displayed data. The range of methods used are considered to be large, ranging from the typical and wide use of comparison/contrast, noting of patterns and themes, clustering and utilisation of metaphors to confirmatory tactics such as triangulation, looking for negative cases, following up surprises and verifying results with participants.

3.11.3 Quantitative Analysis

David and Sutton (2004) state that quantitative research design is positioned within the positivist traditions of the natural sciences. The objective of a research design is to produce a framework for the collection and analysis of data.

Quantitative methods entail more than merely obtaining a few numbers and calculating certain statistics. A statistic is merely a descriptive number and to be of any value, this statistic is required to be presented in a valid manner. Quantitative analysis is being able to understand numbers within a certain context. Numbers make available a universal language that is easily understood (Curwin and Slater, 2002).

In quantitative research, measurement is carried out through numbers. The concepts that characterise quantitative research methodologies entail appropriate methods of measurement and procedures to analyse the relationships between such measurements (Jensen, 2002).

3.11.4 Strengths of quantitative analysis

The potency in numbers exemplifies the many advantages of quantitative research. Being a numbers-based research discipline, quantitative research statistically quantifies customer attitudes, behaviour, and performance. Utilizing a series of tests and techniques, quantitative research will often yield data that may be extrapolated or generalised to a larger population. For the reason that it is so profoundly rooted in numbers and statistics, quantitative research has the capability to effectively translate data into quantifiable charts and graphs. Factual examples have shown the success of quantitative research in quantifying product awareness, establishing customer profiles, and determining market size (Internet 23).

3.12 Reasons for choosing quantitative analysis

Quantitative research was chosen as the survey questionnaire is indicative of a study that entails data in the form of numbers that can be statistically analysed. The intention of the researcher is to categorize the features, count them, and formulate statistical models in an endeavour to elucidate what is observed. This study is also favourable to quantitative research as precise measurements and analysis in the form of a survey questionnaire is utilized. Quantitative research also maintained that the researcher is objectively separated from the subject matter.

3.13 Conclusion

This chapter discussed the research methodology and the research design utilised to conduct the study.

The study entailed an interview by means of a questionnaire, each consisting of twenty eight questions, incorporating a combination of both closed and open-ended questions.

A covering letter together with a consent form, wherein the purpose of the study was explained, accompanied the questionnaire. The letter also specified that the responses will be regarded as confidential and that the findings shall make no reference to participant's names. It was also stipulated that participation was voluntary and they may withdraw from completing the questionnaire at any stage.

The participants were selected using the purposive sampling method. A record of the positions the respondents occupy was tabulated.

The data will be analysed, utilising the model sourced from Denzin and Lincoln (1994), wherein data reduction, data display and conclusion drawing and verification are the components of data analysis.

The questionnaire was chosen as the preferred method of data collection. The reason for this choice of data collection method was to enable the respondent to complete the questionnaire at their leisure without the pressure of time constraints and the presence of an interviewer. The questionnaire comprised open ended and closed questions. The reason for including open ended questions was to enable the respondents to provide more in-depth information and to be able to answer from their own frame of reference. Open ended questions also added to the descriptive richness of the study. The responses of questions were aggregated and discussed.

The next chapter, data presentation, presents the results of the research study.



Data Presentation

4.1 Introduction

A sample of fifty individuals was utilised as participants of the study. The richness of knowledge in the field of pulp and paper that these individuals boast made them obvious participants for the study. The population in this study comprises of employees of SAPPI, an international pulp and paper manufacturing company whom the researcher has regarded as being capable of providing the information required.

A self-administered questionnaire, consisting of twenty eight questions, incorporating a combination of both closed and open-ended questions was used to collect the data. Participants were chosen from across different race groups and from different levels of hierarchy within the organisations they are employed in.

The names of respondents have not been divulged as the intention was for the respondents to complete the questionnaire in an unfettered fashion.

Quantitative research was chosen as the survey questionnaire is indicative of a study that entails data in the form of numbers that can be statistically analysed. The intention of the researcher is to categorize the features, count them, and formulate statistical models in an endeavour to elucidate what is observed. This study is also favourable to quantitative research as precise measurements and analysis in the form of a survey questionnaire is utilized. Quantitative research maintains that the researcher is objectively separated from the subject matter.

Having applied the research design and processing the data obtained, the results using the SPSS package and Microsoft Excel were generated.

Descriptive and inferential statistics are used to analyse the data. Graphical illustrations have been used to depict the data in a frequency and percentage method.

Inferential statistics include analysis of variance (ANOVA). An analysis of responses to the open ended questions is also included.

4.2 Quantitative data

Quantitative research methodologies produce numerical data of which surveys and experiments are the basic means of data collection. Upon collection of the data, they are required to be analysed by means of statistical techniques. The techniques are utilised to describe, organise and explore relationships within the data. The objective of quantitative data collection and analysis is to generate findings that lead to acceptance or rejection of the specified hypothesis (Jensen, 2002).

The numerical data analysis through statistical procedures in this study is a methodical and objective manner of determining whether significant patterns of relationships exist among the phenomena that have been measured in data collection.

The data collected were coded numerically from the questionnaire and entered into an excel spreadsheet. The statistical tests that follow have used this excel spreadsheet as the source of data for analysis.

4.3 Parametric and non-parametric tests

Inferential statistics may be divided into two types of statistical tests. Parametric tests are based on the assumptions of a normal distribution curve and are usually applied to interval data. However, in certain cases parametric tests may be used with ordinal data provided the researcher can successfully argue that the ordinal data can indeed be treated as interval data. Data that is nominal or ordinal, or where the characteristics of the population do not give rise to a normal distribution or the sample is too small, necessitates the need for non-parametric tests. Non-parametric tests are therefore based on other types of distributions (David and Sutton, 2004).

4.4 Questionnaire

The population in this study comprises of employees of SAPPI, an international pulp and paper manufacturing company whom the researcher has regarded as being capable of providing the information required.

The respondents were asked three general information and twenty five specific questions.

4.5 Descriptive statistics - graphical representation of statistical data

Responses to questions that were of a statistical nature have been graphically illustrated.

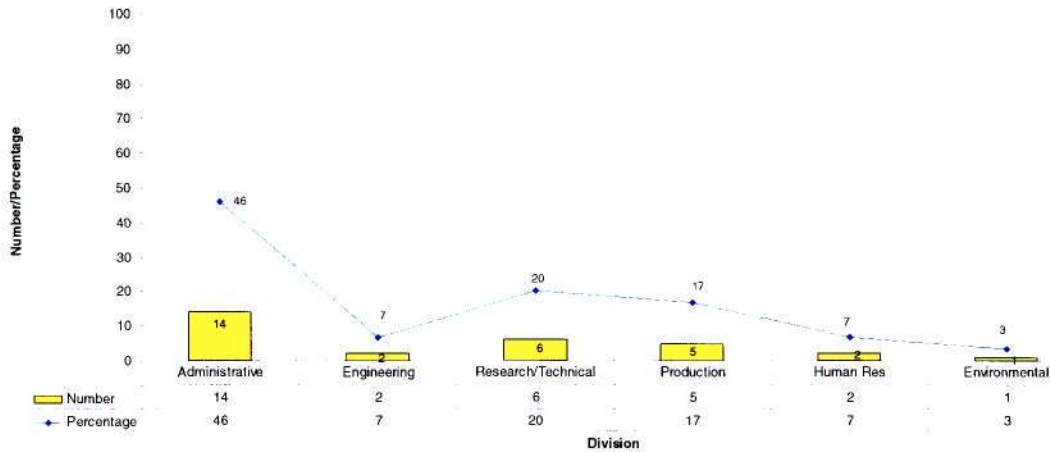
The advantage of using graphical representations of data is that they allow one to visually compare the distribution of different sets of data (Riley, Wood et al, 2001).

The data is presented in a frequency and percentage format. Frequency is defined as the number of times a certain value or characteristic occurs. Percentage refers to the proportion of a frequency as a ratio of one hundred.

Characteristics of the sample

Question 1: Please indicate the division you are employed at within the organisation.

Figure 4.1: Division



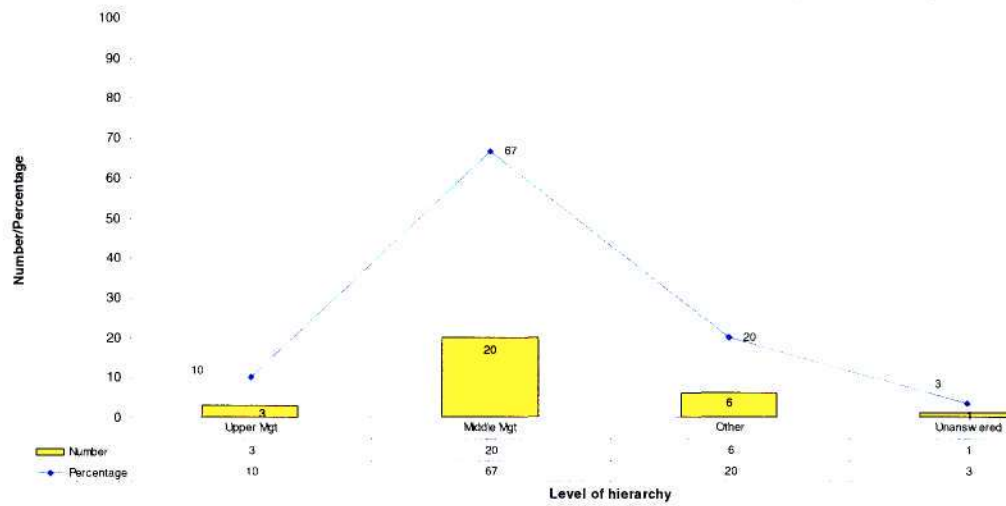
The divisions that the respondents are employed at within the organisation are Administrative, Engineering, Research/Technical, Production, Human Resources and Environmental.

Fourteen (46%) of the participants are from the Administrative division, two (7%) from Engineering, six (20%) from Research/Technical, five (17%) from Production, two (7%) from Human Resources and one (3%) from the Environmental division.

The most number of participants are from the Administrative division.

Question 2: What level of hierarchy within your organisation are you employed at?

Figure 4.2: Level of hierarchy



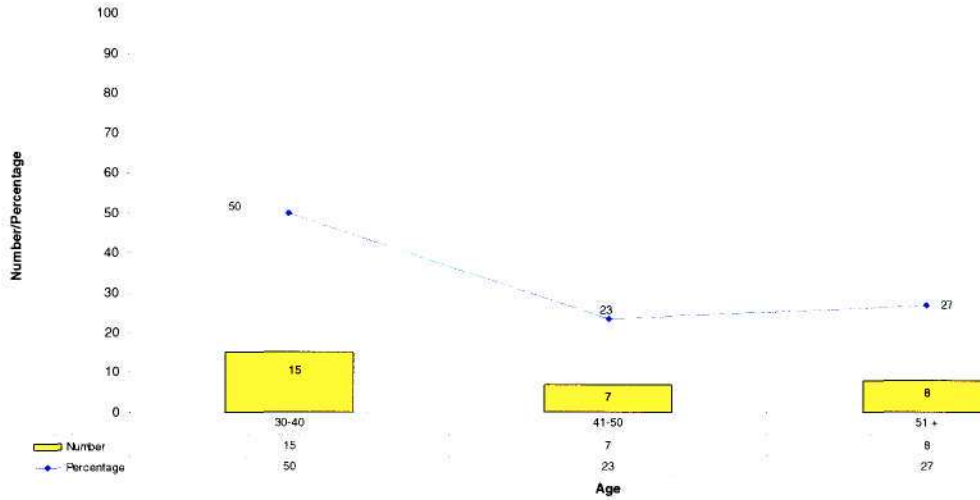
The level of hierarchy held by participants included upper management, middle management and a category named other. The category other refers to participants that are not within the management hierarchy of the organisation that they are employed in.

Three (10%) of the participants are from upper management, twenty (67%) are from middle management and six (20%) are from the category other.

The most number of participants are from middle management and the least being from upper management.

Question 3: Within which age category are you?

Figure 4.3: Age of respondent



Fifteen (50%) of the participants are within the age category 30 to 40, seven (23%) within the age category 41 to 50 and eight (27%) within the age category 51 years and older.

The most number of participants are within the age category 30 to 40 and the least are within the age category 41 to 50.

Data on electronic technology

Question 4: Do you have access to the following e-technologies, either at home or at work?

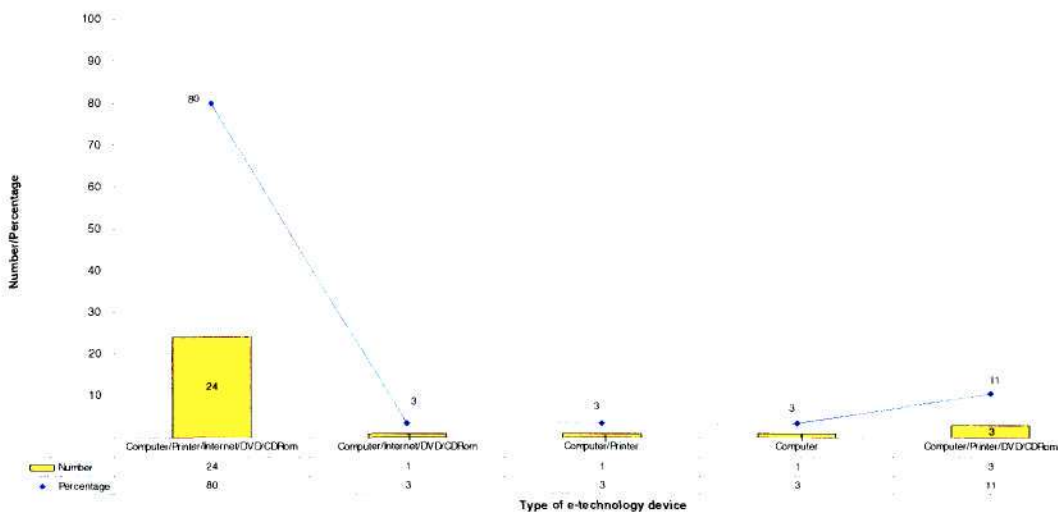
Computer

Printer

Internet

CD/DVD

Figure 4.4: Access to e-technology hardware



Twenty four (80%) of the participants have access to a computer, printer, Internet and DVD/CD Rom. One participant (3%) has access to a computer, Internet and DVD/CD Rom. One participant (3%) has access to a computer and printer. One participant (3%) has access to a computer only. Three participants (11%) have access to a computer, printer and DVD/CD Rom.

Almost all of the participants (80%) have access to a computer, printer, Internet and DVD/CD Rom.

Question 5: When last have you used a library?

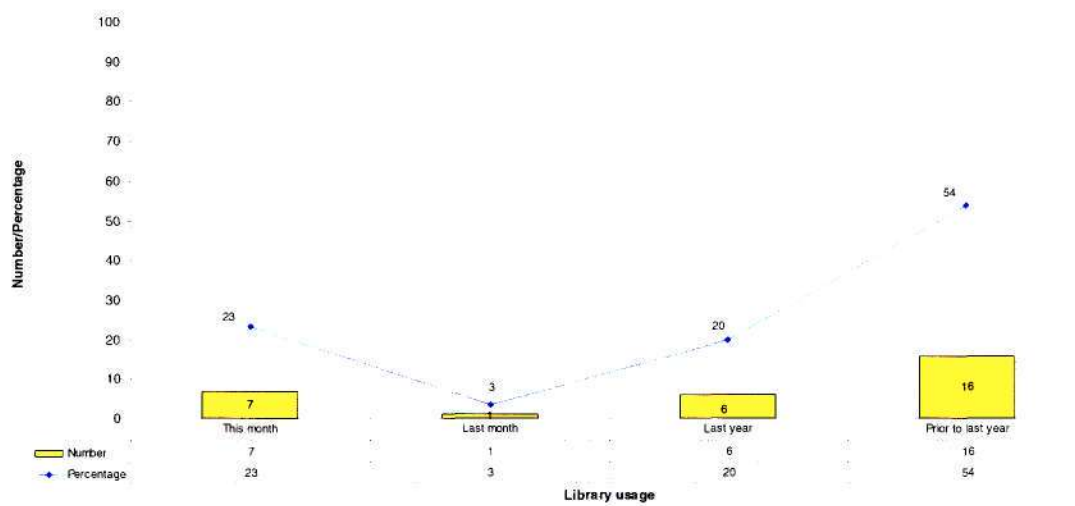
This month

Last month

Last year

Prior to last year

Figure 4.5: Library usage



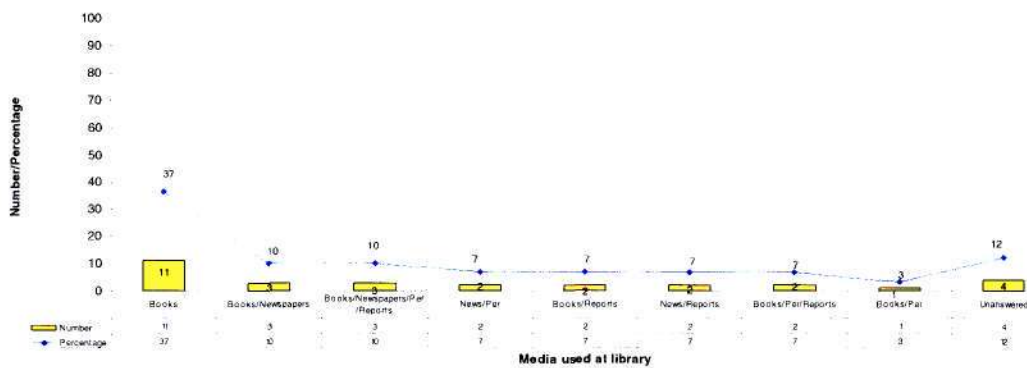
Seven (23%) of the participants made use of a library during the month, one participant (3%) used a library in the previous month, six participants (20%) used a library during the previous year and sixteen (54%) of the participants made use of a library prior to the previous year.

More than half of the respondents had visited the library prior to last year.

Question 6: Did you use any of these at the library?

- Books
- Newspapers
- Periodicals
- Reports

Figure 4.6: Media used at library

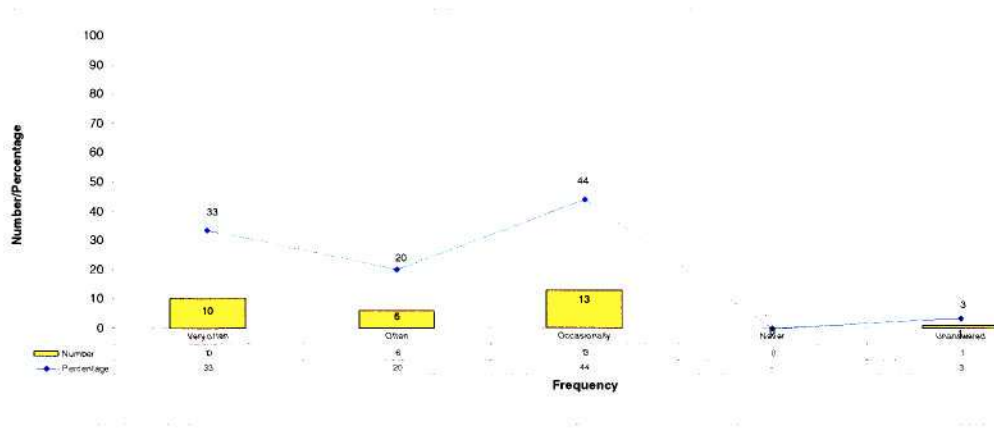


Eleven (37%) of the participants made use of books at the library, three (10%) made use of books and newspapers, three (10%) made use of books, newspapers, periodicals and reports, two (7%) made use of newspapers and periodicals, two (7%) made use of books and reports, two (7%) made use of newspapers and reports, two (7%) made use of books, periodicals and reports and one participant (3%) made use of books and periodicals.

The most accessed media at the library was books (37% of participants).

Question 7.1: Please state how often you access books.

Figure 4.7: Frequency of book usage

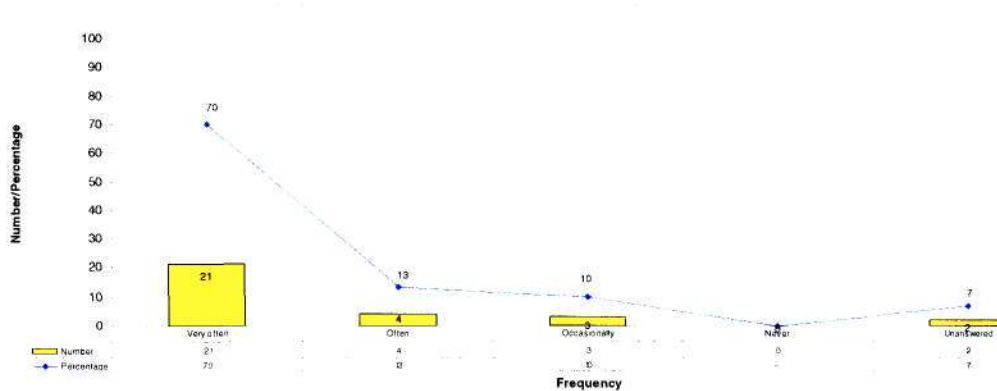


Ten (33%) of the participants accessed books very often, six (20%) accessed books often and thirteen (44%) accessed books occasionally.

The highest usage of books (43%) occurred in the category of occasionally and the lowest (20%) occurred in the category of often.

Question 7.2: Please state how often you access newspapers.

Figure 4.8: Frequency of newspaper access

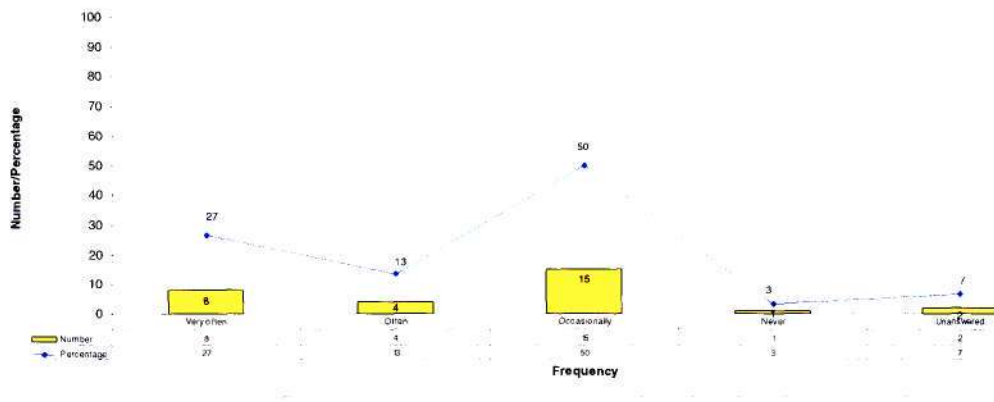


Twenty one (70%) of the participants accessed newspapers very often, four (13%) accessed newspapers often and three (10%) accessed newspapers occasionally.

The highest usage of newspapers (70%) occurred in the category of very often and the lowest usage (10%) occurred in the category of occasionally.

Question 7.3: Please state how often you access periodicals.

Figure 4.9: Frequency of access to periodicals

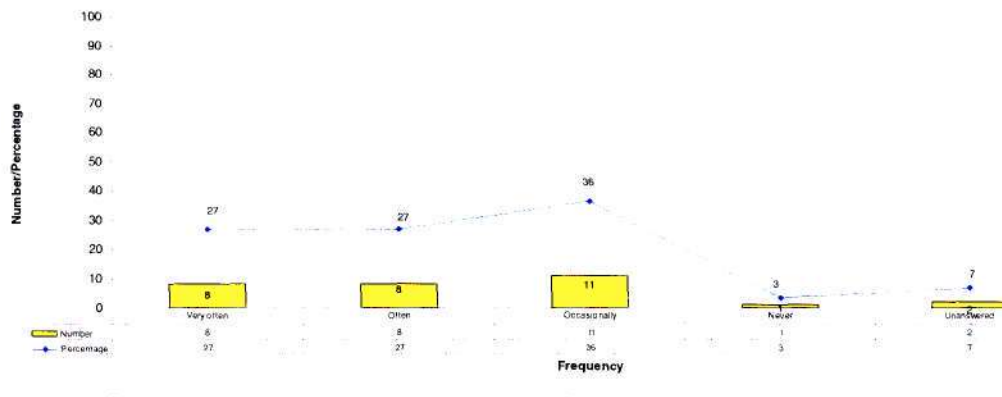


Eight (27%) of the participants accessed periodicals very often, four (13%) accessed periodicals often, fifteen (50%) accessed periodicals occasionally and one participant (3%) never accessed a periodical.

The highest usage of periodicals (50%) occurred in the category of occasionally and the lowest being one participant (3%) who has not accessed a periodical.

Question 7.4: Please state how often you access reports.

Figure 4.10: Frequency of access to reports

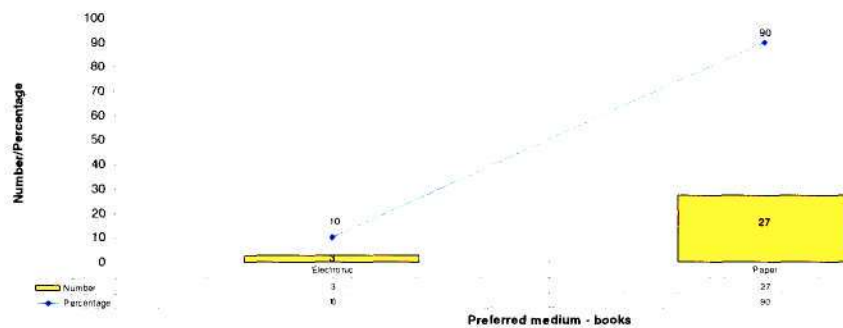


Eight (27%) of the participants accessed reports very often, eight (27%) accessed reports often, eleven (36%) accessed reports occasionally and one participant (3%) never accessed a report.

The highest usage of reports (37%) occurred in the category of occasionally and the lowest frequency being one participant (3%) who has not accessed a report.

Question 8.1: Please state the medium in which you prefer receiving books.

Figure 4.11: Preferred method of receiving books

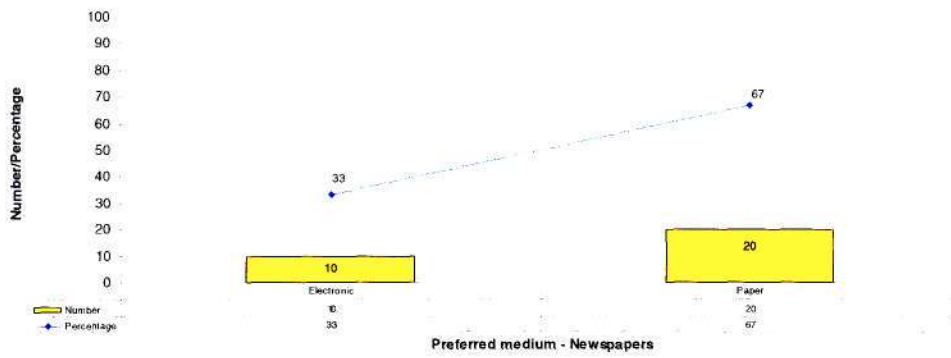


Three (10%) of the participants prefer receiving books electronically and twenty seven (90%) prefer receiving books in a paper medium.

The highest preference (90%) is that of receiving books in a paper medium.

Question 8.2: Please state the medium in which you prefer receiving newspapers.

Figure 4.12: Preferred method of receiving newspapers

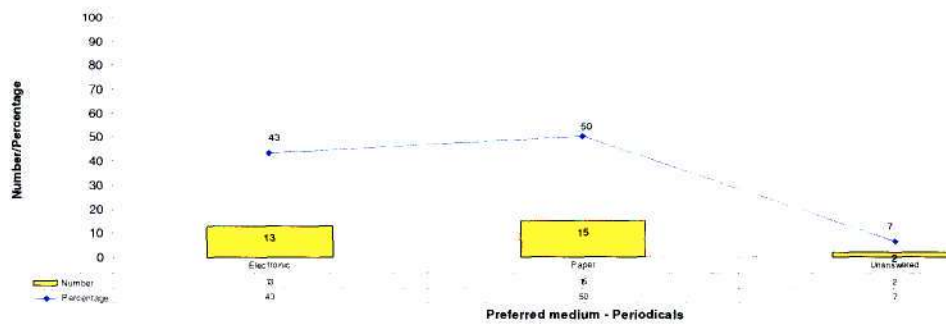


Ten (33%) of the participants prefer receiving newspapers electronically and twenty (67%) prefer receiving newspapers in a paper medium.

The highest preference (67%) is that of receiving newspapers in a paper medium.

Question 8.3: Please state the medium in which you prefer receiving periodicals.

Figure 4.13: Preferred method of receiving periodicals

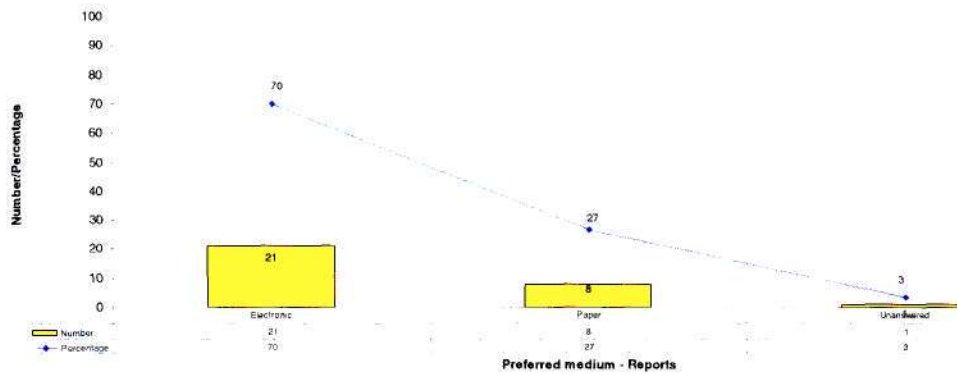


Thirteen (43%) of the participants prefer receiving periodicals electronically and fifteen (50%) prefer receiving periodicals in a paper medium.

The highest preference (50%) is that of receiving periodicals in a paper medium.

Question 8.4: Please state the medium in which you prefer receiving reports.

Figure 4.14: Preferred method of receiving reports



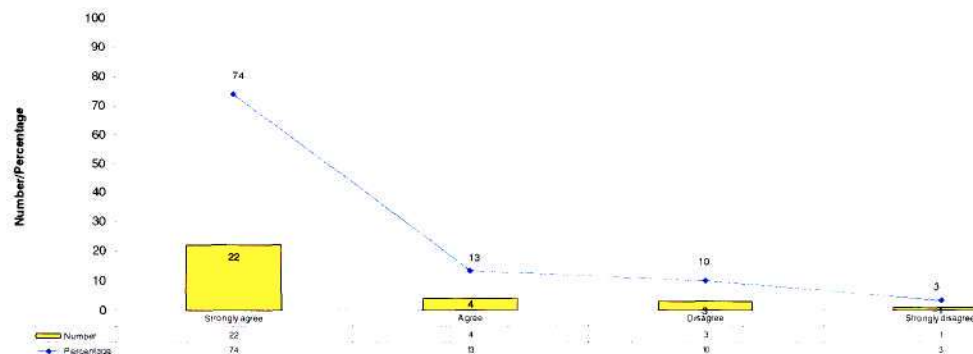
Twenty one (70%) of the participants prefer receiving reports electronically and eight (27%) prefer receiving reports in a paper medium.

The highest preference (70%) is that of receiving reports in a paper medium.

Question 9.1: How would you consider the following statement?

Information received/sent electronically is conveyed almost instantaneously as compared to conventional methods.

Figure 4.15: Efficiency of e-technology



Twenty two (74%) of the participants strongly agree to the statement, four (13%) agree to the statement, three (10%) disagree with the statement and one (3%) strongly disagrees with the statement.

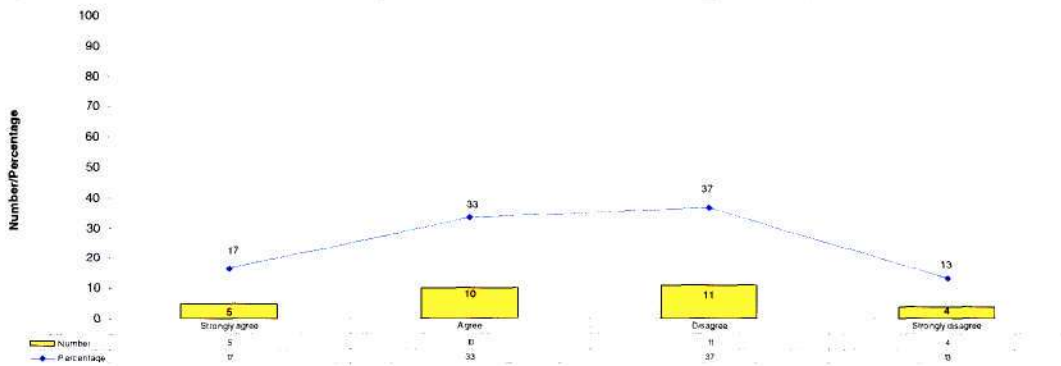
The highest percentage (74%) is that of strongly agreeing to the statement. The lowest percentage (3%) is that of strongly disagreeing with the statement.

Twenty six (86%) of the respondents agree with the statement and four (13%) disagree with the statement.

Question 9.2: How would you consider the following statement?

Electronic information is considered superior as you receive only the information requested.

Figure 4.16: Electronic technology and receipt of information



Five (17%) of the participants strongly agree to the statement, ten (33%) agree to the statement, eleven (37%) disagree with the statement and four (13%) strongly disagrees with the statement.

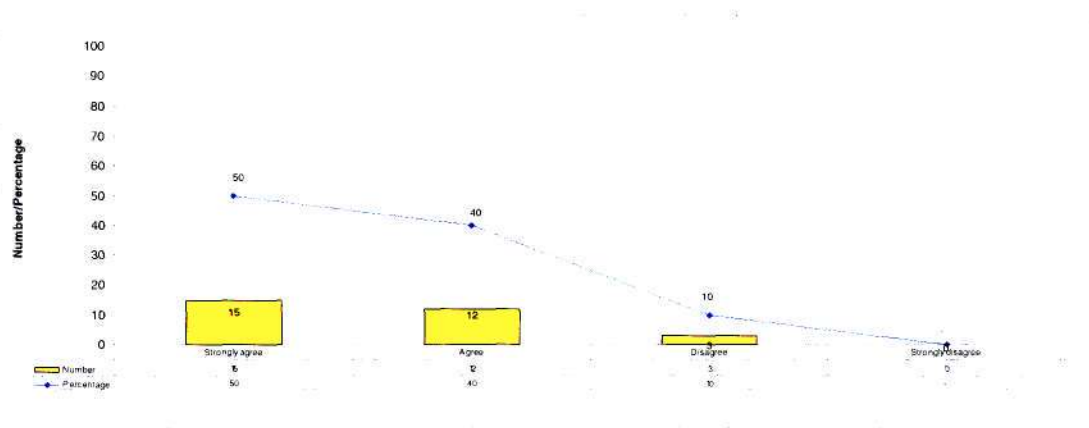
The highest percentage (37%) is that of disagreeing with the statement. The lowest percentage (13%) is that of strongly disagreeing with the statement.

Fifteen (50%) of the respondents agree with the statement and fifteen (50%) also disagree with the statement.

Question 9.3: How would you consider the following statement?

Physical delivery delays are almost eliminated using an electronic method of information transfer.

Figure 4.17: Electronic technology and the elimination of delays



Fifteen (50%) of the participants strongly agree with the statement, twelve (40%) agree with the statement and three (10%) disagree with the statement.

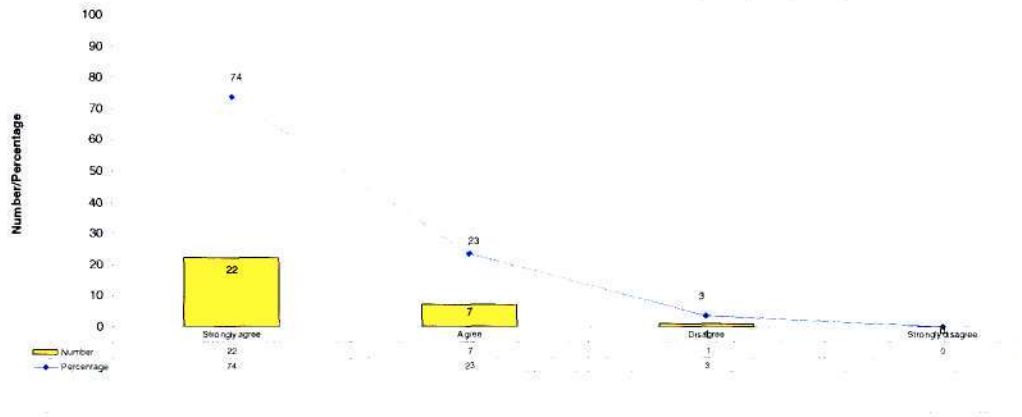
The highest percentage (50%) is that of strongly agreeing with the statement. The lowest percentage (10%) is that of disagreeing with the statement.

Twenty seven (90%) of the respondents agree with the statement and three (10%) disagree with the statement.

Question 9.4: How would you consider the following statement?

E-technology makes it possible to communicate with various individuals at once.

Figure 4.18: Electronic technology and communication



Twenty two (74%) of the participants strongly agree with the statement, seven (23%) agree with the statement and one (3%) disagrees with the statement.

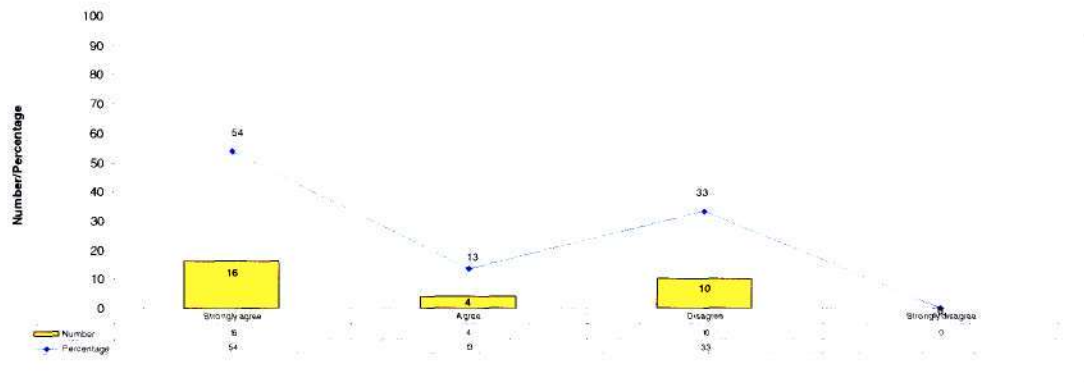
The highest percentage (74%) is that of strongly agreeing with the statement. The lowest percentage (3%) is that of disagreeing with the statement.

Twenty nine (96%) of the respondents agree with the statement and one (3%) disagrees with the statement.

Question 9.5: How would you consider the following statement?

E-technology enhances efficiencies and hence cost savings (e.g. read online instead of buying a newspaper).

Figure 4.19: Electronic technology and efficiencies



Sixteen (54%) of the participants strongly agree with the statement, four (13%) agree with the statement and ten (33%) disagree with the statement.

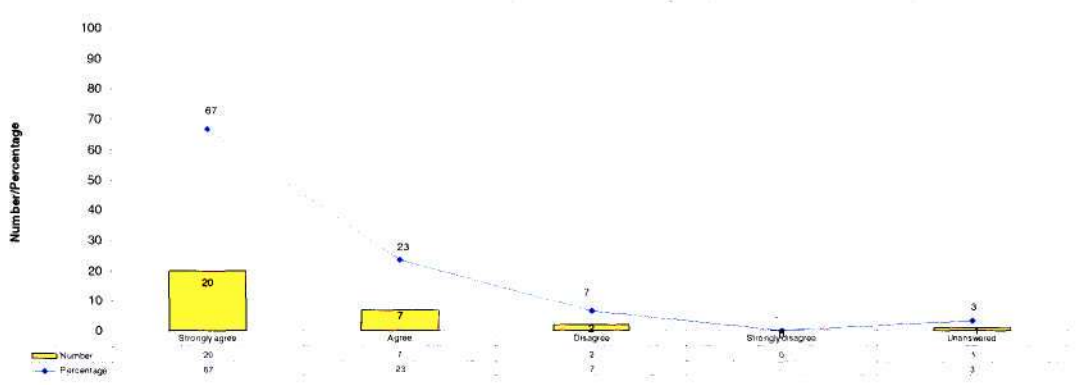
The highest percentage (54%) is that of strongly agreeing with the statement. The lowest percentage (13%) is that of agreeing with the statement.

Twenty (66%) of the respondents agree with the statement and ten (33%) disagree with the statement.

Question 9.6: How would you consider the following statement?

Electronic archiving is preferable as it saves space, retrieval time and costs in comparison to paper archiving.

Figure 4.20: Electronic archiving



Twenty (67%) of the participants strongly agree with the statement, seven (23%) agree with the statement and two (7%) disagree with the statement.

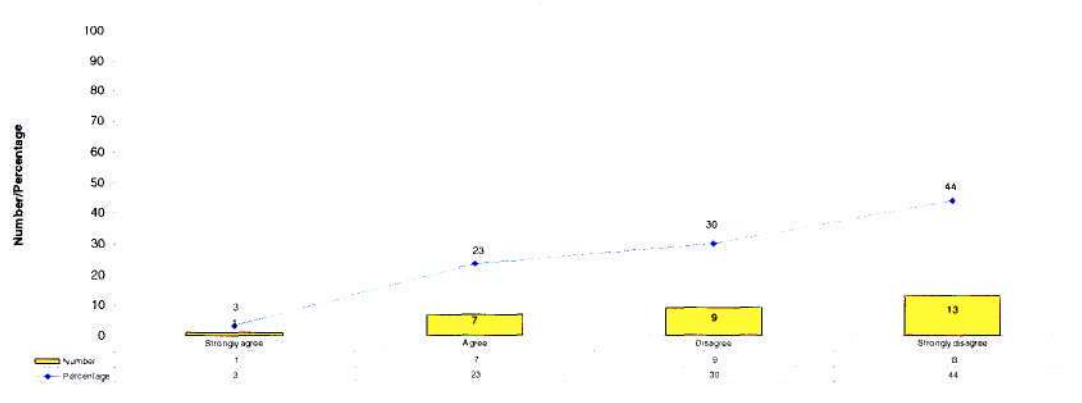
The highest percentage (67%) is that of strongly agreeing with the statement. The lowest percentage (7%) is that of disagreeing with the statement.

Twenty seven (90%) of the respondents agree with the statement and two (7%) disagree with the statement.

Question 9.7: How would you consider the following statement?

In the face of e-technology, newspapers are on a path of extinction.

Figure 4.21: Electronic technology and the extinction of newspapers



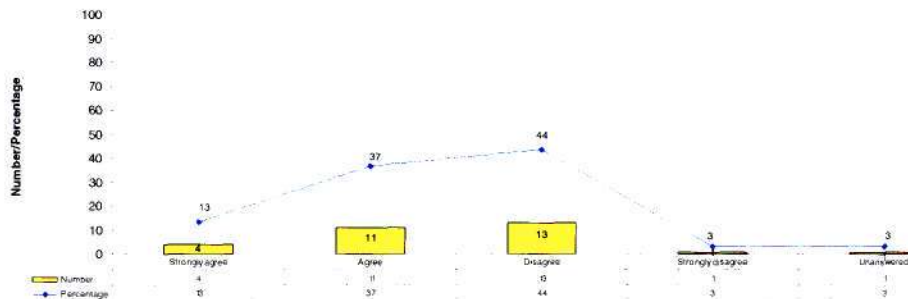
One (3%) of the participants strongly agrees with the statement, seven (23%) agree with the statement, nine (30%) disagree with the statement and thirteen (44%) disagree with the statement.

The highest percentage (44%) is that of strongly disagreeing with the statement. The lowest percentage (3%) is that of strongly agreeing with the statement.

Eight (26%) of the respondents agree with the statement and twenty two (73%) disagree with the statement.

Question 10: There is sufficient research being carried out to understand the drivers impacting the demand for paper.

Figure 4.22: Research in identifying the drivers impacting the demand for paper



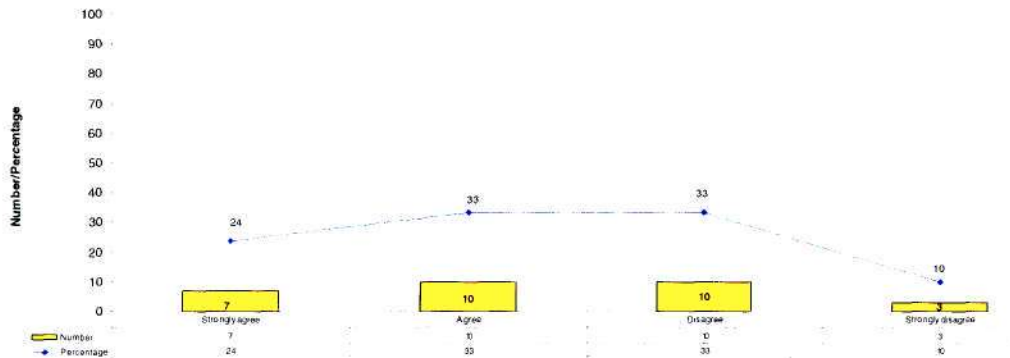
Four (13%) of the participants strongly agree with the statement, eleven (37%) agree with the statement, thirteen (44%) disagree with the statement and one (3%) strongly disagrees with the statement.

The highest percentage (44%) is in the category of disagree. The lowest percentage (3%) is in the category of strongly disagree.

Fifteen (50%) of the respondents agree with the statement and fourteen (47%) disagree with the statement.

Question 11: The digital revolution and the impact of electronic technology have posed a major challenge to the paper industry.

Figure 4.23: Electronic technology and the challenge to the paper industry



Seven (24%) of the participants strongly agree with the statement, ten (33%) agree with the statement, ten (33%) disagree with the statement and three (10%) strongly disagree with the statement.

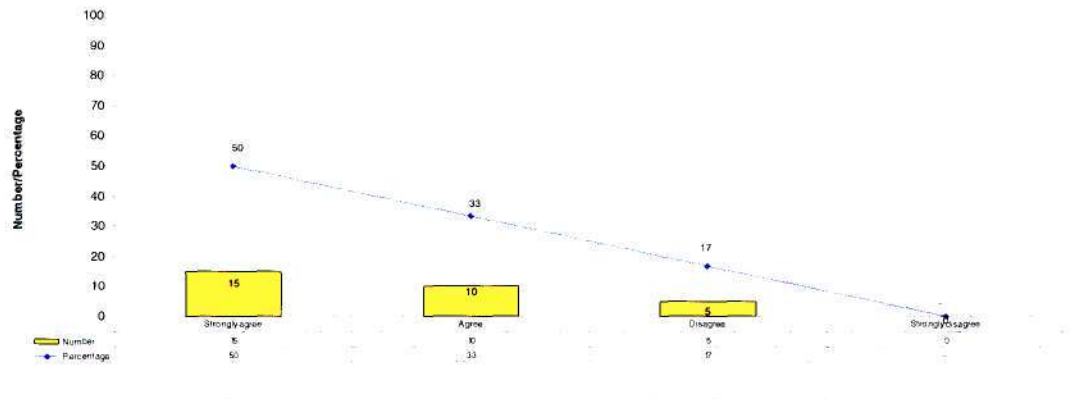
The highest percentage (33%) is in the category of agree and disagree. The lowest percentage (10%) is in the category of strongly disagree.

Seventeen (57%) of the respondents agree with the statement and thirteen (43%) disagree with the statement.

Environmental data

Question 13: Sufficient forestry management programmes are in place to ensure a sustainable supply of trees for the production of paper in the future.

Figure 4.24: Sufficient forestry management programmes



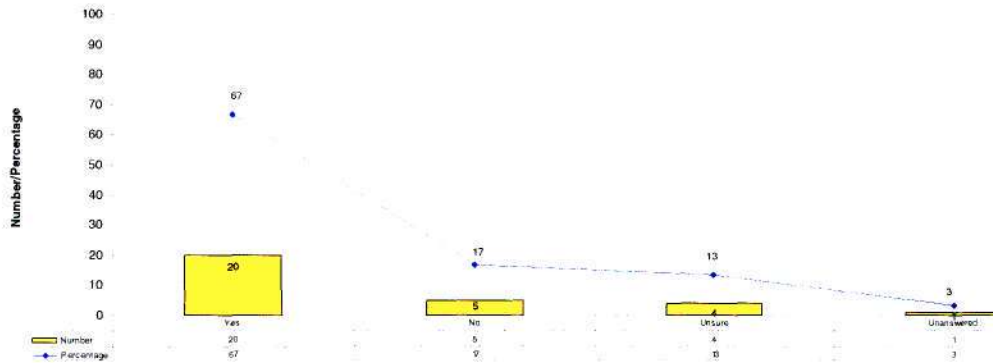
Fifteen (50%) of the participants strongly agree with the statement, ten (33%) agree with the statement and five (17%) disagree with the statement.

The highest percentage (50%) is in the category of strongly agree. The lowest percentage (17%) is in the category of disagree.

Twenty five (83%) of the respondents agree with the statement and five (17%) disagree with the statement.

Question 14: Are environmental concerns (air, water and noise pollution) adequately addressed by environmentalists?

Figure 4.25: Environmental concerns

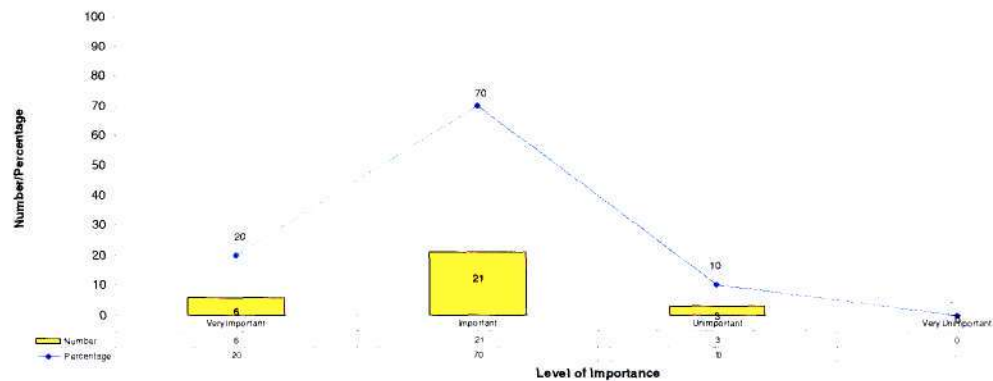


Twenty (67%) of the participants agree with the statement, five (17%) disagree with the statement and four (13%) are unsure.

The highest percentage (67%) is in the category of yes (agree). The lowest percentage (13%) is in the category of unsure.

Question 15: How would you rate Government's stance on environmental concerns?

Figure 4.26: Government's stance on environmental concerns

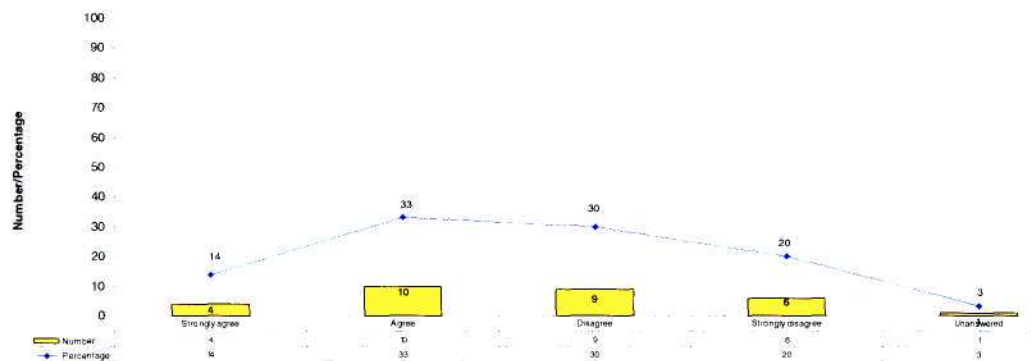


Six (20%) of the participants rate the statement as very important, twenty one (70%) rate the statement as important and three (10%) rated the statement as unimportant.

The highest percentage (70%) is in the category of important. The lowest percentage (10%) is in the category of unimportant.

Question 17: Environmentalists are concerned that natural forests are being replaced by plantations and that there is insufficient use of non-wood fibres and waste paper. Do you agree with this statement?

Figure 4.27: Concern of environmentalists



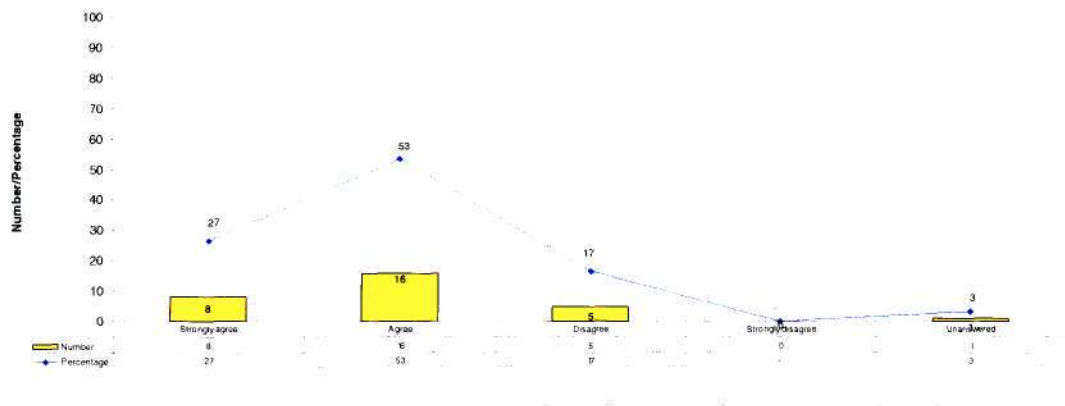
Four (14%) of the participants strongly agree with the statement, ten (33%) agree with the statement, nine (30%) disagree with the statement and six (20%) strongly disagree with the statement.

The highest percentage (33%) is in the category of agree. The lowest percentage (14%) is in the category of strongly agree.

Fourteen (47%) of the respondents agree with the statement and fifteen (50%) disagree with the statement.

Question 18: An adequate amount of research is conducted by pulp and paper making mills to determine environmental impacts.

Figure 4.28: Research in identifying environmental impacts



Eight (27%) of the participants strongly agree with the statement, sixteen (53%) agree with the statement and five (17%) disagree with the statement.

The highest percentage (53%) is in the category of agree. The lowest percentage (17%) is in the category of disagree.

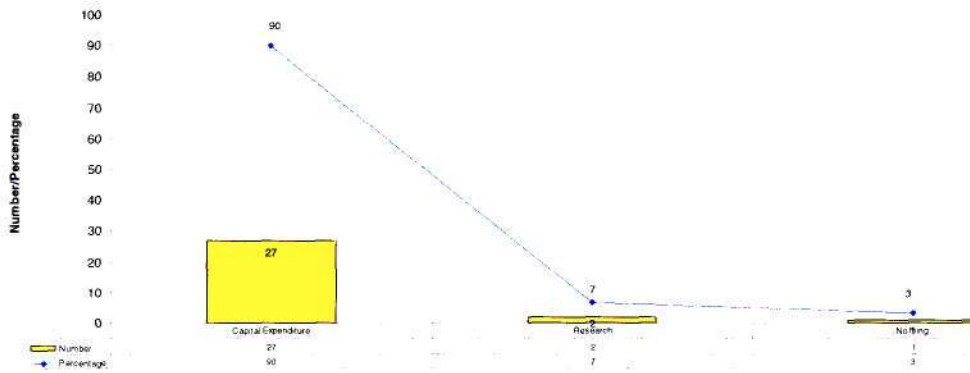
Twenty four (80%) of the respondents agree with the statement and five (17%) disagree with the statement.

Question 19: Studies have shown that the world is getting warmer due to an increase in the concentration of certain gases, such as carbon dioxide and methane (both of these are used in the pulp and paper industries).

Which of the following has your company done to reduce the emissions in the atmosphere?

- Capital expenditure
- Research being conducted
- Nothing (emissions are within acceptable limits)

Figure 4.29: Methods utilised in reducing emissions

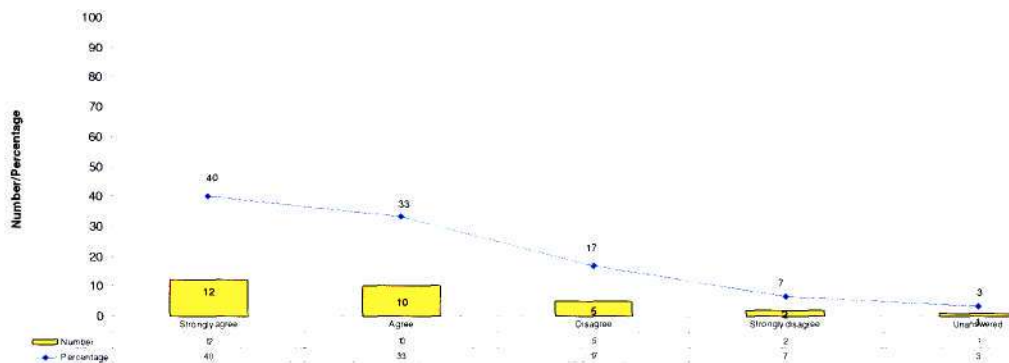


Twenty seven (90%) of the participants stated their organisations invest in capital, two (7%) stated that their organisations engaged in research and one (3%) stated that the organisation he was employed at did nothing to reduce emissions into the atmosphere.

The highest percentage (90%) is in the category of capital expenditure and the lowest percentage (3%) is in the category of nothing.

Question 20: Do you regard environmental concerns as a major challenge to the paper industry?

Figure 4.30: Environmental impacts and the challenge to the paper industry



Twelve (40%) of the participants strongly agree with the statement, ten (33%) agree with the statement, five (17%) disagree with the statement and two (7%) strongly disagree with the statement.

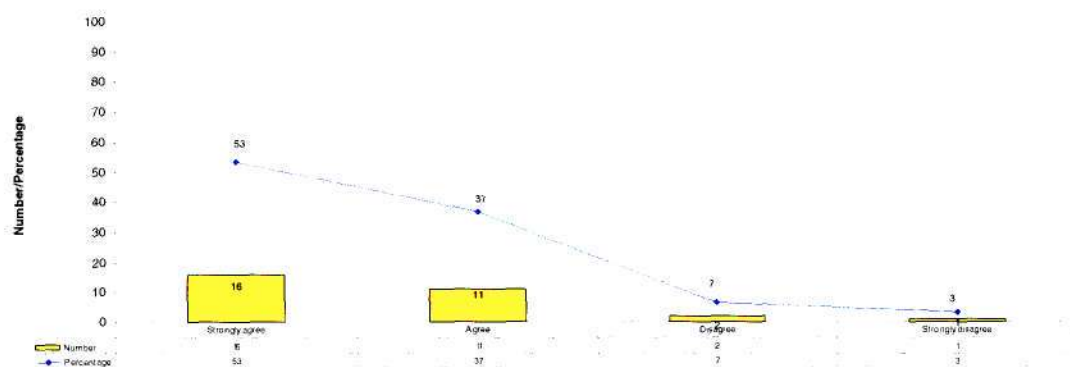
The highest percentage (40%) is in the category of strongly agree. The lowest percentage (7%) is in the category of strongly disagree.

Twenty two (73%) of the respondents agree with the statement and seven (24%) disagree with the statement.

Data on Globalisation

Question 22: Globalisation encourages Foreign Direct Investment in countries that possess a competitive advantage of nations.

Figure 4.31: Globalisation and foreign direct investment



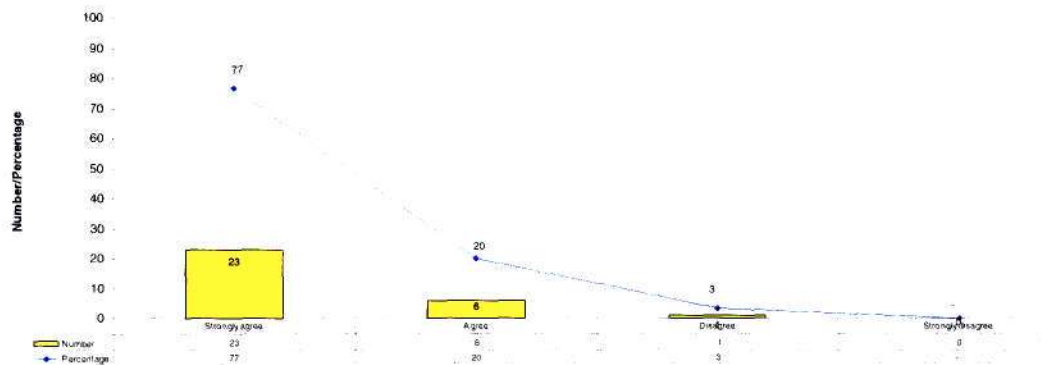
Sixteen (53%) of the participants strongly agree with the statement, eleven (37%) agree with the statement, two (7%) disagree with the statement and one (3%) strongly disagrees with the statement.

The highest percentage (57%) is in the category of strongly agree. The lowest percentage (3%) is in the category of strongly disagree.

Twenty seven (90%) of the respondents agree with the statement and three (10%) disagree with the statement.

Question 23: Globalisation has led to a development of global telecommunications infrastructure and enhanced data flows across different countries.

Figure 4.32: Globalisation and global data flow



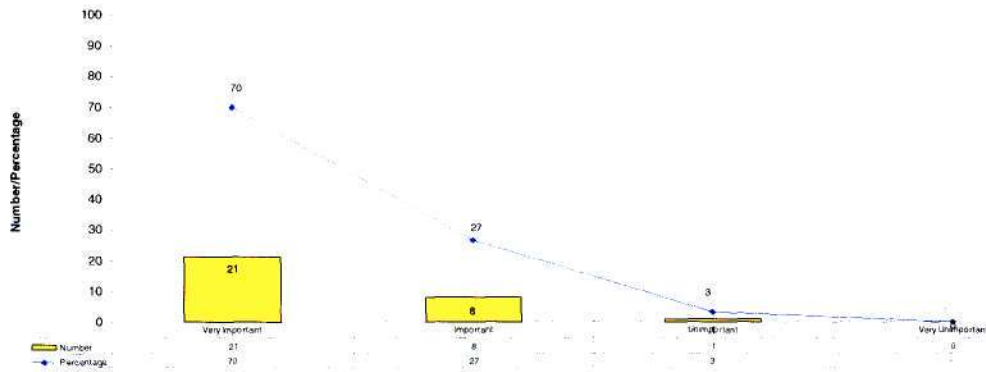
Twenty three (77%) of the participants strongly agree with the statement, six (20%) agree with the statement and one (3%) disagrees with the statement.

The highest percentage (77%) is in the category of strongly agree. The lowest percentage (3%) is in the category of disagree.

Twenty nine (97%) of the respondents agree with the statement and one (3%) disagree with the statement.

Question 24: Please state your level of importance attached to globalisation, considering the ongoing volatility attached to it (rates of exchange, interest rates, balance of payments and inflation).

Figure 4.33: Importance of globalisation

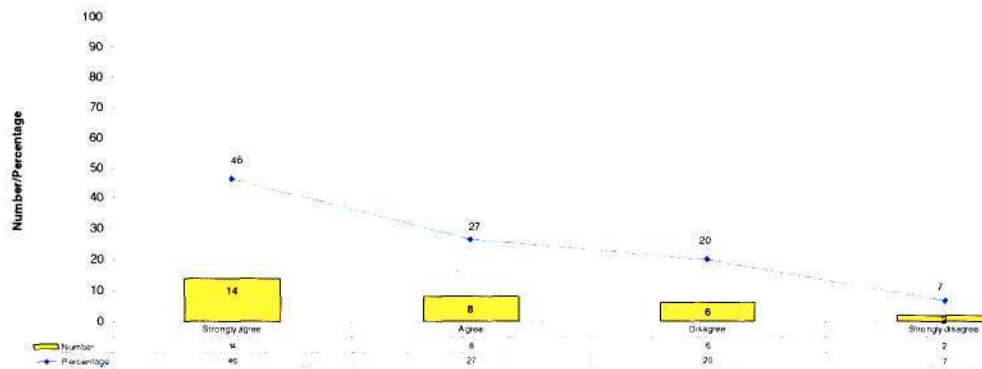


Twenty one (70%) of the participants considered their level of importance as very important, eight (27%) considered their level as important and one (3%) considered the level as unimportant.

The highest percentage (70%) is in the category of very important. The lowest percentage (3%) is in the category of unimportant.

Question 26: Do you regard globalisation as a major challenge to the paper industry?

Figure 4.34: Globalisation and the challenge to the paper industry



Fourteen (46%) of the participants were in strong agreement with the statement, eight (27%) were in agreement, six (20%) disagreed with the statement and two (7%) strongly disagreed with the statement.

The highest percentage (46%) is in the category of strongly agree. The lowest percentage (7%) is in the category of strongly disagree.

Twenty two (73%) of the respondents agree with the statement and eight (27%) disagree with the statement.

4.6 Inferential statistics - data analysis of challenges faced by the paper industry

Inferential statistics refer to inferences that can be made about the population obtained from samples drawn from the population (Welman and Kruger, 1999).

David and Sutton (2004) concur that inferential statistics focuses on techniques that entail making inferences when generalising data from a sample to the entire population.

4.6.1 E-Technology, Environmental and Globalization challenge

Statistical techniques were utilised to determine whether relationships exist between certain specific statements within the questionnaire.

The respondents had to indicate their level of agreement on the following statements:

- Question 11 – Electronic technology is a major challenge to the paper industry.
- Question 20 – Environmental concerns is a major challenge to the paper industry.
- Question 26 – Globalization is a major challenge to the paper industry.

Table 4.1 – Cross tabulation of question 11, question 20 and question 26

Q 26		Q20		Total	
		Agree	Disagree		
Agree	Q11	Agree	10	3	13
		Disagree	8	0	8
	Total		18	3	21
Disagree	Q11	Agree	3	1	4
		Disagree	1	3	4
	Total		4	4	8

The responses of strongly agree and agree were combined to form a category called agree. The responses of strongly disagree and disagree were combined to form a category called disagree. The reason for the combination is that for meaningful analysis to be obtained in a small sample, the combination of results usually provides a more profound analysis.

Of the 29 respondents that answered all three statements, 10 (34.5%) agreed with all 3 statements and 14 (48.3%) with 2 of the 3 statements, i.e. nearly 83% of the respondents agree with at least 2 of the statements.

Table 4.2 – Cross tabulation of question 11 and question 20

		q20		Total
		agree	disagree	
q11	agree	13	4	17
	disagree	9	3	12
Total		22	7	29

Chi-square = 0.008 with p-value = 0.927

Chi-square of 0.008 and p-value of 0.927, together with the responses to question 11 and question 20, indicate no relationship between the responses to these two questions.

Table 4.3 – Cross tabulation of question 11 and question 26

		q26		Total
		agree	disagree	
q11	agree	13	4	17
	disagree	9	4	13
Total		22	8	30

Chi-square = 0.197 with p-value = 0.657

Chi-square of 0.197 and p-value of 0.657, together with the responses to question 11 and question 26, indicate no relationship between the responses to these two questions.

Since the response to question 11 is unrelated to question 20 and to question 26, table 4.1 can be collapsed over question 11 and analyzed for question 20 and question 26.

Table 4.4 – Cross tabulation of question 20 and question 26

		q26		Total
		agree	disagree	
q20	agree	18	4	22
	disagree	3	4	7
Total		21	8	29

Chi-square = 4.035 with p-value = 0.045

Table 4.4 shows that question 20 (environmental concern as a challenge) and question 26 (globalization as a major challenge) are moderately positively related i.e. the answers to question 20 and question 26 agree moderately (contingency coefficient = 0.349).

Table 4.5 – Frequency distributions of question 11, question 20 and question 26

Question/score	Strongly agree	Agree	Disagree	Strongly disagree	Mean
q11	7	10	10	3	2.30
q20	12	10	5	2	1.90
q26	14	8	6	2	1.87

Table 4.5 shows that respondents agree more strongly on question 20 and question 26 (at 1.90 and 1.87 respectively on the scale) than on question 11 (at a mean of 2.30 on the scale). The table indicates that the opinion on question 11 is fairly evenly divided between agree and disagree.

4.6.2 Preference of medium

Tables 4.6 and 4.7 show the frequency distributions for each of the media and a comparison of the mean responses using Least Significant Difference (LSD) tests.

Table 4.6 – Preference of medium (counts)

	Medium			
Response	Books	Newspapers	Periodicals	Reports
Electronic	3	10	13	21
Paper	27	20	15	8
Mean	3.63	2.97	2.64	1.93
Rank	1	2	3	4

Rank 1 – most favouring paper, rank 2 – second most favouring paper, rank 3 – third most favouring paper and rank 4 – least favouring paper.

Table 4.7 – Preference of medium (comparison of means)

Medium	Mean	Difference	Significance
Books	3.63	0.66*	Books > Newspapers
Newspapers	2.97		
Books	3.63	0.99**	Books > Periodicals
Periodicals	2.64		
Books	3.63	1.70**	Books > Reports
Reports	1.93		
Newspapers	2.97	0.33	Means are the same
Periodicals	2.64		
Newspapers	2.97	1.04**	Newspapers > Reports
Reports	1.93		
Periodicals	2.64	0.71*	Periodicals > Reports
Reports	1.93		

* Significant at the 5% level of significance.

** Significant at the 1% level of significance.

The respondents prefer paper as medium for books and newspapers (more so for books than newspapers). In respect of periodicals the preference is evenly divided between electronic and paper. Reports were preferred to be received in an electronic form.

4.6.3 Age versus preference

The cross-classifications of age versus preference for the different types of publications are shown in tables 4.8 to 4.11. The objective of establishing the relationship between age and medium is to determine whether the younger generation have a greater affinity towards an electronic medium as compared to a paper medium, as identified in the literature review.

Table 4.8 – Preference for books in specified medium versus age

		books		Total
		electronic	paper	
age	30-40	2	13	15
	41-50	1	6	7
	51+	0	8	8
Total		3	27	30

Table 4.8 indicates that the majority of respondents, within all age groups prefer receiving books in a paper medium as compared to receiving them in an electronic format.

Table 4.9 – Preference for newspapers versus age

		newspapers		Total
		electronic	paper	
age	30-40	6	9	15
	41-50	4	3	7
	51+	0	8	8
Total		10	20	30

Overall, the age groups show a preference of receiving newspapers in a paper form. In the 30 – 40 age category, the majority of respondents preferred a paper format while the majority in the 41 – 50 age group preferred receiving newspapers in an electronic format. There was an overwhelming majority in the age group of 51+ wherein every respondent preferred receiving a newspaper in a paper format.

Table 4.10 – Preference for periodicals versus age

		periodical		Total
		electronic	paper	
age	30-40	4	9	13
	41-50	6	1	7
	51+	3	5	8
Total		13	15	28

The analysis of periodicals revealed that the preference of the age groups was not as distinct as compared to books and newspapers. The majority of respondents within the 30 – 40 age group preferred receiving periodicals in a paper format while the majority within the 41 – 50 age group preferred an electronic format. Within the 51+ age category, there was a higher preference to receiving periodicals in a paper format, albeit marginally.

Table 4.11 – Preference for reports versus age

		reports		Total
		electronic	paper	
age	30-40	8	6	14
	41-50	6	1	7
	51+	7	1	8
Total		21	8	29

There was a higher preference within all age groups of receiving reports in an electronic format.

Table 4.12 – Means for age groups for the different types of publications

Age	Books	Newspapers	Periodicals	Reports
30-40	3.53	2.73	3.07	2.35
41-50	3.41	2.28	1.57	1.57
51+	4.00	4.00	2.87	1.50

Table 4.12 represents the means for the age groups within the four different types of publications.

Table 4.13 – Results of Kruskal-Wallis test for equality of means for age groups

	Books	Newspapers	Periodicals	Reports
Chi-Square	2.297	8.015	5.433	2.257
df	2	2	2	2
Asymp. Sig.	.317	.018	.066	.324

a Kruskal Wallis Test

b Grouping Variable: Age

Tables 4.12 and 4.13, further reinforce the analysis in tables 4.8 to 4.11, which indicate the following:

- Books: A paper medium is strongly preferred to electronic by all the age groups.
- Newspapers: Respondents from the oldest age group (51+) strongly prefer a paper format in comparison to an electronic medium. Within the other age groups, the preference is evenly divided between paper and electronic.
- Periodicals: The oldest and youngest age groups favour paper as a publication medium, while the middle age group favours electronic.
- Reports: An electronic format is preferred in comparison to paper by all the age groups.

4.6.4 Age versus e-technology (question 11), environment (question 20) and globalization (question 26)

Table 4.14 – Age versus e-technology

		e-technology		Total
		agree	disagree	
age	30-40	9	6	15
	41-50	5	2	7
	51+	3	5	8
Total		17	13	30

The majority of respondents within age groups 30 – 40 and 41 – 50 agreed that electronic technology is a challenge to the paper industry. However, respondents within age group 51+ disagreed that electronic technology is a challenge to the paper industry.

Table 4.15 – Age versus environment

		environment		Total
		agree	disagree	
age	30-40	12	3	15
	41-50	6	1	7
	51+	4	3	7
Total		22	7	29

The majority of respondents within all age categories agreed that the environmental concerns are a challenge to the paper industry.

Table 4.16 – Age versus globalization

		globalization		Total
		agree	disagree	
age	30-40	11	4	15
	41-50	6	1	7
	51+	5	3	8
Total		22	8	30

The majority of respondents within all age categories agreed that globalisation is a challenge to the paper industry.

Table 4.17 – Means for age groups in respect of challenges

Age	Challenge		
	E-tech	Environment	Globalization
30-40	2.33	1.80	1.86
41-50	2.00	1.85	1.71
51+	2.50	2.14	2.00

Table 4.17 represents the means for the age groups in respect of the challenges of electronic technology, environmental concerns and globalisation.

Table 4.18 – Results of Kruskal-Wallis test for equality of means for age groups

	E-tech	Environment	Globalization
Chi-Square	1.084	.456	.368
df	2	2	2
Asymp. Sig.	.582	.796	.832

a Kruskal Wallis Test

b Grouping Variable: Age

Table 4.18 shows that there is no significant difference between the means of the age groups on the challenges of electronic technology, environmental concerns and globalisation.

All three age groups agree on each of the three challenges. There is weak evidence to suggest (using a Least Significant Difference test) that the respondents agree stronger on globalization than on e-technology (p-value = 0.082). There is no significant difference between the mean levels of agreement of environment, electronic technology and globalisation.

4.6.5 Position versus e-technology, environment and globalization

Table 4.19 – Position versus e-technology

	e-technology		Total
	agree	disagree	
position upper management	1	2	3
middle management	11	9	20
other	4	2	6
Total	16	13	29

The majority of respondents within the hierarchical categories of middle management and other agreed that electronic technology is a challenge to the paper industry. However, respondents within the hierarchical category of upper management disagreed that electronic technology is a challenge to the paper industry.

Table 4.20 – Position versus environment concerns

		environment		Total
		agree	disagree	
position	upper management	2	1	3
	middle management	15	4	19
	other	4	2	6
Total		21	7	28

The majority of respondents within all hierarchical categories agreed that environmental concerns are a challenge to the paper industry.

Table 4.21 – Position versus globalization

		globalization		Total
		agree	disagree	
position	upper management	2	1	3
	middle management	15	5	20
	other	4	2	6
Total		21	8	29

The majority of respondents within all hierarchical categories agreed that globalisation is a challenge to the paper industry.

Table 4.22 – Means for hierarchical categories in respect of challenges

Position	Challenges		
	e-technology	environment	globalization
upper management	2.33	2.00	2.00
middle management	2.35	1.89	1.90
other	2.16	2.00	1.83

Table 4.23 – Results of Kruskal-Wallis test for equality of means for hierarchical categories

	e-technology	environment	globalization
Chi-Square	.162	.192	.102
df	2	2	2
Asymp. Sig.	.922	.908	.950

a Kruskal Wallis Test

b Grouping Variable: Age

Table 4.23 shows that there is no significant differences between the means of the hierarchical categories in respect of the challenges facing the paper industry.

All three hierarchical categories agree that electronic technology, environmental concerns and globalisation are a challenge to the paper industry. There is no significant difference between the mean levels of agreement on the three challenges faced by the paper industry.

4.6.6 E-technology issues versus age and position

The respondents were asked their level of agreement on each of the following questions in respect of advantages of electronic technology.

Question 9.1 – Speed of conveying information

Question 9.2 – Receiving only requested information

Question 9.3 – Almost no physical delivery

Question 9.4 – Communication with more than one individual at once

Question 9.5 – More efficient and cost effective

Question 9.6 – Economy of archiving

Question 9.7 – Extinction of newspapers

4.6.6.1 E-technology and age

The results in tables 4.24 and 4.25 show that with the exception of question 9.2 (where there is weak evidence to suggest that the respondents in the 30-40 age group agree with the statement and those in the other two age groups disagree) there is no difference in response between the age groups for the statements.

Table 4.24 – Means for age groups for questions 9.1 to 9.7

age	q9.1	q9.2	q9.3	q9.4	q9.5	q9.6	q9.7
30-40	1.66	2.06	1.60	1.26	1.60	1.40	3.00
41-50	1.00	2.85	1.85	1.14	1.85	1.33	3.14
51+	1.37	2.87	1.37	1.50	2.12	1.37	3.37

Table 4.25 - Results of Kruskal-Wallis test for equality of means for age groups

	q9.1	q9.2	q9.3	q9.4	q9.5	q9.6	q9.7
Chi-Square	3.741	5.225	1.917	2.629	1.795	.081	.705
df	2	2	2	2	2	2	2
Asymp. Sig.	.154	.073	.384	.269	.408	.960	.703

a Kruskal Wallis Test

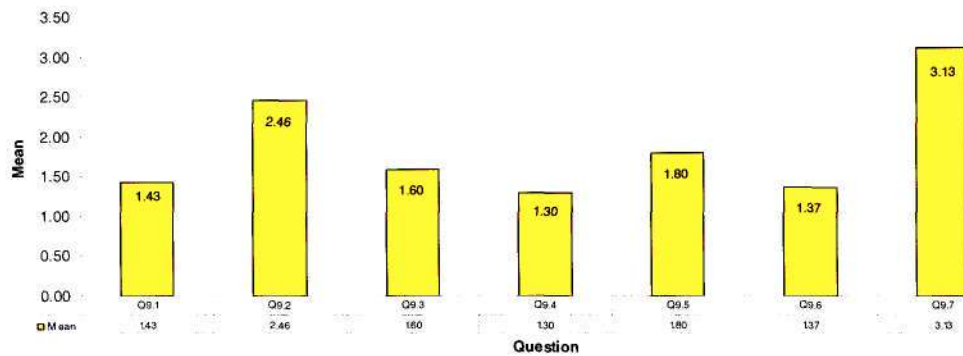
b Grouping Variable: age

Table 4.26 – Results for Least Significant Difference tests for differences between mean for issues

Question	Mean	Rank	Comparison	Difference
q9.7	3.13	1		
q9.1	1.43	5	q9.7-q9.1	1.70**
q9.2	2.46	2	q9.7-q9.2	0.66**
q9.3	1.60	4	q9.7-q9.3	1.53**
q9.4	1.30	7	q9.7-q9.4	1.83**
q9.5	1.80	3	q9.7-q9.5	1.33**
q9.6	1.37	6	q9.7-q9.6	1.75**
q9.2	2.46			
q9.1	1.43		q9.2-q9.1	1.03**
q9.3	1.60		q9.2-q9.3	0.86**
q9.4	1.30		q9.2-q9.4	1.16**
q9.5	1.80		q9.2-q9.5	0.66**
q9.6	1.37		q9.2-q9.6	1.08**
q9.5	1.80			
q9.4	1.30		q9.5-q9.4	0.50*
q9.6	1.37		q9.5-q9.6	0.42*

- * Significant difference at the 5% level of significance
- ** Significant difference at the 1% level of significance

Figure 4.35 – Mean responses for issues



The results in table 4.26 and figure 4.35 show the following differences in mean response between the various issues:

- The respondent’s disagree the most on question 9.7 (extinction of newspapers). The mean result for question 9.7 is significantly larger than that for each of the other issues.
- The respondent’s opinions are divided on question 9.2 (receiving only requested information) as can be seen from the following table showing its frequency distribution.

Table 4.27 – Frequency distribution

Response	Agree	Disagree
Frequency	15	15

Table 4.28 – Classification of question 9.2 according to age and response

		Q 9.2		Total
		agree	disagree	
age	30-40	10	5	15
	41-50	2	5	7
	51+	3	5	8
Total		15	15	30

Table 4.28 indicates that the difference between the responses of the 30-40 and over 40 age groups (referred to above) is the main reason for the divided opinion.

Respondents agree less on question 9.5 (more efficient and cost effective) than question 9.4 (communication with more than one individual at once) and question 9.6 (economy of archiving).

Respondents agree most on question 9.1, question 9.3, question 9.4 and question 9.6.

4.6.6.2 E-technology and hierarchical groups

Table 4.29 – Means for hierarchical groups for questions 9.1 to 9.7.

Position	q9.1	q9.2	q9.3	q9.4	q9.5	q9.6	q9.7
upper management	2.00	3.66	2.00	1.66	2.00	1.00	3.33
middle management	1.40	2.45	1.60	1.25	1.95	1.47	3.25
other	1.00	2.00	1.16	1.00	1.00	1.16	2.83

Table 4.30 - Results of Kruskal-Wallis test for equality of means for hierarchical groups

	Q9.1	q9.2	q9.3	q9.4	q9.5	q9.6	q9.7
Chi-Square	4.619	6.037	4.639	4.712	5.532	2.266	1.613
df	2	2	2	2	2	2	2
Asymp. Sig.	.099	.049	.098	.095	.063	.322	.446

a Kruskal Wallis Test

b Grouping Variable: Hierarchical groups

Tables 4.29 and 4.30 suggest that there is weak evidence that indicate upper management respondents agree less than respondents from the other groups on questions 9.1, 9.3 and 9.4.

Upper management disagrees on question 9.2 while middle management has a divided opinion and the others agree on it.

There is weak evidence that indicates that upper and middle management agree less than the others on question 9.5.

4.7 Responses to open-ended questions

The following questions were asked in an open-ended format. The responses from the participants have been analysed and summarized.

The responses to question 11 (Does electronic technology pose a major challenge to the paper industry) are summarized in the categories of reasons for agreeing and reasons for disagreeing.

The response to the question is almost evenly divided between agree and disagree.

Reasons for agreeing:

- Increased use of the internet for access to news and other information.
- Many companies and individuals are moving towards a paperless (digitally based) society.
- A move away from paper archiving towards digital archiving.
- Hard copies of documents are of limited use.
- Electronic technology is faster, takes up less storage space and is more portable.

Reasons for disagreeing:

- Use of electronic or paper depends on individual requirements.
- In certain situations paper as a medium can reach bigger numbers of people, e.g. poorer people do not have access to electronic news, but can be reached with paper printed news.
- Paper is not just used for printing information and can therefore be used in situations where electronics are useless, e.g. tissues.
- Some documents are still needed in paper form, e.g. certain legal documents.
- There is a strong preference for newspapers to be in paper form.
- The older and poorer members of society have not been educated in the use of electronics.

- Electronics can fail at certain times. For this reason paper documents are needed as backups for important documents.

Respondents that were in agreement that electronic technology posed a challenge to the paper industry (question 12) suggested the following to paper manufacturers to meet the challenge.

- The majority of the people in the world are not computer literate. Therefore demand for paper copies will still be there. Focus business on third world countries where e-tech is not easily accessible.
- Make the price of paper competitive.
- Use pulp for products other than paper, e.g. boxes, food packages, chemical cellulose, garments, shoes, luggage, upholstery.
- Improve the quality of paper.
- Focus on strong points of paper and weak points of competitors.
- Diversify the product range.

The responses to question 16 (What are the concerns on disposal of solid waste from pulp and paper mills) are summarized hereunder.

- Dumping in residential and water resource areas (air and water pollution).
- Informal settlements in ecologically sensitive areas.
- Volume of waste dumped (incineration preferred to dumping).
- Stricter legislation to deal with waste disposal (tough penalties for non-compliance).
- Proper management of waste disposal. Should be done in a safe, environmentally responsible way.
- Allowing disposal only in designated areas.
- Use of bio-mas boilers to generate cheaper energy.
- Re-cycling of waste.
- Use of fossil fuels contributes to the increase in carbon dioxide. A tree is carbon dioxide neutral to the disposal of cellulose fibers.

The responses to question 20 (Do you regard environmental concerns as a major challenge to the paper industry) are summarized hereunder.

- Pollution destroys animal life.
- Effluent and gas emissions.
- Moving towards a zero emission paper mill. Employing environmental officers to ensure compliance.
- The high cost (capital expenditure, research cost to improve technology) involved in creating zero emission is a rather unprofitable investment in terms of return on money.
- Continuous improvement of environmental impact over time.
- Environment Impact Assessments done prior to establishment of paper and pulp mills.
- Developing new technology to address the problem.
- Making consumers more environmentally aware.
- Environment suffers with quality improvement of paper.
- Inefficient use of energy i.e. high dependency on inorganic chemicals.

Respondents that were in agreement that environmental impacts posed a challenge to the paper industry (question 21) suggested the following to paper manufacturers to meet the challenge.

- Through public relation work, i.e. involve public in efforts to meet the challenge. Install a culture of awareness amongst the public and employees (awareness programs).
- Plan disposals and replenishments around the development of a nursery of trees.
- Environment Impact Assessments.
- Cost of meeting this challenge (e.g. improvement of waste technology) is high.
- Effluent treatment, gas scrubber.
- Look at Sappi Saiccor progress.

- Improve waste management.
- Separate fluids from solids in waste.
- Use environmentally friendly equipment.
- Move towards a paperless workplace.

The responses to question 25 (Will firms continue to evolve and become more global or would they protect the local industry) are summarized hereunder.

Reasons for reaching out globally:

- To become more competitive. To be successful and stay in business is all about being profitable (making money).
- For some companies it is essential for survival. If they do not reach out globally they can run the risk of being left behind and becoming isolated.
- Essential for diversification and finding niche markets.
- Produce in less expensive regions (cutting costs) and sell in more profitable (increasing profits) regions.
- Protectionism does not ensure sustainability, competition does.

Reasons for protecting home environment:

- High transport cost of doing business away from home base.
- Cultural differences are problematic when doing business away from home base.
- The local paper industries will suffer from global business contacts (results in jobs losses in South Africa).

The responses to question 26 (Does globalization pose a major challenge to the paper industry) are summarized in the categories of reasons for agreeing and reasons for disagreeing.

Almost three quarters of the respondent agree that globalization is a major challenge to the paper industry.

Reasons for agreeing:

- It is easy to do business (free trade agreements) with China and India (top 2 emerging markets). They produce paper much cheaper and have a high work ethic.
- Healthy competition ensures that inferior products are not exported.
- Must be competitive to survive in business.
- Certain countries (Asian, some African, and South American) can produce products at lower cost.
- Rather import cheaper paper than support more expensive home industries.
- South African labour costs are high.
- Not competing globally in order to protect South African industries can result in losses for South African companies.

Reasons for disagreeing:

- Difficulties with keeping prices competitive and establishing distribution networks (access to resources). Prices are US Dollar or Euro based.
- High transport and distribution cost involved in competing globally.
- Problems caused to local industry by cheap Chinese paper e.g. loss of jobs locally. Local industry should be protected.

Respondents that were in agreement that globalisation posed a challenge to the paper industry (question 27) suggested the following to paper manufacturers to meet the challenge.

- Being more cost effective and efficient.
- Look at plants in other countries.
- Produce products of a good quality and continue improving quality. Comply with ISO standards.
- Be innovative.
- Provide good technical support.
- Retain local market share and grow market share in other countries.
- Compliance with environmental standards.

- Have a sound marketing strategy to reach consumers. Make company more attractive to buy from.
- Effective forestry planning and management.
- Efficient utilization of resources.
- Promote local content.

The responses to question 28 (In the light of the challenges faced by the paper industry, should diversification be considered?) are summarized in the categories of reasons for agreeing and reasons for disagreeing.

Reasons for agreeing:

- Can be done, but focus should be on core products.
- Will spread the risk of operating in a global market.
- Can diversify only in the long term. Need to watch trends carefully.
- Will ensure survival in global markets.
- It is necessary for survival, not an option. You have to diversify to continue operating in an ever changing world.
- Needs to be done to deal with changing demand patterns e.g. some products becoming obsolete.
- Seek alternative sources of paper i.e. synthetic paper.
- Diversification can lead to making new, more profitable core products e.g. Nokia changed from being pulp/paper manufacturer to a telecommunications company.
- Should be done (to maintain jobs and revenue) with the movement towards a paperless society in mind.
- Protect competitiveness by spreading around the business risk e.g. able to change to tissues if demand for writing paper declines.
- Makes businesses think about the true nature of their core business e.g. substrate coating rather than paper manufacture.
- Do not diversify outside area of specialization.

Reasons for disagreeing:

- Rather have one good product than a number of poor ones.
- Diversification can have a high risk.
- Should rather focus on improving their core business (paper manufacturing). Diversification can be detrimental to maintaining this focus especially in situations where a unique recipe and specialized are needed.
- Diversification can weaken a company's infrastructure.

4.8 Conclusion

This chapter presented and discussed the data collected. The quantitative research study entailed a survey by means of a questionnaire, each consisting of twenty eight questions, incorporating a combination of both closed and open-ended questions.

The critical research question focused on electronic technology, environmental impacts and globalisation to the extent that they posed as challenges to the global paper industry.

Having applied the research design and processing the data obtained, the results using the SPSS package and Microsoft Excel were generated.

In chapter five, the results in context of the research objectives are discussed.



Data Analysis

5.1 Introduction

The results in context of the research objectives are discussed in this chapter.

5.2 Data Analysis

The data has been analysed in relation to the problem statement and critical questions outlined in section 1.2.5; which entailed the effects of electronic technology, environmental impacts and globalisation on the global paper industry and the measures that organisations within the industry have to put in place to bullet proof the business. The challenges together with an analysis of the respondent's views are the basis of the analysis.

In response to separate questions (questions 11, 20 and 26) on whether electronic technology, the environment and globalisation posed a major challenge to the paper industry, 34.5% of the twenty nine respondents that answered all three questions, agreed with all three questions and 48.3% agreed with two of the three statements. Considering that almost 83% of the respondents agree with at least 2 of the statements, the results overwhelmingly indicate that the threats are a reality to the paper industry.

The literature review (chapter two) provided a detailed discussion of the challenges facing the paper industry. The results of the survey which have been analysed in chapter four reinforce the discussion within chapter two in respect of the similarities identified within the literature review and the survey.

However, the results indicate that there is no association between the challenge of electronic technology and the challenge of the environment towards the paper industry (Chi-square = 0.008 with p-value = 0.927).

Question twenty (environmental concern as a challenge) and question twenty six (globalization as a major challenge) are moderately positively related (contingency coefficient = 0.349).

5.2.1 Electronic technology and the impact on the paper industry

One of the findings of the research is that each of the thirty respondents in the sample has access to a computer either at work or at home, with eighty three percent of them having internet access. It is therefore apparent that the use of electronic technology in this sample is immense and further suggests that by utilising the internet, conventional methods of knowledge search aren't looked at as the 'first port of call' anymore. These conventional methods include encyclopaedias, reference books, periodicals and the newspaper. Approximately half of the respondents visited the library prior to last year.

The most popular response with regards to the frequency of utilising conventional information methods on a 'very often basis' was newspapers at seventy percent of the sample, followed by books at thirty seven percent. One respondent stated that people liked to enjoy the tactile experienced of the newspaper.

Respondents overwhelmingly prefer reading books in a paper based form rather than electronically, whereas most of the respondents preferred reports in an electronic format. There is a large preference to obtaining newspapers and periodicals in the conventional format.

Most respondents strongly agreed that e-technology makes it possible to communicate with various individuals simultaneously as well as it was strongly agreed that e-technology enhances efficiencies and hence cost savings. A large percentage of the respondents favoured electronic archiving; as it saves space, retrieval times and costs in comparison to paper archiving.

The cross classification between age and media format in response to the question indicating the respondent's preferences on media format, books were strongly preferred in a paper format to electronic by all the age groups. The oldest age group strongly prefers newspapers in a paper format to electronic, whereas within the other age groups, the preference is evenly divided between paper and electronic. The oldest and youngest age groups favoured paper as a publication medium, while the middle age group favoured an electronic version of periodicals. An electronic version of reports is preferred by all age groups.

Respondent's disagreed the most on question 9.7 (extinction of newspapers). The mean result for question 9.7 is significantly larger than that for each of the other issues.

Respondent' opinions are divided on question 9.2 (receiving only requested information).

There is weak evidence that indicates upper management respondents agree less than respondents from the other groups on question 9.1 (speed of information), question 9.3 (physical delivery delays) and question 9.4 (communication with various individuals simultaneously).

Upper management disagrees on question 9.2 (receiving only the information requested) while middle management has a divided opinion and the others agree on it.

There is weak evidence that indicates that upper and middle management agree less than the others on question 9.5 (e-technology enhances efficiency).

The respondent's views on whether electronic technology posed a threat to the paper industry were varied. These included the view that there was no need for alarm in the short to medium term, however in the longer term, the world would be going digital; the older generation still preferred conventional methods; and the youth were more focused on e-media such as laptops with 3G cards, cell phones and i-pods to receive their news rather than the conventional method.

It is ascertained that respondents agree the paper industry is facing a challenge by way of digital revolution and the impact of electronic technology. This is identified in the data analysis wherein seventeen (57%) of the respondents agree with the statement and thirteen (43%) disagree with the statement (question 11).

5.2.2 Environmental concerns and the impact on the paper industry

It can be ascertained that according to the research findings, sufficient forestry management programmes are in place to ensure a sustainable supply of trees for the production of paper in the future and that respondents are in agreement that environmental concerns (air, water and noise pollution) are adequately addressed by environmentalists. Environmentalists are on a constant drive to reduce all types of pollution.

Governments' stance on environmental concerns is considered as being twenty three percent very important, and sixty seven percent important. It is evident that per the sample data, government is ensuring that industry complies with the relevant legislation.

The concerns regarding disposal of solid waste included: solid waste should be incinerated rather than dumped because volume creates energy and bio-mas boilers should be used to incinerate all combustible medium to aid power generation as cheaper energy. Government should subsidise this investment. A big concern is the use of fossil fuels; these contribute to the increase in carbon dioxide on the atmosphere and solid waste to the ground. When asked whether the environment posed as a major challenge to the paper industry, responses were varied.

It is ascertained that respondents agree the paper industry is facing a challenge by way of environmental impacts. This is identified in the data analysis wherein twenty two (73%) of the respondents agree with the statement and seven (24%) disagree with the statement (question 20).

5.2.3 Globalisation and the impact on the paper industry

According to the research data, globalisation encourages foreign direct investment in countries that possess a competitive advantage of nations. Also, the data revealed that globalisation has led to a development of global telecommunications infrastructure and enhanced data flows across different countries. Respondents attach an immense amount of importance in globalisation amidst the ongoing volatility (rates of exchange, interest rates, balance of payments and inflation) attached to it.

It is ascertained that respondents agree the paper industry is facing a challenge by way of globalisation. This is identified in the data analysis wherein twenty two (73%) of the respondents agree with the statement and eight (27%) disagree with the statement (question 26).

5.3 Conclusion

In context of the research objectives of the study, the results of the research were discussed in this chapter.



Conclusions and Recommendations

6.1 Introduction

The quantitative research study entailed a survey by means of a questionnaire, each consisting of twenty eight questions, incorporating a combination of both closed and open-ended questions. In this chapter, conclusions are drawn and recommendations made. The limitations of the study are stated as well further research areas are suggested.

This chapter forms a “golden thread” between the research objectives and the outcome thereof. The extent to which the critical research questions in section 1.2.5 is also discussed.

6.2 Objectives of the study

The objectives of this study as set out in section 1.2.7 are detailed hereunder.

- To determine whether the relationship the global paper industry has with electronic technology, environmental impacts and globalisation is a real concern.
- To determine consumers preferences between conventional methods, in respect of books, newspapers, periodicals and reports in comparison to electronic technology.
- To understand the impact of e-technology on paper consumption.
- To identify the environmental and social impact caused by the paper industry.
- To evaluate the impact of globalisation on competitiveness of players within the paper industry.
- To determine whether diversification is an option for manufacturers within the paper industry.

6.3 Data Analysis – summary of results

The data has been analysed in relation to the problem statement and critical questions outlined in section 1.2.5; which entailed the effects of electronic technology, environmental impacts and globalisation on the global paper industry.

In response to questions on whether electronic technology, the environment and globalisation posed a major challenge to the paper industry, 34.5% of the twenty nine respondents that answered all three questions, agreed with all three questions and 48.3% agreed with two of the three statements. Considering that almost 83% of the respondents agree with at least 2 of the statements, the results overwhelmingly indicate that the threats are a reality to the paper industry.

6.4 Recommendations

6.4.1 Electronic technology and the impact on the paper industry

Question 12 of the questionnaire required respondent's to propose recommendations if they considered that the digital revolution and the impact of electronic technology having posed a major challenge to the paper industry.

The following are recommendations that have been obtained solely from the respondents.

6.4.1.1 Paper mills should diversify the product range by using pulp for other end uses besides paper. Considering that electronic technology is a direct threat, research should be undertaken to determine whether pulp and paper could be blended into the manufacturing process of electronic technology equipment.

6.4.1.2 Paper mills should produce smaller volumes of a premium quality paper.

6.4.1.3 Paper manufacturers should direct their focus on third world countries and remote parts of the world where e-technology and e-business is not accessible to all and where reliance on paper products remains.

- 6.4.1.4 Paper manufacturers should encourage the use of paper in other areas instead of the media.
- 6.4.1.5 Paper manufacturers should target specialty markets instead of the “day-to-day” printing products, e.g. in South Africa, the use of paper shopping bags is almost minimal, whereas in the United States these bags are used at large volumes. With the drive from the South African government to ensure environmental cleanliness and hence the surcharge on plastic shopping bags, the introduction of paper bags will be welcome by the government and the paper manufacturers could ride on this upsurge.
- 6.4.1.6 Paper manufacturers should change its mindset and realise that the core of their business is not “making paper” but coating substrates.
- 6.4.1.7 Paper manufactures should review and analyse the competitor and increase intensity by focusing on the weak points or alternatively the paper industry stronger points.

6.4.2 Environmental concerns and the impact on the paper industry

Question 21 of the questionnaire required respondent’s to propose recommendations if they considered that environmental concerns posed a major challenge to the paper industry.

The following recommendations have been obtained solely from the respondents.

- 6.4.2.1 Paper manufacturers are to conduct environmental impact assessments as a means of reducing negative impacts on the environment.
- 6.4.2.2 Paper manufacturers should investigate usable elements of waste instead of discarding it, e.g. timber residue can be converted to lignosulphonate.
- 6.4.2.3 Paper manufacturers are to ensure the latest technologies are adopted to ensure minimal environmental effects.

6.4.2.4 Further scientific research is required to improve environmental effects by improving on energy efficiency and reducing the use of inorganic chemicals for pulping.

Grieg-Gran (1996) state that paper industry leaders should be more active in spearheading forest stewardship on a global scale. They should be better coordinated so that they can implement leadership for the entire industry by setting examples of best practice and organising industry codes of practice. These leaders should subject themselves to independent forest management audits and certification as well as internal inspection.

The paper industry should make certain that the necessary level of environmental research is undertaken while working towards a goal of “no-observed adverse effect level”. Specific attention should be given to research on chronic toxicity of non-chlorinated compounds. Additional research should also be conducted on employee health in pulp, paper and the de-inking processes. Paper companies should implement continuous improvement programmes to reduce emissions, effluent and waste within predetermined timelines (Grieg-Gran, 1996).

Industry should demonstrate its commitment to the concept of waste generated by the paper making process. Waste should be addressed from the point of resource recovery and waste reduction (Grieg-Gran, 1996).

6.4.3 Globalisation and the paper industry

Question 27 of the questionnaire required respondent’s to propose recommendations if they considered that globalisation posed a major challenge to the paper industry.

The following are recommendations that have been obtained solely from the respondents.

6.4.3.1 Paper manufacturers should implement initiatives to increase plant efficiency in an attempt to manufacture paper at the lowest possible cost; thereby making it possible to compete in global markets.

6.4.3.2 Paper manufacturers should make every attempt in retaining market share as well as investigate options of penetrating into other countries.

6.4.3.3 An appeal should be made to the government for an imposition of import tariffs.

6.4.3.4 Paper manufacturers should differentiate its products on quality and technical support rather than cost.

6.5 Researcher's recommendations

The researcher concurs with the recommendations of the respondents. The following are further recommendations that the researcher deems relevant to the study.

6.5.1 Electronic technology

6.5.1.1 Paper manufacturers should engage in intensive research as a means of finding new end-uses for paper and paper based products, e.g. if paper can be used within any e-technology equipment such as a computer, the industry should capitalise on this factor.

6.5.1.2 E-technology (primarily the use of plastic cards) is being used at an extensive extent as a payment method. It therefore should encourage a move by paper manufacturers to investigate this option as a diversification strategy and adapt part of the manufacturing process to produce plastic cards.

6.5.1.3 Toshiba has developed a printer that utilises ‘paper’ manufactured from polyethylene terephthalate that can be utilised up to 500 times (page 54). Paper manufacturers should see this as an opportunity and either improvise the existing processes or manufacture a new plant that produces this product.

6.5.1.4 In the face of e-technology, paper manufacturers should also explore the option of diversifying (Brick and Click strategy), either by means of a merger or outright purchase of e-technology companies. A diversified company of paper and e-technology will reduce economic risk. Nokia was previously a paper manufacturer and at present it is a leading telecommunications company.

6.5.1.5 Maximise the production of speciality products that cannot be substituted by e-technology, e.g. wrapping and boxes for cleaning materials, tissues, paper plates and cups, kitchen towels, table napkins, lampshades, menu cards, paper hats, crackers, fireworks, programmes, playing cards, board games, kites, model aircraft, football coupons, race cards, presentation, wrapping, packaging and protection for all manufactured goods, transfer sheets for decorating chinaware, filters for water, air, coffee, medicine, beer, oil and for mechanical uses.

6.5.1.6 Exploit the sale of paper to countries that have low literacy levels. A country having a low level of literacy is unlikely to have a need for e-technology. Market penetration in countries having low literacy levels will still have a rising demand for paper until they are exposed to e-technology.

6.5.2 Environmental impacts

6.5.2.1 Paper manufacturers are to transform global paper production and consumption towards manufacturing processes that are ecologically and socially responsible and sustainable, by way of clean production; responsible fibre sourcing and maximising the use of recycled products.

6.5.2.2 Research to understand the effects of environmental impacts should receive priority and be part of the strategic plan of the paper manufacturers.

6.5.2.3 To ensure minimal erosion of natural energy and fuel supplies, the paper manufacturer should introduce a plan of becoming independent of fossil fuels by utilising internal self-generated fuel from waste materials. The pulp and paper industry should invest in capital that assists in environmental monitoring, e.g. environmental sensors.

6.5.2.4 Pulp and paper manufacturers should minimise the combined impacts of water, energy, wood and chemical usage as well as air, water, solid waste and thermal pollution throughout the entire manufacturing process.

6.5.2.5 Pulp and paper manufacturers should also reduce and in due course eliminate harmful pulp mill discharges and the use of chlorine and chlorine compounds for bleaching.

6.5.2.6 Newly constructed pulp and paper mills are to make use of chlorine-free pulping and bleaching technologies in order to ensure effluent-free plants.

6.5.2.7 The pulp and paper industry is required to introduce a practice of sustainable forestry that incorporates the production of wood and paper products, with other environmental aspects, including soil conservation, air and water quality, and wildlife and fish habitat.

6.5.3 Globalisation and the paper industry

Pulp and paper industries are required to maintain its sustainability in the long term by improvising its methods of production and thereby increasing efficiency. More often than not, customers source their paper requirements from the cheapest supplier. The Theory of Absolute Advantage states that countries import should consist of products manufactured more efficiently across its borders while exports should comprise of products manufactured more efficiently at home. Certain countries, e.g. China produce paper at a much lower cost than the United States. Customers would therefore, in all probability purchase their paper supplies from China.

The following are recommendations to the pulp and paper industry in order to ensure sustainability in the long term in the face of globalisation:

6.5.3.1 Research should be conducted to determine the selling prices of other suppliers. Thereafter, paper companies should embark on a Profit Improvement Programme (PIP) to reduce costs. A reduction in costs translates to a reduction in the selling price (keeping the profit percentage the same). Selling price scenarios should be formulated until the selling price is in line with that of other manufacturers. Amongst other cost reduction endeavours, upgrading mill technology or deciding to permanently close off non-performing certain machines are considerations that are required to be taken as part of the cost cutting strategy. Provided that the selling price sustains the business and that the economic position of the company is not compromised, the products of the firm should be marketed at the new price. The Theory of Comparative Advantage comes into action and the paper manufacturer in question is the preferred supplier.

6.5.3.2 Research and Development should be a focal point as customers require paper products as per a required specification. Customers are also demanding a high quality product in terms of brightness and strength. Although globalisation favours the cheapest supplier, customers also require products that are of a high quality. Quality should therefore be marketed rather than price.

6.5.3.3 Paper manufacturers should also enter into long term contracts with customers. In this way, the customer is obligated in terms of the contract to purchase from the supplier in question. Although the price may be cheaper in another country at some position during the duration of the contract, the customer is locked into a contract and has no choice but to comply.

- 6.5.3.4 In the case of certain countries, environmental regulations are non-existent, whereas in other countries these regulations are legislated in law and non-compliance may result in penalties and threats of mill closure. In these circumstances, the paper manufacturer that has to comply with strict environmental legislation is worse off from a financial point of view as compliance requires capital investment, by way of monitoring stations and environmental sensors as well as personnel to ensure legal compliance to predetermined standards. Those paper manufacturers that are affected by the challenge of globalisation and feel prejudiced because of the disparity of environmental legislation should formulate a strategy that markets its products favourable in an environmentally friendly manner.
- 6.5.3.5 Rather than requesting government to place import tariffs on goods, an appeal should be made for subsidies to invest in capital to drive down production costs. Protectionism would ensure that the domestic economy would be taken care of; however, if other countries follow the same approach, it becomes a battle of economies. Subsidies serve as an incentive for capital investment as it drives costs down as well as it provides employment within the local economy.

6.6 Limitations of the Study

The research that has been conducted focused primarily on those individuals in the pulp and paper industry. The study was biased and therefore limits the possibility of generalising the results to a greater population. It is unsure whether the results would have been any different if the participants were from across a spectrum of industries.

The questionnaires were completed by the participants in their personal capacity. Had the study been an in-depth company analysis, the study would have been more focused.

The questionnaires were not completed by any directors of companies. The focus and direction of the company is driven by these individuals. Their views would have been interesting and added to the body of knowledge on the subject under investigation.

The sample size should be increased as larger sample is more reliable when generalising the results to the population.

A qualitative study should be considered wherein in depth interviews are also conducted.

The data collected didn't give rise to firm commitments and there appeared to be a certain caveat in some of the recommendations of the respondents. The data also lacked a certain amount of lustre considering the questionnaire was completed by predominately managers. A richer data collection was expected.

6.7 Suggested Further Research

The research comprised the study of the effects of electronic technology, the environment and globalisation on the global paper industry. The following are suggestions for further research that arose from the problem statement and critical questions in section 1.2.5 in this study.

- 6.7.1 This study was quantitative based. Further research should be conducted using qualitative methodology wherein a greater understanding from the perspective of the respondent is obtained.
- 6.7.2 An intensive study should be conducted on diversification of paper mills to ascertain whether modifications to existing plants would have the potential of producing other end products and thereby allowing penetration into other sustainable markets.
- 6.7.3 Studies should be undertaken in determining trends in global investments in recycling capacity.

6.7.4 Research should be conducted to determine how competitive advantages can be maintained and whether the industry will sink into price wars.

6.8 Conclusion

The research problem focused on electronic technology, the environment and globalisation to extent that they posed as challenges to the global paper industry.

The quantitative research study entailed the researcher obtaining data by means of a survey questionnaire, each consisting of twenty eight questions, incorporating a combination of both closed and open-ended questions.

The study revealed that some respondents felt the challenges faced by the global paper industry were minimal; and there were others that perceived the threats as being genuine. The open ended responses from participants were varied. There was however, overwhelming agreement that the challenges were indeed a threat to the sustainability of paper companies.

Limitations of the study included choosing participants primarily from the pulp and paper industry, questionnaires were completed by the participants in their personal capacity, certain questions baffled the participants and as such they were unanswered and questionnaires were not handed to be completed by any directors of companies.

Further research was suggested and included conducting a qualitative study, exploring the aspect of diversification and understanding the recycling sector of the industry.

In conclusion, this study was a genuine attempt to solve the problem statement and critical questions.

As far as meeting the critical questions in section 1.2.5, the work was not as fruitful as it was hoped. As data collection unfolded, the questions that were considered critical at the outset proved to be even more substantial.

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Questionnaire
Topic: Challenges faced by the global paper industry

Questionnaire no:

General information

1. Please indicate the division you are employed at within the organisation.

Administrative Engineering Research/Technical Production
 Human Resources Environmental

2. What level of hierarchy within your organisation are you employed at?

Director Upper Management Middle Management Other

3. Within which age category are you in?

30 - 40 41 - 50 51 and older

E-technology

4. Do you have access to the following e-technologies, either at home or at work?

Computer Printer Internet connection DVD/CD Rom

5. When last have you used a library?

This month Last month Last year Prior to last year

6. Did you use any of these at the library?

Books Newspapers Periodicals Reports

7. Please state how often do you access any of the following:

- Books
- Newspapers
- Periodicals
- Reports

Very often	Often	Occasionally	Never
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4

8. Please state the medium in which you would prefer receiving the following:

- 8.1 Books
- 8.2 Newspapers
- 8.3 Periodicals
- 8.4 Reports

Electronic	Paper
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

9. How would you consider the following statements?

- 9.1 Information received/sent electronically is conveyed almost instantaneously as compared to conventional methods
- 9.2 Electronic information is considered superior as you receive only the information requested
- 9.3 Physical delivery delays are almost eliminated using an electronic method of information transfer
- 9.4 E-technology makes it possible to communicate with various individuals at once
- 9.5 E-technology enhances efficiencies and hence cost savings (e.g. read online instead of buying a newspaper)
- 9.6 Electronic archiving is preferable as it saves space, retrieval time and costs in comparison to paper archiving
- 9.7 In the face of e-technology, newspapers are on a path of extinction

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4

10. There is sufficient research being carried out to understand the drivers impacting the demand for paper?

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4

11. The digital revolution and the impact of electronic technology has posed a major challenge to the paper industry.

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4

Please explain your view: _____

12. If you are in agreement with the statement in question 11, what recommendations would you suggest to paper manufacturers to meet this challenge?

Environmental

13. Sufficient forestry management programmes are in place to ensure a sustainable supply of trees for the production of paper in the future?

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4

14. Are environmental concerns (air, water and noise pollution) adequately addressed by environmentalists?

Yes	No	Unsure
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. How would you rate Government's stance on environmental concerns?
 VI=Very important, I=important, U=Unimportant, VU=Very unimportant)

VI	I	U	VU
1	2	3	4

16. What are your concerns (if any) regarding disposal (either incineration or landfill dumping) of solid waste generated from pulp and paper mills?

17. Environmentalists are concerned that natural forests are being replaced by plantations and that there is insufficient use of non-wood fibres and waste paper. Do you agree with this statement?

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4

18. An adequate amount of research is conducted by pulp and paper making mills to determine environmental impacts?

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4

19. Studies have shown that the world is getting warmer due to an increase in the concentration of certain gases, such as carbon dioxide and methane (both of these are used in the pulp and paper industries).

Which of the following has your company done to reduce the emissions in the atmosphere?

Capital expenditure Research being conducted Nothing (emissions are within acceptable limits)

20. Do you regard environmental concerns as a major challenge to the paper industry?

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4

Please explain your view: _____

21. If you are in agreement to the statement in question 20 is yes, please recommend measures that can be put in place by paper manufacturers to meet this challenge.

Globalisation

22. Globalisation encourages Foreign Direct Investment in countries that possess a competitive advantage of nations

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4

23. Globalisation has led to a development of global telecommunications infrastructure and enhanced data flows across different countries.

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4

24. Please state your level of importance attached to globalisation, considering the ongoing volatility attached to it (rates of exchange, interest rates, balance of payments and inflation.

VI=Very important, I=Important, U=Unimportant, VU=Very unimportant)

VI	I	U	VU
1	2	3	4

25. Are you of the opinion that firms will continue to evolve and follow in the path to a more globalised world and take advantages of the features that can generate comparative advantages, or will they take a stance on protecting its home environment?

Please explain your view: _____

26. The formation of the global village, as a direct result of globalisation, has resulted in the reduction/elimination of import tariffs, thereby opening the doors to international trade with no barriers. Goods produced in one country are becoming increasingly available in all other parts of the

world. Do you regard globalisation as a major challenge to the paper industry?

Strongly agree	Agree	Disagree	Strongly disagree
1	2	3	4

Please explain your view: _____

27. If you are in agreement with the statement in question 26, please recommend measures that can be put in place by paper manufacturers to meet this challenge.

Diversification

28. In light of the challenges (digital revolution, environmental threats and globalisation), please explain your view on whether paper manufacturers should consider diversification as an option.

ANNEXURE B**UNIVERSITY OF
KWAZULU-NATAL**

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11 DECEMBER 2006

MR. HN DHANI (882201678)
GRADUATE SCHOOL OF BUSINESS

Dear Mr. Dhani

ETHICAL CLEARANCE APPROVAL NUMBER: HSS/06850A

I wish to confirm that ethical clearance has been granted for the following project:

"A study of challenges faced by the global paper industry"

Yours faithfully


.....
MS. PHUMELELE XIMBA
RESEARCH OFFICE

cc. Faculty Office (Cheraiyn Terblanche)
→ cc. Supervisor (Mr RM Challenor)

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