Logistics Management in the Information Technology Industry

by

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submitted as partial completion of the requirements for the degree

Master in Business Management

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2001

Acknowledgements:

I would like to thank everybody that has made the writing of this dissertation possible: first and foremost to both my parents whose support and encouragement throughout my life has made me the person I am today – their unconditional love has been without equal; and also to my friend Casper for his endless patients and understanding through the many months of research and planning. Thanks also to Professor de Wit for his leadership, knowledge and insight. A special word of thanks and appreciation also goes out to my employer, where my interest and understanding for this complex industry and its processes were born and nurtured. Most importantly, I would like to thank the Lord for giving me the opportunity, ability and means to have made this dream come true.

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CHAPTER 1

THE INFORMATION TECHNOLOGY CHANNEL

1 THE INFORMATION TECHNOLOGY CHANNEL

1.1 Introduction

1.1.1 Problem statement

South African businesses seem to lag very far behind in the way companies in the first world are now managing their logistical supply chains, especially in the information technology (IT) and other related industries. The current South African business mind-frame continues to concentrate on managing and operating as much as possible of the supply chain in-house, with a fear of outsourcing even non-core business or operational functions. Either the benefits of outsourcing the logistics of non-core business activities are not known, or not understood. This leads to companies not performing at their highest productivity level even in their main areas of core competence. The huge financial and human resource benefits are also an important aspect which seems to then elude the general section of the every day South African IT company.

1.1.2 Objective of the research

The purpose of this dissertation is to research and determine the processes, trends, advantages and disadvantages of logistics management in the information technology industry. The objective behind the research which will be conducted for the purpose of the writing the dissertation, can be examined two-fold:

i. Logistics management.

   Logistical or supply chain elements, such as procurement, warehousing, assembly and distribution will be researched in later chapters. A new concept in complete turn-key supply chain or transaction management, namely *fulfilment*, will also be researched, discussed and explained.

ii. Information technology industry.

The IT industry was chosen as the area in which all research will take place. This industry and its characteristics will be discussed in the first chapter.

1.1.3 The Information technology industry

Information Technology (IT) is one of the most exciting industries currently operating on the world markets. It is new, fast-paced and continuously changing, developing and improving. Many young and dynamic companies are flourishing in IT. This dissertation will briefly discuss this industry as a whole, and then concentrate on the processes, players and future possibilities that has made this industry the success it has become.

Much research is currently being done in and around the IT industry. In its analysis of information technology spending, the *International Data Corporation* (IDC) reveals that worldwide spending on IT products and services totaled US$758 billion in 1998, which is an increase of just more than six percent over the 1997 value for end-user spending. Research from the tenth annual edition of the IDC's 'Worldwide Black Book' reveals local economic setbacks have tempered worldwide average annual IT market growth for the period 1998 to 2003 to nine and a half percent, postponing the market's achievement of the trillion-dollar milestone until the year 2002 (Stevens 2000: 1 – 2).

The IDC further estimated worldwide IT market growth to have been nine percent in 1999, and predicts that it will be even higher at the end of 2000. The stabilisation of troubled economies (such as Thailand, Brazil and some African countries), has definitely strengthened the worldwide IT market. The personal computer and server markets are rebounding, posting solid growth in 1999 and 2000, while growth in software and services markets continues to accelerate. As spending on software and services increases, these technology segments are garnering a larger proportion of the worldwide product mix.

It is clear to see how these and many other forecasts reflect a very healthy local IT demand, although it may be tempered by some global market realities. However, higher worldwide growth is anticipated for 2000 and 2001, with the mentioned compound annual growth rate of nine and a half percent predicted for the five-year period from 1998 to 2003.

1.2 The importance of the IT industry

1.2.1 The changing business environment

Business is continuously changing. On a daily basis, people and their business enterprises are exposed to news and information that challenges their current thinking patterns, and leads to new and improved ways of doing things. To keep up with the pace of change, knowledge of the market place and its latest trends, opportunities and threats are required. There is a varied selection of business software available to the South African business world, many of it relating to the new buzz-words in the industry such as e-commerce, CRM (Customer Relationship Management), ERP (Enterprise Resource Planning) and outsourcing. It is believed by many that there are two key areas that need to be considered for any business to operate effectively and profitably in the years to come: *information technology* and the *people* who use it (Pienaar 2000: 1 – 2).

1.2.2 The people factor

Business enterprises spend money upgrading their systems, introduce new concepts and more efficient methods of doing business – often without paying sufficient attention to the people whom need to use it. Pienaar adds that:

> *"Information Technology is part of our lives. It continues to spread through our society. It has changed how we communicate, conduct our business and view our lives. However, let's not forget people – who create, learn and inspire. Systems make it possible and people make it happen."*

1.3 Worldwide IT trends

1.3.1 The South African situation

According to *Ernst & Young*'s review of merger and acquisition activities in 1999, the IT sector is currently the biggest acquiring industry in South Africa. Their latest Merger & Acquisition Activity (M&AA) booklet published, shows that the IT sector accounted for acquisitions totaling R16.7 billion in 1999 (this is a total of thirteen and a half percent of all deals recorded in 1999). It is not often that one industry makes such a significant contribution to the acceleration of mergers and acquisitions within the South African economy in such a short space of time. In 1991, when the first M&AA booklet was published, the industry sector relating to IT did not even exist as a separate entity! As with most industries that are new to the market, these mergers will continue to take place, as IT companies grow in order to gain the critical mass needed for global success.

The following table contains some very interesting and revealing figures and percentages pertaining to the South African IT market:

Table 1.1 The South African IT market

Total market value in 1999:	R28.7 billion
Predicted market growth per annum 1999 to 2002:	17%
Estimated number of IT channel companies:	600
Average annual IT salary:	R207 913

Source: BMI-T IDC SA, 1999 in *The Weekly Channel* Volume 13, no. 11 04/04/2000.

1.3.2 The African continent

The state of IT in the rest of the African continent unfortunately does not look so bright. At a United Nations forum in July 2000, African nations appealed for crucial investments to ensure that the African continent is not completely bypassed by the technological revolution. Reuters (in *ITWeb* 07/07/2000) reports that President Alpha Oumar Konare of Mali explained to the United Nations Social and Economical Council (ECOSOC) conference on information technology, that money would help bridge a growing digital gap between the world's rich and poor. Unfortunately, this might be a daunting task since forty percent of African adults are illiterate. More than seventy percent of Africa is rural and there are fewer than a hundred thousand internet accounts to the more than seven hundred and fifty million people living outside of South Africa, where communications are far more developed.

African leaders generally agree that rapid changes in the global economy have magnified pressures on economies still largely rooted in subsistence agriculture, to leapfrog several stages of economic development in order to enter the knowledge economy. In the Reuters report, it is further estimated that Africans on average pay more than US$240 a month for internet connections, compared with the less than US$20 that United States internet users pay each month. It is clear that developing African countries will need specific solutions to overcome the delays and high costs of establishing these necessary communication links.

1.4 IT outsourcing

Information Technology outsourcing is back in fashion having recovered from a rather poor reputation during the 1990's, mainly due to naive service contracts and poor service delivery (Chalmers 2000: 1 – 2). Many feel that the outsourcing industry has now matured and is enjoying a renaissance, with many JSE-listed technology companies growing on the strength of massive outsourcing deals. As will be seen in later chapters, there are now sophisticated service level agreements (SLA's) in place that regulate the service providers and protect the consumer. Elaborate techniques are

also applied in order to evaluate potential suppliers and to benchmark service offerings.

In order to determine the viability and profitability of the outsourcing concept, many internal issues need to be considered, such as (Pienaar 2000: 1 – 2):

i. The company's core competency.
ii. The company's primary products.
iii. Future growth of the company.
iv. Collaboration with suppliers and clients.
v. Flexibility.
vi. Timeframes that need to be worked towards for implementation, results and changes in working processes.

1.5 Research methodology

During the research of this dissertation, the attributes of a proper business research process were followed closely:

i. The *objective* of the research is clearly described in the first chapter.
ii. The research *procedures* are explained in the fourth chapter.
iii. Thorough *planning* will be of primary importance throughout the whole research process.
iv. Any faults, shortcomings or *imperfections* of the research process were predicted and estimated. The impact such shortcomings will have on the final conclusions will also be explained.
v. All data was properly and thoroughly *analised* in order to determine its relevance, validity and importance to this study. Data was gathered by circulating questionnaires to supply chain management companies, their clients and suppliers (Questionnaires attached in Appendix). Personal interviews were also conducted with various players in the IT industry. In conjunction to this primary information, many literary sources were also studied in order to obtain relevant secondary information.

vi. *Conclusions and recommendations* will be limited to the information that will be gathered and justified by the research and will be summarised in the last chapter.

The research in this study was done by following seven basic steps, namely:

i. Identify the topic to be researched, which is: *'Logistics Management in the Information Technology industry'*.
ii. Explore and judge the situation, especially the overall South African situation, its players, markets and industries. Where the South African market was lacking in sufficient examples, the international scene was also explored and judged in terms of its validity to be implemented in the current South African situation. Primary information (questionnaires and personal interviews) as well as secondary information (textbooks, publications, scientific articles etcetera) were both utilised.
iii. The design of the research study, which was done in accordance with the prescribed methodology of a proper research proposal as explained above.
iv. Sampling and data capturing of all information gathered from research as well as from interviews with targeted players in the major IT markets.
v. Evaluation of the researched information. All data was scrutinised and reduced to a manageable quantity, whereafter it was used to develop summaries and conclusions.
vi. Writing of the dissertation.
vii. Constant analysis, interpretation and corrections.

1.6 Contents of the dissertation

This dissertation is divided into five chapters. The information included in each chapter is as follows:

Chapter 1: The first chapter contains the problem statement, the purpose of the research and a brief overview of the industry within which all research took place. It explains the importance of the IT (Information

Technology) industry as well as some of the current trends dominating the relevant markets at present. It also includes a summary of the research methodology of the dissertation.

Chapter 2: The second chapter extensively investigates one of the major trends that is occurring in the IT industry in the new millennium: the outsourcing of the supply chain. The importance of managing existing business paradigms and simultaneously evaluating current channel strategies will be discussed. Ways in which value can be added to a business' operations through outsourcing, as well as ways in which to manage this outsourcing process were researched and will be discussed.

Chapter 3: In the third chapter, the new terminology for the process of complete outsourcing, namely fulfilment, will be analysed in great detail. All relevant processes will be defined and discussed (such as procurement, warehousing, assembly, distribution, reporting etcetera).

Chapter 4: The research methodology of the dissertation is explained in detail in the fourth chapter. The properties of the research as well as the steps followed during the conducting of the research are discussed.

Chapter 5: The last chapter firstly contains conclusions which were reached after completion of the research. The characteristics of a fulfilment house, its clients and suppliers are briefly discussed. The second part of the chapter contains recommendations that has been derived from the research and conclusions.

Questionnaires that were used during various interviews are included in the Appendix at the end of the paper.

1.7 Conclusion

In the first chapter the topic and objective of the dissertation is explained. The various characteristics of the worldwide IT industry were then researched – many of these traits and trends will still be discussed in later chapters. In this dissertation the emphasis will however fall on the local South African IT industry, since it is widely believed that this is the industry which can lead to economic growth and other advantageous impacts on the country. This is why the processes discussed and explained in this dissertation, were all researched from the perspective of the South African IT industry: it is widely believed that IT may have the answers to empower the people of this country. While it is unlikely that the local IT industry will ever grow at a rate fast enough to solve all of the country's various economic problems (*e.g.* unemployment and illiteracy), it does have a vital role to play in enabling other industries to grow, which in turn will stimulate employment opportunities in these industries. According to Schofield (2000: 1):

> *"Information Technology forms the backbone of South Africa's ability to develop and grow, and earn a place in the global economy. By developing the appropriate skills to support this backbone, the IT industry will be helping to assure employment for many previously unemployed South Africans."*

CHAPTER 2

OUTSOURCING THE SUPPLY CHAIN

2 OURSOURCING THE SUPPLY CHAIN

2.1 Introduction

The last couple of years have seen a dramatic change in the way that business is done. Rapid advances in technology and increasing regulatory freedom have changed the rules of competition. Companies are now competing globally and traditional barriers between industries are breaking down. To cope with these and other changes and achieve superior performance, business leaders are moving towards new business paradigms that allow their companies to work more closely with their traditional and new business partners in order to adapt to the rapidly changing marketplace. This new collaboration can be achieved by outsourcing all non-core business activities, which in turn will lead to an improved integration through supply chain management. Supply chain leaders are reconsidering the linkages, not only between functions within their own companies, but also with other organisations up and down the supply chain.

The Information Technology (IT) industry provides a unique and compelling case for creating value through outsourcing and ultimately the total integration of supply. The industry's dramatic history of outstanding growth, its sheer pace, the magnitude of change and increasingly complex and global supply chains have created huge challenges for all participants. According to Gattorna (1999: 188), traditional channel structures and behaviours in the industry's supply chains have not kept pace with the changes. Comprehensive management which collaborates the supply chain as a whole is needed to fulfill the new demands set by players and consumers alike in the IT market of the future.

2.2 Managing existing business paradigms

2.2.1 Discontinuous business change

There is not one industry that can claim to have remained constant and unchanged over the last couple of decades. All industries have seen a change in the way things were traditionally done - these changes can mostly be contributed to the rise of

information technology. The development and constant improvements in technology (for instance mechanisation, automation, the development of the computer, cellular phones, the internet, wireless applications and many others) have had far-reaching effects in every single business sector. As it enters the new millennium, business now finds itself in a mode of *discontinuous* change. Changes are abrupt and sudden, leapfrogging ahead of predefined expectations, driven by new discoveries and the application of innovations and new technologies. Behrmann (2000: 1 – 2) defines discontinuous change as almost the opposite of change as we know it – being a 'gradual transition based on an evolution from past events'. Understanding whether this unevenly distributed revolution has arrived in a company and how much dislocation it will create, is crucial to business success.

One of the best examples of discontinuous change is the internet. There are good reasons why some industries will be turned upside down by the internet and others will not and they relate directly to the resource that the internet distributes – namely information. Where information was previously made available sequentially and then only to select groups, the internet now opens the window to massive amounts of information directly accessible by individuals. The result is an instant change in individual thinking, buying and expectation patterns throughout all business sectors, but especially in the IT industry. Rayport (2000: 10) states that:

> *'The internet may yet change everything, but the rate of change will differ wildly among industries. For some businesses the future has arrived, while for others it is still a theoretical possibility hovering on a constant horizon.'*

It is derived by many that the biggest growth and most significant change has in fact occurred in the industry that has shaped the future of all others: the IT industry.

2.2.2 Changing the mindset

It has been sufficiently concluded that the business environment of the new millennium is changing rapidly. Companies who want to keep up with the pace, or even be a step ahead of the competition, must look at new ways to better their current business operations. Only those individuals and companies who can proactively adapt

to these fluctuations and discontinuous changes will survive. It is here where each and every person can either be the most limiting or liberating factor in the organisation. Fitzgerald (in Ling: 1999: 1) states that the mark of a first rate intelligence is 'the ability to hold two opposed ideas in the mind at the same time and still retain the ability to function'. Aletha Ling, Group Chief Executive Officer of *Computer Configurations Holding*s, beliefs that everybody carries around biases and perceptions about their own abilities, opportunities and futures as well as those of their companies. Breaking out of these beliefs and being open and receptive to change, both personally and organisationally, lies within a person's own mindset.

The role that is played by these established and fixed mindsets (also referred to as paradigms or thought patterns) in a specific company, industry or business environment must not be underestimated. Although they may have some advantages, they more often than not have a negative, restraining effect on change and evolution. De Villiers (1996: 27 – 30) lists some paradigm characteristics:

i. A mindset or paradigm invariably leads to a way of thinking, a structure of reference or boundaries within which a person handles or evaluates incoming information - this concept was first discovered and described by Thomas Kuhn in 1970. There is no such thing as a completely objective person. Paradigms colour the perceptions, decisions and actions of all people, either negatively or positively influencing the ways in which they conduct business and make business decisions.

ii. Especially in a company that is well positioned, functioning profitably and performing close to optimum levels, paradigms will be set strongly and followed meticulously. Any new ideas, innovations or technologies (such as outsourcing current profitable business operations or processes) will therefore not be accepted easily.

iii. A paradigm performs the same function as a sift, selecting which of the received information is to be interpreted as well as in which way. If a conflict exists between the information received and the person's paradigm, this information will in most cases be ignored. The mind is very effective in

finding and sifting the facts that will support a particular mindset or point of view. This means that a person's mind or a company as a whole will focus on the data that it needs to support its own point of view. In all people there is an inherent resistance to change, which plays a huge part in the way data is digested or processed. It is therefore imperative to challenge the mind to find some mind-opening practices and eliminate those practices that limit breakthrough thinking.

iv. It is important to note that when a set paradigm is changed or a paradigm-shift has taken place within a leading business enterprise, it will influence all other players in the industry. When a new, improved technology or innovation is developed and implemented by one company, all other players competing in the same industry will have to follow suit. Another company that may have had a big market share before, will quickly find itself with diminishing sales and growth if it does not also adopt the new innovation in the market.

Deeply set within the collective mindset of the company is all the experience, learning and beliefs of the past. Whereas it is imperative to stimulate learning in the organisation and to capture and hold the essential intellectual property which is the company's asset, it is just as important to *unlearn* what is no longer relevant and thus stifling the ability of the company to really innovate and become a market leader. Unfortunately, bringing about mindset change is hugely difficult. Since it is a fight against a basic and ingrained behaviour or way of thinking, enormous energy will be spent in trying to prove that the person or the company has been right all along and that there is really no reason to change the mindset and adapt any new business processes.

Never before has change occurred faster nor has the effects of these changes been more far-reaching on the way we live and work and do business. In order to survive, there needs to be adaptation through change and liberation. Above all else, action is then needed to break out of the box of rigid thinking. Ling (2000c: 2) sums up the immense value that can be created by breaking through the paradigm and changing the mindset:

"It can powerfully change one's own life and success. It is the difference between mediocrity and exceptional performance at whatever level and in whatever endeavour. It is the ability to think bigger and translate that thinking into action...This is the key difference: no breakthrough results are possible without action, either personally or organisationally...Thinking out of the box is crucial but it is useless without breakthrough action..."

2.2.3 Maintaining a competitive advantage

After breaking away from the limiting paradigms of the past, the reborn company must aim at achieving and maintaining a competitive advantage over its competitors (ways in which this can be achieved will be discussed in later chapters). Every academic, author, entrepreneur and businessman holds a different view on the elements required to manage and maintain a winning company. The following four basic elements adequately sums up what needs to be done in order to maintain a sustainable competitive advantage in the discontinuously changing IT industry:

i. Knowledge.

Only knowing is not sufficient anymore. Knowledge, which can be defined as 'having the capacity for informed action', is needed to stay ahead of the pack (Szyllo 2000:1 – 2). Knowledge is an extremely powerful business tool: it can even change set paradigms in a successful company. However, knowledge is useless if it is not managed properly.

- Firstly, companies need to obtain knowledge, whether it is through primary or secondary resources or just by learning through doing (experience).
- Secondly, infrastructures then need to be created which will ensure that the knowledge obtained is retained and shared with the relevant people at the relevant time.
- Lastly and probably most important, companies need to *act* on their knowledge. They need to at all times keep track of emerging trends, new technologies, innovations and all other possible opportunities and threats in the market. The key to success is to be proactive rather than reactive. In order to maintain a winning company the relevant knowledge gained must

move employees and management alike into motion and lead to deliberate action. This ties in directly with the statements made by Ling on the importance of not just knowing, but taking action by changing the ways in which things have always been done (*i.e.* changing the business paradigm).

ii. Connectivity.

The more people or companies work together in a network, the higher the value of that network becomes. Internal connectivity as well as connectivity to the outside world must not only be good or sufficient, but must offer added value. In order to successfully manage either knowledge, change, transformation or any other organisational issue there needs to be connectivity and a positive flow of ideas. Connectivity and speed are needed to extract value from the above-mentioned knowledge.

iii. Speed.

Speed to market is vital. Getting the best product there before the competition will ensure at least an initial market dominance. Just as important is speed of communication to customers and suppliers. Most companies operate in real time and need the correct and relevant information available at the click of a button. This is one of the main advantages that outsourcing selective business processes to a third party can add to any business' operations. Outsourcing will be discussed in great detail later in this chapter.

iv. Effectiveness.

Actually doing different things instead of just doing the same things differently, is what defines success today. Companies need to differentiate themselves from their competitors by the way they do things, amongst others their ways of communication, connectivity, marketing, service levels and any other business activities.

2.2.4 Complete transformation

It often occurs that a company cannot just adapt to changes in the market by disregarding or adapting their set paradigms. More often than not a complete business

transformation is necessary to stay ahead of new technologies and innovations. This may include changing the structure, people, skills, operations, technology, procedures, philosophy or culture of the company and/or its employees. In order for this re-creation or regeneration to work, a company needs a strong strategic imperative, a plan and a capable multi-disciplinary team committed to executing change. Of primary importance is the belief of all participants that this transformation will ultimately lead to a better future. Passion, vision and insight is necessary to grasp the possibilities of where the company is heading. The point of departure is openness and trust and moving forward requires communication and motivation. Many authors view transformation management as one of the critical success factors of the new millennium (Ling 1999: 1 – 4; Szyllo 2000: 1). The challenges in managing change go far beyond the requirements of developing and managing traditional companies. In many ways it is also much more difficult than starting something from scratch. As discussed above, existing paradigms and their set structures are resistant to change. The challenge lies in maintaining both the performances of the existing structure or relevant skills while at the same time moving towards the new.

Transformation is not a single event but a series of steps in a process. In conceptualising the process of transformation it is essential that the complexity and sensitivity of the challenge be acknowledged. There exists some useful building blocks that can be used in constructing the transformation process. The programme will require strategy, marketing, technology and many other company resources. Ling (1999: 2 – 4) has identified the following building blocks in the process (includes ideas based on the Wheelwright Clarke model):

i. The first building block is the very important *research* stage. It goes without saying that not everything that needs to be known is known at the outset of a project. Information can be gained by primary research or by consulting secondary sources. As new ideas and alternatives are considered, they must be discussed completely and challenged entirely by the research team.

ii. The next building block is *piloting* the most likely of the ideas, which allows the team researching the possible transformation alternatives to assess some of

the ideas in a more practical environment. This will add more light to the way in which the transformation process is moving.

iii. In the *establishment* phase the ideas which have survived the piloting phase are applied more broadly in order to create something even more practical to work from. Although this can already be seen as the start of a definite design, dynamics of the research team and the company itself will still affect the transformation.

iv. Finally, the last building block is laid by *implementing* the best practice in a steady state. In order for the outcome to be successful, continuous assessment, communication, interaction, learning and feedback throughout the previous stages are vital.

Transformation is implemented and managed in order to change paradigms which may no longer be relevant in the present-day IT industry which is known to be undergoing rapid, involuntary and discontinuous change. Transformation management often means changing a complex system that will result in an integral reaction where one point of change will have an effect throughout the whole system. Transition through successful transformation management should be viewed as a core competence in any organisation, since being the first to implement the process of transition into the future, will be awarded with a competitive advantage, at least until the rest of the players in the market catch-up.

2.3 Evaluating the current channel strategy

After company paradigms have been evaluated and changed for the better, the company may have reached the decision that, in order to keep up with the discontinuous changes in the IT market, it needs to change its existing business strategy. One available and very viable alternative is to outsource some of its business activities to strategic partners. This will mean that company management will not only be responsible for managing their own business, but also for the chains and links with their outsource partners. This in turn will call for a channel strategy which will optimise all operations between the client company and its suppliers in the channel.

Companies must be equipped to build into each and every one of these channel decisions, an assessment of whether the transaction supports or erodes the company's strategic objectives. Strategy should be viewed as a higher-level abstract where goals must be built into and then incorporated with every day channel management decisions.

However, before any company can formulate its optimal channel management strategy, a calculated and deliberate overview of all the activities involved is needed. In an ideal world, customer demand would be smooth and growing. Demand would be perfectly predictable and therefore enable perfect planning of the supply chain. Unfortunately, this is seldom the case. Buys (2000: 1 – 4) therefore states that *demand planning* should be the first activity to receive attention as part of an optimal channel strategy.

2.3.1 Forecasting

Companies today are faced with consumers who expect global access to high-quality and reliable products. Thus, getting the right product to the right place at the right time and at the right price, is becoming more than just a competitive advantage – it is becoming a necessity for survival. This is one of the main reasons why putting together the detailed components of demand planning or forecasting is emerging as a critical factor for business success. The product of the demand plan or forecast is the anticipated sales for whatever planning period is applicable to the products or the business as a whole. Hughes, Ralf and Michels (1999: 102) state that the essence of the quick response forecasting approach is no longer about selling what you buy, but about buying what you sell.

One of the keys to excellence in demand forecasting is *collaboration* (Gattorna 1999: 131 - 133). The greater the amount of information that can be incorporated into a forecast, the more accurate it is likely to be. Gattorna explains that when different business functions each develop their own forecasts, they typically do so with different assumptions about the factors that will ultimately affect demand. A consensus process then ensures a consistent set of assumptions based on a broader base of input. In a well-functioning process, operations can have a far-reaching impact

on the accuracy of the demand forecast. Based on feedback from operations, marketing may decide to cancel a promotion scheduled for an item in short supply and rather re-direct the associated spending to items with higher inventory levels. Similarly, the sales force may be re-directed in terms of which products to push into the market. It is clear to see how the inclusion of operations in the planning process increases in importance as a business becomes more constrained by supply. While operations can then provide critical information on product supply, the primary sources of information on the actions that need to be taken to stimulate demand will always be primarily driven by the sales and marketing team of a company.

Forecasting can be a very effective business tool. Its implementation as part of the company's channel strategy offers a number of significant benefits, such as:

i. Reduced risk accompanied by an increase in certainty of demand. The more information gathered for the forecast (be it by sales and marketing or operations), the lower the risk of receiving unprepared-for orders becomes.

ii. By planning ahead and being aware of future orders, a company will be able to calculate its needed stock levels. A reduction in inventory levels, which in turn holds significant capital benefits, will be achieved by implementing the information gained through the forecast.

iii. Fewer staff will be needed to cover demand peaks. If the forecasting system is accurate, increased levels of demand can be anticipated and adequately planned for. The high amounts of money which usually needs to be spent on paying over-time salaries can then be drastically reduced.

iv. A definite improvement in the visibility of the customer or the end-user's demand can be obtained. By collaborating the research and experience of all divisions (operations, sales and marketing), a better idea can be formed of what the needs of customers will be like in future. This will lead to better planning through the use of an improved forecasting system.

v. Improved customer service will be a direct result of proper forecasting and planning, since the right product will be available at the right time in the right place.

Even with a proper forecasting system in place, a company may still at some points in time, not be able to cope with situations of exceptionally high demand. Companies who wish never to be in an out-of-stock situation or not have sufficient goods on hand to satisfy a sudden increase in demand, may well be advised to outsource some of their business processes or operations. These out-sourced business processes (such as procurement, assembly, warehousing or distribution) will receive detailed attention in the following chapter.

2.3.2 Static and strategic components

By adding static and strategic policy components to the forecast, it is then possible to build a model of how inventory should flow during a given period. The task at hand is however how to put this theory into practice. The *static* components are relatively simple to determine. They can be assigned quantitative values by answering general questions such as:

- What is the lead-time?
- How often is the order repeated (order frequency)?
- How much is ordered at a time (order quantity)?

Any decent Enterprise Resource Planning (ERP) system will be able to incorporate the above mentioned *static* components into a report. It is, however, the *strategic* policy elements influencing channel decisions that need a lot more thought and proper planning.

Forecasts, lead times, order quantities and other variables will unavoidably and inconsistently change. It is here where the concept and advantages of *safety stocks* come into play. Unfortunately, even if it is possible to provide intelligent answers to the static questions mentioned above, no ERP system will be able to translate those answers into the optimal safety stock level. According to Buys (2000: 1 – 4), in order

to optimise the supply channel, it is necessary to ensure that the least amount of inventory is held - that means just enough to maintain the targeted level of necessary inventory. It is perceived that the better supply chain management solutions will use neural programming techniques to combine the static and strategic components and then calculate the correct safety stock level to which the business must make its replenishment decisions. In later chapters, the functions, goals and advantages of keeping a safety stock will be thoroughly researched.

2.3.3 Benchmarking

In the past it was usually deemed sufficient simply to measure internal company performance. Today, most companies use various tools such as service level agreements (SLA's) and pricing models to ensure that they receive the solutions they require from their strategic partners in the supply chain. A company can, however, never be sure that these measurement tools are in fact in line with industry's best practice. The intense level of competitive activity encountered, especially in the IT market, has led to a new emphasis on measuring performance not just in *absolute* terms, but rather in terms *relative* to the competition (Christopher 1992: 80 – 84). This is where the tool of benchmarking comes into play. Christopher defines competitive benchmarking as 'the continuous measurement of the company's products, services, processes and practices against the standards of best competitors and other companies who are recognised as leaders in the particular industry'. Figure 2.1 on page 24 successfully explains the steps in the generic benchmarking process.

Although benchmarking starts with competitive analysis, it does in fact go far beyond only that. While competitive analysis focuses on product comparisons, benchmarking looks beyond products to the operating and management skills that actually produce the product.

Kunz (2000: 1 – 3) advises that the process of benchmarking should not only be used to define solutions required and measure solutions delivered based on industry's best practice, but also to provide an adjustment mechanism by highlighting company weaknesses that need to be improved. Benchmarking breaks down the paradigm of an ingrained reluctance of operations to change. Tucker, Zivan and Camp (1987: 4) have

found that people are often more receptive to new ideas and their creative adoption when those ideas did not necessarily originate in their own industry.

Other principles of importance when implementing benchmarking as a channel management tool are:

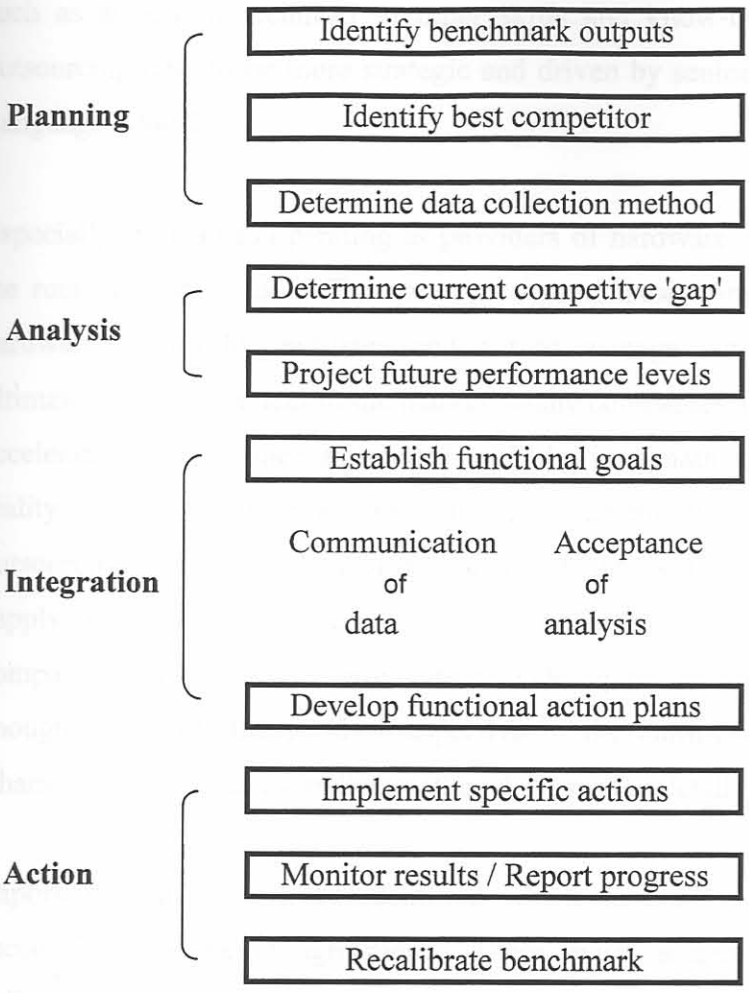
i. In order to use benchmarking as an adjustment mechanism, it is important that all factors, such as the process or activities to be benchmarked as well as the benchmarking partners are predefined as part of the outsource channel agreement.

ii. It is important to note that benchmarking against companies of a similar size in the same industry is not enough to ensure success - it is also necessary to take into account the unique situations that prevail in a particular given organisation and the industry as a whole. Benchmarking studies are free to search out the 'best of a breed' of a process or skill, wherever it may be found (Walleck 1991: 5).

iii. Benchmarking can be used as a safeguard for both customers and suppliers alike, especially in instances of substantial change to the existing outsource- or service level agreement. This means that the benchmarking tool can be used as a guideline for implementation of the change requirements.

To derive the most benefits from the benchmark tool, it is imperative that it be used in all stages of the company's dealings in the supply chain. Once the requirement versus the industry benchmark is plotted, the company can decide if it wants to outsource or rather perform the function of benchmarking internally. If used correctly, benchmarking will provide an effective and objective tool to maintain realistic standards in terms of channel aspects such as pricing and service level standards.

Figure 2.1 The generic benchmarking process



Source: Hines P. 1994. Creating world-class suppliers: 200.

2.4 Adding value through outsourcing

2.4.1 Collaborating with strategic business partners

When looking to break away from old business paradigms and move to a more streamlined and ultimately more profitable business alignment, modern companies often choose to outsource their non-core business activities. Maree (1998: 1 – 3) notes that businesses are evolving and becoming more effective in their traditional operations, often opting out of the race to produce everything in-house. Managing all business functions in-house have become so complex and expensive to maintain, that

outsourcing has become a viable option and in some cases, a sure means of gaining a competitive advantage. Previously companies would outsource for tactical reasons, such as a lack of technical or other skills and know-how. Now the reasons for outsourcing tend to be more strategic and driven by senior management (Nowicki in Language 2000:2).

Especially companies operating as providers of hardware and software are following the route of outsourcing. The core function of these companies is to either import hardware or develop software and not to manage the whole supply chain and ultimately get the product to the market. Many companies are increasingly wary of the accelerated obsolescence associated with the information technology industry. The reality of these and other corporate management challenges is what is driving outsourcing trends in the IT arena and this bodes well for IT service providers and supply chain managers. According to Kemp (2000: 1), the caveat is that the sourcing company must find service providers who clearly understand their role and are strong enough to deliver the goods irrespective of the culture of the sourcing company. Characteristics of such suppliers will be discussed in detail in the following chapter.

Important elements can be identified which should be seen as pre-requisites to successful outsourcing agreements. There exists a definite need for accelerated delivery of relevant information to management in order for them to execute timeous, cost-effective decisions. There are many ways in which information can be used, manipulated and delivered. New technologies are constantly emerging that can offer substantially improved cost-to-benefit characteristics. South African companies are only now catching-up to their worldwide counterparts in realising the importance of information as a vital company asset and a core economic enabler of the new millennium (Maree 1998: 2). In the next chapter, the ways in which this information is relayed from the service provider to the client company will be discussed in detail.

The benefits of outsourcing are endless and many authors have listed them in various works (Dash 2000: 8; Language 2000: 1 – 5; Maree 1998:1). Summed up below are some of the main advantages that can be derived from outsourcing non-core activities to strategic business partners:

i. A stable budget in the form of a negotiated fee structure can be drawn up. When, for instance, a hardware importer outsources the assembly of his end-item, he will receive a fixed quote based on quantities and lead-times, from the chosen business partner. This will allow the importer to include this variable cost into a stable budget.

ii. Service levels can be guaranteed. The company that spends more time developing the important relationships with its market – rather than performing repetitive administrative or other non-core tasks – is the one that will eventually enhance its long-term value in the eyes of the customer.

iii. Access to scarce resources and specialised skills can be obtained. A company which possesses the skills to develop software, may not possess the resources or know-how to distribute the software into the market. By outsourcing this non-core business activity, both companies can concentrate on doing what they do best.

iv. Increased flexibility to accommodate business changes and expansion. When needed, it is easier to change outsourcing partners than changing one's own internal operations.

v. Most importantly, the ability to concentrate on the business' core functions will be obtained.

However, Dittberner (2000: 1 – 2) warns that outsourcing does not guarantee success. Although outsourcing brings innovation and a fresh approach to all business activities, the need for a cultural fit must not be underestimated. The delivery capability of the service provider needs to be assessed meticulously. Companies will do well to ensure that the outsourcers they select become more than mere solution providers – they must in fact be seen as critical links in the products and services delivered to clients.

2.4.2 Outsourcing integration driven by management

Despite all the movement and changes in the industry, there still appears to be considerable confusion among many IT participants about the best ways to integrate all static and strategic elements in their supply chain. Supply chain management (SCM) is one of the latest buzzword in the IT industry and is said to be saving the industry millions of Rands. However, mechanical principles dictate that any chain is only as strong as its weakest link. In many cases, significant value is being overlooked or simply not being captured. Many supply chain participants are still focused mainly on products and markets (and other *static* elements), meanwhile neglecting aggressive management of the supply chain itself as a strategic source of added value. Others are limiting their integration efforts to quick, tactical solutions, rather than launching more far-reaching strategic initiatives.

2.4.2.1 Management capabilities

A company cannot manage its way in or out of a changing environment, but needs to lead it through innovations and the development of new technologies. However, Behrmann (2000: 1 – 2) offers a note of caution to companies that wish to implement tools which will help them in managing discontinuous change: a sure recipe for failure is hiring only IT specialists to facilitate the adaptation. The process must be business-driven and not technology-driven. Technology on its own does not create wealth or growth or a new mindset, but rather the intelligent use of technology applied to business objectives. Business leadership must thus drive the process and only then allow the technologists to get on with the job of making it work.

According to Useem, professor in management at the University of Pennsylvania (in Kunz 2000: 1 – 2), the new outsource manager will require at least four important capabilities:

i. Strategic thinking to determine what to outsource and how to add competitive advantage to the business through the outsource deal. As outsourcing develops and changes, both the customer and the supplier or service provider's management will need the skills to facilitate new trends such as risk and

reward programmes, contract interpretation and implementation as well as the constant strategic realignment of the service and the contract.

ii. The ability to continually negotiate the right deal for the company while ensuring that the deal is in line with internal requirements. The management team needs the necessary experience, leadership skills and theoretical exposure to outsourcing in order to be aware of internal needs and requirements as well as external availabilities.

iii. Partnership governing is essential to ensure the outsourcing deal works for both the outsourcer and his partners. These days, leading companies are outsourcing for strategic reasons and not simply as a 'quick fix'. This means that the customer's management must be fully informed and the supplier's strategy understood. On the other hand, the supplier's management structure must in turn understand the customer's strategy in order to be able to interpret it correctly. This will cause both the management teams of the partners in the relationship to work together towards achieving the same goals and objectives.

iv. Management will need change management skills not only to counter employee resistance but also to continuously align the outsource transaction to the business requirements. Initially, business paradigms may have to be changed to allow the acceptance of the outsourcing agreement by management and employees alike.

2.4.2.2 Key success factors

The reality of corporate management challenges is what should be driving supply chain and outsourcing trends in the IT industry (Kemp 2000: 1 – 2) and this bodes well for IT service providers. The caveat is that the sourcing company must find service providers who clearly understand their role and are strong enough to meet all demands. Much has been documented recently about the opportunity of new supply chain execution technologies to provide noticeable cost- and time-savings. Most of these technologies are targeted at reducing the cost of transactions and/or improving the visibility of supply chain transactions and costs. Inventory Carrying Cost (ICC) is

the most obvious tangible goal of a project. (ICC is defined as cost of capital plus variable costs such as shrinkage, damage and obsolescence.) On the other hand, there exists less tangible, but far more strategic project objectives, of which the influence can be just as great. A good example of an intangible goal is service level improvement, in the form of maintaining gross profit by improving customer loyalty. The problem at hand is that it is very difficult to separate the strategic from the tactical (or static) in supply chain optimisation. Many experts believe that failed projects often have their root cause in management's inability to dynamically link strategy and execution (Buys 2000: 1 – 3).

Webb (1999: 1 – 3) lists some key factors which should receive attention in the management of the outsource relationship:

i. Time must be taken to ensure due diligence is performed between the parties. This must include open and honest declarations regarding expectations, goals, targets, costs and service parameters.

ii. The outsourcing company and its chosen supplier or service provider must ensure that their needs and capabilities are matched. Suppliers of goods and services vary widely in their competencies. Care must be taken that the service offering fits the requirements.

iii. Risks need to be determined early on. Some service providers will procure and warehouse their client's components at their own risk. This means that, according to the outsource agreement, they will ensure that sufficient quantities of their clients' stock are available at all times. In order to maintain safety stock levels, they will manufacture or procure components even before an order is placed. Especially with the high rate of obsolescence in the IT industry, this can lead to a situation where large amounts of capital will have to be written-off when components are upgraded or replaced.

iv. Some measure of control needs to be maintained, especially if the service provider is not manufacturing all components in-house, but employing additional sub-contractors to fulfill the outsourcing company's orders.

v. Confidentiality must be a pre-requisite to the signing of any outsourcing agreement. Many companies operating as supply chain or logistic managers in the IT channel have clients which are competitors (for instance different internet service providers such as *MWeb*, *UUNET*, *WorldOnline*, *AfricaOnline* and *IAfrica*). The intellectual property of each needs to be guarded and protected unconditionally.

The concept of SCM should thus extend an organisation's value chain forward to its clients' clients as well as backwards to its suppliers' suppliers (Theron 2000: 1). By linking to these value chains and planning in conjunction and within the context of the supply chain, inventories and work in progress can be driven down, lead times can be optimised and the entire supply chain can be made more responsive to changes in demand or supply. As mentioned before, any chain can only be as strong as its weakest link. If the operations of one or more companies in the chain are not executed properly, it will negatively influence the entire supply chain. The onus therefore lies with management to ensure that the chain has no weak links. Managers need to execute the optimised supply chain plan, manage deviations and make decisions in real time. It can be concluded that the goal of any company operating in a supply chain, must be to achieve negative working capital (i.e. sell and get paid before you pay), together with adhering to service levels that exceed customer expectations.

2.5 Supply chain management

2.5.1 Collaborating the supply chain

2.5.1.1 Present channel inefficiencies

Before examining the best ways in which to manage a company's supply chain, it is advisable to first be aware of the problems that currently characterise the channel. Three major inefficiencies discovered through extensive research are:

i. Poor integration.

Unlike industries such as food service, consumer packaged goods, automobiles and apparel, the IT industry has not yet matured to very high levels of integration in its supply chain. Inefficiencies are emerging that are preventing potential channel growth. Supply chain inefficiencies in particular, have led to chronically delayed new products, demand distortions, scarcity and allocation problems, inventory obsolescence risks and unpredictable service levels.

ii. Insufficient channel relationships.

With the current turbulent pace of change, participants in the IT industry are under increasing pressure to identify and exploit new value sources and then add this value to the channel. Relationships among supply chain participants (being the component supplier, the assembler, the distributor and finally the retailer) are currently insufficient to provide the necessary solutions to many of the problems relating to integration mentioned above.

iii. Rapid and uncontrolled technological growth.

The pressures and tension among IT supply chain participants stem from several sources, most of them by-products of rapid growth which is being fuelled by the current advances in technology. Moreover, consumers are increasingly demanding products with unique configurations, which has resulted in proliferated product offerings. Competitors have become increasingly able to emulate one another within ever-shorter time frames. The result of these trends has been a rapid decline in average selling prices and profit margins. Pedroncelli (2000: 2) confirms these statements by adding that the South African IT industry is now entering a slightly more mature phase, and that one of the effects of this is that margins are dropping as competition in the channel becomes cut-throat. Bigger customers are aggregating their buying power and are putting pressure on vendors to deal with them directly.

To assess ways in which to improve integration and collaboration of the industry's supply chain, *Andersen Consulting* (now known as *Accenture*), in conjunction with two universities in the USA (Stanford and Northwestern) initiated a study of the

worldwide IT industry as a whole (in Gattorna 1999: 188 – 207). The research team undertook a mail survey of more than two hundred companies, site visits to leading companies and secondary research on supply chain performance and financial analysis – providing a comprehensive picture of each segment in the industry. The goal was to understand how companies were integrating supply chains, to identify opportunities for improving performance and value creation, and to define critical factors for successful implementation. Through the research work, it was concluded that the problems discussed above are very real in the global IT industry as a whole. The problems and inefficiencies identified by the international research, were discovered to be just as real and present in the South African IT industry.

2.5.1.2 Possible success factors

In order to deal with rapid technological, commercial and even social change, organisations are being forced to rethink their current business development strategies. Radical adjustments in focus, positioning, product or service development and relational links with trading partners are required to keep the business on course and meet the ever-greater demands of customers. Hughes, Ralf and Michels (1999: 210) have identified a number of critical success factors that will all, to a greater or lesser extent, influence the way in which IT companies eliminate present channel inefficiencies:

i. Top management involvement.

Top management needs to give direction and be actively involved in orchestrating the overall change program. As discussed above, it is management that needs to drive the move towards outsourcing and supply chain management.

ii. Setting goals and strategies.

Management needs to develop strategic purpose by setting explicit goals and priorities across all business activities, as well as in dealings with suppliers across the supply chain. An appropriate strategy needs to be determined that will balance the need for business development led by change, together with narrower operational process design.

iii. Critical success areas.

It is necessary to define mission critical areas such as market management, redesign of supply chains, supplier responsiveness, product development and strategic target costing. Cross-functional and cross-supply chain integration of effort and expertise is then necessary to address these various target areas.

iv. Segmentation.

The various supply chains and supply processes must be segmented and then resources must be allocated accordingly.

v. Continuous change management.

The required change management capabilities, such as project management and process measurement, must be strengthened in order for change to occur. This is especially important in companies with deeply ingrained traditional paradigms.

Extensive attention and activity related to improving supply chain integration is becoming a top management priority. The market seems to have realised the immense value that can be added to their own internal business operations by being an active channel member and working closely together with partners, suppliers and outsourced service providers. *BMI-TechKnowledge Group (BMI-T)* is Africa's leading supplier of market intelligence and knowledge-based consulting in the areas of IT, telecommunications and the internet. In a recent article released on the ITWeb (Moller 2000: 1 – 2), *BMI-T* confirmed these inroads made by players in the IT market. Substantial collaboration and integration, both current and planned, is starting to develop among software developers, hardware suppliers, assemblers, distributors and retailers alike.

2.5.2 Supply chain integration

Synchronised supply chain planning is no longer a future promise – it is a reality, if not a pre-requisite, for competitive performance (Hunter 2000: 1). Rapid technological change, ever-shorter product lifecycles and increased supply chain complexity in the IT industry have all compounded the challenge of matching supply

to demand. The industry's changing supply chain structure has created further challenges for supply chain value enrichment. Until the mid-1980's, leading IT companies performed the majority of activities in the chain in-house. During the 1990's however, the industry started to evolve into a networked structure, where many independent companies joined forces to bring a product to the market. A critically under-utilised key to lean inventories and increased market agility is the degree to which supply chain partners collaborate in planning and executing the combination of tasks that bring a product from raw materials to market. According to Harris (2000: 5) the industry is definitely following a consolidating trend, with the market controlled by a shrinking number of players.

In practical terms, even though IT products have short lifecycles, these products tend to have *similar lifecycle trends* over the period from introduction and adoption, to tail-end sales and ultimately very low sales after the announcement of the product's replacement (Buys 2000a: 2 – 3). Software products often tend to replace prior products and in essence are sold or upgraded into the same customer base as the superseding product or version. This lifecycle inheritance implies invaluable corporate experience and knowledge: it almost guarantees consistency, which massively reduces the workload of product managers when new products are introduced into the market.

Linkages among the participants in a company's supply chain are a key dimension of the organisation's overall supply chain strategy. The foundation of a supply chain integration strategy can be formed by answering questions relating to the degree to which the firm should integrate across its supply chain, as well as looking at the alternative types of supply chain integration that are required. Gattorna (1999: 28 – 32) has calculated that supply chain integration can fundamentally be divided into four different forms – information, decision, financial and operational integration:

i. Information integration enables firms across the supply chain to share useful information. It is vitally important that companies working together in a chain are aware of what the other is doing regarding any new developments, technologies, innovations, marketing campaigns or any other issues that might

influence the relationship between the parties, as well as external relationships with the market.

ii. Decision integration supports the planning and control functions of management across multiple organisations within the supply chain. Once again, this confirms the need for working together and being transparent in the relationship. Continuous communication will be necessary to achieve decision integration in the channel.

iii. Financial integration changes the terms and conditions of payment across the supply chain. A manufacturer may agree to warehouse goods for a specified period of time and then only demand payment from his client when he actually delivers the goods to the reseller. Some manufacturers only demand payment at the time its products are sold *by* a retailer rather than demand payment at the time the goods are sold *to* the retailer.

iv. Operational integration encompasses the sharing of physical and human assets between participants within a supply chain. A manufacturer may provide warehouse space to one or more of its suppliers for the purpose of producing components for the assembly line. Beyond the savings in the fixed costs of warehouse space and equipment, such arrangements enable both parties to respond more quickly to production changes and to reduce overall cycle times and costs.

As an example, the power of aligning supply chain strategy with a company's business strategy can be seen in the success of three major US companies that recently incorporated this approach into their business strategy. *Wal-Mart*, *Coca-Cola* and *Dell Computer* have all easily outperformed their competitors in terms of shareholder value growth over the second half of the last decade. According to comparisons in the Stern Stewart EVA 1000 Database (in Gattorna 1999: 20), *Dell Computer's* growth exceeded its industry average by more than three thousand percent. The management activities pertaining to an integrated supply chain will be discussed in detail in the next chapter, since it is here where the role of the modern-day *fulfilment house* comes into play. The IT industry has barely scratched the surface in exploiting the available

opportunities and technologies for this type of integration. Close collaboration among supply chain partners will lead to a better alignment and thus enhance the value of the network's combined activities.

2.5.3 Intelligent supply chains

According to Gordon Edwards, Chief Executive Officer of *Logical South Africa*, there will be an increased collaboration between customers, business partners and suppliers in the new digital economy. This trend will lead to the creation of an *intelligent supply chain* that represents both a series of electronic linkages as well as links through e-trading with other virtual supply chain partners.

The idea of an intelligent supply chain is echoed by Dave Morley, sales director of *GE Information Services* (in Edwards 1999: 1 – 2): "The speed of global internet adoption, which took only four years to reach fifty million users, as opposed to radio which took thirty-eight years to reach the same number of users, mirrors the speed with which technology and business is changing around us."

If a company's supply chain is optimised through efficient management, then the needs of customers will be successfully met. This success is however due as much to the supply chain as it is to the company. According to Morley, the degree to which decision-makers buy into the process of collaboration in the supply chain will determine the holistic success of supply chains and e-trading in the new global economy.

Jonathan Thornhill is the national marketing manager at *Bowline*, a South African company operating in the IT supply chain management industry. Thornhill (in Gillingham 2000:17) says that SCM will achieve substantial growth by offering cutting-edge technology and world-class service. Clients of channel management companies are demanding solutions that will add value to their businesses. This can be achieved through a combination of cost-effective and efficient integrated management solutions that are geared to meeting all global operational and logistical requirements.

2.6. Fulfilment

Chiu (1995: 4) from the National Taiwan Institute of Technology in the Republic of China, explains how the heightened intensity of competition is drastically changing the way companies operate their business systems. These changes include the application of the integrated logistics management concept to the analysis and design of their supply chains.

Fulfilment is a new trend in the world of supply chain management. Where in the past, companies were satisfied to outsource merely some of their non-core business operations (*e.g.* warehousing, assembly or physical distribution), fulfilment implies that all the businesses' operational functions are outsourced and handled by only one company - these companies are called fulfilment houses. Fulfilment is a total turn-key solution, where all aspects concerning the management of a new product (from processing artwork and masters of concept products, up to the delivery of the final end-product into the retail channel) is outsourced to one company, the chosen fulfilment house.

Fulfilment thus implies a totally outsourced supply chain. Generally, it is made up out of the following six actions:

- Processing the new product concept (receiving and evaluating the initial masters and artwork).
- Manufacturing or procuring components on behalf of the client, from a variety of resources and suppliers.
- Physical assembly of the new end-item.
- Warehousing of the components or finished goods.
- Physical distribution back to the client, or to the client's client (be it resellers or directly to the end-user).
- Feedback and control initiatives, generated by reports from the Management Information System (MIS).

Fulfilment is as much of a mindset as a reality. It is open thinking about geographies, people, information, markets, cultures and businesses. It is the exploitation of

worldwide markets by large and small businesses, literally anywhere in the world. It is increasingly about the seamless integration of the virtual networks of businesses and collaborators. While not disregarding the need for efficiency, a sometimes contradictory objective, namely flexibility, must also receive attention in the strategic processes performed by the fulfilment house and all other partners in the chain.

The ultimate goal of any fulfilment house is to offer a *total database management solution* to its client. This will mean that the client hands its whole database over to the fulfilment house, for it to manage the whole supply chain operation from beginning to end. Needless to say, a great deal of trust is necessary before this is done (trust in the capabilities of the fulfilment house management, as well as in their information and security systems). The fulfilment house needs to research the various ways in which it will be able to add value and offer a total solution to a potential client's business. Armed with knowledge and a tailor-made turn-key business solution, the fulfilment house can present itself to a new client in order for them to build a long-term, mutually beneficial outsource relationship.

2.7. Summary

In order to remain a competitive player in the IT market, companies may need to change their set ways and existing paradigms by relinquishing control and outsourcing some of their business operations to strategic partners. It will then become necessary to transform their management teams in order to include the effective management of the total supply chain. It is widely believed that business strategies invariably fail as a result not of their design but of their execution and management. In order to be successful, a strong need for external orientation towards outsourcing and the management of the supply chain as a whole need to exist. Hughes *et al* (1999: 209) have identified a wide array of initiatives that need to be pursued in order to achieve the benefits derived from a responsive outsourcing supply chain management operation:

- Identify and simplify key supply chain processes.
- Eliminate waste and non-value adding operations.
- Rationalise and consolidate the external supply base.

- Minimise stock holding and reduce inventory.
- Shift the emphasis from push and supply to pull and demand.
- Streamline warehousing and distribution.
- Strengthen the information technology infrastructure to facilitate the flows of stock data and sales.
- Reduce lead times.
- Develop capabilities and train the supply base.

Optimising any one of these sub-processes is however most unlikely to make a significant contribution to overall business performance. Equally, addressing only individual activities within a single process, such as sourcing, forecasting or benchmarking, will also have little impact. In order to be successful, transforming responsiveness needs an integrated and holistic approach.

CHAPTER 3

A THEORETICAL BREAKDOWN OF FULFILMENT

3 A THEORETICAL BREAKDOWN OF FULFILMENT

3.1 Introduction

Many companies outsource some of their non-core business activities, be it their warehousing requirements, the assembly process, physical distribution or any other function, often to different companies that specialise exclusively in one of these activities. It is here where fulfilment houses are uniquely differentiating themselves from the competition: fulfilment houses offer a one-stop shop. It is known as a cradle-to-grave approach, since they take over the whole process of delivering the product into the market, over and above its initial development. Much of this value that can be added, is expressed in shared performance based on an educated perception and an intuitive understanding and recognition of the emerging value patterns connected to total outsourcing. There are some common denominators among the players who are performing and delivering this sustainable value, and these will be discussed in detail in the last chapter. This chapter will introduce the concept of complete outsourcing by comprehensively studying, describing and evaluating the six fulfilment steps briefly mentioned in the previous chapter.

3.2 Creating a new product

3.2.1 Design of the new product

The most important factor to understand when trying to define the word *product*, is being able to appreciate what it is not. A new product is not just its physical characteristics, attributes, or ingredients. A product has a much more complex meaning, which can be understood by referring to the product *concept*.

3.2.1.1 Reasons for the development of new product concepts

The improved political situation in the 'new' South Africa brought with it international acceptance and the potential for increased international trade. As these barriers are lifted, so too is there an increase of entrants into our local markets. New and improved product concepts are fast becoming essential for the survival and long-

term growth of any company. As product life cycles continue to shorten for computer software and hardware products, the manufacturers of these items are focusing their resources on their core business and are outsourcing all non-strategic, non-core activities. According to the management of the international multi-million dollar fulfilment company *Modus Media*, the main benefit of outsourcing is that it enables the manufacturer to focus on its core business and improve its time-to-market (*www.modusmedia.com*).

When a new product concept is introduced, initial market awareness might be minimal and market acceptance might be slow. All efforts must be geared toward stimulating primary demand (demand for the product itself). The introduction stage is the period of initial success or failure for new products. The product will begin to make rapid sales gains as the rate of market acceptance accelerates. It will become easier to obtain distributors, but competition will also increase as imitators introduce their versions of the product to the market (Monroe 1990: 273). Eventually the rate of market acceptance will then decrease as the number of potential new customers diminishes.

Tying in with this statement, there are many other reasons why new product development is so vitally important to any company. Hisrich & Peters (1991: 7 - 9), listed the following:

i. Growth stimulation.

Probably the most important reason for developing new products is to stimulate growth. Growth or increased market share is regarded by many as the ultimate goal of the organisation, since growth may ultimately reflect higher profitability and cash flow. The South African Reconstruction and Development Programme (RDP), as well as the economic empowerment of the informal sector, are both aimed at developing and supporting economic growth in previously under-developed or disadvantaged areas in South Africa. For those organisations embracing a competitive logistics strategy geared toward achieving improved results through growth, technology is found to be a key enabler in achieving the required levels of internal and external integration.

ii. Response to competitors.

Often new products are developed in response to competition, since companies need to react to the innovator in the market place. Product lines need to be extended to protect the competitive position, and achieve a sustainable competitive advantage. Companies 'bundling' their products with others, is a new trend fast catching on in the South African Information Technology market place.

A good example of bundling is the South African ISP (Internet Service Provider) *MWeb*, who made the strategic decision to bundle their software with the compatible goods of another suitable market player. They chose *MMW* (Multimedia Warehouse), who imports hardware (such as modems, cables, adapters and lightning protector units) as well as other components needed to install and connect to the internet. The two companies, working together with a fulfilment partner who brings all the components together as a final end-item, are now selling much more of their combined stock, known as the 'Big Black Boxes' to the public, than would have been the case if they were each selling their components separately.

iii. Excess capacity.

The development of new products is also sometimes stimulated by excess capacity. Machinery, warehouse space and labour all require certain fixed expenses regardless of whether they are utilized fifty or one hundred percent of the time. To enhance effectiveness, new products are developed to productively utilise this existing excess capacity.

iv. Lower demand.

In competitive markets, when resources become scarce, competition intensifies or demand drops, companies must find alternative means to support this inevitable downturn in business. More often than not, these companies then *outsource* some or all of their business segments to a strategic partner or fulfilment house, which will then take over the operational processes from the struggling client company.

In a combined study by Andersen Consulting and the University of Pretoria (Franz, Cilliers and Andrews 1994: 16), this appearance is supported by the following statement:

> *'Logistics in South Africa has, until recently, not been treated as a source of value creation or as a competitive advantage. Due to increased competition both locally and abroad, and the erosion of traditional product related sources of competitive advantage, a new source of competitive advantage will have to be found. Integrated logistics management offers huge potential as a new source of competitive advantage through cost reduction and improved customer service.'*

v. Changes in consumer needs.

When consumer preferences change, which happens with sometimes alarming regularity in the information technology market, companies must seek and develop new or alternative products or concepts to fulfill this demand. These rapidly changing customer requirements are driving suppliers to differentiate between their product and those of others, based mostly on quality and other value adding features.

Consumers often 'trade up' as their needs change, and this stimulates the sale of other items. In the information technology market, the development of the personal computer has enhanced sales of larger systems. Manufacturers of small computer systems, such as *Siltek* (manufacturing *Xylo* computers), *Mustek* (manufacturing the South African top-seller *Mecer*), and *Pinnacle* (manufacturing the *Proline* computer brand), are now also developing larger systems to integrate with the smaller computers in a data communication network.

Delivering large quantities of customised products require superior levels of flexibility. This in turn requires a comprehensive view of the supply chain with differentiation and customisation being added as late as possible to retain the benefits of economies of scale throughout the major portion of the logistics

pipeline. Franz *et al* (1994: 22 - 23) accentuates the fact that adding value will be the source of differentiation, which in many cases, will not be achieved from the core-product, but from an extended product or service offering.

vi. New technologies.

In the beginning of 2000, Microsoft introduced BIOS-Locking technology. This new requirement stipulates that all Microsoft OEM customers (Original Equipment Manufacturers), will receive BIOS-locked recovery media instead of the generic Operating Systems (OS) disk. Edge Bisset, former IT specialist at *Bowline Fulfilment*, explains that a BIOS-locked disk is a CD that has been created in such a way that it will only work on a certain machine, or range of machines. This means that a BIOS-locked recovery CD from a *Mecer* machine will not work on a *Xylo, Acer* or *Pinnacle* system. This new requirement has opened a gap in the information technology market. While some fulfilment houses may see it as a threat to their current business operations, it can open the door for countless new opportunities and new business development.

vii. New innovations.

Many new innovations may be designed to reduce the cost of an existing product. In this new millenium, technology is evolving at an ever-increasing pace. A good example can be seen in the way computers have been redeveloped and bettered over and over again, to reduce them from the huge operating systems they once were, to the much smaller, user-friendly personal computers, notebooks and laptops being used today.

viii. New potential.

The innovativeness and creativity of managers or even other employees in a company can never be overlooked as an important stimulus to new product development. Most companies have some kind of new business development division, whose sole responsibility is to identify or create new potential, find new business and expand current operations.

3.2.1.2 Product components

Business analysts are using the term product *concept* to define the total meaning of all a product's attributes or characteristics. A product concept consists of three product *components* which will be discussed in detail.

Figure 3.1 Product components

Source: Hisrich RD & Peters MP. 1991. Marketing decisions for new and mature products: 6.

i. The core component.

This element is what many refer to as the 'product', being the physical product or its functional features. For a computer, the core component might be its

operating system, speed, ease of use, or memory capacity. These characteristics or attributes relate directly to the physical product and/or its functional features.

ii. The packaging component.

Since many products are so similar, differences are perceived based on the company's ability to reflect some other diversifying qualities in its product. This usually entails having a different or unique packaging component, which consists of factors such as price, perceived quality, the package itself, the brand name, or the overall image of the product.

iii. The support services component.

This component is also used to reflect various differences in the product. Lifetime guarantees of workmanship, on-time delivery, quality repair and free installation are some of the support services that are important in reflecting the meaning of a whole product or end-item.

Understanding these factors is important when a company decides to develop and design a new product, manage a mature product, or reposition an existing product. If, for instance, a company wants to introduce a new multi-media game into the market, the first step will be to develop the physical concept. A compact disk or CD-master of the game has to be developed, as well as all other information-material, such as user guides or manuals that has to be written and their content finalised. All artwork (e.g. for the CD itself, the CD inlays or booklets, manuals and outer carton design), then needs to be created by an artist.

Fulfilment houses usually only assist their clients during these above-mentioned processes by providing ideas, samples or information on prescribed specifications, such as:

i. The best materials to be used for the product itself, as well as in the packaging. Goods transported over long distances need to be re-inforced to protect them from damage caused by handling and freight. Fulfilment houses can also advise on ink and print types.

ii. The format in which information (such as for the compact disk master and all artwork) needs to be supplied in. Some suppliers can only print from hard copies, others need diskettes, compact disks, positives or some other digital format to produce the final replicated item.

iii. Because of their extensive knowledge, fulfilment houses can also provide information and specifications on sizing of components, like the size of CD labels and jewelcases, or the dye on which artwork for outer cartons must be designed.

3.2.2 Creating the Bill Of Material

3.2.2.1 Assigning part numbers to components

After the new product concept has been designed, all the single components that will be making up this end-item, must be determined. Individual part numbers need to be assigned to each separate component. These unique part numbers are necessary in order for each individual item of inventory to be identified in the Management Information System (MIS) that is in use. According to De Villiers (1988: 38), some elements to take into consideration when assigning these part numbers, are:

i. Expandability of categories, which means that as many components as needed, must be able to be added to the number sequence. This means that categories must be flexible so that an almost unlimited amount of new items can be added.

ii. The ability to sort components into required categories, which necessitates an almost unlimited range of not only individual items, but also of categories.

iii. The minimum number of characters (alphabetic or numeric) required by the MIS must be taken into account, since some information systems require at least one alphabetical and one numerical digit in order to register a new component code or part number.

iv. Convenience in use will always be important. This will help to reduce human error by making components more easily identifiable. Pickers and workers in the assembly lines can more easily and correctly 'pick' or choose the correct component if its part number offers an indication of what the specific component is that must be used to 'build' the specific end-item.

If any changes are made to an item (*e.g.* changing some wording or the packaging or the colour, or adding a sticker etcetera), it must immediately be regarded as a completely new item and therefor the part number already assigned, must be changed (or a new one created). In other words, any modification of an item that makes it somehow different from others of the same type, requires that the different item be identified by assigning a separate identifier or part number. All items, including raw materials, sub-assemblies, finished goods (end-items) and spare parts must have individual, identifiable part numbers. It is important to note that the assignment of sub-assembly identities are determined by the way in which the product is being manufactured or assembled on the production line, and not by the design of the product (De Villiers 1988:50 - 59). This means that, if a number of components are assembled at a workstation, and then forwarded as a complete task to be used in further assemblies, this sub-assembly will need its own unique part number.

3.2.2.2 An indented Bill Of Material dissected

The multi-level or indented Bill Of Material (BOM) system is used in order to give a listing of all components in the product structure. Sub-assemblies are differentiated by offsetting or indenting either the part number or the description or both. The different levels (or sequences) are also identified by a number, which may or may not be indented.

Some or all of the following information are displayed in an indented BOM:

i. Location.

The location where the component is housed, is especially important when the fulfilment house owns and operates from more than one warehouse. Different

locations are also created to separate components housed in raw materials, from completed end-items in customer stock or finished goods.

ii. Quantities in stock.

The quantity on hand of each component is refelcted on the BOM. This is especially important to the procurement team who has to re-order goods when quantities are insufficient to complete orders.

iii. Quantities on order.

The quantity of the component that is currently on order, if any, is displayed. This gives an indication to the specific account manager working on the client's account, whether or not new buying orders on components have actually been placed, as well as what the relevant quantities are. In order to benefit from economies of scale, buying orders may be placed for bigger quantities than what is needed to fulfill a single current order. Apart from the cost-effectiveness achieved, ordering more than what is necessary will also lead to a safety stock being built up.

No fulfilment house willingly runs out of stock. The result is not only lost sales, but also customer dissatisfaction together with the administrative cost of raising and eventually delivering the balance of the customer's order. A small reduction in stockholding can produce a disproportionate reduction in the level of service. The reverse is also true, meaning that there is no point in stocking up on components to meet a hypothetically possible order of several times normal demand levels. However, most fulfilment houses alleviate this potential problem by only procuring or manufacturing on order. It is interesting to note that there is usually a relationship between mean order size, the standard deviation of the distribution of the orders around this mean, and safety stock levels (Fawcett, McLeish & Ogden 1992: 73 - 74).

iv. Quantities allocated.

Quantity of the component allocated, to this end-item as well as to all other products on the production schedule, is also displayed on the BOM. If an account manager sees that there is a quantity of, for instance 200 units in the

warehouse, with another 300 already on order, and he needs only 400 units to complete a specific order, this does not automatically mean that he will have sufficient components on hand for his order. Some of these same components may already be assigned to be used in other end-items using the same generic component.

v. Quantities for this order.
Quantity of the component to be used in this specific end-item, which is usually one, but may be two or more, for instance when two or more of the same stickers, labels or logo's are used to complete one end-item.

vi. Reference designators.
References are usually added to components, to indicate and relay important information or instructions regarding the specific item, to be followed when assembling the end-item.

Page 54 contains a table which is an example of an Indented BOM created for a fictitious multi-media study guide, consisting of 8 components with 1 sub-assembly. The client is *Genius* and the name of the product or end-item is *'Easy Study'*. The order is for three thousand units. A combined alpha-numeric system is used to assign part numbers.

Discussion on sample BOM:

I. Firstly the end-item (the complete product or finished good) is assigned a parent-item number, usually easily identifiable and consisting of a combination of alpha-numerics. In this case, the parent-item code is *EASY-1000*. Follow-on products or new versions can then be allocated the part numbers *EASY-2000*, *EASY-3000* etcetera.

ii. A sequence number is automatically assigned to the components. These numbers are usually a power series with the same exponent, in this example 10, 20, 30 etcetera. Each sub-assembly is regarded as a separate item on its

Table 3.1 Sample indented Bill Of Material

Parent-item: EASY-1000

EASY STUDY FULL PACK

SEQ.	PART NO.	DESCRIPTION	QTY ON HAND QTY ALLOCATED	QTY PER PARENT QTY ON ORDER
10	GENIUS-1000	GENIUS GENERIC	7800	1
		OUTER CARTON	3000	0
10	EASY-100	EASY STUDY	6000	2
		VERSION 1 STICKER	6000	0
		Ref: apply to outer carton and registration card		
20	GENIUS-2000	GENIUS GENERIC	1500	1
		REGISTRATION CARD	3000	5000
30	EASY-200	EASY STUDY MANUAL	3000	1
			3000	0
				0
40	EASY-300	EASY STUDY CD SET	0	1
			3000	3000
10	EASY-301	EASY STUDY CD ONLY	0	1
			3000	3000
20	EASY-302	EASY STUDY INLAY SET	0	1
			3000	3000
50	SHRINK-606	SHRINKWRAP	9675	1
			3000	0

Source: Own research.

own, and is therefore also assigned the same values, i.e. 10 and 20. The sub-assembly is identifiable because of its indentation.

iii. Codes (part numbers) are assigned to each component. Characteristics of these numbers were discussed above. Components used exclusively in the *'Easy Study'* end-item, will be named as such for easy identification. Generic *Genius* products (such as the outer carton and sticker), are named to be identified as generic *Genius* components.

iv. A short description of the component is then given, to help reduce human error by making the component more easily identifiable and the BOM more easily readable.

v. Quantities on hand for each component are displayed. If there are not enough units available to fulfill the total order (three thousand units in this case), more will have to be procured. Where components will be used again for future orders, more than what is needed at the moment may be procured in order to benefit from economies of scale and to build up a safety stock.

vi. The quantity of each component allocated, is the sum of the quantity needed to fulfill this order, added to the quantity of these items to be used for each other order using this same component. This quantity will always be at least three thousand (since that is the order quantity in this example), unless where less than one unit is to be used in each finished product.

vii. Quantity per parent means the number of times a specific component will be used to create the finished product or parent item. Note that 0.1 shippers (boxes or containers) are to be used per parent. This means that one shipper will be used for ten end-items, or in other words, ten end-items will be packed into one shipper.

viii. The quantity on order simply means the quantity that has already been ordered by the procurement department on that specific component.

ix. As mentioned above, reference designators can be added to relay important information to all users of the BOM, especially the production team working in the assembly lines. In this example, the reference: 'apply to outer carton and registration card' has been added to the *Genius* generic sticker component.

3.2.2.3 Aspects related to the use of a Bill Of Material system

a) The company's database.

According to Plossl (1983: 94), the primary intent of using a BOM is to facilitate planning and control activities. When a BOM is entered on the MIS database, all parties involved will immediately be able to see the structure of the new product. Procurement will know the type and quantity to order on each component, the production team will be able to plan ahead and reserve space on their assembly line for building the new product, and the despatch department will know to reserve delivery space and time for the consignment to be shipped.

It is thus clear to see the importance of entering correct information on the new item to be built in order to keep the fulfilment house's MIS database one hundred percent correct and up to date. Dr. Gordon C. Everest of the University of Minnesota offers the following definition:

> *"A database management system (DBMS) is any computer-based system that will define, create, retrieve, update, revise and maintain the integrity of the system."*

Simply put, a DBMS is a software package that assists the user in the managing of the computerised database. CODASYL (Conference on Data Systems Languages) is a voluntary group of people supported by their respective organisations, who are interested in the development of database techniques and languages. The essential objectives of a BDMS, as derived from the CODASYL, are to:

i. Provide instant access to all transactions related to the Management Information System (MIS). This feature is especially important when different

people are working on the same system, receiving and issuing components, reporting work in progress, or generating sales orders and invoices. When a stock status history report is printed, it should accurately reflect all past transactions relating to the specified item.

ii. Eliminate redundancy by structuring data suitable for all applications. Stock or systems becoming obsolete and that has to be written off, will inadvertently lead to capital losses.

iii. Allow multiple concurrent updatings and retrievals, once again important when more than one person is working on the same system network.

iv. Provide a system that offers revolutionary growth by the possible addition of data and programmes. As mentioned before, especially in the IT industry new products are created or changed and improved all the time. The database must be able to cope with the addition of new component- or end-item part numbers.

v. Provide a description of the database entries not tied to any particular processing language (alpha-numeric codes).

vi. Reduce application programme maintenance and provide on-line maintenance of databases. In the fast-paced IT world, system hold-ups can lead to huge losses. It is unacceptable that stock is held up in a warehouse (or in any other part of the supply chain), because orders can not be inputted on a broken-down or off-line system.

vii. Provide protection against unauthorized use and invasion of privacy of specified files. The programme usually prompts for a password in order to allow only authorised personnel access to the system.

Murdick (1980: 488 - 491) explains how an organised collection of all records in a MIS forms the database. A record is kept of all inventory. Records on each end-item

include all components and sub-assemblies of the finished product, as well as all the part-numbers, descriptions, quantities and costs of all stock.

Unlike records in a file-orientated data processing system, the logical relationship among records in a database is not formed by programmes or programmers. Rather, records in a database are related to one another in an exceedingly complex fashion in advance of their creation. It is like a giant map showing all record types in the database together with the name of the record (the part-number and description) and the fields it contains (*e.g.* quantities and costs of components and end-items).

The actual input/output operations in a database system are far too complex for any single individual to comprehend, let alone control. This leads to another fundamental constituent of a database management system: the Data Management Programme (DMP). The DMP will control all access to and from the database. Typically this programme is the nucleus of a database system and is provided by the computer manufacturer or a vendor of computer software.

b) Database solutions.

The South African company *Idion Technology Holdings* is a developer, importer and vendor of such inventory or database system programmes. According to Corné Arnold, Group Marketing Director of the company, *Idion* shares achieved the overall best performance in 1999 on the JSE (Johannesburg Stock Exchange). In February 2000, they acquired one hundred percent of US-based *Vision Solutions* for $62.5 million (R394 million), which will drastically improve their global presence. *Idion* CEO, Nicolaas Vlok (in Kausch 2000: 1), expects the company to derive seventy-five percent of its income in the next year from international operations.

Idion specialises in the development and implementation of applications for specific business needs. They have a wide array of database solution packages available, two of them being:

- *Mercury/RMA* which is designed to assist operations personnel with performance and capacity management.

- *CATSe Resource Manager*, which is designed to bridge the gap between management and technical support. It significantly reduces the manpower, time and costs of conducting performance and capacity audits, whilst improving the reliability and accuracy of results.

It is easy to see how these solutions can add value to the operations of any business. They form part of the organisation's MIS and MRP (Material Resource Planning) system.

c) Advantages of using the Bill Of Material system.

When planning the development and production of a new product while using the MRP system, the BOM has a primary role in initiating the procurement process. It will entail getting material ordered at the proper time so that it will be available when needed to produce a parent- or end-item.

Other advantages of implementing the use of a BOM and the accompanying component codes (part numbers) in the MRP system, include (Small 1987: 14 – 15; Jessop *et al* 1994: 25 - 31):

i. The code system avoids the repeated use of long descriptive titles.

ii. Bills Of Material are accurate, and therefore they are used exclusively to portray the content of an end-item. This is why they are used by the assembly team in the warehouse to assemble or 'build' the correct end-item. Codes assist standardisation and the reduction of varieties.

iii. All users work from the same set of numbers and descriptions, making it easier for all parties involved to communicate and differentiate between components. This eliminates misunderstandings, discrepancies and inaccuracies to a great extent. Codes accurately identify all items.

iv. Making use of the BOM-system ensures that the customer receives the product exactly as he ordered it, since most fulfilment houses demand that the client

signs off all final BOM's before components are procured or assembly can start.

3.3 Component procurement

When procuring components needed to produce an end-item, there are three possibilities available to the fulfilment house:

- Total buying situation.
  Buy the finished product (usually to then be used as a sub-assembly), from an external source/supplier.

- Buy-and-manufacture situation.
  Only procure certain components or materials from an external source, then manufacture some in-house, and do final assembly within the fulfilment house's warehouse.

- Total manufacturing situation.
  Manufacture the total finished product or end-item in-house.

3.3.1 In-house manufacturing

This option is only available to the fulfilment house when they have the necessary facilities and equipment available to produce or manufacture goods. Usually fulfilment houses do not see this as their core business, and will therefore only manufacture a limited range of components in-house (such as CD-R replicating or the printing of stickers and labels). This will also only be done when small volumes of components need to be manufactured, which means that outsourcing to strategic suppliers are not economically viable.

3.3.2 Procuring components from strategic partners

The buying of the best product at the best price is one of the main functions performed by the fulfilment house on behalf of its clients. Lately, this purchasing

effort has introduced more responsibility for the IT buyer than ever before, especially as technology becomes more entwined in a company's overall business strategy. Over time, fulfilment house buyers have experienced their role in IT purchasing becoming more important as their companies come to rely more on technology to achieve their strategic business objectives (Avery 1999: 50).

The use of technology will become a great competitive tool in the new millenium – many fulfilment houses are already using the internet to communicate with suppliers or to buy raw-materials or components on behalf of their clients on-line. The most obvious costs incurred from buying include paying the cost price of the component, the transport costs, receiving and inspection costs, as well as paying for insurance. Even though electronic procurement is a great cost cutter, the cost of this type of purchasing does not have a high level of visibility in many corporations. Jarvis (in Berry 2000:1) explains that, as a result, the price a company pays for said goods and services quite often grows insidiously within the enterprise, ultimately claiming a significant portion of operational costs.

The newly formed company *e.com Institute* is helping companies use internet technologies to transform their supply chain and procurement procedures and then use it to their strategic advantage. Automation and web-enablement of the procurement process provides an opportunity to increase productivity and reduce costs. Many new ventures, such as *e.com Institute,* can automate the entire procure-to-pay cycle, from product selection and catalogue management to receiving and final settlement. This closed-loop approach, with immediate interactive business controls, allows the fulfilment house to take information from every corner of the enterprise, view it real-time, and proactively take action through the system itself.

Important aspects when procuring components, as seen from the fulfilment house's point of view (Hisrich *et al* 1991: 7 – 9; Hugo & Van Rooyen 1991: 3 – 9; Jessop & Morrison 1994: 9 – 10; Hines 1994: 271 – 288), include the following:

i. Rather procure components (instead of manufacturing) when the necessary facilities to manufacture are not available in-house, and money can be invested more productively somewhere else. Fulfilment houses are not manufacturers.

They must rather concentrate their efforts on their core business, which is offering a complete supply chain *management* solution to their clients.

ii. Usually firms in other business sectors, such as specialised manufacturers, will go to great lengths to produce all goods in-house, and only buy those components for which the demand is low and only temporary. Since fulfilment houses are not manufacturers, they follow the complete opposite policy. They outsource buying, and will procure all components if possible. Only when the prices offered by the suppliers of these goods are too high because of very small volumes, the fulfilment house may consider producing it in-house.

iii. Fulfilment houses must procure when suppliers can manufacture at a better price (usually because of the learning curve effect and manufacturing through economies of scale), than what the fulfilment house can do it for themselves in-house.

iv. When making use of third parties to provide the necessary raw materials or components needed to manufacture the clients end-item, it might be wise to order more than what is needed to fulfil the current order. This safety stock (also referred to as buffer stock) is maintained to prevent an excessive number of stock-outs. Marginal analysis is generally used to determine the optimum level of safety stock to be kept (Johnson 1996: 321 – 322). This mathematical calculation involves the calculation of the relationship between the number of units in the safety stock, their total value and their carrying costs. Costs derived from stock-outs must also be calculated and then taken into account when procuring.

v. Sometimes patent- or copy rights exist, which prohibits own manufacturing. This automatically leads to a forced buying situation.

The amount of components used in end-items that were not manufactured in-house, but bought from a strategic partner (supplier) is much higher than what most uninformed people think. In Hines (1994: 133), Mitsubishi Motors (MMC) stated that:

"We depend on the outside firms which cooperate with us, for items which comprise about 70 percent of the cost of a vehicle."

Most of the parts making up a Japanese motor car are in fact not even made in Japan. Likewise, the American computer a lot of people think they own, is actually made up out of components manufactured and produced from all over the world.

3.4 Assembly

3.4.1 Building the new product in a warehouse

In order for the warehouse staff to receive components into the warehouse, the company's inventory management system must conform to some basic requirements. Because the functions performed by a fulfilment house are so diverse, a very specialised MIS needs to be in place to effectively manage the goods of all their diverse clients.

When components are procured, they are immediately assigned unique part numbers. These goods are then received and booked into the fulfilment house's warehouse. After a production order has been captured on the material MIS, goods can be issued to the assembly team in order for them to start 'building' the finished product.

Picking is the term used to describe the process of extracting goods from the bins and racks in a warehouse to collect all the items required to satisfy any particular issue note (generated by a production order on the MIS) or any other demand (Jessop *et al* 1994: 84). There are two main ways of doing this: (1) the storekeepers together with their appropriate issuing staff are in charge of particular sections of the warehouse and will collect only the components which are housed in their particular section of the warehouse, or (2) by the method of travelling picking, where one storekeeper is responsible for collecting all the items appearing on the issue document wherever they may be located in the warehouse.

The product is then physically assembled or 'built' by a picking line (or 'working cell') in a warehouse, always according to the predetermined Bill Of Material, and

using the manufactured/procured components. The process can also include serialising and bar-coding. Worker cells are assigned to individual jobs, with each worker being responsible for a specific task, such as inserting components into an outer carton, sticking on labels or shrink-wrapping the final end-item.

3.4.2 Just-In-Time manufacturing

Manufacturing or assembling only on demand is especially important in the competitive IT market. Technologies change and are improved constantly - these improvements are made to products faster than ever before. If a product is not introduced into the market as quickly as possible, the technology used may already be obsolete by the time it reaches the retail shelves.

This is where the well-known JIT (Just-In-Time) philosophy comes into play. JIT is the concept of meticulously planned logistics and distribution operations, which helps reduce stocks, lead times and therefore, costs (Fawcett *et al* 1992: 82 - 84). With the increased pressure on supply chain management for greater efficiency, it is crucial that materials, components and end-items are at exactly the right place at exactly the right time.

JIT creates a *pull* mechanism in the supply systems, whereby goods are drawn through the chain by demand and orders for products, rather than being pushed through to form work-in-progress or safety stock. The main prerequisites for its implementation are short, dependable lead times and high levels of quality (Hugo *et al* 1991: 58 – 61; Johnson *et al* 1996: 69 – 73, 173, 327 – 328). These ingredients remove the need for stockholding for reasons of unpredictable demand, interrupted or delayed supply and poor quality.

IT systems which entrench JIT manufacturing disciplines will help all South African industries weather the onslaughts of a slow economy, low customer spending and cheaper imports. At the same time, IT will also help to open doors globally. The industry needs to operate smarter and leaner, and must be flexible to meet customer demands (Clague 2000: 1 – 2). This can only happen with the support of IT systems that have been developed to meet all customer requirements. When IT is implemented

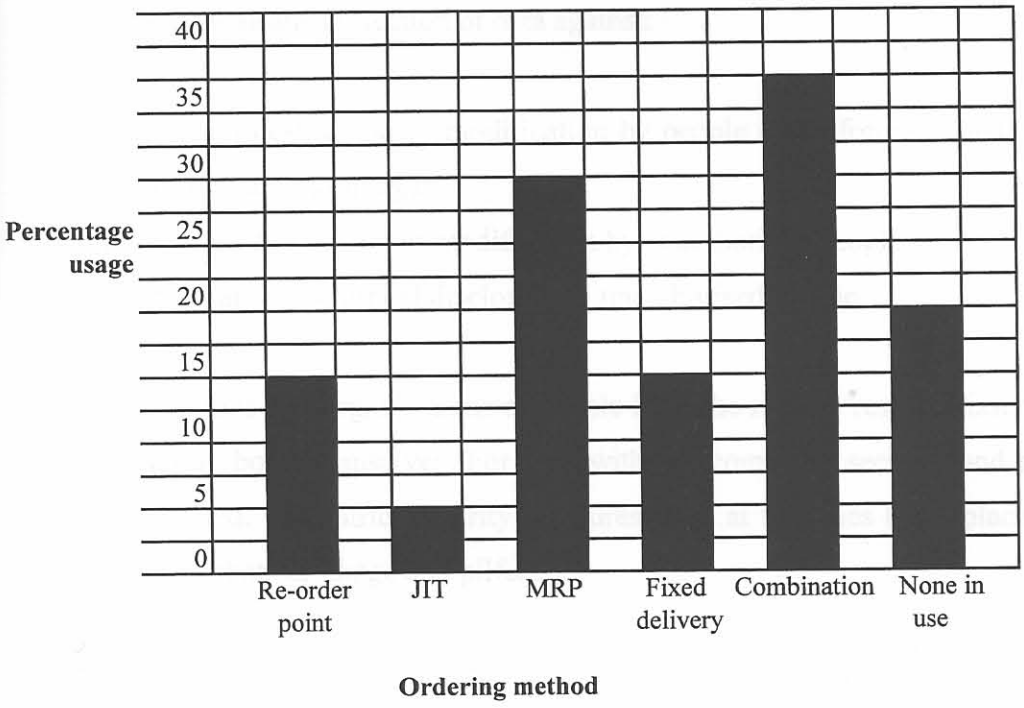
to facilitate the JIT operation, the whole communication chain will become far more dynamic and reliable. Some players in the IT market have had their fingers burnt because they have tried to adapt generalised manufacturing systems to their needs, rather than opting for a specialised system. The key concerns are manufacturing and delivering on-time to customers' specifications with tightly defined cost criteria. One of the main causes of loss to a fulfilment house is late delivery to the customer, since goods are then returned or sometimes not even received. It is thus imperative that goods be assembled and despatched on time – Clague believes that this can only be achieved if management at all levels in the fulfilment house have accurate information on which to base their dynamic just-in-time decisions.

It is important to note that JIT can not be applied to every single product being assembled, particularly where the demand is seasonal. It is however still used in many areas of procuring or purchasing raw materials or components, as well as in general inventory management and distribution. Refer to figure 3.2 on page 62 for a percentage breakdown of the most common ordering methods used in South Africa.

The basic principle of JIT is to have goods delivered exactly where and when required, literally just in time to make the next move along the supply chain, whether it be for production and assembly, or for distribution. This can only be achieved by detailed forward planning and extensive use of information systems. It is not merely a particular method of distribution, but a total logistics concept which, if conscientiously implemented throughout a supply chain, means drastically reduced inventory and costs as well as an improvement in levels of service. The application of the JIT principle to the IT industry has definitely brought along these afore-mentioned considerable benefits. All fulfilment houses need to recognise that JIT is an extremely useful business technique, and should use it accordingly, in order to improve their value-added service offering to their clients.

JIT is, however, by no means the only ordering method used in South Africa. The following figure shows the ordering method most commonly used is MRP (Materials Resource Planning), while the JIT-system is used only about five percent of the time.

Figure 3.2 Ordering methods and their percentage usage



Source: Franz P, Cilliers W & Andrews D. 1994. Logistics Excellence in South Africa: 44.

3.4.3 Quality control and protection of intellectual property

Having absolute control over the quality of all goods that leave the warehouse to be delivered into the market, already started with the fulfilment house's strategic choice of suitable suppliers. Components of exceptional quality are needed to deliver finished products of the same exceptional, uncompromisable quality. In the competitive IT industry, nothing than absolutely the best is good enough. Products are of high monetary and intellectual value, with a high standard of technological advancement. They are expected to perform perfectly every time.

Tying in closely with the principle of ensuring and adhering to high quality standards, is the principle of protecting intellectual property. Fulfilment houses often have competitors as clients (*e.g.* ISP's like *MWeb*, *UUNET*, *IAfrica*, *World-Online*

etcetera.) The fulfilment house should be able to guarantee each and every one of its clients that the technological and intellectual content of their products are safe.

Data security means protection of data against:

- Accidental destruction or modification by people or by forces of nature (such as flood, fire and lightning).
- Intentional destruction or modification by unauthorised people.
- Accidental or intentional disclosure to unauthorised people.

Privacy implies that organisations or people have the right to restrict dissemination of information about themselves. For data within a company, security and privacy are closely related. Very strict security measures must at all times be in place to protect data and combat shrinkage and pilferage.

Microsoft SA reported that during February and March 2000, calls coming into the company's customer care and call centers from individuals and companies wishing to find out if their software is legal, increased by forty percent (Reynolds 2000a: 1 – 2). This statement was made by Mark Reynolds, manager in charge of Microsoft SA's anti-piracy and legislation drive. He adds that, judging by the content of the recent distress calls, people and companies are starting to become more aware about piracy – and the fact that, in the final analysis, it amounts to criminal conduct. Often, piracy is a result of not keeping proper track of software usage and then falling behind on the licensing agreement and its payments. Companies should view their software as assets and carefully track and record its usage.

Mr. Reynolds further stressed that there was an 'obvious and flagrant disregard' for the copyright laws of the land, and that concrete steps would be taken to 'expediently resolve matters'. The reason for this harsh action is obvious: 'Although the provisional figures provided by the Business Software Alliance reveal that software piracy in South Africa has decreased from forty-nine percent to forty-seven percent during 1999, there is still a long, long way to go. At 1998 software piracy levels, the cost to the economy was put at more than R550 million.'

In an attempt to further clamp-down against software piracy, Microsoft has recently hand-delivered warning letters to a number of as yet unnamed flea market stalls in the Johannesburg and East Rand area (Reynolds 2000: 1). All of these stalls were allegedly selling counterfeit Microsoft games as well as computer games from other software vendors.

3.5 Warehousing

3.5.1 Materials handling

At the interface between procured/manufactured raw materials and components, and their distribution as finished goods or end-items, there must invariably be some kind of handling operation and, in many cases, a storage facility. The handling operation was discussed previously (assembling components into finished goods) - this handling operation or assembly process usually occurs in the warehouse owned by the fulfilment house.

The extent to which assembly and warehousing occurs is determined by the relationship between raw material sources (suppliers), production or assembly units, as well as the quantity, geographic spread, concentration and specific requirements of the fulfilment house's clients. If it was a case of merely handling supplied components from the supplier's vehicle straight through the assembly process, or from the assembly line straight to the distribution vehicle for final delivery, then only a need for handling operations would exist in the scope of services managed by the fulfilment house. However, as a continuous flow of goods along the supply chain, without resorting to any kind of storage option, is still a target to be achieved, then some kind of storage or warehousing option will remain as part of many logistics and distribution operations, and a service offered by the modern-day fulfilment house.

Distribution resource planning (DRP) is an inventory method helpful in determining inventory requirements in warehouses. Whereas materials requirement planning (MRP) deals with production inputs, DRP involves finished products (Johnson *et al* 1996: 345 – 346). The key to DRP is centralised order processing by the fulfilment house, especially when the fulfilment house owns or operates more than one

warehouse. The receiving of raw materials and components at regional warehouses or distribution depots, can easily result in an unbalanced inventory of these components or even finished goods throughout the firm's regional warehouses. With DRP all client orders are processed at one location, and then the end-items or finished products are sent to the appropriate warehouse in order to de delivered to fulfil the order, as well as to replenish the inventory that was just sent out on the client order. The result is that all stock is then balanced throughout the warehouse system. The central inventory planner, in conjunction with the procurement department, can then ensure that, if shortages do occur, they can be evenly spread among warehouses, so that no client needs to accept complete stock-outs while others are receiving almost all of their requested shipments.

The whole process of materials handling can be seen as being dependent on some interrelated and dependent functions, three of them being packaging, unitisation and the handling of goods (Fawcett 1992: 94).

a) Packaging.

This function is vital to the most effective materials handling processes, and the need for it depends on the basic state of the item to be handled (being raw materials, components, sub-assemblies or end-items). Packaging performs many functions (Jessop *et al* 1994: 286 – 287; Johnson *et al* 1996: 147 – 155), such as:

i. Containment of the item, which should ensure that the finished product reaches the client and ultimately the end-user in a convenient form and quantity. Goods need to be enclosed, both to protect them and protect other items from them. Protection of the goods is an important aspect in meeting high customer demand expectations as far as product quality and condition are concerned. Especially in goods of a technical nature, or containing a great amount of specialised intellectual capital, total protection of its quality should be the ultimate goal of the fulfilment house. Goods must be tamper-proof to the extent that evidence of tampering can be noticed.

ii. Another way in which packaging can be seen as a function of the materials handling system, is through the provision of information to the end-user, but also to all those involved in handling the product along the supply chain. Packaging provides necessary basic information on the product, such as item, model, size, colour, and instructions for use (some of which may be legal requirements).

iii. Packaging can also be a forceful marketing tool to promote and strengthen brand identity. Although boxes or containers are thought primarily to be protective in nature, they may also contain features with a strong sales orientation. Some retailers build displays using these outer cartons to create the impression that they have made an extra-large purchase of a certain item – presumably at a lower price per unit that is being passed on to the consumer (Johnson & Wood 1996: 148). A good example is the tall towers of MWeb's internet starter kits (Big Black Boxes), often seen in the entrances or in some other visually conspicuous area of the shop (such as at Incredible Connection, Game, Makro and other retailers of computer software). In such instances it would be appropriate to display some advertising (such as added value, reduced price or exceptional quality) on the outside of the outer carton.

However, from the fulfilment house's logistics and distribution point of view, the main purpose of packaging will remain that of protection and identification of the packaged product. Quick, clear identification during goods receiving, picking, assembly and despatch operations are essential to generate the required degree of cost-effectiveness and customer satisfaction in terms of order correctness, and minimisation of errors. The usefulness of this function is also evident when it comes to cycle count- and stocktaking procedures.

b) Unitisation.

The formation of multiple packages into a single standardised uniform load for handling and storage purposes has become one of the cornerstones of effective materials handling and distribution systems. Ruxton and Oxley (in Fawcett 1992: 99) describe unitisation as 'an assembly of individual items or packages, usually

of a like kind, to enable convenient composite movement'. Unitisation usually also helps to create maximum use of storage space. Most fulfilment houses make use of wooden pallets to reap the benefits of unitisation and space utilisation. Universal use of the wooden pallet has been achieved as a result of its versatility. They are fairly cheap in terms of individual unit cost, although a fulfilment house which has for instance forty thousand pallets in circulation at a replacement cost of approximately R33 each, has some R1 320 000 tied up in these handling units alone. This has led to the view held by all market players that pallets are no longer thought of as free. Transport companies doing collections and deliveries are required to return the same number of pallets to the fulfilment house, or will otherwise be billed separately for the unreturned pallets.

A new trend in materials handling might be the introduction of plastic pallets made from recycled plastic containers (Johnson *et al* 1996: 162). The plastic pallet will have no nails that might protrude to injure handlers, damage cargo or scratch floors and pallet racks in the warehouse. The problem at the moment seems to be in the development of a sturdy plastic pallet that will weigh less than twenty-five kilograms (being a weight that can be manually handled), but still strong enough to carry loads of great weight.

c) Mechanised and automated handling systems.

It is necessary to have suitable equipment for the easier handling of unit-loads and faster movement of packages along the supply chain. The term 'mechanised and automated handling systems' therefore include not only the various types of industrial trucks which are designed for the handling and movement of unit-loads, but also conveyor- and crane systems for high-level storage, retrieval and order-picking. In most fulfilment warehouses, the total operation comprises a standard sequence of activities – being the discharge of delivery vehicles and receiving of the goods, the putting away of these raw materials or components in storage locations, and then their eventual retrieval (picking) for assembly purposes. It is for these operations that a wide range of mechanical handling equipment has been developed, ranging from pallet or lift-and-reach trucks, to forklifts and the afore-mentioned crane systems.

In some technologically advanced warehouses, these handling systems have been completely automated, making use of very advanced communications technology (Fawcett *et al* 1992: 108). Minicomputer terminals are set up on forklifts in order to speed up the process of information transfer during storage, retrieval and order-picking operations. These activities are becoming virtually paperless, thanks to direct communication between materials handling equipment and the warehouse's computerised stock-control system or MIS. The mini-terminals relay instructions and confirm task completion, while digital readings in order-picking cranes tell the operator which location or storage bin to move to for the next pick or put-away.

A new trend in warehousing is automated storage and retrieval systems (ASRS), which consist of computer-controlled handling equipment in what are often unmanned storage areas. These ASRS systems are as of yet not widely in use in South Africa, mostly because of implementing and capital costs running well into the millions of Rands, as well as the need for very high levels of productivity. In the future, well-established fulfilment houses may look to implement this materials handling system in their warehouses, in order to improve their own operations and ultimately offer a better and faster service to their clients.

With the combination of engineering and computer technology, advanced materials handling has become an essential part of both the modern warehousing scene, and the most effective, integrated supply chain fulfilment operations. It is important to note that these high levels of sophistication in the handling system can often carry with them a high degree of risk, therefore careful research and analysis at the planning stages are essential.

3.5.2 Managing a warehouse

A large warehouse can easily swallow a hundred men, so that it appears to be empty. This appearance is also obvious to the workers, who spend much of their time alone or in small groups. Organisation is a tool of management, and represents the way in which people are grouped to do work. Supervision of staff in a large warehouse presents a problem because of the scattering of groups over fairly large areas and their

separation by racks, machinery, and piles of goods. Also, work-force motivation is difficult because of the repetitiveness of the process.

In a fulfilment house, the management of the warehouse is an exacting task, where in fact, management is doing work through people. It is often stated that the essence of management is communication. Communication must exist in an organisation between teams, between members of the teams, as well as with other organisations which touch upon, or interact with their own organisation.

These teams often tend to take on the nature of the manager - they work according to the atmosphere created by the manager. The late Douglas McGregor, Professor of Industrial Management at the Massachusetts Institute of Technology (in Burton 1979: 241), put forward the view that the work force reacts to the assumptions of management in a subtle and frequently unconscious way. The traditional assumption that workers are lazy and prefer to do nothing, has a lot to do with this then frequently being the apparent situation. On the other hand, as stated by Kroon (1993: 351 - 360), when management hold a very different assumption, that all people wish to use and develop their potential and seek satisfaction for their abilities in achievement at work, it can be demonstrated that this then becomes the case.

With the maturing of the labour management function, supervisors in a warehouse must become pro-active, moving from their current work mode of responding to exceptions, to the alignment of their activities to support the fulfilment house's strategic goals and business philosophy. The maturing role of supervisors is supported by the advent of software that easily incorporates labour rules and interfaces with operational systems such as enterprise resource planning (ERP) solutions (Matthysen 2000: 1). The management of large labour forces, with the attendant paperwork, often results in the wasteful application of skilled supervisory resources. Critical to time- and knowledge management in a fulfilment warehouse, is giving supervisors access to real-time information and Management Information Systems (MIS), allowing time to focus on the setting of priorities, the making of critical choices and assessing the material impact of their decisions.

Matthysen (2000: 2) has identified how the combination of the automation of clerical supervisory functions, together with the delivery of information, can reduce the time spent on administrative activities, and give supervisors the information needed to plan and organise the warehouse operations. This can be done by applying the following five principles:

i. Consistent application of business rules throughout the entire fulfilment house.
Applying this principle will ensure that every employee, being a manager, a supervisor or a warehouse worker, clearly understands what is expected of them. Ultimately, when all employees are treated equally, they will automatically conform to the same working standards and adhere to the same set of business rules and principles.

ii. Systematic push mechanisms.
These should be in place to alert supervisors to exception identification. When orders are 'pushed' through the warehouse, they acquire immediate attention. If they are not dealt with as soon as possible, and finished on time, the next order will come pushing from behind – leading to a build-up of work to be done.

iii. Collection of activity information.
By performing this activity, the objective assessment of productivity can be achieved. Supervisors, or any person in a management position over-seeing workers, need accurate information to be able to assess the productivity of the workforce. Ideally, a performance and capacity management software solution (like the *Idion* Mercury/RMA system discussed earlier) must be implemented to assist operations personnel with performance and capacity management.

iv. Scheduling applications.
This will allow the optimal use of the workforce while still adhering to company standards and legislation. When emergency orders are received that need to be expedited through the channel, additional workers can be contracted to help the fulfilment house keep its delivery-promises.

v. System interfaces.

Interfaces with other systems facilitating a two-way exchange of information, feeding business processes such as billing and extracting activity and workload information from operational sources, is a necessary tool when combining above-mentioned functions in an organisation.

3.5.3 People issues

i. Responsibility.

Responsibility given generates a responsible attitude (Burton 1979: 237 – 244; Kroon 1993; 283 – 284). Therefore, every individual in the warehouse must be given a definite functional responsibility and, where possible, also a geographic responsibility, such as a series of racks or bins, or a specific area such as receiving, assembly or despatch.

ii. Environment.

Research has shown that orderly, clean and neat warehouses lead to a higher rate of productivity (Johnson *et al* 1996: 380). Workers are more positive, show a sense of pride and are harder working in a 'friendly' environment. Sanitation can also be related to employee safety and morale and indirectly to the quality of the products handled.

iii. Education.

Courses for training should be run periodically. These can be linked to background training already received, and successful completion of such courses can then in turn be linked to pay rate increases and promotions.

3.5.4 Designing a functional warehouse

Jenkins (1990: 158) has identified and formulated a six step plan to prepare the *functional layout* of a warehouse. These steps will briefly be discussed in order to provide some background information on the preliminary design and layout of a warehouse.

Step 1: Determine parameters.

Firstly it needs to be decided what will and will not be included in the warehouse set-up, as well as what kind of warehouse needs to be designed (be it a Private-, Contract- or Plant warehouse, or some other kind of distribution center). An evaluation must be done on what the existing space and equipment are.

Step 2: Establish all objectives.

While establishing the project's parameters, the objectives may become evident. This is because *what* is to be studied (within the parameters) is inseparable from *why* (the objectives). Some objectives may be to:

- provide minimum-cost warehousing even though sacrificing service,
- provide minimum-cost warehousing while maintaining the established level of service,
- provide better (quantified) service than competition regardless of cost or
- provide competitive (quantified) service at the lowest possible cost.

Step 3: Gather relevant information.

This needs to be done in order to determine how best to conform to these above-mentioned directives. As with any complex problem, the solution becomes easier in direct relationship to the amount of relevant information that is available.

Step 4: Analyse information.

As in any research, do not ignore any of the gathered information. Either decide that it is irrelevant, or assign it a quantitative value.

Step 5: Implement the layout plan.

No project is complete once the best plan has been devised, even when it is in blueprint or a miniature model form. Implementation is the next crucial step. The effective, efficient and most orderly way in which to implement the warehouse layout is to start with an empty building that has all the storage racks and other fixtures installed and the floors and ceilings properly lined. Then as the inventories arrive, they are put away according to the pre-

established plan. In future, no outbound shipments should be made until inventories and paperwork systems are in place and ready to go. The amount of work involved can still be substantial. Just how much depends on how much hand sorting and stacking is required, and how many units and quantities will be involved in the assembly process.

Step 6: Review the initial plan.

This is the time to look back at the whole plan, and how well it has been implemented. Reconcile any differences. Issue citations to jobs well done.

Information gathered during the above-mentioned Step 3, will include many facets. The physical lay-out of the warehouse needs to be in line with the major functions it will be performing. Johnson et al (1996: 363 - 365) identified some of the trade-offs that will need to be made:

i. Space devoted to aisles versus space devoted to racks.

As aisle space increases, storage capacity decreases. This means that aisles must demand equal engineering attention as storage areas, and both have to be planned together to arrive at a functionally efficient warehouse.

Probably the single most important element affecting aisles is the handling equipment employed. Johnson (1996: 364) calculated that a typical order picker spends 60 percent of his time in a warehouse moving from location to location, and this is why a worthy objective of a layout design should be to lose the least space possible, in order to minimise travelling distances and time. This is why narrow-aisle lift trucks, side loaders, 180-degree turret lifts, deep-reach forks and stacker cranes were developed – mainly to minimise space consumed in aisles.

Another important consideration regarding aisles is that both sides of the aisle must offer access to stored goods. A warehouse should never be designed with an aisle running along the side of a wall. Also, a single row of pallet racks with aisles on both sides of the rack, should never be used. Racks should be back-to-back so that aisles permit access to storage on both sides.

ii. Horizontal versus vertical high-rise layout.

This trade-off arises between building costs which decline on a cubic-foot basis as one builds higher, and warehouse equipment costs which will necessarily increase. Building height translates to storage height. Height is even more important than width and depth in determining total storage capacity. Changing this dimension, if needs be, also has the least effect on building costs for the same increase in capacity.

In the past, high storage was not always possible to implement because equipment manufacturers did not provide for reaching higher. The high rise hoists necessary to perform this function, have only been developed fairly recently, but is already in use in all major fulfilment warehouses.

iii. Productive production flows.

Finished goods that are shipped most often and in the greatest volume, must be stored in the most efficient area for material handling. According to Jenkins (1990: 176) this simple notion can reduce the warehouse worker's material handling and travel time by up to 50 percent.

Conventional warehouses usually have the receiving dock on one end and the shipping or despatch dock on the other, with straight, clear racks and aisles running orderly from the one end to the other. This is a much more efficient and time-saving set-up than the old irregular 'maze-system' still utilized in some of the older warehouse set-ups.

A new trend is to implement a diagonal storage system. Racks are laid out diagonally rather than at right angles to the aisle. This concept is not uncommon, as can be seen by the way diagonal parking bays are laid out in some city streets and parking lots. This is done to reduce the needed width of the street or the total amount of space for a given number of parking spaces. The same reasoning applies to diagonal storage in a warehouse. There might be some space lost with this pattern against walls and the ends of aisles, but this loss can be reduced by storing in these triangular voids things of less depth and width than the standard unitized loads.

Taking all of the above-mentioned elements into account, it can be concluded that the single storey warehouse construction is more productive and economically viable to be used as a fulfilment house warehouse. Jessop *et al* (1994: 194 - 199) have listed the following six reasons why it is better, in most cases, to erect single storey warehouses:

i. The cost per cubic foot of storage space is usually much cheaper in a single storey construction, because the shell can be of lighter construction than is possible with a building having upper floors.

ii. The weight-carrying capacity of an upper floor is always limited by structural considerations. Forklifts and other machinery or equipment needed to reach high warehouse shelves, are very heavy and their weight will not be supported by a floor that has not specifically been reinforced to support this weight.

iii. Material-handling costs are likely to be less in a single-storey warehouse than in a multi-storey building where goods have to be transported up and down between floors. Special lifts or conveyor belts are necessary to transport these heavy bulk items.

iv. More use can be made of natural daylight in a single storey layout, effectively lowering electricity costs.

v. Adequate ventilation is cheaper and easier to arrange when there is only one ground-level floor involved.

vi. Modern high-rise equipment enables the efficient use of vertical space from a single ground floor, effectively making it unnecessary to have more than one storey.

3.5.5 Warehousing by the fulfilment house on behalf of the client

Most clients of fulfilment houses will, at some point in time, need to make use of the warehousing service offered by the fulfilment house. Often, a great amount of capital equipment, human resources and management expertise are tied up in these costly

stock-holding or storage units. Fawcett (1992: 113) has tried to justify the existence of warehousing activities on the following grounds:

i. Assembly area (make- and break-bulk).

Fulfilment warehouses are used to assemble end-items from the supplied components. They are also used to facilitate break-bulk operations, where large bulk quantities are broken down into smaller individual orders before onward transit to the client, or the client's client (e.g. retailers or end-users).

ii. Safety stock.

These warehouses can provide a buffer between the rate of supply and manufacture, and that of demand. The supply of raw materials or components and production operations (assembly), can be planned in advance, whereas actual demand from clients and their customers is usually unpredictable. In the event of a sudden unexpected increase in sales demand, component supply failure, or a breakdown in assembly, inventory held in the warehouse (also referred to as safety stock), can then be used until the problem is resolved or an alternative source is found.

iii. Cutting of costs.

By warehousing stock, production cost savings can be optimised by permitting long production runs, and minimising set-up and changeover costs. This will help keep manufacturing and processing costs down by means of economies of scale.

iv. Seasonal demands.

Anticipation inventory can be created, especially for goods with a seasonal demand pattern. In order to make provision for such demands, and yet maintain consistency in levels of production, goods to service this seasonal demand need to be built-up over an extended period of time. A typical example is the increase in sales of multi-media educational products in the first few months of the year, when new students enroll at universities and colleges. On the other side of the time-scale, according to Ronny Russel (previously Product Marketing Manager at *Workgroups*, one of the *Siltek*

divisions) the sales of computer and other multi-media games reach a peak during the last few months of the year, especially around Christmas time.

v. Customer service.

Fulfilment warehouses aid in the maintenance and improvement of customer service levels. The closer their clients' stock is located to the market, the greater the availability of goods to fulfill individual orders, and the shorter lead times can be. When the points of supply and demand are far removed from each other, providing high levels of customer service becomes more demanding on the distribution system, as well as more costly. Fulfilment houses can use their logistics and distribution management function to set up these warehouses to help maintain customer service levels in a more cost-effective and efficient manner.

In addition to these reasons, there is a need for companies at all times to protect their investment in inventory, being components or finished goods. The most convenient way to achieve this, is for them to stock their goods in a secure and suitable environment such as the warehouse of their fulfilment house, where the risk to inventory from damage, deterioration and unauthorised removal will be minimised. Franz *et al* (1994: 22) determined that an average of around sixty-three percent of warehouse space in South Africa is owned, while the balance is either leased (twenty-six percent) or owned by third parties (eleven percent). Fulfilment houses must at all times insure the protection of the intellectual property of their IT clients' goods.

Recently, there seems to be a trend towards gradually moving to increased warehouse outsourcing, although many South African companies are known to be hesitant in relinquishing control over their warehouse facilities. It is the aim of fulfilment houses to offer a complete solution to their clients. Therefore they strive to keep all their clients' stock in their warehouse, where they can assemble and deliver on order. Raw material as well as finished goods are housed, at a pre-determined warehousing fee.

At any given time, any client of the fulfilment house must know their exact stock quantity on the fulfilment house's premises. The relevant account manager must generate reports from the MIS and forward it to the client, usually on a weekly or

monthly basis (depending on the predetermined SLA). Information included in these reports may comprise of quantities of components kept in own raw materials or in customer stock, products or end-items housed as finished goods or kept in customer stock, information of work in progress, or information on stock that is currently in transit. These, and other reports, will be discussed at length later in this chapter.

3.5.6 Geographic location

Many factors influence facility location. Inappropriate locations could result in many serious problems such as poor service to customers, high operating costs, excessive loss due to theft, and unnecessary high freight costs. The difference between carefully selected locations and random selections could well mean the difference between a successful warehouse system and one that is doomed to failure. The four factors discussed below should all, amongst many others, influence the fulfilment house warehouse location decision to a greater or lesser extent:

a) Infrastructure and transport.

Infrastructure and the available transportation services are in many cases the most important location considerations (Jenkins 1990: 59 – 63). The warehouse should be located in such an area as to permit the lowest total inbound and outbound freight costs within the constraints of the facility's objectives as stated above. Transportation costs are relatively easy to measure and highly visible. It also directly affects inventories, as related to transit times, the likelihood of damage, and service reliability.

The warehouse location decision as influenced by the availability of adequate transportation facilities, can also take on a more personal nature. A different type of transportation that should be considered is that which involves moving people, particularly employees (Burton 1979: 237 – 243; Jenkins 1990: 63 – 64). The overriding consideration in conducting business is, and will always be, people. Therefore, the accessibility of the warehouse to employees and others who come to conduct business there, is also an important consideration in determining warehouse location.

b) Community resources.

Being close to a labour force and other community resources are some more location necessities of a more personal nature, but is just as important as other operating requirements. While labour availability is not as great a concern in warehousing as it might be in many other aspects of the industry (such as those requiring a greater number of workers, or more specialised training), it is still an important factor to take into consideration.

Some community resources that could favourably influence the facility operations and employees' well being, are:

i. Safety and security.

Effectiveness and responsiveness of the police force, especially in areas known to have a high crime rate. This consideration increases in importance as the value of the goods in the warehouse increases. Especially warehouses where goods with a high intellectual value are kept, are prone to thefts and raids. Fulfilment houses in the IT industry know that one end-item may cost only a couple of Rand to produce, but because of the intellectual property contained in the material (such as on CD's, disks or in manuals or textbooks), the actual value of this product can amount to many hundreds or even thousands of rands. While it may cost only about R20 to produce one physical Microsoft operating pack (such as the new Windows Millenium operating system package), the reseller value of this end-item into the consumer market can be many thousand of rands.

While fulfilment houses do rely on the local police force, they always also have their own security systems in place. The safety of the people and the goods in the warehouse should never be compromised. Especially foreign companies with locations in South Africa, are known to spend a lot of money ensuring the safety and security of their workers and inventory.

ii. Community attitude.

The attitude of the community towards the particular warehouse can be an important community decision influencing the warehouse location decision. It is not advised to employ white workers only in a predominantly black area, or *visa versa*. It is also important to note that sex, race, colour or creed have yet to be found significant in assessing the competence of warehouse personnel.

iii. Education opportunities.

The adequacy of the surrounding schools available to the employee's children, will influence the type of worker that can be attracted to the location. Also, the existence of other institutes of learning where employee's can further educate themselves, might be an important consideration to some employees considering joining the workforce.

iv. Suitable housing.

Availability of housing at reasonable prices is another important human consideration, especially when employing a large warehouse workforce, who might have a limited budget to spend on housing and other personal necessities.

v. Necessary warehousing services.

The availability of repair services for the facility's equipment is crucially important, especially when locating in undeveloped countries. Operations in a warehouse should never come to a stand-still because of defective equipment. Waiting on repair services or spare parts can drastically reduce the productivity of a warehouse, which will in turn negatively effect the client SLA, because of delays in expected delivery times.

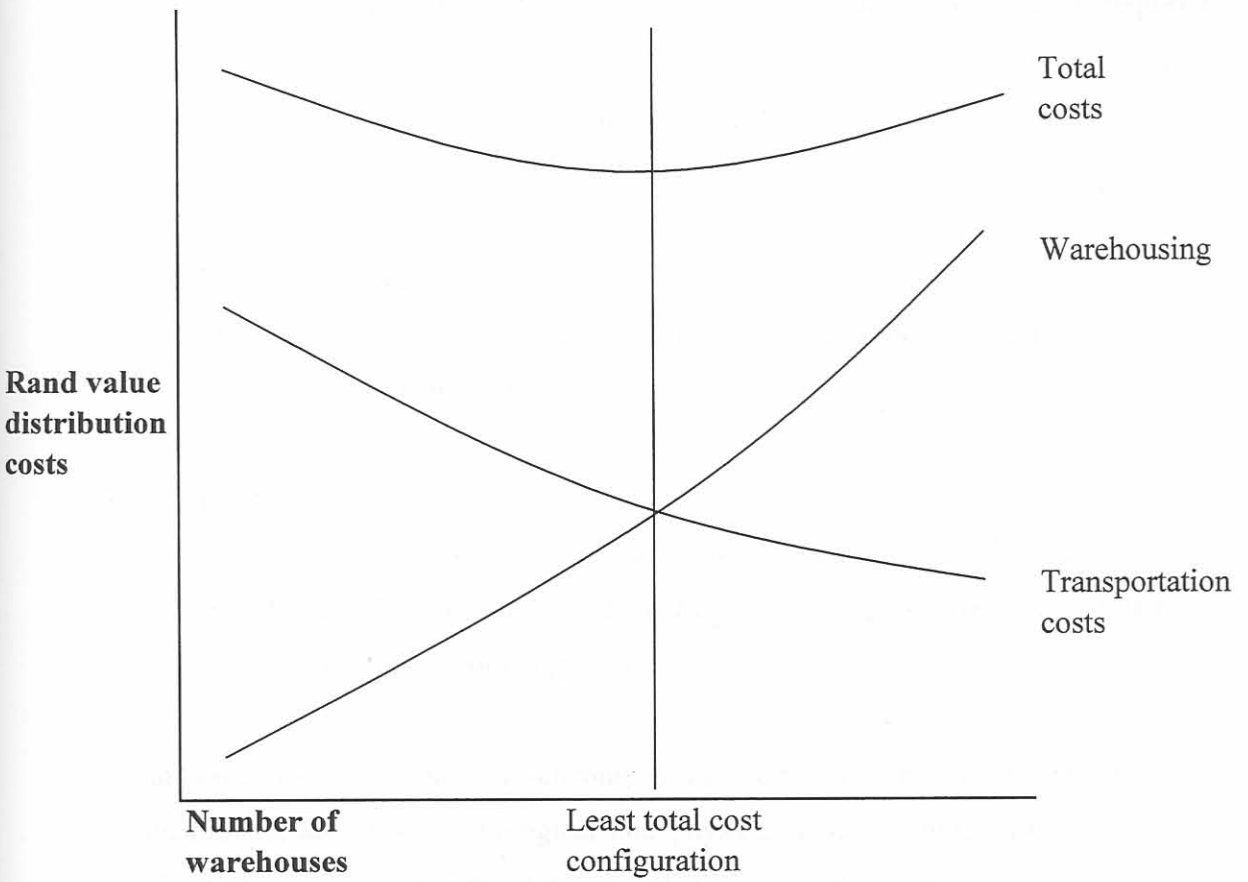
vi. Environmental considerations.

Avoidance of areas with pollution problems is always a good idea when searching for an ideal warehouse location. Especially in European countries, environmental considerations impact greatly on location considerations (Jessop *et al* 1994: 238 – 239). Consumer awareness and environmental regulations will shape logistics policies in the new millennium.

c) The client.

Being close to the client and its market is of crucial importance to any fulfilment house and its warehouses. As discussed above, delivery times, especially in the rapidly changing IT industry, should directly affect the location of the warehouse. Many fulfilment houses set up strategically placed warehouses (or just some kind of presence in the form of a distribution depot) in different parts of the world to better service all their clients' physical distribution needs. A trade-off needs to be made between transport costs, and the cost of setting up a number of strategic warehouses or distribution depots.

Figure 3.3 Relationship between warehouse and transport costs.



Source: Fawcett P, McLeish R & Ogden I. 1992. Logistics Management: 67.

According to Jenkins (1990: 69), the following four factors directly affect delivery time:

i. Client Service Level Agreements.

The required time to meet the client's stated service objectives. These are off course determined by the earlier agreed-upon SLA between the fulfilment house and its client. Sometimes seen as detrimental to normal business practice, preference is often given to big, important clients who are responsible for a large percentage of the fulfilment house's profits. Sometimes special arrangements need to be made to handle emergency orders that need to be delivered urgently.

ii. Available capacity.

The availability and costs of transportation to make possible these required and agreed-upon delivery times. On some occasions, even fulfilment houses need to outsource their physical distribution or delivery workload if they are unable to accommodate it all in-house.

iii. The distance factor.

The travel distance to the fulfilment house's customers, which can be very long and costly when delivering to overseas clients.

iv. The time factor.

The actual travel time to customers, which radically multiplies when goods have to be delivered to outlying rural areas with a poor infrastructure or road network, also affects delivery time.

In fact, the two main all-encompassing considerations to locate close to customers, are of a psychological and physical nature (Jenkins 1990: 76 - 81). Psychologically, customers generally 'feel' that if their fulfilment house, or at least some kind of presence (like a warehouse of some kind or a distribution outlet) is close by, they are better off to deal with them than with suppliers that are more distant. The physical part of this is, as mentioned above, that it is normally

the shortest distance between the fulfilment house and its customer that results in the least travel time.

d) Rates payable or receivable.

Taxes and subsidies can have a huge impact on choosing a location to set up a warehouse. Some real estate taxes are based on market value, others on initial cost. Complicating this even more, is the fact that, more often than not, percentages and ratios of the market value and initial cost are used to determine taxes to be paid.

In Free Enterprise Zones, special tax inducements are offered to companies. Some nations subsidise, promote or protect certain types of commerce, especially companies in the infant stage. It is never illegal to avoid taxes legitimately; it is intelligent business to cut all and any costs as much as possible.

3.5.7 The future of warehouses

Notwithstanding the continuing use and development of warehouses, there are now some logistics management leaders, developers and writers who are questioning the purpose and value of warehouses (Fawcett 1992: 134). In order to achieve fast, smooth movement of IT goods along the supply chain, high-speed, if not instantaneous transfer of information concerning that movement is vital. As explained before, if products do not reach the hi-tech, volatile IT market as soon as possible after their development, a new and improved substitute may have already taken its place, causing the initial developer to lose benefits that could have been gained by being the first entrant to introduce the new technology (Thompson & Strickland 1996: 146). Being first to introduce a new product concept into the market, can have a high pay-off when:

i. First-time customers remain strongly loyal to the pioneering company when making repeat-purchases.

ii. Moving first constitutes a pre-emptive strike, making imitation very hard and sometimes even unlikely.

iii. Early commitments to suppliers of raw materials, new technologies and distribution channels, as well as setting up strategic partnerships with these suppliers, can lead to a cost advantage over rivals. It will create even more barriers to entry for potential competitors.

iv. Pioneering helps to build a company's image and reputation with resellers as well as with consumers.

Techniques such as optimised production technology and 'Just-In-Time' (JIT) distribution have brought into question the advantages of warehouses and other kinds of storage- and distribution centers. The installation of electronic point-of-sale (EPOS) equipment in so many retail outlets provides on-line transfer of sales information from shops and stores to distribution centers and suppliers, enabling logistics and distribution managers to track actual demand on a daily basis. This can make the keeping of large sums of capital tied up in safety stock a thing of the past. Storage or warehouse facilities and their associated running costs also acquire huge amounts of initial investment- and running capital.

Studying all of the above, one can indeed debate the benefits of warehousing, especially from a financial point of view. This is where the initiators and developers of the fulfilment house industry saw a gap in the market, and have consequently differentiated themselves from the traditional view on warehouses as being a storage-only set-up. The warehouse space they offer to their clients, are not just storage space for keeping stock, but is in fact a value-adding service. The fulfilment house will procure all components needed to produce the end-item at its own cost, and store them at their secure warehouse facility for a specified period of time before starting production. After the end-item has been assembled, the fulfilment house can once again keep the product in stock until the client decides where and when it needs to be delivered. Most fulfilment houses then only invoice their clients for all components procured or manufactured, and all assembly done, once the final goods have been delivered to the client or to the client's client.

3.6 Physical distribution

3.6.1 Mode of transport

Transportation is a major component of the overall logistics cost and effort. Evaluating, selecting and managing the best mode of transport (road/rail/air/sea) for each specific client with his specific needs, is one of the value-adding services offered by fulfilment houses. The process of DRP (Distribution Resource Planning) discussed earlier, was developed as an attempt to apply material requirements planning principles to outbound distribution. Although there is currently some continuing debate as to whether this can be done successfully (Van de Mark 1988: 34; Masters 1992: 64), it is expected that the use of DRP in the fulfilment industry will increase as supply chain relationships are improved (Johnson *et al* 1996: 346).

i. Road transport.

Regardless of the specific resource planning systems that are in use, the selection of the best mode of transport for each individual client's unique requirements, is still one of the basic concerns to be evaluated and then operated and managed by the fulfilment house. Owing to its ability to operate door-to-door, road transport has the facility to move almost anything almost anywhere, making it the most useful method of land transport. In comparison with other modes, road transport is competitively priced – particularly as a bought-in service from third-party operators. Owing to the fragmented and traditionally independent nature of the haulage and distribution industry, there has always been a high degree of competition, which has ensured that, on the basis of price alone, road operators have frequently had the sharper competitive edge. In South Africa, as in the rest of the world, road freight is most commonly in use, accounting for seventy-four percent of all transport (Franz *et al* 1994: 21, 52).

Despite its perceived advantages, however, road-based distribution has to a certain extent become a victim of its own success (Fawcett *et al* 1992: 47). Collection and delivery operations by road, continue to be hampered by mounting congestion in town and city centers, thereby increasing operating costs and perpetuating the unfriendly image of big delivery trucks. These heavy-load vehicles are often considered to be

one of the major threats to general safe road travel. In spite of improvements in vehicle and component technology, security is an ongoing source of management concern. Road distribution is at great risk from both the casual pilferer and organised groups. Especially in the hi-tech IT industry, goods of high value are usually involved. South Africa in particular, does not have a very good record concerning theft from vehicles, or even the theft of a whole load and vehicle and other types of hi-jackings.

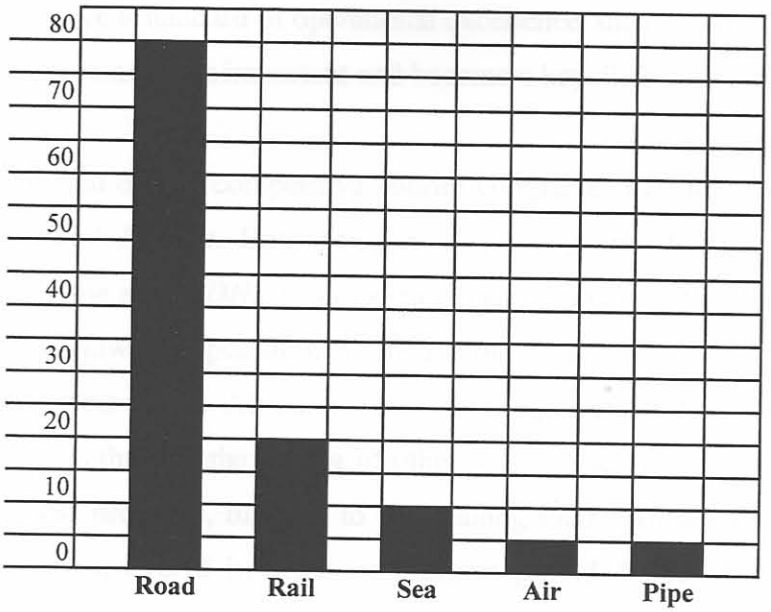
ii. Rail transport.

The South African railway company *Spoornet*, did not have a very good start to the new millenium. *Spoornet* is currently planning to lease about half of its freight rail networks to private operators, making use of only around 5 800 km of their current freight network where there is a dedicated service and good profit. This comes as *Spoornet*, which is in line for a big eminent overhaul, expected to lose R200 million for the year ended March 2000 after its R135 million loss for the previous year (Chalmers 2000: 17). The planned turnaround strategy will focus on growing *Spoornet's* market share through efficiency improvements and better customer service. It will also include conforming to the regulations of the road-based freight industry to try and create a better playing field for rail.

However, regardless of all the advantages, disadvantages and discussions above, *road* transport continues to be the fulfilment house's most favoured means of moving goods, being in-bound raw materials and components, or finished goods and end-items (Franz *et al* 1994: 52). Refer to the figure on page 90 for a comparison of the methods of freight transport most often used.

In Europe, movers of goods have some other viable modes of transport available to them. Road freight is still the number one means of transport (accounting for sixty-three percent of all goods moved), but thanks to the many navigable rivers and water channels criss-crossing the European continent, movement of goods on water is also popular, accounting for approximately twenty-four percent of transport (Fawcett *et al* 1992: 47). Rail and pipe movements make up most of the balance.

Figure 3.4 Usage of transport modes by South African companies.



Source: Franz P, Cilliers W & Andrews D. 1994. Logistics excellence in South Africa: 89.

In South Africa, changes in transportation to rationalise this effort are inevitable. Because of deregulation, options available to fulfilment houses and their distribution-partners have increased dramatically. Distributors and transport companies are no longer constrained with respect to the variety of services they are allowed to offer. Lately, however, intermodalism seems to be at the order of the day, where various transport services are combined in order to offer the most suitable service solution to each client.

Franz *et al* (1994: 55) calculated that service criteria in South Africa (in order of priority), are as follows:

- On-time delivery.
- Reliability.
- Damage-free delivery.
- Ability to expedite.
- Flexibility.

Price is mentioned to be the least important of ten requirements included in the list drawn-up by Franz. Once carriers begin to perform equally in respect of the above five criteria and achieve a standard of operational excellence, the provision of a *value-added service* will become more important and become a key differentiator of service.

A good example is that of two competitive courier companies in South Africa, *DHL* and the newly formed *Postnet*. Both companies' pick-up and delivery prices for parcels are basically the same. *DHL* is an international company with a big customer base and a good worldwide reputation, where *Postnet* is now desperately trying to improve and grow their South African market share by differentiating themselves from their competitors through the adding of other valuable services. *Postnet* goes to their clients' business premises, offering to bring along their own workers who will pack the goods to be delivered in boxes or shippers provided free of charge. This service can be especially helpful to fulfilment houses who often have to deal with emergency shipments.

iii. Emergency shipments.

Expediting emergency shipments through the supply chain is often required by the fulfilment house client. Clients need to notify their fulfilment house as far as possible in advance, of the need to expedite or rapidly move a shipment through the system. The fulfilment house (or his distribution-partner) must then make every effort possible to ensure that the goods are delivered to its destination with maximum speed (Johnson *et al* 1996: 251 – 252). When road transport is being used, the operations manager must ensure that the product is quickly placed on the next outbound vehicle. When railroads are involved, the yardmaster needs to be notified, in order for him to single out the expedited railcar when it arrives, and immediately switch it to the proper outbound train.

3.6.2. Distribution by the fulfilment house in-house or outsourcing

Establishing, maintaining and enhancing your distribution network to provide a reliable, cost-effective service is of utmost importance. The way in which the final

product reaches the market (important aspects are short lead times, good condition and competitive pricing), can influence hugely on the success of its introduction into the retail channel. Road transport is the only means of transport which is, for most businesses, relatively easy to own and operate as part of their in-house own-account sector. Because of the relative shortness of many journeys (fulfilment houses are often situated very close to their clients), road transport has become the dominant means of transport in many areas of logistics and distribution.

If the fulfilment house cannot handle all aspects of distribution successfully on its own, this function is then outsourced to companies who specialise in physical distribution. This so-called *third party logistics*, where certain elements of logistics are outsourced to third party service providers, is a fast growing trend internationally (Forker 1997: 7). It is also an area of logistics in South Africa that has seen significant changes in recent times, particularly so in transport and distribution. How information is then traded with these carriers, will directly effect the level of service the fulfilment house can expect.

The prime reasons for outsourcing physical distribution, is demonstrated by the following benefits accruing from the use of these specialised, third-party service providers (Fawcett *et al* 1992: 152; Franz *et al* 1994: 53; Johnson *et al* 1996: 230):

i. Customer service.

The fulfilment house can offer an improved service to its client by utilising the extensive, well-established distribution and service networks of the third-party contractor. Improved levels of service can be achieved especially when servicing clients or their markets in out-lying or rural areas, and most particularly when the client does not demand a particularly dedicated service.

ii. Concentrate on core competency.

Specialist distribution contractors allow the fulfilment house increased flexibility regarding its range of services offered to their clients. Specialised management of logistics operations by professional transport and distribution operators release the fulfilment house management to concentrate on the mainstream business activities. Distribution-related problems are left to be

dealt with by the contracting company, relieving the fulfilment house of unwanted pressures.

iii. Reduce costs.

The outsourcing of the physical distribution service can greatly reduce costs in the long run. Economies of scale exist when a fulfilment house uses a third-party contractor with an extensive network of services. General distribution of more than one client's goods at the same time, makes contractors' operations financially viable and profitable, thereby achieving a more realistic cost for the fulfilment house's client and ultimately for the end-user. Service Level Agreements (SLA's) are negotiated in order to meet all requirements and achieve reasonable and competitive bottom-line prices.

iv. Better management.

Improved management control can be achieved when fulfilment houses enter into strategic partnerships with third-party providers of distribution services. Contractors usually provide their customers with a weekly, monthly or quarterly report and account (depending on the SLA) for services during that period. Distribution costs would therefore be known in advance, enabling the fulfilment house to budget accurately for the particular service.

v. Utilising capacity.

When an own, dedicated fleet is used by the fulfilment house, these vehicles are more often than not under-utilised. Even the big delivery trucks, owned and operated by specialist delivery companies, have an underutilised capacity of approximately nine to eleven percent. On the other hand, research has shown that companies who have acquired their own specialised fleet of delivery vehicles, can have an under-utilisation capacity of around twenty-five percent, even up to fifty percent (Forker 1997: 27).

The policy on emergency shipments and the expediting of orders differs between industries. Franz *et al* (1994: 53) calculated that, in the case of emergency shipments, forty-six percent of companies outsource the additional capacity required. Some industries (like the beverage industry in South Africa) do not outsource emergency

shipments at all. Since it is the primary goal of fulfilment houses to offer a value-adding solution through superior service levels to their clients, they often need to employ outside contractors to help them cope with the needed capacity when they suddenly have to expedite emergency shipments.

3.6.3 Specialist distributors

As discussed above, companies that have as their core business the physical distribution of goods, are often employed by fulfilment houses to handle the collection or delivery of their clients' goods. *Tarsus Technologies*, the distribution arm of the JSE-listed *MB Technologies*, stamped its authority on the recently held South African Compaq Channel Awards (Scott 2000:1). For the fifth consecutive year, *Tarsus* won the top award for the region, being voted the Distributor of the Year at the function held at the Theatre on the Track at Kyalami in February 2000.

A good example of outsourced distribution can be found in the partnership formed between *LG Electronics* (the world's largest optical storage manufacturer and third largest monitor manufacturer) and *Compucomp*, a leading South African distributor of computer hardware and software. *LG Electronics* appointed *Compucomp* to distribute their range of IT products, including their new PC range which was launched in South Africa during February 2000. Carlos Vizcarra (in Evans 2000:1), CEO of the *Compucomp* group of companies, said that the agreement with *LG Electronics* can be viewed as 'highly strategic', and that it would 'significantly effect the company's bottom-line' during the next 12 to 24 month period. Vizcarra adds that *Compucomp* has the infrastructure, including seven branches around South Africa and more than one thousand dealers, to 'ensure that the *LG* range of products achieves maximum market penetration'. Commenting on the appointment of *Compucomp* as its nationwide distributor, Jaehong Kim, product manager of IT products at *LG Electronics Incorporated* in Johannesburg, said that *LG* aims to become one of the biggest IT players in South Africa (Evans 2000:2). He adds that their PC range is 'going to make a strong impact on the local market' and he believes that *Compucomp* has 'the expertise and the access to the dealer market to make a huge success of this venture'.

In another recent distribution outsourcing deal, *Siltek Distribution Dynamics (SDD)*, the focused IT supply chain company in the JSE-listed *Siltek* group, boosted its capacity to distribute IBM personal systems following an outsourcing agreement with *First Technology (Pty) Ltd* (Flatau 1999:1). In terms of the agreement, *SDD* will incorporate *First Technology*'s Gauteng IBM distribution operation, including its sales and marketing teams, into its own IBM business unit which distributes IBM personal computers, servers and thinkpads. The move is in line with *Siltek*'s IT supply chain strategy to achieve incremental revenue gains without increasing operating costs, thereby boosting the group's bottom line. The current outsourcing deal is projected to increase *SDD*'s recovery on fixed overheads as well as to increase gross operating profit with the increased sales channel.

3.7 Reporting

3.7.1 The Management Information System

It is not a new concept to have a formal system in place in order to organise and manage inventory. As long as two decades ago, Murdick (1980: 11) formulised this comprehensive definition of a Management Information System (MIS):

> *"The system which monitors and retrieves data from the environment, which captures data from transactions and operations within the firm, and which filters, organises and selects data and presents them as information to managers is called the Management Information System (MIS)."*

In the past, managers were only able to process information on a personal basis, which meant that different managers would operate according to their own different and unique perceptions of their environment. Also, systems which were being developed, had a functional bias, concentrating exclusively on inventory control, production, accounting or distribution planning.

Fortunately, some fundamental changes are now occurring in progressive companies. In the new millennium, management is becoming increasingly system-oriented and more sophisticated in their management techniques. Information is now planned and

is made available to managers or other decision-makers as and when needed. This leads to a system that is able to tie planning and control to operational systems of implementation. In today's leading logistics organisations, order fulfilment should be the central focus. Every activity should be targeted at supporting this process together with the correct organisational structure and information systems.

Having available correct, relevant and timeous information, is crucially important to the fulfilment house and its clients. Through the fulfilment house's MIS, reports can be compiled to relay information to the client, regarding amongst others stock levels of components and finished goods, the value of this stock, work in progress, expected delivery times etcetera.

The basic steps in the development of a MIS (Murdick 1980: 27), consists of the following:

i. The determination of information needs is the primary concern. The type of information that will be needed by the fulfilment house to effectively manage its client's account, must initially be decided upon. Just as important, is what information will be needed by the client, in order for him to best manage his outsourced business and have some control over his stock. The fulfilment house's client is almost never the end-user – they in turn also need to sell their stock to resellers, retailers or consumers.

ii. Secondly, MIS objectives need to be set. Here the fulfilment house has to decide exactly what his chosen MIS has to be able to do. The relevant important aspects are, amongst others: ease of use, being able to cover a wide range of functions, as well as drafting and printing comprehensive reports, charts and graphs.

iii. The next step is to develop a specific MIS plan, together with a proposal for management approval. Usually an operational team will develop this plan, which will stipulate all above-mentioned requirements. This plan will then be proposed to the relevant decision-making authorities.

The MIS performs many functions with respect to decision making. Firstly, it helps managers make decisions by supplying crucial information which offers guidance in solving problems. Secondly, the MIS aids in the making of repetitive decisions where the decision process remains constant but the input varies. Also, as listed by Fawcett *et al* (1992: 84 - 88), information systems can have the following four additional purposes:

i. Serve as a trigger mechanism by producing instructions or documents necessary to activate other components of the system. For example, a proportion of the lead time between a client placing and receiving an order, is accounted for by the length of time that it takes to process the order and initiate action from the fulfilment house's supplier.

ii. Information systems monitor and control the whole system performance, ensuring that established cost and customer service objectives are met.

iii. They coordinate functions both within the system and between distribution and other key decision areas of the fulfilment house.

iv. They link the fulfilment house's internal MIS to interrelated external systems such as those of their suppliers, clients and third party distribution operators.

Murdick (1980: 325) further researched some distinct advantages of implementing an MIS on the fulfilment house network:

i. Cross-functional integration.

It uses electronic data-capturing mechanisms to calculate the quantities on all goods (components, work in progress and finished goods) in the warehouse. This will assist in the reduction of errors because of greater standarisation and better procedures and policies. Whenever stock is moved, *i.e.* received, issued the MIS. In most cases it is easier to achieve technical integration of system areas than it is to integrate across functional boundaries. As a result, information systems provide the prime mechanism to enable cross-functional integration.

ii. Shorter lead times.

When components are correctly received when they arrive, and production orders are timeously inputted by the relevant people, production can successfully be planned ahead. This preparation-time improvement will have a positive effect on lead times and ultimately on the capital budget.

iii. Generating of reports.

Charts, graphs and lists can be drawn off the MIS that will reflect quantities on hand, quantities on order and quantity to be assembled. This will directly aid the keeping of a better historical record system. Also, it will improve management's understanding of the business and free their time for higher-level contributions.

iv. Minimum stock holding.

The keeping of stock will be down to a minimum when an MIS is used correctly. This will mean that as little as possible capital will have to be tied-up in inventory.

v. Minimum out-of-stock situations.

If avoiding an oversupply were the only problem associated with inventories, the solution would be simple: store fewer items. Unfortunately, not having enough is as bad as having too many. In other words, in conjunction with keeping stock levels to a minimum, an MIS will also help to avoid a stockout situation and the inevitable resulting loss of orders.

A stockout occurs when the supply of an item is exhausted and the client wants this item delivered either to himself or to his client. Stockout costs are difficult to determine and often inexact, but nevertheless very real (Johnson 1996: 316, 319 – 320). Estimating the cost or penalty for a stockout involves an understanding of client reactions to the fulfilment house being out of stock at the time the clients want the product. In order to better control this situation, its monetary value must be calculated. Without making the effort to quantify the profit consequences of shortages, the fulfilment manager is flying in the

dark when it comes to choosing the most profitable aggregate service level (Herron 1987: 113).

A company's MIS is its heartbeat. All information is entered here, and all reports are drafted from the information entered. Some processes to be generated from a MIS are listed and discussed below.

3.7.2 Order processing

The order processing system triggers all other operations in the fulfilment house's logistics and distribution management function. Whilst in theory it is possible to manufacture, procure or warehouse a product in anticipation of its sale to a client, in practice it is obviously much more profitable and efficient to do so in the certain knowledge of future sales. It is imperative that the moment an order is placed by a client, this event must trigger a string of actions to satisfy that order.

Various ordering methods were discussed which all assist in the determination of both frequency and quantity of orders from clients. Fulfilment houses must effectively apply these ordering techniques in an attempt to optimise order requirements and reduce unnecessary stock holding. In today's hi-tech IT environment, companies often rely on electronic data interchange (EDI) systems for this purpose. With co-operation between the supplier, the fulfilment house and the client it is possible for replenishment orders and associated data to be transmitted between computers, thus ensuring that all logistic requirement-planning decisions are based on the very latest information.

When a fulfilment house receives an order from a client, the first step will be to ensure that there are sufficient components in stock to fulfill this order. If not, more needs to be procured. In a real-time system, entering a specific purchase order into the system will immediately reflect these relevant quantities involved. The fulfilment house needs to receive a formal purchase order from his client, before any goods can be issued, assembled into an end-item or despatched for physical distribution. The fulfilment house then issues a sales order to his client in return.

All the above-mentioned transactions are captured on the fulfilment house's MIS. There is evidently much room for the implementation and improvement in the management of order levels and order frequency, which in the long run, should assist in reducing the high reliance on emergency ordering which is both costly and detrimental to the maintenance of consistent service levels.

3.7.3 Shipment reporting

This report tracks the exact size, value and whereabouts of the client's goods. This function is especially important if the goods from one client's order are travelling in different consignments or to different locations. If the client receives a daily shipment report he will always be fully aware of where his stock is.

This reporting service is also especially important in the specifically specialised fulfilment industry. Goods are often not delivered back to the fulfilment house client, but directly to a reseller or into the retail channel (the client's client). The fulfilment house will invoice his client for goods delivered, but this client then needs accurate information to in-turn invoice his client.

3.7.4 Serial tracking

On occasion, goods are bar-coded or provided with promo-codes or some other kind of identificator, in the fulfilment house's warehouse. This process is usually implemented when products are of a highly specialised technical nature (examples are computer operating systems, internet starter kits or multi-media games). The final product or its components can then be tracked through the retail channel right into the final consumers home or office. The fulfilment house and the client can get specific information on each end-item, such as date of manufacture or date of delivery, etcetera. If a fault or defect is discovered in an end-item, it is then easier to trace a batch according to its serial number.

The serial tracking of end-items will lead to much more detailed, comprehensive and useful shipment reports. This is yet another way in which fulfilment houses offer

added value via a total management solution to its client's whole supply chain operation.

3.7.5 Invoicing

It is important that the quantity and value displayed on the sales order, corresponds directly with the relevant invoice. Many fulfilment houses generate their invoices from the delivery note, to ensure that the quantities are correct.

Some fulfilment houses are allowed to invoice on behalf of their clients. This happens when the fulfilment house delivers directly into the retail channel, and not first back to their own client. Since many retailers (like the South African franchise of the *Incredible Connection* computer stores) do not accept any goods without an invoice attached to it, fulfilment houses can then even print invoices with their client's name and logo, and deliver it together with the goods into the channel.

3.7.6 Management of receivables

This value-adding service offered by fulfilment houses is also utilised when the consignment is not delivered back to the client, but rather physically distributed to the appointed resellers, usually located all over the world.

The fulfilment house's client will provide them with a list of their customers (usually resellers), who will then not place their orders with the client, but directly with the fulfilment house. Especially in international business transactions, fulfilment houses can then collect royalties or other payments from these resellers, and forward it to their client.

This complex system of financial management provides a central point to monitor, manage and control the financial viability of all assets, including depreciation, lease variations and ownership of complete assets. The financial value of the goods are managed by the fulfilment house, from procurement right through to the final distribution process.

3.8. Summary

This chapter is the result of a thorough investigation of the six main processes and functions generally performed by a modern-day fulfilment house, which are:

- Creating a new product and establishing its components.
- Procuring these components.
- Physical assembly.
- Warehousing of components or finished goods.
- Physical distribution.
- Reporting.

The advantages gained by the client company when using a fulfilment house, are proved to be numerous and substantial. The main benefit is in the value that a fulfilment house adds to the operations of the client company. Especially in an IT or other related technological company, it can be concluded that management and employees alike should concentrate on the core competency of the company and outsource as many of the operational functions as possible.

CHAPTER 4

RESEARCH METHODOLOGY

4 RESEARCH METHODOLOGY

4.1 Introduction

Research is the systematic, controlled and critical investigation of events, led by theories and hypothesis about the events. Business research, as was done extensively in this study, can be defined as the systematic investigation in order to provide information that may or may not be used to solve business problems.

In this research, the attributes of a proper business research process were followed closely:

i. The *objective* of the research was described in detail in Chapter 1.
ii. The research *procedures* will be clearly explained later on in this chapter.
iii. Thorough *planning* took place throughout the whole research process.
iv. All data (primary and secondary) was properly and thoroughly *analised* in order to determine its relevance, validity and importance to this study.
v. *Conclusions and recommendations* will be limited to the information that was gathered and justified by the research and will be summarised in the last chapter.

4.2 Properties of the research

4.2.1 Rational and empirical thinking

Theoretical and empirical research was done throughout this study. Rational thinking played an important role in the evaluation of information as well as in the conclusions and recommendations at the end of the dissertation. Both rational and empirical thinking will be defined and discussed.

i. Rational thinking

Rationalism implies that reason must be the primary source of knowledge. All information must be derived from rules, laws and basic truths. This is also

called deductive thinking, which is the deriving of a conclusion by reasoning – in other words the conclusion is reached by logical deduction.

It is thus clear that the conclusion must be derived from the gathered information and its reasons and explanations. The reasons implicate a conclusion and represent a proof. There is a very strong relationship (or connection) between the information and reasons, and the conclusion. A deduction can only be valid if it is impossible for the conclusion to be untrue if the assumptions are true. For example:

Assumption 1:	All *Bowline* employees are hard workers.
Assumption 2:	John is a *Bowline* employee.
Conclusion:	John is a hard worker.

ii. Empirical thinking

On the other hand, empiricism means that the observations were mainly obtained through experiences in the business environment. Events are described, explained and predicted by means of observation and experience – this process is also called inductive thinking.

With induction, there is not such a strong connection between the information and its reasons, and the conclusions derived from this information. A conclusion is derived from one or more facts, and this conclusion explains this fact while the fact in turn explains the conclusion. It is very important to note that this conclusion is only a hypothesis, in other words only one explanation and there may be many other true hypotheses which can be derived from the same fact or set of facts. (A hypothesis is an assumption or concession made for the sake of argument.)

4.2.2 Different thinking styles

Some different thinking styles (also known as sources of knowledge) are:

i. Untested opinions.

These are generally believed by most people, even though the opposite may have been proved to be true.

ii. Self-evident truths.

These basic truths are derived from the 'laws of nature'.

iii. Method of authority.

People with status or in high positions are automatically believed because of their social standing or business position.

iv. Literary style.

Information is gathered through the work done by others. Information is interpreted in terms of its scientific goal and perspective, and not in terms of the abstract and general categories of the researcher's own reference scheme.

v. Postulational style.

Formal, mathematical terms and postulates are studied. A postulate is an essential presupposition, condition or premise of reasoning. These lead to logical information like mathematical models, simulations and business laws. This method can be used successfully to determine the composition of the market before a new product is launched. Postulational thinking is a good example of *deductive rationalism*.

vi. Scientific method.

This thinking style is a combination of logic and rationalism, in other words *inductive empiricism*. It is a direct observation of the phenomena in the market. The thinking is done through very clearly defined variables, methods and procedures. Hypotheses are tested empirically. The thinking has the capacity and ability to eliminate contradictory hypotheses - simply stated it can thus be viewed as a self-correcting process.

This last style discussed (*i.e.* Scientific thinking), is the source of knowledge that was most widely used throughout the entire research process. Although countless literary

sources were consulted (secondary information), the majority of the research concentrated on the information gathered from the completed questionnaires and interviews (primary sources of information used in a logical and rational way).

4.2.3 The role of a hypothesis

A good hypothesis has three very distinct qualities. In order to be true, a hypothesis must be adequate, testable and better than its rivals.

Furthermore, a hypothesis must:

- Lead the direction of the study and its research.
- Limit the data that is to be studied (set the parameters).
- Identify the relevant information.
- Provide a framework for the conclusions that will be derived from the research.

4.3 The research methodology

The research in this study was done by following seven basic steps, namely:

1. Identify the topic to be researched.
2. Exploration and judgement of the situation.
3. Design of the research study.
4. Sampling and data capturing.
5. Evaluation of the researched information.
6. Writing of the dissertation.
7. Constant analysis, interpretation and corrections.

4.3.1 Identify the topic to be researched

The title of this study is:

Logistics management in the information technology industry.

This topic can be split successfully into two meaningfully segments:

i. Logistics management.

The total supply chain was researched and described in great detail in the third chapter. All elements from procurement, warehousing and assembly, up to final distribution and reporting were discussed. A new concept, namely *fulfilment*, was discovered and its characteristics, implementations and new possibilities were researched and documented in detail.

i. Information technology industry.

This industry, and especially its performance in the South African market was scrutinised, thoroughly researched and explained in the first chapter.

4.3.2 Exploration and judgement of the situation

After the above-mentioned topic was chosen for the study, the overall South African situation was firstly explored. Fulfilment houses, as well as their suppliers and clients were questioned very early on in the research process (Questionnaires attached in Appendix). Where the South African market was lacking in sufficient examples, the international scene was also explored and judged in terms of its validity to be implemented in the current South African situation.

4.3.3 Design of the research study

The format of the research study was designed in accordance with the prescribed methodology of a proper research proposal:

- The study started off in broad terms, describing the information technology industry as a whole.
- Secondly the parameters were narrowed to include only certain selected aspects of this industry, namely the supply chain and the outsourcing of some or all operational business processes.
- Next a new trend in supply chain management, namely fulfilment, was extensively researched and explained.

- Lastly conclusions, new possibilities for the future and specific recommendations were made in the final chapter.
- Both primary and secondary information were used in the research process. Company websites and brochures were examined in order to obtain background information on the various companies, their suppliers and clients. Secondary information was obtained mostly via phone calls, personal visits and interviews with key personnel. Supply Chain Management / fulfiment companies that were interviewed over a period of time are:
  - *Siltek*
  - *Memtek - MultiMedia Warehouse*
  - *Workgroups*
  - *Bowline*
  - *Modus Media*

  The following clients and / or suppliers of such fulfilment houses were also interviewed:
  - *Sonopress* (Compact Disc manufacturer)
  - *Artone* (printer)
  - *Microsoft* (operating system)
  - *Linux* (operating system)
  - *MWeb* (Internet Service Provider)
  - *UUNET* (Internet Service Provider)
  - *AfriMusic* (on-line e-commerce shop)
  - *Brilliant Business Systems* (accounting software packs e.g. Tax Return)
  - *Masterskill* (educational software packs e.g. A+, MCSG)
  - *Idion Technology Holdings* (software developers)

Questionnaires to Supply Chain Management companies as well as to their clients are attached in Appendix.

4.3.4 Sampling and data capturing

a) Major players to be considered.

The information technology (IT) industry in South Africa is dominated by a small number of big players. Examples of IT distributors (hardware and software) are *Microsoft*, *MMW* (Multimedia Warehouse), *Workgroup* and *Acer*. Some big ISP's (Internet Service Providers) are *MWeb*, *IAfrica*, *UUNET*, *Africa Online* and *World Online*. Because of the relative small group of major players in the South African IT industry, most of the bigger companies were researched, interviewed and asked to complete questionnaires (refer to point 4.3.3 above). The findings are discussed in detail in Chapters 2, 3 and 5.

b) Measurement scales.

Concepts used in research may be classified as objects or as properties:

Objects include the things of ordinary experience, such as companies and their employees. Objects may also include things that are not as concrete, for example attitudes, cultures and peer-group pressure.

Properties, on the other hand, are the characteristics of the objects. This may include things like an employee's physical and psychological characteristics. It may also include his social properties such as leadership ability and class affiliation or status.

Much of the gathered data were encoded to make it easier for the information to be analysed and compared. Depending on its nature, the data was grouped into one of the four main scale-types:

i. Nominal scale.

This measurement scale is the least powerful of the four types. It has no order, distance or origin and its basic empirical operation is to determine equality. The data set is partitioned into subsets or categories that are mutually exclusive and collectively exhaustive. Even though some purists argue that the use of a nominal scale does not qualify as measurement, it is the scale that is most widely used in business research.

ii. Ordinal scale.

This scale has order but no distance or unique origin. It is used in the determination of greater or lesser values. It implies that one statement is 'greater than' or 'lesser than' or even 'equal to' another statement, without stating how much greater or less.

iii. Interval scale.

The interval scale has the powers of nominal and ordinal scales (order and distance), plus one additional strength: it incorporates the concept of equality of interval (the distance between 1 and 2 equals the distance between 2 and 3). Still, the interval scale has no unique origin and can be used only in the determination of equality of intervals.

iv. Ratio scale.

This scale possesses order, distance as well as a unique origin. Its empirical operation is the determination of equality of ratios.

4.3.5 Evaluation and interpretation of the researched information

The data that was used in the writing of this dissertation, was mainly obtained in three ways:

i. Primary data, which is data that already exists. Many literary sources were consulted in order to collaborate the most accurate, current and widely accepted market trends.

ii. Secondary data was collected for the purpose of evaluating the most relevant information pertaining to the topic of this thesis.

iii. Interviews were conducted with managers and lower-level employees at some of the biggest IT and supply chain management companies in the country, as well as with their main suppliers and clients. The interviews were designed with the specific purpose of obtaining hands-on information relevant to the

current local and global trends in the IT market (Questionnaires attached in Appendix).

All gathered data was scrutinised and then reduced to a manageable quantity. It was then used to develop summaries, look for patterns and apply statistical techniques. None of the data was ignored. It was either catagorised as irrelevant, or as relevant, current and topical in which case it was used as information.

4.3.6 Writing of the dissertation

Finally, the text was written where all findings, conclusions and recommendations were reported. This dissertation is the result of the study on logistics management in the IT industry.

4.4 Summary

As mentioned in the introduction to this chapter, research can be defined as the investigation of events as well as the theories and hypotheses relating to these events. When the topic of this dissertation was chosen, the research of relevant events, market trends and relevant business processes were undertaken in a systematic, controlled and critical manner. In order to ensure that all relevant data was given an equal chance to be incorporated into the end-results, different thinking style were used as sources of knowledge. The research methodology were explained in detail in points 4.3.1 to 4.3.6. In the last chapter, all findings will be summarised. Recommendations for the future will also be discussed in detail.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5 CONCLUSONS AND RECOMMENDATIONS

5.1 Introduction

This final chapter contains a summary of conclusions which were derived by collaborating and merging all data (primary as well secondary information) that was obtained through the researched conducted for the writing of this dissertation. After certain direct conclusions have been reached, the second part of the chapter then contains recommendations for the future of the information technology industry, logistics management in South Africa and for fulfilment houses in particular.

5.2 Conclusions

The following findings and conclusions can be derived from the completed questionnaires, personal interviews and literary sources consulted:

5.2.1 Market and industry drivers

Through the research conducted by consulting literary sources and articles in journals and trade magazines (mainly secondary information), it can be successfully concluded that several market and industry drivers shape the business processes of companies operating in the fulfilment industry. Firstly, as product life cycles shorten for computer software and hardware products, the manufacturers of such software and hardware have focused their resources on their core business functions and have outsourced the non-strategic, non-core activities.

Secondly, the market for outsourced products and services has been positively affected by the ability of information and products to be digitally distributed. Digital distribution of software products has driven one-to-one marketing, thus collapsing the channel between content owner and business consumer. As products and services are digitally distributed, the inherent value of the product or service shifts from manufacturing/push to information management/pull. This new trend especially benefits fulfilment houses operating in the information technology industry.

Lastly, changing end-user requirements have also helped to drive the fulfilment industry's growth. Generally, clients who make use of fulfilment houses require:

- Customisation of products and services by company or individual.
- Security across global infrastructures.
- Velocity, in order to implement worldwide simultaneous delivery and reduce time-to-market.
- System efficiency to reduce redundancies and integrate software manufacturing, distribution, order-processing and support.

These requirements are better met by outside full-service providers due to their dedicated expertise, experience, scale, operations infrastructure and system investment.

5.2.2 Fulfilment house services

Afore mentioned supply chain management and logistical companies were interviewed and completed questionnaires. From this primary information it can be concluded that fulfilment houses generally offer a very wide range of diversified services, all uniquely customised to suit the requirements and needs of each of their individual client companies. When a comprehensive array of these services are used in conjunction with each other, it will lead to a customised solution for the management of the supply chain of any company. Services most generally performed are:

i. Component assessment and procurement.
Most fulfilment houses employ dedicated account managers who aid the client company in the assessment, selection and procurement of components that are best suited and priced to meet the client's budget and market specifications.

ii. Software replication by means of in-house replication services.
In-house replicating equipment offers the advantage to the fulfilment house of them being able to replicate and deliver small or large quantities of compact

discs, cassette tapes or any other type of information carrying component. It also allows the fulfilment house to respond quickly and effectively to changes in product configuration.

iii. Warehousing.

Raw materials, components, work-in-progress as well as finished goods are warehoused by the fulfilment house on behalf of the client.

iv. Customisation of branding.

Components and finished goods can be branded to suit any requirement.

v. Assembly of deliverables.

Sophisticated assembly lines with short lead-times enable the fulfilment house to provide a fast, on-demand and customisable product manufacturing service. This not only prevents stock shortages, but also keeps finished goods to a minimum, saving the client valuable financial resources.

vi. Order processing and deliveries.

It was found that most fulfilment houses invest in a powerful Management Information System (MIS), where orders can be processed in real-time. This important tool then ensures the rapid deployment of the client's goods into the market.

vii. Database management.

The fulfilment house can also assist the client in the creation of sales projections that can help to ensure that the client stays in tune with the latest market demands.

viii. Reporting.

Through the maintenance of real-time stock reports (again by means of the fulfilment house's MIS), strict inventory risk management and control is made possible. This aids in the tight control over inventory levels, decreasing the risk of obsolescence.

ix. Tailored and complex distribution.

Goods are freighted either back to the fulfilment house client, or to the client's client, the retailer or directly to the end-user. It was found that most fulfilment houses utilise their own vehicles, although they may make use of out-sourced freight and courier services if the need arises. Most fulfilment houses can also do serial number tracking if this is required by the client.

x. Management of receivables.

Through special arrangement with certain banks and other financial institutions, some fulfilment houses can collect and repatriate royalties and license fees on behalf of their offshore clients. These fulfilment houses manage independent bank accounts for each client. In addition, they may also manage the risk on foreign exchange transactions.

xi. Shipment reports.

Detailed shipment reports are customised and delivered to each client at a desired frequency (being daily, weekly or monthly) to meet specific requirements. As with the stock reports discussed earlier, shipment reports are also generated automatically from the MIS.

xii. Peace of mind.

By means of advanced hi-tech security systems, fulfilment houses can ensure the secure warehousing of goods, the protection of intellectual property and a commitment to the elimination of piracy.

5.2.3 South African players

Primary research has shown that there are currently only between twenty and thirty fulfilment houses operating worldwide. The South African company *Bowline (pty) ltd*, with offices strategically situated in Cape Town and Midrand, is believed by many to be the only company acting as a proper fulfilment house in Southern Africa. Secondary research reveals that being a lone competitor in this specialised industry may have the following advantages:

i. *Bowline* has no direct South African competitors who can offer the same combination of services and the total turnkey solution to their clients.

ii. *Bowline* is often the first in the market to try something new, or invent new processes and procedures that can streamline the supply chain. They are thus viewed as an innovative and highly adaptable company.

iii. *Bowline* is big enough to manage the total end-to-end supply chain of any company, but also small enough to customise and adapt their service offering to each and every client's specific needs.

iv. Because of all the above-mentioned advantages, *Bowline* has built up a sound and very loyal customer base. Their clients trust them to manage their entire inventory, all distribution, reporting and even their debtor's books.

It is however these same above-mentioned advantages that can also be a disadvantage at the same time. Being the only competitor in the industry means that the company has no other competitors to measure itself against. There are no industry standards in place against which to benchmark. This more often than not makes it very difficult to explain the total service offering and logistical solution to prospective new clients. The value that is added by a company like *Bowline*, is not only in procuring components, assembling end-items or doing deliveries, but rather in the total supply chain management solution that they offer. Utilising the full spectrum of a fulfilment house's services, provides the client company with peace of mind and allows them to rather concentrate on their own core competencies (*i.e.* the development of new software or new technologies).

5.2.4 Benefits of outsourcing to a fulfilment house

As has already been discussed above, the benefits of utilising the full spectrum of services offered by a fulfilment house, extend far beyond only the outsourcing of some isolated business activities. As discussed above, many fulfilment house clients and

suppliers were interviewed before it was concluded that the optimum benefit will be achieved through a variety of services, including the following:

i. Customised solutions.

As each supply chain management client has different needs, customised solutions are needed to offer a comprehensive value-added service tailored around specific needs and requirements.

ii. Turnkey solutions.

A client's concept is developed into a complete service (in terms of procurement, production, warehousing, assembly and distribution) of their final product. If so desired, the fulfilment house will take over the whole process, from buying components up to the final delivery of the end-item (a 'cradle-to-grave' approach).

iii. One point of contact.

In order to ensure that the client of the fulfilment house receives service levels that exceed its expectations, these supply chain management companies need to simplify client needs by offering them a dedicated account manager who will manage the process from the minute the client's requirements are discussed, up to the time of delivery of the product to its final destination. Clients then do not need to negotiate on issues concerning cost, quality etcetera with a large amount of suppliers and service providers. This management function will be taken over by the fulfilment house.

iv. Warehousing on behalf of the client.

Many clients of fulfilment houses do not own their own warehouses and therefore store their components and finished goods on the premises of the fulfilment house. This service then allows clients to feel safe and secure in the knowledge that their products are being constantly monitored via state of the art security systems. Clients can also receive detailed reports on the status of their inventory at a desired frequency and in a customised format.

v. E-commerce.

The fulfilment house that wants to continue adding value to its clients' business operations, will need to offer a wide range of e-commerce facilities in the near future. Both B2B (business to business) as well as B2C (business to consumer) selling requirements will have to be met. The viability, benefits and opportunities of e-commerce will be thoroughly researched and discussed under the Recommendations at the end of this chapter.

5.2.5 The role of suppliers

Choosing the right supplier is one of the most critical business decisions a fulfilment house can make since it will greatly affect all aspects of procurement- and stock management. Good planning regarding quality and quantity will be futile if the supplier cannot deliver on the stipulated specifications. The implications of having bad suppliers can be disastrous to any fulfiment house. Some situations that were revealed through the research process, are:

i. Out-of-stock situations.

When components and raw materials are not available at the exact time and place when they are needed, it will lead to unnecessary production- and sales disruptions. Stock-outs occur when a company is out of stock but has a buyer willing to buy. One sure way for the fulfilment house to lose clients, is to be an unreliable source of supply. Ultimately, this will have a widespread negative effect on the fulfilment house's operations, including a loss in market share and profit margins. If goods are not delivered to the retailer's shelf as soon as possible after development, a newer, improved version may already be on its way. This will lead to the unfortunate event of stock becoming obsolete.

ii. Obsolescence.

The term 'obsolescence' recognises the fact that sometimes, items in an inventory gradually become out of date (Johnson 1996: 319). This process of then having to write-off stock will of course be expedited if goods were received late from suppliers. It can be concluded that obsolescence poses a

serious threat to the fulfilment house, since the cost of writing-off stock can run into many thousands of rands if everything possible is not done to firstly minimise the situation, and then to manage the process properly.

iii. Unreasonable prices.

Unnecessary highly charged prices will lead to cost increases, which will inevitably filter down to the fulfilment house's client, and ultimately to the end-user. Alternatively, these high prices will have a very negative effect on the fulfilment house's own profit margins if they do not also increase their price to their client accordingly.

iv. Poor market position.

Poor suppliers will contribute to a fulfilment house's weak competitive position in the market, which will probably be accompanied by a decrease in the market share.

v. Missed opportunities.

The fulfilment house will miss out on business opportunities because of its bad track record on delivery times, quality and price. Once a fulfilment house has earned itself a bad image or reputation in the market, it will be very difficult and sometimes very costly to prove otherwise.

On the other hand, effective and reliable suppliers are invaluable. Through the research, the following characteristics of good suppliers can be concluded:

i. They will supply goods and services of the specified quality.

ii. These goods or services will be delivered or achieved within the pre-determined time-span, which is crucially important in the fast-paced and continuously changing IT industry. Receiving raw materials and components on time will help to reduce the appearance of out-of-stock situations, or having to write-off stock that has become obsolete.

iii. Honest suppliers charge reasonable, competitive and market-related prices, which should be passed on throughout the whole supply chain and ultimately to the end-user.

iv. They can react quickly to changing requirements and can service even unpredictable needs or requirements.

v. They have the initiative to continuously better their ways of delivering their service.

vi. They continuously look for ways to be more cost-effective.

vii. They will warn their client in advance if they will not be able to meet all requirements, so that suitable alternatives can be found.

viii. They can supply technological knowledge and other relevant information derived from their experience. Good suppliers are an increasingly valuable source of information, be it for either product or process innovation.

Bearing in mind the fact that a competitive advantage is increasingly a function of supply chain efficiency and effectiveness, it can be concluded that the greater the collaboration at all levels between supplier and customer, the greater the likelihood that a mutually beneficial advantage can be gained. The end result that can be derived from this collaboration is more often than not measured in terms of lower material costs, higher quality, shorter lead-times of supply and lower inventories.

5.2.6 The fulfilment house client

It was found that many fulfilment houses started out by specialising their service offerings particularly to the IT industry. Even though this might have been the initial point of market entrance, it was found that successful fulfilment houses today invariably posses a wide range of strategically differentiated clients such as Internet

Service Providers (ISP's), cellular service providers, ancillary computer hardware distributors, producers of multimedia games, audio distributors and many others.

Many companies utilising the services offered by fulfilment houses were researched. One such a South African company, currently outsourcing its business operations to a fulfilment house, will be briefly discussed as an example:

i. *Siltek Ltd.*

Siltek Distribution Dynamics (SDD) is South Africa's largest broad-based distributor of information technology. They distribute a wide range of 'best of breed' hardware and software products, as well as other computer peripherals, components and consumables. One of the company's many focused business units is *MultiMedia Warehouse (MMW)* which is a focused multimedia and entertainment distribution company with a wide range of products varying from audio to communications, graphics, games, voice recognition and many others. The core competence of the *MMW* workforce is to import hardware and other computer peripherals and to then market it into the retail channel. They have extensive knowledge of the characteristics and needs of their market and they know where to buy the best components or products at the best prices, wherever in the world that might be. They know which components to bundle with which products and how to present it to the channel in an attractive and affordable manner.

However, the *MMW* buyers and sellers still need somebody to actually assemble their end-items or bundle their products with the goods of others. Their expertise does not lie in managing the actual physical operational work to be done on the assembly lines. This is where companies like *MMW* are realising the huge value that fulfilment houses can add to their businesses. Below is a sample of a simplified workflow process:

1. The *MMW* importer will buy components from his overseas suppliers, for example:
   - Computer modems from Taiwan.
   - Modem driver disks from Australia.

- Modem cables from Germany.
- Phone lines and lightning protector units from Japan.

2. *MMW* will choose a suitable fulfilment house, preferably located close to the selected target market. The fulfilment house will collect the above-mentioned components from *MMW* and receive it into their own warehouse.

3. In this case, *MMW* will also need packaging for their modem bundle. This procurement function can also be outsourced to the fulfilment house, which will buy-in printed outer cartons on behalf of *MMW* and store it, together with the other components, in their warehouse.

4. Fulfilment houses assemble only on order. Goods are usually warehoused as components rather than as finished goods. This is done because of the fast pace with which the content and configuration of IT products change, improve and become obsolete.

5. Before starting the assembly process, it is imperative that both parties agree on various important aspects. First of all the Bill Of Material (BOM, as discussed in Chapter 3), must be finalised and signed by both parties. This is the exact 'recipe' that the fulfilment house staff will use to 'build' the end-item. Other terms and conditions, such as costs for warehousing, assembly and freight must also be agreed upon.

6. After the required quantity of the end-item has been completed, the fulfilment house then delivers it back to *MMW*, or directly into the retail channel (*e.g.* to computer stores such as Incredible Connection, or to other nominated retailers such as Pick 'n Pay, CNA, Makro or Game).

5.2.7 Current technologies

5.2.7.1 E-commerce

Research contained in literary resources and academic articles have proven that, in order to survive in the new digital economy, fulfilment houses, suppliers, retailers and basically all companies that want to stay competitive and maintain or improve their market share, are investing in an e-business strategy of some kind.

Many people use the term e-commerce without having a clear picture of exactly what it is. Very simply put, e-commerce is about doing business electronically using the internet. It is buying and selling on-line. It can happen between businesses and other businesses (B2B), or between businesses and consumers (B2C) as well as between consumers and consumers (C2C). It can simply be defined as a tool to improve business performance through connectivity.

E-commerce is essentially frictionless. Hardwick (2000: 1 – 2) explains how there are no phone calls, faxes or paper trails which can clog the communication channel between buyer and seller. Through research it can be concluded that virtually every industry is now represented on-line by at least one e-commerce entrepreneur or company trying to carve out a niche in the e-business community. These e-businesses are using the internet to optimise their market positions by integrating their supply chain- and logistics management applications with their internal and external value chain processes. As was mentioned many times before, companies can no longer afford to operate as independent islands in a sea of partners and competitors. In order to stay competitive and thrive in a real-time, 24-hour-a-day, 365-day-a-year worldwide marketplace, companies must bridge information islands both internally and across business communities.

a) Current world-wide trends.

Ernst & Young (*E&Y*) recently questioned thousands of consumers and many companies in the United States, Australia and the whole of Europe. In this global on-line retailing survey, the *E&Y* researchers found that personal computer and internet penetration are increasing, and also that more and bigger purchases are being made on-line. Some other interesting trends relating to e-commerce consumers, were that they are found to be:

- Prone to on-line impulse buys.
- Not very concerned about their credit card security.
- Very concerned about shipping costs.

It is suggested in the report that these findings can also be applied in the South African model. It can therefor be concluded that it will be wise for all players entering the e-commerce market, to find ways in which to lower their shipping costs, or to build these freight costs into the selling price of their products.

b) The South African user group.

The largest online survey conducted in South Africa by the local internet portal site MSN.co.za, has revealed that thirty six percent of all South African internet citizens (or '*netizens*' as they are often called) have purchased online (Scholtz 2000: 1 – 2). These are interesting figures if they are compared to the recent survey conducted by *Ernst & Young USA* which stated that only twenty seven percent of the United States market has bought online, while it is estimated that only ten percent buys online globally.

c) E-business benefits.

Research has shown that companies worldwide have been investing heavily in business applications and computer systems to improve their productivity, enhance their efficiency, reduce costs and share information with business partners. With the implementation of an e-business solution and the accompanying escalation in more efficient and faster information flow, it can be concluded that international as well as South African companies will be able to realise the benefits of:

- Reduced inventory levels.
- Shorter cycle times.
- Improved customer service.
- Improved asset utilisation.

- Reduced obsolescence.

5.2.7.2 Wireless Application Protocol

WAP (Wireless Application Protocol) has become one of the new buzzwords in the IT and telecommunications industries. Traditionally, internet users received access to the net and webpages through a cable interface with telecommunication networks. The development of WAP has now eliminated this cable interface. Users of this technology are able to gain access to the information on the internet and intranet through handheld wireless devises such as cellular phones, pagers, personal digital assistants and two-way radios.

The technology is thus a scalable, open interface technology that replaces conventional copper or fibre optic telephone cabling. It is compatible with networks providing voice, video, data and internet access. Some of the WAP characteristics and advantages that were researched and concluded, are that it is:

- Faster than the traditional method of working on-line.
- More convenient since the internet can be accessed from wherever you are.
- Less expensive to roll out since no cable network needs to be installed.
- Able to deliver quick return on investment (ROI) in high-density areas.
- Has a fast installation process.
- Has a high capacity.
- Allows cheaper network maintenance.

Through the above research, it can thus be concluded that WAP technology can present endless opportunities to logistics managers and fulfilment houses. Areas of inception into the fulfilment house business operation will be discussed under the following Recommendations.

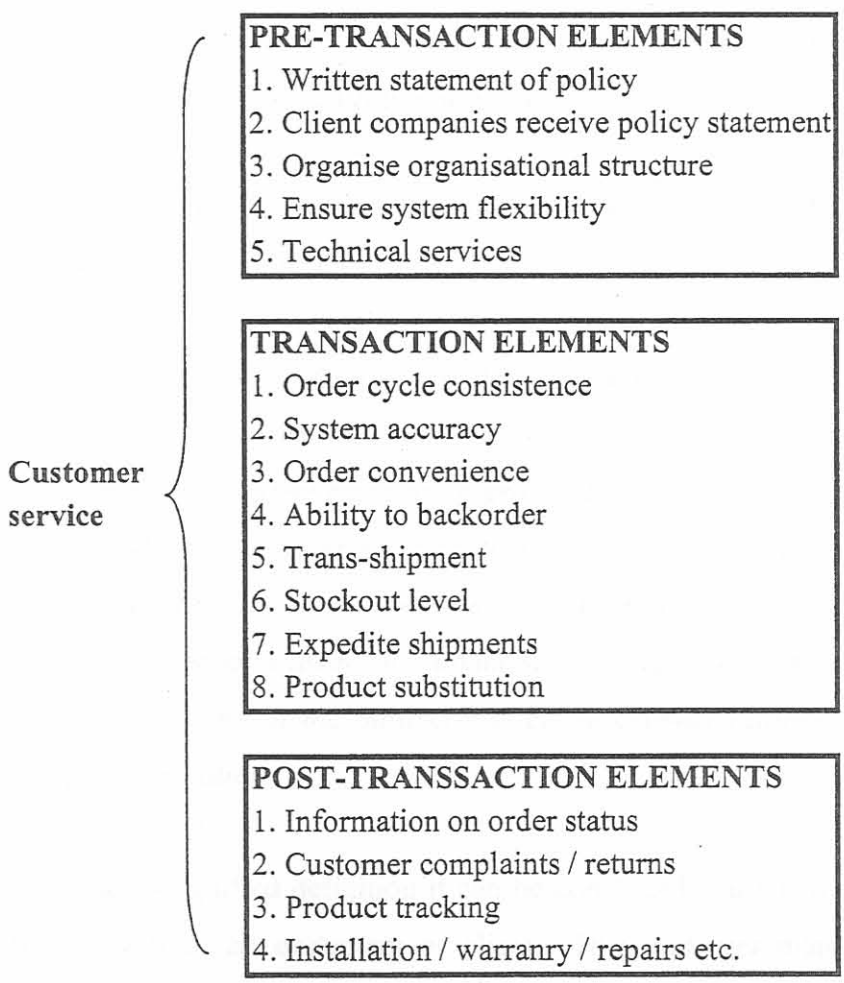
5.3 Recommendations

It is predicted worldwide that the future of dedicated and competent fulfilment houses looks bright. This also seems to be the general feeling throughout the South African

industry. In the past, the decision to outsource was mainly driven by perceived problematic labour situations and the lack of expertise or other resources. Lately, there now seems to be a need for additional added value. Apart from doing only the basic things right (*e.g.* warehousing, assembling and delivering), fulfilment houses must now look at new and innovative ways in which they can add more specialised value to the businesses of their clients. Recommendations to obtain this added value will be discussed in detail below.

5.3.1 The client as the most important asset

Figure 5.1 Customer service elements.



Source: Hines P. 1994. Creating world class suppliers: 65.

i. Customer service

When offering a service of comprehensive supply chain management as discussed in the examples above, the role of customer service is imperative to success. It is because of the multivariate nature of customer service and because of the widely differing requirements of specific IT-market needs, that it is essential for any fulfilment house to have a clearly identified policy towards customer service. Most fulfilment houses see their superior customer service as the most important element in their company's marketing mix. The classic competitive dimensions of the past, being price and promotion, are today substantially less important than quality and reliability. If the product or service is not available at the time the customer requires it and a close substitute is available, then the sale will be lost to the competition.

ii. Customer Relationship Marketing.

The essence of Customer Relationship Marketing (CRM) is not a new concept. According to Wright (1999: 1):

> *"CRM is about finding, winning, retaining and growing customers to increase the value of your customer base. It's about gathering information on your customers, identifying those groups that are attractive to your organisation, and then treating your customers differently according to their potential lifetime value to you organisation. It's also about building relationships and building knowledge. It's about segmenting your customer groups to interact with them via the most cost-effective channel relative to their value to the organisation."*

In a much simplified definition it can be concluded that CRM is about the effective management of all customers or clients. This customer management can then be viewed simply as the need to improve your organisation's client knowledge and client communication. Today companies deciding to outsource their business operations are empowered to decide what, how, with whom, to what extent and for how long they

want these outsourced agreements to continue. They have infinitely more choices in services and interaction channels available to them. Fortunately, the rise of the modern-day fulfilment house, coupled with new technological advancements, has provided fulfilment houses the ability to satisfy all client needs.

5.3.2. Improving technologies

5.3.2.1 E-commerce

a) B2B e-commerce.

It is recommended that, in future, businesses will have to think beyond only e-commerce (which has its emphasis on electronic trade) and concentrate more on e-business, which is a much wider concept encompassing all of a company's processes.

Research predicts that global electronic business will be worth an estimated US$6.9 trillion by the year 2004, with almost eighty nine percent of all on-line business transactions made in only twelve countries. The combined revenues for Eastern Europe, Africa and the Middle East are estimated to be at approximately US $68.6 billion in the same period (the above-mentioned figures were taken from a report researched and published by the US company *Forrester Research*).

It is recommended that the e-business solution which is implemented, must be able to perform the following five important functions:

i. Allow businesses to leverage their existing investments (e.g. in current back-office systems) across the new e-commerce operation.

ii. Perform other services that will increase the speed, efficiency and accuracy of business processes across the entire value chain.

iii. Extend the trading network to include all current and potential business partners and customers.

iv. Outsource the management of integration, administration and simple help-desk tasks in order to concentrate on the company's core business.

v. Allow only selective trading partners that can be changed on demand, and then also provide audit trails of interaction among these partners.

b) Recommended opportunities in South Africa.

There are many opportunities for South African businesses to be successful in the new digital economy. It is recommended that the following areas are identified and targeted:

i. The isolated market.

The *E&Y* survey results that were mentioned in the Conclusions above, show a definite window of opportunity for South African companies. Only eight percent of the international companies polled said that international expansion would form part of their future growth plans. Locking in their home markets by acquiring new customers and expanding into new categories and channels were found to be more important to them. (International sales represented only five to twenty five percent of revenues, and the respondents confessed to logistical problems standing in the way of international business.) The conclusion is that there is still time for South African companies to jump onto the e-business bandwagon. Not many of the big overseas international players see Africa as a market for them – especially the United Sates will first focus all their operations locally and then turn their attentions to Europe. If the current lack of understanding of the e-commerce business model can be overcome, on-line buying and selling will lead to new benefits for South African buyers and sellers alike.

ii. New technologies.

Cynics argue that e-commerce won't survive in South Africa because the market is simply too small. This might have been the case if the personal

computer were to remain the only point of access to the internet. Fortunately, developers are now manufacturing cellular phones and other hand-held devices that enable web access and browsing through WAP technology. Considering the fact that the amount of cellular phone users in South Africa is higher than in some first world countries, this new technology will definitely enhance and grow the use of the internet in South Africa. It is predicted that more than ten million people in South Africa will own their own cellular phones by the year 2005. It is recommended that all companies operating in the IT market, research how they can best use this technology to their advantage.

iii. Improved access and usage.

In the B2B market, South African companies are starting to get serious about e-commerce and significant growth in this sector is expected as businesses go public with their online strategies. In 1998, it was estimated in a report in 'The Business Day', that about ninety three percent of South Africa's top two hundred and fifty listed companies had internet access. This figure has definitely risen substantially over the past two years. It is clear to see why it is highly recommended that fulfilment houses and all other players in the IT market, ensure that they use the current tendens of increased e-commerce usage to their advantage.

5.3.2.2 Wireless application protocol

a) Opportunities for fulfilment houses

The *Gartner Group* (in Cilliers 2000; 1) estimates that over four hundred trading markets have been launched to date and that this figure will rise to at least ten thousand by the year 2002. Over three million worldwide sellers are expected to participate in e-marketplaces by that time, with an estimated US$438 billion in B2B transactions taking place.

If fulfilment houses want to continue offering their clients a comprehensive and complete turnkey solution, it is recommended that they become themselves e-

commerce enabled, and also offer their clients the opportunity to engage in B2B and B2C business transactions. The additional value that is now added by also adding WAP-enablement to this technology, substantially increases the advantages fulfilment houses and their clients and suppliers can achieve. It has amongst others, the following advantages:

- It simplifies the ordering process.
- It can substantially reduce lead-times.
- Payments and transfers can be made electronically.
- Information can be accessed and processed at any time from anywhere in the world.

5.4 Summary

While outsourcing business processes is often perceived to be a tactical exercise, outsourcing an entire supply chain to a fulfilment house must be seen as an option to create and add strategic benefit and value to current business operations. In the typical information technology company, the decision to outsource the supply chain is usually driven either by pressures to reduce costs, or because of a lack of expertise or physical manpower. Outsourcing can translate into an important opportunity for the outsourcing client company to add great value to its own business operations.

Research conducted by the 'Supply Chain Council' in the USA, indicates that the key cost drivers of a supply chain are order management and inventory carrying costs. This means that the maximum value that can be provided by a fulfilment house to its clients, are in the areas of order management and inventory carrying cost reduction. These should thus be the main areas of concern for all fulfilment houses that are currently operating in the worldwide IT industry. However, in order to remain competitive, fulfilment houses need to continuously research processes and new ways in which they can even further improve their value-adding services and solutions.

APPENDIX

Appendix A

Questionnaire to outsourced service providers and fulfilment houses:

i. Personal profile

1. Name of person being interviewed
2. Job description, functions, responsibilities etcetera
3. Years with the company and in current position

ii. Company profile

1. Name of company
2. Type of industry / target market (*e.g.* communication technology, internet service providers, other IT-related etcetera)
3. Nature of clients' business (*e.g.* software development, packaging or bundling of hardware or other computer peripherals etcetera)
4. Company characteristics
   - number of offices
   - geographic area covered (national or international)
   - number of client companies
   - number of employees
5. Annual sales figures (not compulsary)
   - volume
   - turnover
6. Potential internal company strengths
   - core competencies in key areas
   - adequate financial resources
   - potential market leader
   - access to economies of scale
   - insulated from strong competitive pressures
   - proprietary technology
   - cost advantages
   - product innovation skills
   - proven management

iii. Scope of value added services offered

1. Procurement
   - buying on behalf of clients
   - suppliers used
2. Warehousing
   - quantity and location of warehouses
   - size (square meters)
   - racking, pallets and other equipment used
3. Assembly
   - nature of physical assembly lines
4. Order processing
   - Management Information System
   - procedures
5. Physical distribution
   - geographic area covered
   - own vehicles, outsourced courier and freight companies or a combination
6. Reporting and invoicing
   - Management Information System report writing capabilities
7. Other services / customised solutions offered

Appendix B

Questionnaire to the client companies of outsourced service providers or fulfilment houses.

i. Personal profile

1. Name of person being interviewed
2. Job description, functions, responsibilities etcetera
3. Years with the company and in current position

ii. Company profile

4. Name of company
5. Type of industry / target market (*e.g.* communication technology, internet service providers, other IT-related etcetera)
6. Nature of business / type of product and product characteristics (*e.g.* software packages, interactive game bundles, internet starter kits which are standardised, branded etcetera)
7. Company characteristics
   - number of offices
   - distribution area (national or international)
   - number of employees
8. Annual sales figures (not compulsory)
   - volume
   - turnover
9. Potential internal company strengths
   - core competencies in key areas
   - adequate financial resources
   - potential market leader
   - access to economies of scale
   - insulated from strong competitive pressures
   - proprietary technology
   - cost advantages
   - product innovation skills
   - proven management

iii. Industry profile

1. Market size
2. Scope of competitive rivalry
   - among competing sellers
   - threat of potential entry
   - competition from substitutes
   - power of suppliers
   - power of customers
3. Market growth rate (annual percentage)
4. Industry's stage in life cycle (new / mature / declining etcetera)
5. Number of companies in industry
6. Customers (number of buyers)
7. Ease of entry and exit into the industry
8. Experience curve effects
9. Dominant economic characteristics of the industry environment (industry structure, capital requirements, scale economies etcetera)
10. Industry profitability
11. Driving forces
12. Key success factors
13. Industry prospects and overall attractiveness
14. Potential external opportunities
    - ability to expand into new markets or segments
    - ability to transfer skills or technological know-how
    - integrating forward or backward
    - new foreign markets
15. Potential external threats
    - entry of lower-cost foreign competitors
    - rising sales of substitute products
    - adverse shifts in foreign exchange rates
    - regulatory requirements

iv. Processes outsourced to outside value-added service providers or a fulfilment house (this topic was discussed in great detail):

- activities outsourced (*e.g.* procurement, assembly, warehousing, distribution, reporting, debt collection etcetera)
- Service Level Agreements (*e.g.* nature of contracts, time frames etcetera)
- management of the outsourcing process at all levels

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