

COMPETITIVE STRATEGIES FOR FIRMS IN THE GLOBAL DIGITAL ECONOMY

by

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DECLARATION

I the undersigned hereby declare that the work contained in this study project is my own original work and has not been previously in its entirety or in part been submitted at any university for a degree.

OPSOMMING

Tegnologie is een van die belangrikste faktore in vandag se sakewêreld. Informatietegnologie speel 'n al groter rol in alle sakegebiede. Logistiek is daarby ingesluit, en is een van die areas wat die meeste deur tegnologiese verandering geaffekteer word. Sakeondernemings moet toenemend aanpas by die nuwe tegnologie om te kan voortbestaan. Die fokus van hierdie werkstuk is om firmas bewus te maak van die voordele wat informatietegnologie inhou en hoe ondernemings daarby kan baat. Daar word gepoog om firmas bewus te maak van die wye verskeidenheid tegnologiese produkte wat bestaan, en hoe hulle aangewend kan word om besigheidsprosesse te verbeter. Daar word riglyne vasgestel wat firmas die geleentheid bied om tegnologie doeltreffend in te span en om 'n ingeligte keuse te kan maak. Die rol wat die Internet in logistiek en die sakewêreld speel word ook bespreek, asook die effek wat elektroniese handel op logistiek het. Riglyne word ook verskaf oor die implementering van 'n stelsel wat elektroniese handel moontlik sal maak. Die inligting wat verskaf word kan firmas help om hulle strategieë doeltreffend te beplan en om sodoende sukses te behaal in die globale digitale ekonomie.

ABSTRACT

Technology has become one of the most important factors in the business world today. Information technology is playing an ever-increasing role in all areas of business. Logistics is no exception, and is one of the areas most affected by technological change. Many firms need to adapt technologically, or they might face extinction. This study aims to make firms aware of the power of information technology and the benefits it holds for those who use it. It tries to inform firms about the various uses and applications that exist and how they can improve business processes. It sets guidelines for the implementation of information technology and allows the firm to make an informed choice. It also discusses the growing role that the Internet is playing in logistics and the business world as a whole. Tips for the implementation of an electronic commerce system are also given, and the effects of electronic commerce on logistics are discussed. The firms can use the information to plan their strategies more effectively and hopefully find success in the global digital economy.

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CHAPTER 1

INTRODUCTION

There is no doubt that the business world has seen some rapid changes in the last decade. Many of the changes are due to the enormous advances in the field of Information Technology (IT). The changes have caused many smaller firms to struggle to remain competitive. The aim of this study is to provide these firms with guidelines that will allow them to incorporate IT in an efficient and effective manner, which will allow them to remain competitive. These guidelines will aim to inform firms about how IT can help them achieve greater success, how to go about incorporating the changes, and what other avenues can be explored to expand and improve their business.

There is an old proverb that states that the only thing we can be absolutely sure of is change. In the modern business world this is truer than ever before. Business techniques and strategies are changing on what seems to be a daily basis. The catalyst for these changes is often the developments in the field of IT.

IT has become commonplace in the business world, and many smaller firms have had to adopt a sink or swim attitude. This has meant that they have had to invest in expensive technology to be able to remain competitive. It is important to realise that having a Personal Computer (PC) that does daily invoicing does not mean that the firm is technologically geared to take on the global market. Expansion on greater scale is required, and some large capital investments have to be made. The key is to make the right decisions about the technology that will be purchased. The firms that are still sceptical have to be made aware of the capabilities of some applications, and how these applications can transform their business. More often than not the applications are geared towards changing or improving the logistics of the firm. This in turn leads to the desired improvements and competitive advantage.

One advantage that these smaller firms have is that it seems to be easier to expand one's market these days. The introduction of the Internet has brought about a global society that has seen traditional market boundaries almost disappear. The modern transport infrastructure also allows firms to be able to deliver to remote markets with greater ease. Unfortunately many firms still embrace a negative attitude towards this sort of expansion. Entering the global market is not done without facing some difficulties, but with the right strategies and systems in place it can be done.

Chapter 2 addresses the various logistics strategies that firms should consider and how these strategies can help them gain a competitive advantage. These strategies must be in line with the firm's plans to expand – be it nationally or globally.

Increased competitiveness has led to a focus on customer service, since this area has been the one affected most by technological advances. Customer service is a key element in obtaining an advantage and being successful. In chapter 3 the various impacts that IT has on industries, competition and competitive strategies is discussed.

Once the firm has accepted the idea that technology will play an integral role in its future, it has to go about incorporating it in the firm. Chapter 4 deals with the plans to implement IT and discusses the possibility of outsourcing the IT function.

Chapter 5 provides the firm with some of the key factors to consider when it installs hardware/software. It also examines the unique growth phase that a system can go through after being implemented.

Chapter 6 deals with Electronic Data Interchange (EDI), bar-code scanning and Enterprise Resource Planning (ERP) software, tools that have helped to propel logistics into the twenty first century.

Chapter 7 looks at the future of logistics and the Internet. It starts off by briefly explaining how the Internet came about and how it works. The effect the Internet has on the firm's business and logistics processes is also discussed.

Chapter 8 looks at a new phenomenon in logistics, namely e-commerce. A brief explanation of e-commerce is followed by some strategies firms might wish to employ if they are considering entering the world of e-commerce.

Finally a brief case study of Cybercellar, an online store, is included in chapter 9 to give firms an idea of the possibilities that exist in e-commerce and what can be achieved with proper planning.

CHAPTER 2

LOGISTICS STRATEGY AND PLANNING

In any firm the whole logistical process has to be carefully planned to ensure that the desired goals are reached. Most firms realise that the aspect of customer service is a very important area of differentiation. If a firm has superior service it is more than likely to attract more customers. The logistics process is made up of several key elements, which all serve to improve service and keep costs to a minimum. In today's business world there are many ways in which information technology (IT) can assist in this venture.

Customer service is a key issue these days and logistics acts as a tool to improve customer service levels. In the logistics process itself there are three key elements that can affect performance: transport, inventory and location. Strategies concerning these areas will help bring about savings in terms of time and money. It is important to know exactly what these strategies are, since we must incorporate technology to help reach these goals.

Firstly we must examine the common trends when looking at customer service and the firm's goals in this matter.

2.1 CUSTOMER SERVICE GOALS

Ultimately all firms strive to offer the best possible service to their clients. How firms define the best service levels and achieves them is something only they can control. One thing is absolutely certain, competition has increased due to globalisation, and firms will only survive if they aim to offer better services than their competitors. There seems to be a number of ways to do this, with IT playing a major role in ultimate success.

According to Ballou (1999:82) there are three main elements of customer service: pretransaction, transaction and post-transaction. The pretransaction phase sets up the customer's initial feel of what to expect. Most firms will establish some sort of environment regarding their service by carefully setting out service policies and goals. These policies will be made known to the potential customer. Internally there will be procedures set out which will direct staff on how to deal with possible problems. This will include complaints, returned goods, damaged goods, etc. Although IT might not have a role to play here it is important for the firm to pay attention to this crucial aspect of customer service. Quite often, if the proper procedures and goals are not set in place, difficulties arise when customers approach the firm with problems.

The transaction phase looks more closely at the actual workings of the system. Here the firm can make a huge difference by effectively managing all areas concerned with this phase. One of the most important elements is order processing. If the proper systems are not in place it can cost the firm time and money. IT can play a massive role in the preparation, transmittal, entry and filling of orders. Electronic Data Interchange (EDI), bar-code scanning and Automated Storage and Retrieval Systems (AS/RS) are all examples of how IT helps to speed up processes, and at the same time making them more accurate. Information on the advances in these fields, and how they assist us, will be given in chapter 6. Another vital part of the transaction phase is the choice of transportation mode. With the advent of intermodal transport, the choices are almost limitless. A trade-off exists between financial costs and savings/benefits in time and customer service. A third aspect to consider is stock levels. Keeping stock can help firms offset any sudden problems created by extra demand.

The final phase in the transaction process is the post-transaction phase. These are basically the actions that go towards fulfilling goals mentioned under the pretransaction phase. Here the focus is on ascertaining that the proper systems are in place to deal with problems, and that employees make use of the facilities. It is also concerned with the support services some firms might offer – commonly referred to as after sale service. These services are common

amongst car dealerships and products of a technical nature (e.g. computer software/hardware).

Co-ordination of these phases brings about high service levels and customer satisfaction. The three phases also play an important role in determining the order cycle time – especially the transaction phase. Order cycle time refers to the total time taken from when the order is placed until the product is delivered. According to Ellinger, Daugherty and Gustin (1997:130) surveys suggest that, according to customers, order cycle time is the most important factor contributing to good service.

Based on the statements made above, it is logical to assume that bad service will lead to a loss of income. Bad service will often lead to a decline in sales and a loss of customers – both current and prospective ones. Marketing textbooks often refer to the negative effects of unsatisfied customers. A customer who has had a bad experience could lead to a loss of many more prospective customers. People are more likely to share information about bad service experiences than spreading the word about excellent service. It costs the firm more to retain a customer who has had a bad experience, than it does to generate new customers.

To avoid situations like these firms continually have to strive to maintain high service levels. IT does help to speed up these processes, and deliver more accurate information. IT can help in the consumer's day-to-day shopping experiences where retailers have installed systems to speed up operations at the checkout points. Point Of Sale (POS) systems that use bar-code scanning are an example. Quite often these systems are connected to a central database that contains a variety of information about the product. The particular product's stock level can be part of this information, and information about shipments that need to be sent can be passed on to the supplier through an EDI link to prevent an out of stock situation. IT also helps certain suppliers track and trace their shipments so that they can offer clients accurate, up to the minute information about the status of their shipment. UPS and FedEx are two prime examples of carriers who employ this technology. Both firms use bar-code scanners

throughout their system to transmit information to their global computer network. Customers can access their website and trace their shipments all over the world.

Another trend with firms is to form alliances or partnerships with members of the supply or distribution channel. These alliances allow the firms work more closely towards a common goal. In this type of arrangement there has to be a high level of co-operation and sharing of information between the partners. If the union is a good one, and all the entities strive to make things work, an influx of new customers will soon become a reality. One aspect that does require attention is the level of integration. Often high levels of integration lead to better results. This gives rise to the problem associated with the compatibility of systems. The firms must ensure that their IT systems are compatible and that procedures are properly defined and co-ordinated.

Once the firm has set its goals regarding customer service and the proper technology has been incorporated to help achieve these goals, the next step is to consider the other vital strategies in the firm's business plan.

2.2 THE TRANSPORTATION STRATEGY

Transport is the most important cost element in the logistics process. Transport can make up a big portion of the overall cost of a product. From a strategic point of view transport plays an important role. When considering customer service, transport can assist in the reduction of order cycle times, and help to improve service levels. Transport is a key factor for firms that are looking to expand and enter new distant markets and be competitive in those markets. If transport is used to operate in other markets, it could bring about economies of scale. If the right modal selection takes place, transportation costs can be significantly reduced, and products could even become cheaper (Ballou, 1999:135).

There are many strategies involved in selecting a suitable mode of transport. If the firm would like to offer superior service then the aim is to select the best

overall transport service that is available. This includes the price, the average transit time and the safety record of the carrier. The safety record is important since the firm would like to minimise the loss and damage to goods in transit. It is important that the carrier understands the objectives of the firm and acts accordingly (Ballou, 1999:137).

More and more firms are building up strategic alliances with carriers to ensure that their goods are transported quickly and efficiently, and that the required quality services are delivered. The logistics system is comprised of a number of elements that have to operate efficiently to ensure success. Firms are realising that close relationships with the members of the supply chain can lead to greater efficiency, which will in turn boost customer service and lead to more sales. Transport is a key element in this chain and many firms are outsourcing the transport function to professional carriers who can offer the best services. The firms tend to form an alliance and co-operate closely to achieve maximum success. In order for the firms to achieve success they need to focus on eight key factors. These factors are:

- *Individual excellence* – both parties should be market leaders and aim to achieve some positive results from their alliance.
- *Importance* – the alliance must be part of the firm's strategy, and it therefore has to do all it can to make the endeavour a success.
- *Interdependence* – the partners must work towards a common goal and be able to assist each other.
- *Investment* – the firms should invest in each other financially to show their commitment to the relationship and each other.
- *Information* – it is vital that effective communication exists between the parties.
- *Integration* – partners teach each other about their methods of operation to facilitate understanding and run things more smoothly.
- *Institutionalisation* – the relationship is made formal.
- *Integrity* – the partners have to honour and respect each other and work towards the benefit of both parties.

(Bowersox & Closs, 1996:100)

The move towards integrated supply chain relationships is very common in the world of business today. Many firms are focusing on their core business activities and outsourcing other areas of their operations to experts. The concept of outsourcing will be discussed in more detail in chapter 4.

Another aspect for firms to consider is the intrinsic advantages/disadvantages of each mode of transport. Road transport is the primary choice, but with the advances in intermodal transport, combinations of modes are possible. Once again the firm must consider the costs, transit times and service levels to make the right choices. Ballou (1999:149) suggests that a firm could meet their service objectives by owning and controlling their own fleet of vehicles. A number of advantages accrue by having dedicated vehicles that are available solely for the firm's purposes, but there are also disadvantages. Costs are a major stumbling block, as are all the related administrative tasks. Routing and scheduling also become a headache. There are many software applications that allow firms to set up schedules and determine routes by means of the computer. The common finding is that these applications are effective, but sometimes an experienced person can set out a route that might be slightly quicker and cheaper. This however depends on the number of vehicles, customers (drops) and time constraints. IT has made rapid advances in this field and is a definite benefit to those who are novices and do not have access to qualified, experienced personnel.

2.3 THE INVENTORY STRATEGY

A firm's inventory strategy plays a major role in their overall strategy. On average inventory costs account for 25% of the total logistics costs (Ballou, 1999:245). The firm's inventory policy will be dictated by the network structure and desired levels of customer service. If the firm carries excessive inventory to cover up its logistics network inefficiencies, it will only increase the overall logistics costs of the firm (Bowersox & Closs, 1996:30)

The ultimate goal of the firm's logistics strategy should be to reduce costs and promote efficiency. The amount, type and assortment of stock will have a direct effect on the transportation and warehousing costs.

Transport costs are affected by the volume of the goods and the number of trips that have to be made between warehouses and delivery points.

Having an inventory gives rise to the need for a warehouse, which gives rise to many costs. The firm's strategy can either reduce or increase these costs. The most common cost associated with warehousing is the capital costs of the warehouse. This cost can be avoided by exploring the possibilities of leasing a warehouse, or by making use of public warehouse facilities. The public warehouse could prove to be a viable option, since it provides the firm with the storage space, materials handling equipment and staff. A situation could arise where the area that the firm has chosen for the warehouse might not have any of these two options available. In some cases the firm needs the warehouse as part of the production process, as is the case with cheeses and wines. In these cases the firm has to build its own warehouse (Ballou, 1999:246).

The capital costs of the warehouse have already been mentioned, but other costs are also involved. The main cost component is that of the materials handling equipment. The materials handling equipment plays a very important role in the logistics process and exceeds \$ 50 Billion annually (Lambert, Stock & Ellram, 1998:310). Poor handling of goods can also lead to product damage and inefficiency (Bowersox & Closs, 1996:32).

Bowersox and Closs (1996:419) have identified the three main handling requirements within the warehouse:

- *Receiving* – unloading the goods that are received.
- *Instorage handling* – movement within the warehouse, normally consisting of transfer and picking.
- *Shipping* – checking and loading the orders.

The strategy of the firm can determine the amount of capital that will be spent on materials handling equipment, but if too little is spent overall costs could increase and negate the potential savings. According to Bowersox and Closs (1996:422), the following must be taken into consideration:

- *The equipment should be as standardised as possible.*
- *The system should provide a continuous flow of goods.*
- *The firm should invest more in handling equipment and less in stationary equipment.*
- *The equipment should be utilised to its full potential.*
- *Gravity flow should be incorporated in all the possible areas.*

As for the equipment, there are many different types, sizes and levels of technology. Equipment can be mechanised, such as forklift trucks, pallet jacks, conveyors and pick-to-light systems. Semiautomated systems that include Automated-Guided Vehicle Systems (AGVS) and robotics are also available. Finally, fully automated systems that consist of Automated Storage and Retrieval Systems (AS/RS) are also available. The firm has to decide upon the level of automation and the amount of money that it wishes to invest in its materials handling equipment. Fully automated systems will generally cost more, but they also could be more efficient (Bowersox & Closs, 1996:422).

Ultimately inventories are kept to provide the customers with a service and gain, or maintain a competitive advantage. Firms must realise the importance of inventories and view them as part of the total network and total costs.

2.4 THE LOCATION STRATEGY

Location strategy is a large determinant in overall costs. It shapes the logistics network design and is a major determinant of transport costs. Most of the theory surrounding the location strategies of a firm is of a quantitative nature. There are many mathematical models that can assist in determining the optimal place to set up facilities such as a warehouse, production plant or distribution centres.

Software applications have been designed to do the required calculations, with the objective being a reduction in transport costs and delivery times.

Attention must also be paid to the number of facilities that is used. The use of heuristic models and linear programming can assist in the choice of location. The number of warehouses will have many cost implications, but one important area is inventory costs. Having more warehouses should lead to more inventories and this will lead to increased inventory carrying costs. Since location plays such an important role in the overall logistics costs, it is important that the IT applications that are available are utilised to their full extent.

After considering the strategies that are important in a local environment, the focus will move to the strategies that should be considered by an expanding firm. An expanding firm refers to a local firm wanting to become a national player, or a national firm wanting to be a global player.

2.5 STRATEGIES FOR AN EXPANDING FIRM

The single most important change IT has brought about is the so-called 'global village'. IT has increased the market for products and advances in transport have helped to get the goods to these distant markets.

Firms wanting to expand their markets have to analyse the following:

- *The structure of the industry and the number of competitors.*
- *The supply chain in other markets, as well as the customers in other markets.*
- *The firm's relative cost position compared to established local firms.*
- *Whether it is possible to gain a competitive advantage in the market.*

There are two ways in which an advantage can be obtained. The first is to have products that cost less. Product differentiation is a second way of gaining an advantage. Product differentiation entails offering the same product, but with unique services or added extras.

According to Porter (1996:74) there are two key dimensions to a firm's global competitive strategy.

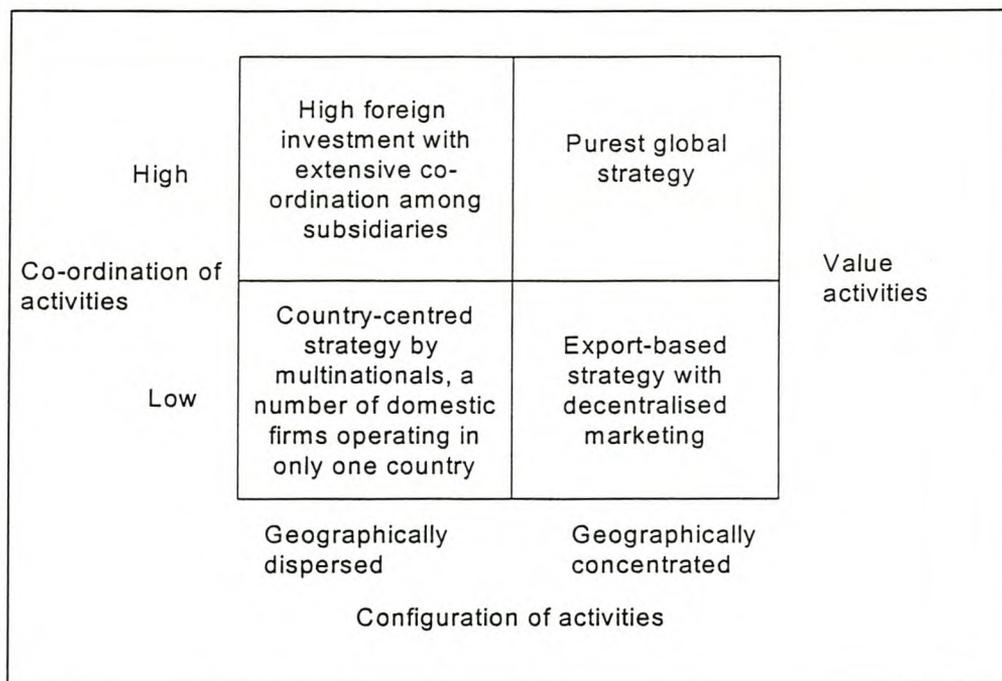
- *Configuration* – referring to the places in the world where activities take place and the number of places that exist.
- *Co-ordination* – how similar the activities are in each country.

Configuration can be central (doing all the activities in one location and serving the world from that location), or it can be dispersed (performing every activity in every country).

The policy on configuration can influence co-ordination. If the firm opts to disperse its activities it can allow each plant to operate differently. Alternatively, a high level of co-ordination can exist, and the different plants will have the same information systems, production processes, etc.

Figure 1.1 represents of the levels of configuration and co-ordination that can exist:

Figure 1.1: Types of International Strategy



Source: Porter (Deans & Jurison, 1996:77)

As mentioned earlier, firms can also enter into strategic alliances or coalitions with foreign firms. This would be especially helpful in environments where the market is difficult to enter due to cultural and legal differences in foreign markets.

If the firm does expand on a global scale it has to determine what sort of organisational structure it will have. If the firm adopts a global strategy, the organisational structures will tend to be similar in every subsidiary. In this case the firm must decide if it will have a central or dispersed configuration. If it opts for a dispersed configuration it will have to have high levels of co-ordination. If the firm decides to adopt a country-specific strategy, each firm will have its own organisational structures to cope with the local conditions. The firm will therefore have a dispersed configuration with low levels of co-ordination.

2.6 INCORPORATING INFORMATION TECHNOLOGY IN THE GLOBAL BUSINESS STRATEGY

It is apparent that IT can play an important facilitating role in a firm's global strategy. A prerequisite for a successful global strategy is the compatibility of the systems otherwise it will become a burden and a barrier. Managers must realise the need for IT to be globally competitive, and at the same time identify what systems are needed and how they will be incorporated. Once this has taken place the firm must reassess its strategies and make sure that IT is working to help achieve these goals.

Ives, Jarvenpaa & Mason (1996:143) state that each firm has what they call 'Global Business Drivers' (GBDs). GBDs are entities that benefit from global economies of scale and contribute to a global strategy. According to them, if IT is to be applied to add value, it must be done through the GBDs.

Some examples of GBDs are:

- *Joint resources* – human resources are probably the key GBD in any firm.
- *Rationalised and flexible operations* – rationalised operations disperse production throughout the world, relying on careful co-ordination and good

ties with suppliers and clients. Flexible operations move the production of goods from one country to another according to labour, raw materials and skills shortages.

- *Risk reduction* – the diversification of the firm's assets and their value.
- *Global products* – products that are identical across international boundaries, and help to build consistency amongst travelling clients.
- *Quality* – Total Quality Management is a key factor in globalisation, and is another key GBD. IT allows the firm to trace any product defects to the exact source of the problem.
- *Corporate customers* – firms that expand globally generally look for suppliers who are able to expand with them, and give them consistent service across the globe.

When approaching the issue of GBDs there are four key aspects to consider:

- *When incorporating the use of GBDs we must focus on the specifics of the firm, its suppliers, distributors, products and customers.*
- *Differences in other business units must be recognised, since this will give rise to other GBDs.*
- *Cultural differences might make it difficult to reach consensus about GBDs.*
- *Senior business management must get actively involved.*

Once all the strategies of the firm have been examined and decided upon, ways must be found in which technology can assist in reaching objectives. Compared to the way things were done in the past and how they can be done now with the help of IT, it is evident that IT makes the whole process easier, and often cheaper.

After focusing on the broader aspects of the business world, and certain strategies that have to be considered, attention must now be paid to the more specific business functions. IT plays a big role in the broader business decisions and strategies, but the main effects of IT can be seen in the day-to-day business activities, which will be discussed in the next chapter.

CHAPTER 3

INFORMATION TECHNOLOGY AND COMPETITIVE STRATEGIES

Chapter 2 focused on the various logistics strategies that firms have to consider if they wish to gain a competitive advantage. Transportation, inventory, location, customer service and IT are all important in determining strategy and ultimately gaining a competitive advantage. Each area affects the logistics process individually and as a whole. The aim of this chapter is to determine what effect IT can have on these areas of business and, in turn, how it might affect the firm's strategies.

3.1 GLOBALISATION AND INFORMATION TECHNOLOGY

In the business world today strategies are constantly changing due to the effects of IT. The biggest effect that IT has had was changing the marketplace into a global one. Companies now have to focus their strategies on a much wider scale. According to Bradley, Hausman & Nolan (1993:3): "technology enables firms within an industry to capture economies of scale and scope by going global; global firms rely on technological innovation to enhance their capabilities. Technology is thus both driven by, and a key driver of, globalisation."

Telecommunications is probably the prime example of this trend. A global firm definitely needs to have good communication between all its branches. In addition the improved communication can allow the firms to operate globally with different organisational structures in each country or business unit. The improved communication allows high levels of instantaneous communication between units to ensure a co-ordinated effort. With advances in the field of telecommunication direct links to suppliers, customers and business partners are possible. To allow for effective communication and collaboration, group

decision support systems, extranets and teleconferencing devices have been developed (Turban, Rainer & Potter, 2001:246). However, the prime catalyst in this area has been the Internet – a topic that will be discussed in chapter 7.

It is apparent that the incorporation of IT will somehow affect the firm's operations, but why do firms choose to employ new technology? There are many answers to this question, but some of the most common reasons include:

- *Improving products* – improvements include easier access to product information, technologically superior products and enhanced service features due to greater responsiveness to customer needs.
- *Catering more to the needs of the customer* – this is part of improving the product. Technology can assist the firm in producing products that cater to the exact needs of different customers.
- *Assisting in the maintenance of the product* – technology can help to diagnose problems and present solutions. Technology can also ensure that problems are detected early and corrected the first time.
- *Assisting the customer when purchasing the product* – there are three main areas where IT can facilitate this:
 - making products more readily available (inventory control systems)
 - electronic purchases (e-commerce, and EDI to some extent)
 - simplifying payment (electronic transfers)

(Alter, 1992:549)

While the effects of technology, and specifically IT, can be seen on the products their effects reach a bit further than that. IT not only affects products but can also change the firm's structure and business environment. Bradley, Hausman & Nolan (1993:5) state that IT can change business environments in the following ways:

- *Businesses will all be affected in some way - whether they are users of the technology or not.*
- *The fundamental structure of firms will be affected – improved communication will allow for more networked structures.*
- *Competitive strategies will change due to the effects of IT on industries and their structure.*

The last point is very important, since it is the key factor in determining the success or failure of a firm in the business world today. Industry structures are continually reshaped by the innovations in IT. Some of these changes will now be examined.

3.2 THE EFFECTS OF INFORMATION TECHNOLOGY ON INDUSTRY STRUCTURE

Due to the rapid improvements that are occurring firms will have to make more investments in IT in order to stay competitive. One of the effects of the improvements and innovations in the field of IT has been the creation of new industries (especially information driven industries) and the restructuring of old ones. Bradley, Hausman & Nolan (1993:6) define restructuring in this context as: "...the changing bases of competitive advantage in an industry and the fundamentally different ways in which buyers, suppliers, and rivals compete, cooperate, and, in general, interact with one another."

Many of the new industries that have sprung up offer services that complement existing industries and services (Bradley, Hausman & Nolan, 1993:14).

Information technology has gone from being an input to being a central business activity. Examples of these changes can be seen in almost every industry. The one industry that has been affected most is manufacturing. Because globalisation has increased competition, firms have had to expand and base major operations in other countries. These firms rely heavily on IT and telecommunications to co-ordinate their activities in remote locations. The manufacturing methods themselves have changed dramatically. The tendency is to rely heavily on computers to aid in the manufacturing process. Computer-Aided-Design (CAD) and Computer-Aided-Manufacturing (CAM) have become commonplace. The programmable machines have brought about manufacturing cells – factories within a factory. These cells are highly efficient, flexible, reliable and require low overheads. CAD also allows for the standardisation of products

and improvement of communication between design and manufacturing departments (Bradley, Hausman & Nolan, 1993:15).

The retail industry has also derived some benefits from the developments in IT. In an era where customer service is very important, responsiveness to customer needs is crucial. Many firms also realise that the speedier the response is the more likely that the customer will be satisfied. To ensure this 'quick response' firms require:

- *Specific products for specific markets.*
- *An information architecture that will accommodate all suppliers.*
- *A short-cycle replenishment system.*

Having this strategy is one thing, but some important systems need to be in place. Good partnerships with suppliers are essential. Alliances with the suppliers will stand the firm in good stead. If the firm can implement EDI and bar-code systems with their suppliers they can improve their responsiveness. Point Of Sale (POS) systems should also be implemented so that the firm can analyse sales trends. This will help to forecast demand and enable the firm to be responsive to customer requirements. The retail industry can also benefit from the implementation of CAD to improve design times and thereby speed up response times (Bradley, Hausman & Nolan, 1993:17).

Two prominent examples of the implementation of 'quick response' strategies are Benetton and Wal-Mart. Benetton has implemented CAD and other manufacturing technology as well as EDI to reduce their lead times drastically. Benetton uses EDI links to its stores to continually monitor stock levels. Benetton's one warehouse can supply any store in the world with extra stock. All of their garments are created on a CAD system that stores all the relevant information about the garment. If the warehouse has no stock available garments can be made and delivered within four weeks. If there is stock available it only takes seven days to replenish stock. Benetton has successfully employed EDI and CAD to cut lead times from 120 to as little as 7 days (Ballou, 1999:15). Wal-Mart uses POS technology and EDI in their stores. The POS and EDI data is sent to the suppliers to help them plan their shipments and manufacturing cycles. Due to the fact that everything is planned the stores and

their suppliers can save on warehousing costs. Stock levels will also be more accurately planned and very few stock-out situations will occur (Bradley, Hausman & Nolan, 1993:17).

These are just some of the ways in which IT can influence the structure and operation of industries. Firms tend to be more efficient and are able to reduce costs. Due to the fact that they are more efficient and responsive the firms also tend to be more competitive. All of the changes can be attributed to the influence of IT.

3.3 HOW INFORMATION TECHNOLOGY CAN AFFECT THE FIRM'S STRATEGIES

The ways in which firms have to adapt their strategies in the business world today were discussed earlier. The strategies discussed were of a more common nature. The strategies that will now be focused on are more specific, and involve the need for firms to adapt their competitive and co-operative strategies.

Firms employ technology to speed up processes, reduce costs and improve quality and customer service to remain competitive. As far as costs go IT can help to reduce inventory as well as overall costs.

Within the supply chain IT can be employed to build relationships, increase efficiency and reduce the day-to-day transaction costs. Technology can also be used to manage vertical relationships between business partners aimed at gaining competitive advantage. Horizontal relationships are aimed at gaining economies of scope. To allow the effective co-ordination of the horizontal relationship firms absolutely have to employ IT and telecommunications (Bradley, Hausman & Nolan, 1993:19).

3.4 THE DIFFICULTIES OF MAINTAINING A COMPETITIVE ADVANTAGE

Technology can help a firm gain that all-important competitive edge. One problem that all firms face is the rapid improvements that occur on an almost daily basis in the IT field. Technology that could assist in giving the firm a competitive advantage today will probably be outdated by next month. This is a very problematic issue for most firms. Another factor that contributes to the difficulty of maintaining an advantage, is the rapidly growing size of markets.

Competitive advantage can be achieved by lowering your costs, or by differentiation. Exploiting the economies of scale, lowering transaction costs and effectively managing partnerships with suppliers can lower costs. Differentiation entails a broadening of normal business activities to respond to customer needs or improve on quality or product features.

As already mentioned, the problem with most technological applications today is their very short life span. Investing in the best equipment can give a firm a definite advantage, but more often than not this advantage is short-lived.

There are other factors that can lead to a loss of the competitive advantage. Bradley, Hausman & Nolan (1993:21) highlight some other factors that make it difficult to sustain a competitive advantage:

- *Imitation* – some methods that give a firm an advantage can easily be imitated and no patents exist to curb this.
- *Substitution* – if the method is too complex to imitate, technology can often find a way to substitute the method. A good example is FedEx, who is under threat due to the proliferation of faxes and e-mail.
- *Hold-up* – a party that is a key supplier of a resource can withhold key information or resources to ensure that they receive a cut of the profits. While this is taking place other firms might be developing systems that help them gain an advantage.

- *Slack* – this occurs when the market leader becomes complacent and does not continue to explore other avenues that will lead to greater efficiency. The competition will soon catch up and might even surpass him.

These are just a few selected examples of how difficult it can be to maintain a position of superiority. It goes without saying that with technology improving as rapidly as it currently is, firms will be faced with more challenges each day.

CHAPTER 4

REENGINEERING THE FIRM TO INCORPORATE INFORMATION TECHNOLOGY

Any decision by the firm to alter some of the existing strategies will definitely bring about great change within the firm. The day-to-day operations of the firm will most likely change, as will some of the existing structures within the firm. In this chapter these issues will be discussed. First, attention will be given to the way in which the firm must plan for the implementation of an information system. Secondly, the options of outsourcing the IT function and how this can affect current structures and methods will be discussed.

4.1 PLANNING FOR THE IMPLEMENTATION OF INFORMATION TECHNOLOGY

In the previous chapter the ways in which IT could assist the firm in improving their current business processes were discussed. If the decision is taken to incorporate the specific system, it will often lead to a change in the way business processes are handled. The corporate structure will often undergo some changes as well. It is rather obvious that the implementation of IT will be part of the firm's business plan. The main aim will be to gain a greater competitive advantage.

According to Alter (1996:558) IT has to be linked to the firm's Critical Success Factors (CSFs). CSFs are factors that ensure the success of the firm's operations. CSFs vary from firm to firm and industry to industry. The CSFs can stem from the structure of the firm, its competitive strategy, its market position or temporary operating problems. Identifying CSFs can help the firm with the implementation of IT. Some examples are the improvement of customer relationships, improving relationships with suppliers or using capital and human

resources efficiently and effectively. The firm can go about the process as follows:

- *Identify the primary mission of the firm and objectives that define satisfactory performance levels.*
- *Identify CSFs.*
- *Identify measures of performance.*
- *Develop systems to collect and use the data.*

Using the CSF method only allows the firm the opportunity to identify the information that will be necessary in critical areas. No attention is paid to how the system should be constructed. In order for this to happen the firm needs to clearly define its business objectives. If these objectives have been identified and clearly spelt out it will be easier to construct the information architecture.

According to Alter (1996:560) the information system architecture should answer the following questions:

- *What data will be collected?*
- *Where and how will the data be collected?*
- *How will it be transmitted?*
- *Where will it be stored?*
- *For what applications will it be used, and how will these applications be related?*

According to Alter (1996:560) IBM has identified five key steps in planning an effective information architecture, they are:

- *Define business processes;*
- *Define business data;*
- *Define the current information architecture;*
- *Define the business objectives and environment;*
- *Recommend an information architecture for the future.*

The incorporation of IT will bring about many changes in the firm and it is important that the management and staff are aware of the amount of change that will occur. A team effort is required to ensure the success of the entire

operation. Some practices will change due to the automation of the system, requiring training and reengineering of the business process if necessary. Further changes could involve downsizing the current labour force, outsourcing the IT function or the formation of strategic alliances.

The possible decisions do not end here, as there are many other issues to consider. One of these issues is the location of the information system. Alter (1996:563) highlights the importance of deciding on a centralised or decentralised system. The decision affects efficiency and effectiveness. A centralised system allows for greater efficiency, while a decentralised system leads to better effectiveness. The differences are quite obvious: a centralised system contains all the hardware and software in one location, and a decentralised system has hardware and software components at each office/store/depot. The problem that a firm has to address in this situation is the level of customer service it wants to provide. With a decentralised system each store can offer exceptional service to its clients, but there could be compatibility problems. A centralised system eliminates the compatibility problem, but could cause a problem when local differences need to be addressed. Firms often opt for a 50/50 type of situation, with some degree of centralisation and decentralisation present.

According to Copacino (1998:36) a firm that wishes to install an information system today has to include the following four elements:

- *Enterprise Resource Planning (ERP) software* – this will help to link departments and is a key factor in global competition.
- *Decision support software* – allows for supply chain optimisation and demand planning. It can often also perform various forecasting and planning functions, and should be compatible with the ERP software.
- *Management and logistics execution software* – normally controls functions such as warehousing and transportation.
- *Channel integration software* – EDI applications, Collaborative Planning, Forecasting and Replenishment (CPFR) software and Internet-based applications. This will allow for the more effective management of the supply chain.

The actual selection and implementation of a system will be discussed in chapter 5. In the next section the focus will be on the outsourcing of the IT function, an aspect that could affect the firm's structure.

4.2 EXPLORING THE POSSIBILITIES OF OUTSOURCING

Many firms believe that they do not possess the necessary resources or skilled staff to have their own information systems in place. In cases such as these, the firm will normally outsource the IT function. The decision to outsource is not an easy one, and a right answer does not exist. One thing is certain: outsourcing the information system will bring about some changes to the firm's structure and operating procedures. The firm now not only has to decide whether to outsource or not, but it has to consider the possible effects on the firm's operations.

Outsourcing basically involves the delegation of all tasks/responsibilities associated with the provision of IT services to a third party. Willcocks and Lacity (1998:4) have identified four possible outsourcing strategies:

- *Contract-out strategy* – the firm sets clear objectives as far as their IT needs are concerned. The contract goes to the specialist who can best meet their needs at the lowest costs.
- *Preferred contractor strategy* – a long-term relationship is built with a vendor who manages and delivers the IT activity. This method tends to minimise risk.
- *Buy-in strategy* – certain IT specialists (like programmers) are contracted to perform a temporary function in the firm.
- *Preferred supplier strategy* – a very close relationship is built with the vendor so that any new technological developments can be utilised to the benefit of the firm.

The contract-out and preferred contractor strategies are more indicative of the normal outsourcing procedure. The preferred supplier strategy rather acts as a strategic alliance.

There are many reasons for the firm to consider outsourcing. As mentioned earlier, one of the reasons would be the apparent lack of in-house expertise. Another reason could be the desire to concentrate on their core business activities. This reason specifically is the main argument in favour of outsourcing. Many firms make use of outsourcing in the modern business world. In the transport and logistics industry this is more evident than in any other. Firms are realising that their main business activity is the transportation of goods and not the management and development of an IT department. Willcocks and Lacity (1998:7) provide four other reasons for outsourcing:

- *The bandwagon effect* – the tendency to follow the example of other firms in the industry;
- *Cost reduction/containment*;
- *New forms of organisation and management* – a strategic move;
- *The information systems 'money sink'* - getting rid of a function that is troublesome and costly.

4.2.1 THE ADVANTAGES OF OUTSOURCING

One of the primary reasons in favour of outsourcing is the possible reduction in costs. Costs can be eliminated by allowing the IT vendor to supply its own trained staff. Outdated hardware can be scrapped, and new systems can be leased. If the firm is able to focus on its primary business activity, the vendor can do the same. This will enable the vendor being able to keep abreast of the latest IT developments. These developments can be utilised in the firm to the benefit of both parties.

Outsourcing the IT function will allow the firm to gain expertise from experienced professionals. This expertise will often assist the firm in finding solutions to their problems, leading to improved business practices. This will help to improve service quality and productivity.

Another strategy behind outsourcing is the reduction of risk. Normally the risk will lie with the vendor, improving the risk position of the firm. This increased

security can give the firm the opportunity to change infrastructure to harness new technology or opportunities.

Outsourcing the IT function will bring about changes. These changes will occur at a great pace. Firms often decide on a strategy, but are slow to implement it. If the function is outsourced, the vendor will use its expertise to enter the firm and change the necessary rules and methods. As mentioned, the vendor will also be more likely to do so at a greater pace and with greater ease.

If the firm is only considering outsourcing, the mere thought can be of assistance. Part of the whole process involves obtaining quotes from suitable vendors. During this process the firm can 'take stock' and assess its position.

One of the advantages of outsourcing is the ability of the firm to concentrate on their core business functions. The advantages of outsourcing will also be evident within the firm. Senior managers will be allowed to concentrate on their departments and the specific issues within that department. The IT functions would be controlled by another department/manager, this will ease some of the burden on management and staff. This can also be a source of motivation in some firms (Willcocks & Lacity, 1998:61).

Unfortunately outsourcing also has some negative aspects to consider.

4.2.2 THE DISADVANTAGES OF OUTSOURCING

In some cases outsourcing can lead to higher costs. This is due to the high fees that specialists demand for their services.

Although outsourcing can reduce some risk aspects, it can also lead to increased risk. As with any strategic move there will be an element of risk that has to be endured. The risk could vary from bad service on the part of the vendor to outside staff causing the firm problems. One of the biggest risks is the complacency of the vendor, and his inability to find the best solution for the firm.

A disadvantage of outsourcing that can also be linked to the risk factor is the tendency of the firm to lose track of what is going on in the world of IT. If the firm places all its faith in the vendor, it could become disinterested in the technological developments that are taking place. In cases such as these, the firm might not be aware of the fact that they are being left behind. Another problem could develop if the firm later decides to take on the role of provider of the IT services itself. If the firm has outsourced every aspect of the IT function, including staff, it could find itself to be in need of skilled labour.

Another disadvantage is the loss of flexibility. If the firm had to reverse its outsourcing decision, the firm could be in a position where it has no trained staff nor any hardware and software. Further complications can arise when negotiating contracts, leaving the firm with its hands tied.

Outsourcing the IT function can also lead to more administrative work and the hiring of staff could become more complex. The vendor's performance will also have to be monitored and evaluated at regular intervals, leading to more work than previously anticipated (Willcocks & Lacity, 1998:64).

Outsourcing the IT function is by no means a decision that can be taken hastily. It can also not be taken after listing all the advantages and disadvantages. A very detailed analysis of the situation is required. The firm must compare its IT resources to those of its competitors. This will require a detailed analysis of its costs, productivity, quality of staff and position in the market. The firm also needs to gain some knowledge of the various IT options that exist. A good approach would be to gain some sort of working knowledge about the vendors most suitable. The knowledge that the firm gains can assist in finding the right vendor, and assessing whether the vendor is in fact looking after the needs of the firm. If the firm has had some prior business relationship with the vendor it would be very advantageous. The firm might be able to obtain some sort of discounted rate. The firm will also benefit from this relationship by knowing the methods of the vendor and being sure of the fact that the vendor will comply with the exact needs of the firm.

Outsourcing is a very contentious issue and should be approached with some caution. If the firm blindly rushes into a situation it could end up being a very costly error. The alternative to outsourcing is an investment by the firm in IT infrastructure. This will be discussed in chapter 5.

CHAPTER 5

IMPORTANT FACTORS TO CONSIDER WHEN PURCHASING AND INSTALLING INFORMATION TECHNOLOGY

Not all firms will decide to outsource their information technology resources. This will result in the firm having to invest in its own hardware and software. In this chapter the aim is to provide some guidelines as to what is important, and what should be studied carefully before purchasing any hardware or software. The purchasing of hardware and software and the outsourcing process is linked to the final implementation of the system. Finally the stages of growth of the IT system in the firm will be addressed.

5.1 PURCHASING SOFTWARE

Although the reference is made to software, it can incorporate hardware as well. Factors that are common to both hardware and software areas were dealt with in section 4.2. These 'common knowledge' factors like the specific function of the software, the firm's budget, etc. are normally easily decided upon. One area where firms often do experience some difficulty is where to start, or how to go about selecting a software application and a suitable vendor.

Once the firm has set the guidelines as to what the required software should do, they can start exploring the market. The best alternative is trade shows where one can often see live demonstrations of the product. The Internet can also act as a good source of information, but one has to know where and how to find the information. Another alternative is computer magazines and other similar journals. There are also consultants who are able to give accurate information about the products most suited to the firm's needs. Finally the firm can conduct a brief survey to determine what their competitors and other firms in the industry are using.

Once the firm has found suitable candidates, it is imperative that some form of contact is established with the vendors. The firm should ask the vendor for some background information about their operations. William Sperbeck (2000:1) the president of LIS (Logistics Information Services) advises that the profile should at least include:

- *A description of the firm's corporate structure.*
- *The documentation and training that the firm will provide.*
- *A demo disk of the software, to verify if the hardware is compliant).*

This information will allow the firm to set up a shortlist of the most likely candidates. The vendors on this list must be studied critically. Not only must the firm find out what the general perception of the firm and its product is, but they must also find out the more in-depth details. This is necessary because nobody wants to invest in a product if the firm supplying it will be bankrupt in a month or two. The financial status of the firm is therefore one of the most important things to look at. Sperbeck (2000:2) also lists some other general points to consider:

- *Number of locations;*
- *Ratio of programmers to salespeople;*
- *Hardware required to run the software;*
- *How the data will be loaded;*
- *Whether the configuration allows for expansion;*
- *Whether it is easily upgradeable;*
- *The language the software is written in;*
- *A list of current users of the system.*

The last item on the list will provide the firm with the most accurate idea of what type of company they are dealing with. The firm can also ask the vendor to perform some basic, as well as more complicated tasks with some data. This will allow the firm to see exactly how the system will manage, interpret and process its data.

If the decision has been made to purchase software from a specific vendor, a contract must be entered into. The firm must make sure that the contract

contains absolutely everything that is relevant and vital to the transaction. Sperbeck has set up a very handy checklist for the whole process:

- *Define the system's requirements* – this has already been discussed in section 4.1, but basically entails answering the following question: “What processes are you currently using, how should the system fit in and what will its function be?”
- *Create a requirements document* – this basically entails writing down the specific requirements the firm has identified.
- *Identify candidate software packages.*
- *Assess support needs* – in this very important step, the firm needs to find out what manuals, modifications to the current system, installation, training and maintenance needs have to be met.
- *Make a package selection* – this requires the vendors to submit proposals, which will be scrutinised. The vendors must also be thoroughly checked, and a cost-benefit analysis of each package must be performed.
- *Negotiate a contract* – which should specify prices, the programming language to be used, support services offered and performance guarantees.
- Install the package, and
- *Perform package testing* – these last two areas will be dealt with in more detail in the next section.

5.2 INSTALLING SOFTWARE

Regardless of the decision to outsource or to buy software, the firm will reach a point where the system will be installed. The installation and implementation of the system can provide more headaches than any of the other topics discussed so far. To eliminate some of the headaches the firm should set some specific goals for the installation of the system. If the process follows some sort of schedule it might just prevent some costly errors and other hassles. Installation of the system does not happen overnight, it can take months before completing the process. This is exactly why firms need a proper schedule and contingency plan.

Du Plessis (1994:57) provides some helpful advice about the planning and final installation of the system. Communication is the key element in the installation of the system. The firm needs to communicate its needs to the vendor. The firm has to keep the staff and all the suppliers and clients properly informed. Employees will play a critical role in the success of the installation process. For this reason the firm should avoid any negative attitudes or influences from the staff. It is absolutely vital that the firm delays any retrenchment of staff until the system has been installed and is operational. If the firm retrenches staff during the process it will create a negative atmosphere as all the staff members will fear for their positions. The staff also needs to be informed about their specific role in the 'new' system and proper training (if necessary) must take place. It is vital that the staff has a working knowledge of the system, and training on the proper hardware and software is crucial. Communication with suppliers and clients is also important. They must be made aware of the fact that a new system is being implemented so that if any problems were to arise they would understand.

It is important that sufficient testing of the system takes place. This will help to iron out any problems. If necessary, the old system can be run in conjunction with the new one until the firm is certain of its capabilities. The final implementation can occur in one (hopefully smooth) step as mentioned, or by simply switching directly to the new one. The latter is not always the chosen option, and many firms opt to implement the system step by step.

Once the system has been fully installed and has been up and running for a while, the final evaluation has to take place. This is where the firm evaluates whether the system is indeed operating as it should. This is probably the most nerve-wracking part of the process – especially if some problems occur.

If all of the above steps have been taken care of, one important step remains – proper maintenance of the information system. Maintenance is an area that is often neglected by management. An information system is similar to a motor vehicle; it too needs constant maintenance. The firm has to ensure that the

information system is running smoothly. Maintenance entails repairs to the hardware, software updates and hardware upgrades.

5.3 THE STAGES OF GROWTH OF INFORMATION TECHNOLOGY IN THE FIRM

Ideally any firm incorporating IT would like the system to be as close to perfect as possible. This does not happen very often in practice, and firms tend to go through several minor crises before reaching the perfect scenario. If the firm is not merely incorporating a new system, but also doing so for the first time, it can experience some sort of growth pattern of IT in the firm. As the firm begins to harness the power of the system and build on it by automating more areas in the firm, it will often become more crucial in running the firm. The system can thus start off being a business application and after a while end up being the driving force behind the firm.

In previous sections the discussion focussed on the importance of planning the incorporation of IT in the firm. No matter how much planning is done, IT will still tend to go through this evolutionary process. Galliers and Sutherland (1999:41) have built on the ideas of several other experts in the field of IT, and have devised a "Revised Stages of Growth Model". In this model they identify six main growth/evolutionary phases of IT in the firm, namely:

- *'Ad hoc'ocracy*;
- *Starting the foundations*;
- *Centralised dictatorship*;
- *Democratic dialectic and co-operation*;
- *Entrepreneurial opportunity*;
- *Integrated harmonious relationships*.

When developing the model, Galliers and Sutherland also relied on the research of McKinsey and Company. Their management consultancy experts have identified seven key areas in business operations. These seven areas are referred to as the "Seven Ss". The "Seven Ss" are:

- *Strategy,*
- *Structure,*
- *Systems,*
- *Staff,*
- *Style,*
- *Skills, and*
- *Superordinate goals.*

The model that Galliers and Sutherland have devised is quite comprehensive. A summary of the central idea of the model follows.

5.3.1 'AD HOCRACY'

This is a stage that can hopefully be avoided by all firms. There is often not an exact strategy regarding IT, and hardware and software purchases are made at random. In this stage the firm often does not appoint any IT specialists to oversee the function in the firm. The random purchases that are made are normally standard packages that deal with inventory, payroll or accounting functions. The software can assist the firm, but is in no way the ideal solution. The software is also purchased and installed without any prior planning. One of the main concerns is the fact that the new software is incompatible with existing software or systems. The whole system is unconnected and everything happens in an uncontrolled fashion, leading to inefficiency.

Management often shows a lack of knowledge about all the IT applications that are available and the different uses for each application. The lack of knowledge seems to be of little concern to management, who seem to focus on what IT can do for certain areas of the firm rather than the firm as a whole. The managers in charge of the IT function will tend to run their department without any concerns for the needs of other departments. This can cause conflict within the firm, and complicate the tasks of other departments.

5.3.2 STARTING THE FOUNDATIONS

If the firm were to invest in IT for the first time, it would be advisable to skip stage one and try to begin at stage two. In this stage the firm would have actually set certain goals and focussed more on IT as part of the firm's operations.

The firm will firstly focus on obtaining staff with the proper qualifications so that they could run the IT department. This would then obviously also entail a shift towards products that meet the needs of the firm more closely. The main objective is to increase the productivity of the firm. Although specialists will be employed and the firm will have a specific department dealing with IT issues, this department will still act as a subdivision of another department. This department will often be known as the Data Processing (DP) department.

The software purchases that are made will often be unnecessary, and be made with a false sense of security. If the previous applications have provided the firm with some success, they will tend to feel that more IT applications can lead to even greater success. The investments in new applications will often still leave gaps, and at the same time overlap certain current systems. The applications will still be focused on some operational activity within the firm, not on the firm as a whole.

The new department will incorporate a DP manager with system analysts and designers. The IT staff, while trying to meet the needs of the firm, might ignore the needs of the end users. Although the firm's IT department might be more specialised, there will still be a lack of proper communication and co-operation between the departments.

5.3.3 CENTRALISED DICTATORSHIP

By this stage the firm has realised the importance of IT and its strategy will start focusing on IT. Often the starting point is a restructuring of the management structures. The firm will recognise that success depends on the effective

planning and co-ordination of activities between departments. This restructuring will also lead them to the discovery that many of the current IT applications are insufficient, and that IT must be linked to business plans. The role of IT will be extended even further to support the growth and development of the firm. The IT department, which still operates under the mantle of the Data Processing department, will become an independent unit. The manager will have many of the same responsibilities as other managers, but his department will not make any business decisions.

The lack of proper integration leads to the resurfacing of some of the old problems. The new department meets the firm's IT needs, but it still tends to ignore the specific needs of end users. The department can cover all IT related issues but might lack the expertise to deal with all the situations effectively. System security and reliability are two key issues that will still cause severe problems.

The staff in the department will grow to include planners, database and administrative staff. The management structure will commonly involve senior management issuing orders to the IT department, who will then look after the needs of each department. Senior management will also tend to become rather concerned about the large investments in IT infrastructure, and the apparent lack of return on investment. The IT department will offer several very good reasons for the expenditures and often defend their position by stating how complex their task is.

5.3.4 DEMOCRATIC DIALECTIC AND CO-OPERATION

Due to the fact that each department is reliant on the IT department to sort out their needs, the whole system tends to be in a state of chaos. More emphasis is thus placed on the effective control, integration and co-ordination of the IT function.

The data-processing department is decentralised and each department now has its own IT back-up. This back-up unit looks after the IT needs of its own department. This allows the end users to demand more attention and their needs be looked at more closely. The department previously known as the Data Processing department now becomes the IT department. The DP manager assumes a more senior role in the firm. Several 'mini departments' spring up all over the firm and systems analysts are trained to become business analysts. The knowledge they gain can allow them to plan more carefully to meet the needs of the firm and all departments within it.

Instead of management exercising control over the functions of the IT department, they now act independently and co-ordinate the use of IT throughout the firm. This ensures that all components are compatible, integrated and co-ordinated. Decision Support Systems (DSSs) are incorporated on a small scale, and the firm shifts its focus towards collaboration and co-ordination. The staff becomes more homogenous, with IT staff members learning more about business practices and end users learning more about IT applications. Once again there should be emphasis on the main theme, which is co-operation.

5.3.5 ENTREPRENEURIAL OPPORTUNITY

When the firm has incorporated IT more actively in the firm, they will shift their focus to find strategic uses for IT. The absolute ideal situation would be for firms who incorporate IT for the first time to start at this level. For those who have perhaps dabbled in some IT applications and are looking to expand their areas of business, this is the level to be on. This stage should be the focus for any firm wishing for success. In most firms IT has undergone an evolutionary phase and now that the firm needs to expand, become more competitive or simply change its focus somewhat the emphasis falls on the unique opportunities IT has to offer. By this stage each business unit or department has a good working relationship with the IT department. Proper systems and infrastructure are in place and allow the coalition to operate smoothly and effectively.

The systems that are in use are ultimately aimed at satisfying the customer, and are thus market orientated. The IT applications are also used to add value to the product or service. The IT department has been decentralised to allow each department within the firm to have their own experienced IT staff and department. The ultimate control still rests with those who run the IT department as a whole. Each department develops its own systems that try to give the firm a strategic advantage. The departments might make use of internal and external data to achieve these goals. Some problems could arise when trying to integrate the internal and external data.

Business and information systems planners are brought in to plan an effective and strategic information system (IS) as IT becomes an important and integral part of the firm's business activities. Most staff members will display good entrepreneurial skills and have good knowledge about IT systems and applications. The main goal of this stage is to use IT to get ahead – the underlying theme of this thesis.

5.3.6 INTEGRATED HARMONIOUS RELATIONSHIPS

This is the Utopia most firms strive for. It is obtainable, but with applications changing so rapidly the firm will often fall back into one of the previously mentioned stages. The main objective is to try and maintain the strategic advantage gained in the entrepreneurial opportunity. As was mentioned this is not easy, since IT is a dynamic field requiring constant reassessment.

Strategic alliances will be forged with various important business partners to help maintain the position as market leader. Information technology is often used to build these relationships. Business units and IT is centrally managed, and is co-ordinated rather than controlled. The manager of the IT department is now very important within the firm and makes various strategic decisions for the firm.

Planning the IT system is done interactively and the highest possible levels of co-operation and co-ordination between the various departments. IT has now become a business driver, rather than a business solution. Internally the firm hopes to find initiatives for the maintenance of its position at the top. Externally it makes use of strategic alliances.

The firm must realise that any information system will generally pass through these phases. Effective planning and implementation of the information system might allow the firm to skip some of the early phases and make the transition between each phase smoother. The main aim is to identify the possible problems that could arise within each phase and to try to eliminate them. The information system should be an asset to the firm, not a source of frustration.

CHAPTER 6

INFORMATION TECHNOLOGY DEVELOPMENTS THAT HAVE CHANGED THE NATURE OF LOGISTICS MANAGEMENT

In previous chapters various aspects of information technology were investigated. The effects it has on business processes, management and business structures and the firm's strategies have been discussed. So far the discussion has looked at IT in its broader sense and has not really looked at the hands-on applications that exist. In this chapter these applications will be discussed.

This chapter focuses on some of the more influential applications in the IT world that have changed the course of logistics. The basic functions and operational methods of each application will be studied. In some of the cases we will try to determine what future the specific application might have, given the massive advances in technology and the influence of the Internet. Ultimately the firm should gain some knowledge about applications that could prove crucial to its success. The applications discussed commonly reduce costs, order cycle times and help to improve quality and co-ordination. According to Malone and Rockhart (1993:40) IT can have some other effects, such as:

- *Substitution* – humans are often replaced by the new technology which can normally perform the same function more accurately and at a lower cost.
- *Increased demand* – better co-ordination can lead to more alternatives for the consumer and thereby increase demand. This can counteract the substitution effect to some extent.
- *New structures* – new links can be established to improve the co-ordination between retailers and suppliers.

6.1 ELECTRONIC DATA INTERCHANGE (EDI)

Electronic Data Interchange (EDI) is probably one of the most important innovations in logistics management. The term refers to the transfer of data from one organisation to another via computer. The system tends to be faster and more reliable than paper-based systems. According to Robeson and Copacino (1998:738) paper-based systems have some inherent disadvantages:

- *Time consuming* – they often require the entering and re-entering of data, and there are postage delays to consider as well.
- *Inaccuracy* – the system lends itself to human error, either with the entering of the data, or the numerous steps involved that require constant re-entering of the data.
- *Labour-intensive* – data is entered manually in the paper-based system, which causes it to be very labour-intensive.
- *Uncertainty* – there can be many mailing and processing delays causing some uncertainty.

EDI not only attempts to, but also succeeds in eliminating these disadvantages. The system removes many of the problems mentioned above, and creates a more efficient business environment.

The main characteristic of any system is the fact that it needs to be compatible with other systems. EDI has its own 'language' and set of standards. "EDI standards are rules that establish a basic syntax for formatting information electronically. Just as the English language has an agreed-upon set of words (vocabulary) and an agreed-upon set of rules for arranging those words (grammar and syntax), so does EDI" (Robeson & Copacino, 1998:739).

At the moment two standards exist:

- *ANSI ASC X12*
- *UN/EDIFACT*

The ANSI ASC X12 standard was developed by an Accredited Standards Committee (ASC) who was chartered by the American National Standards Institute (ANSI) to develop a common EDI code.

According to Robeson and Copacino (1998:74⁹) the ANSI ASC X12 standard establishes information structuring for electronic communication, and sets guidelines for:

- *What may be sent;*
- *Information required on each document;*
- *Sequence of the information;*
- *The format of the document;*
- *Meaning of the information (a code for all the abbreviations).*

As can be gathered, the ANSI ASC X12 is used mainly in the USA, but there is also an international standard, namely the UN/EDIFACT. This standard is primarily used in Europe, and was developed by the United Nations to promote an international standard that could facilitate international trading. UN/EDIFACT stands for United Nations/EDI For Administration, Commerce and Transport. There are some similarities between the two standards (Robeson & Copacino, 1998:741).

Table 6.1 is a good representation of the difference between a paper-based order and an order generated using the ANSI ASC X12 standard.

One very important aspect of the whole EDI system is the software that runs the whole system. The software has to convert all the data into the necessary EDI language, and once it has been sent the receiver needs the software to convert it into standard format. The various hardware and software components that are required vary according to the type of application. The firm should approach the acquisition of these components according to the methods described in the previous chapter.

The implementation of an EDI system is by no means easy, and will change the normal operating procedures. According to Robeson and Copacino (1998:747) there are several steps that should be followed when implementing EDI. These steps are:

- *Determine strategy – why is EDI needed and how comprehensive should it be?*

- *Gain senior management support.*
- *Establish a project team.*
- *Perform an EDI audit – review and understand the paper system, analyse the flow of existing information, identify potential changes before implementing EDI.*
- *Select transactions/trading partners.*
- *Map with trading partners – reach an agreement on how to perform EDI.*
- *Conduct a pilot test.*
- *Modify and expand usage.*
- *Check EDI readiness.*

Table 6.1: An example of an ANSI ASC X12 Purchase order

<u>PAPER PURCHASE ORDER:</u>	<u>ANSI ASC X12 EDI DOCUMENT :</u>
Start of transaction P.O. No. 4001 Date: 12/15/95	ST-850-0001 N/L BEG-00-NE-4001--951215 N/L
Buyer: Allen Manufacturing 123 North Street Large Town, Cape Town 00000	N1-BT-Allen Manufacturing N/L N3-123 North Street N/L N4-Large Town-CT-00000 N/L
Vendor: Baker Supplies P.O. Box 999 Somewhere, Cape Town 00002	N1-VN-Baker Supplies N/L N3-PO Box 999 N/L N4-Somewhere-CT-00002 N/L
Ship to: Plant 1 456 West Ave. Smallville, Cape Town 00001	N1-ST-Plant 1 N/L N3-456 West Ave. N/L N4-Smallville-CT-00001 N/L
5 EA BC436 Compressors @ 12,50 each	PO1-1-5-EA-12,50--BC436-PD-Compressor N/L
Number of line items = 1 End of transaction	CTT-1 N/L SE-14-0001 N/L

Adapted from Robeson & Copacino (1998:742)

Note: N/L indicates a new line character.

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- *Select transactions/trading partners.*
- *Map with trading partners* – reach an agreement on how to perform EDI.
- *Conduct a pilot test.*
- *Modify and expand usage.*
- *Check EDI readiness.*

The selection of transactions and trading partners is an important aspect of the process. The selection of transactions consists of:

- *Requests from major trading partners;*
- *Expected payoff in terms of paper and manual labour reduction;*
- *Use by others in the industry.*

The selection of trading partners involves:

- *Is the trading partner doing EDI with someone else?*
- *Does the trading partner account for a large percentage of transaction volume?*
- *Is there a good relationship with the trading partner?*

There are many advantages and disadvantages to the implementation of EDI. Robeson and Copacino (1998:751) list some factors that could act as barriers to implementing EDI. The first reason is the possibility that the firm's trading partners do not have computerised systems. The costs that need to be incurred to bring the trading partner up to speed will often offset the costs of implementing EDI.

A second reason is that the implementation of EDI could have a negative effect on a different department. The most common result of EDI implementation is some sort of impact on the accounting department because of its paperless nature. The best solution is senior management support and training for the accountants as well as other areas impacted by the implementation of EDI.

A third reason is that EDI will also move documents faster, which could mean a loss of cash reserves. Since documents move faster and are thus processed faster it could mean that payment would be required earlier. The fact is that payment need not take place immediately, and new terms can be negotiated if necessary.

The final, and often the most important reason, is the fact that EDI documents have no signature. There is still some dispute over the legality of EDI documents, but if some agreement can be reached with the trading partner it can serve to overcome this problem.

There are also numerous benefits to be gained by implementing EDI, otherwise nobody would do so. Robeson and Copacino (1998:753) highlight the major benefits of EDI. Firstly, the most significant benefit is the improved responsiveness to customers. EDI facilitates the provision of accurate and timely information. "Implementing EDI is a clear-cut way of responding to customer requirements" (Robeson & Copacino, 1998:753). Secondly, it improves and strengthens channel relationships.

Thirdly, implementing EDI can also increase internal productivity. The EDI audit that is performed before implementation can allow the firm to spot certain weak points and improve those areas. Fourthly, EDI can also lead to the implementation of better management techniques such as JIT (Just In Time). Fifthly, the firm can also place itself in a better position to compete internationally if it implements EDI. Furthermore, EDI can speed up design and production processes and reduce the time and cost involved in international documentation. Lastly, the firm can also benefit from decreased operational

costs. Costs can be minimised in the areas of document processing, personnel, inventory and error consequences.

By studying the section above it is evident that EDI can influence logistics management and help the firm a great deal. Robeson and Copacino (1998:754) provide some examples of EDI in logistics. Transportation is one area where EDI can be implemented and is of great use. EDI has become very useful in passing documents between the shippers and the carriers. The implementation of such a system can lead to cost reductions and reduce errors.

EDI has a significant role to play in the area of materials management. As mentioned earlier EDI can facilitate and enhance JIT systems. EDI is also a key component in MRP (Materials Requirements Planning) systems. MRP systems will be discussed in section 6.3.

The most common application for EDI is purchase order processing. The implementation of EDI can lead to reduced processing time, fewer errors, higher productivity levels and improved supply chain relationships. If the EDI system is operating effectively it can also assist in the reduction of inventory levels, which will lead to an overall reduction in costs.

In chapter 2 mention was made of the Point Of Sale (POS) applications that can improve the firm's customer service. EDI is critical to the success of POS systems. When a customer purchases an item the inventory levels are automatically updated. If the inventory reaches a certain level a replenishment order is automatically sent via EDI. This can improve customer service and distribution of the firm's products.

Some might feel that EDI systems are now obsolete because of the massive strides that have been taken in the field of business to business e-commerce. This is a debate that is far from over, and it will be discussed in the section involving ERP (Enterprise Resources Planning) software. It is, however, very clear that EDI systems have been able to change the face of logistics and have been of great benefit to those firms who have implemented them.

6.2 BAR-CODE SCANNING

Bar-code scanning is another application that has proved to be a key development in the field of logistics. Along with EDI, bar-code scanning has helped to transform the nature of logistics management. Hand in hand it has brought about an increase in responsiveness, accuracy and productivity.

Bar-coding is one of the more popular identification systems that firms use today. Various other identification methods exist, comprising of manual and automated methods. Among the automated methods that exist, bar-coding tends to be the most popular. The reasons for this popularity are:

- *Flexibility* – the system can handle a high degree of SKUs (Stock Keeping Units).
- *Low costs* – the system is normally quite cheap.
- *Accuracy*
- *Speed* – the system makes product identification very easy and thus speeds up the whole process.
- *Simplicity* – the system is very easy to use.

(Mulcahy, 1994:13.6)

The bar-code system can be installed throughout the warehouse, and along various points of the supply and distribution channel. The system makes use of a laser scanner that 'reads' the code on a product. This code commonly consists of black bars and white spaces of varying widths. The white spaces are reflected back to the scanning device and are in turn sent to a microprocessor. The microprocessor then identifies the product and stores the code. Once this has been done the microprocessor can perform various functions, such as diverting the product on a conveyor system or sending stock requests via EDI links.

The code is normally printed onto adhesive labels that are attached to the product. There are various machines that either print or read the codes. The options that exist depend on the type of surface or product and the different

locations of the scanning devices. The most common scanning device is the hand-held laser scanner (Mulcahy, 1994:13.13).

As for the code itself there are many derivatives. The one most commonly used is the Universal Product Code (UPC). The UPC usually consists of twelve digits, each digit represented by two black bars and two white spaces. The code can be separated into two zones to allow bi-directional scanning, which will limit the code to six digits. A variant of the UPC exists, namely the European Article Number (EAN). The EAN differs from the UPC in that it has a specific country's flag attached to identify the country of origin. The other bar-code derivatives are:

- *1 (Interleaved) 2 of 5 bar-code* – a numeric code used in the warehouse for shipping, sorting and SKU identification.
- *Telepan* – used in the textile, insurance and milk processing industries to identify SKU's. The code is owned by a private company and can encode the full ASC II set.
- *Code 93* – an alphanumeric code used for sorting, shipping and receiving. Used in the manufacturing industry to verify components and work-in-progress.
- *Code 3 of 9 code* - three wide black bars and six white spaces. In the USA it is a self-checking, bi-directional alphanumeric code. It is used in the warehouse industry and by the Department of Defence.
- *Code 128 bar-code* – contains all 128 characters in the ASC II set. The code is also bi-directional.
- *Codabar bar-code* – a numeric bar-code that is self-checking and bi-directional. Used in the transport industry, by blood banks, libraries, inventory control, SKU pricing and distribution industries.
- *Code 11 bar-code* – a numeric code used to identify communications equipment and electric and electronic components.

(Mulcahy, 1994:13.21)

The latest development in the logistics industry is a scanner that transfers the ASC II text into HTML (Hypertext Markup Language). This development is prompted by the increasing number of firms that use the Internet for conducting

business. This will eliminate the need for microprocessors that decode the bar code (Cooke, 1999c: 113).

Two computer firms, JetForm and Zebra Technologies, have developed products that can allow firms to incorporate bar-code printers in their ERP systems. While bar-code scanners are compatible with EDI and ERP software, printers are not. This development will allow firms to take data directly from the ERP software and convert it into labels. The software that has been developed will allow the seamless integration with current ERP systems, and allow firms to operate more efficiently, (Logistics Management and Distribution Report, 1998:83).

6.3 ENTERPRISE RESOURCE PLANNING (ERP) SOFTWARE

Enterprise Resource Planning (ERP) stems from Materials Requirements Planning (MRP) and Materials Resource Planning (MRP II) software created mainly by IBM. The notion of requirements planning was formalised in the 1970s and given the name Materials Requirements Planning. The basic idea was to schedule the supply of parts, materials and other goods of which the demand was relatively well-known. The goal was to minimise inventory and thereby reduce costs.

Once firms started to apply computers for business applications, the first area they were used in was for payroll functions. This was a repetitive calculation that was quite easy for the computer. The next step was to develop software that could perform MRP functions. IBM developed a Requirements Planning System (RPS), that later became known as Manufacturing Requirements Planning (MRP) systems. There were several problems with the first systems; the most important was that the system produced wide variations in the results. Later, Master Production Scheduling (MPS) and Capacity Requirements Planning (CRP) were introduced and this saw the birth of Manufacturing Resources Planning (MRP II) software. The new systems should have ironed out the previous problems, but the same problems kept emerging. This ultimately

led to the creation of Enterprise Resources Planning (ERP) software, which is an improvement on MRP II, the addition of some features and the better integration of the MRP II modules (Robinson, 2000:2).

ERP is not a single system, but a framework of all the systems within the firm. The most important point is that instead of having different software systems dealing with various tasks within the firm, the firm has one system taking care of everything. The framework includes applications that deal with:

- *Administration* – finance, accounting;
- *Human resources* – payroll, benefits;
- *MRP* – procurement, production, planning.

(Kalakota & Robinson, 1999:166)

SAP is arguably the leader in ERP systems and their R/3 system is one of the most widely used IT applications in the business field. Table 6.2 illustrates some of the functions supported by SAP R/3.

Usually ERP systems can assist in sales and operation planning, but it must be fed the highest quality of information available to ensure successful results. The ERP system usually controls the MPS. This task can be made easier by carefully planning the sales and operations functions. The role of the MPS is demand management, which can give rise to more stable manufacturing, higher levels of customer service and lower inventory (Robinson, 2000:3).

With more and more business conducted over the Internet, some firms have started to question the value of their ERP systems. Some sceptics believe that ERP systems are obsolete and that the Internet will replace all the 'old' applications. This is true to some extent, but ERP systems do still have a role to play. The Internet might have many new uses and applications, but some people are using the current systems to harness the power of the Internet.

According to James and Wolf (2000:101) firms can build on their current ERP infrastructure, and allow ERP to serve as a platform from which to enter the world of e-commerce.

Table 6.2: Functions and processes supported by the SAP R/3 system

<u>ACCOUNTING AND FINANCE</u>	<u>PRODUCTION PLANNING AND MATERIALS MANAGEMENT</u>	<u>HUMAN RESOURCES</u>	<u>SALES AND DISTRIBUTION</u>
<ul style="list-style-type: none"> ▪ Assets accounting ▪ Cash management ▪ Cost centre accounting ▪ Product cost accounting ▪ Profitability analysis ▪ Profit centre accounting ▪ General ledger ▪ Accounts receivable and payable 	<ul style="list-style-type: none"> ▪ Purchasing ▪ Vendor evaluation ▪ Inventory management ▪ Warehouse management ▪ Material requirements planning ▪ Plant maintenance ▪ Production planning 	<ul style="list-style-type: none"> ▪ Travel expenses ▪ Personnel planning ▪ Payroll ▪ Billing ▪ Financial consolidation 	<ul style="list-style-type: none"> ▪ Sales planning ▪ Order management ▪ Distribution planning ▪ Project management ▪ Quality management

Source: Kalakota & Robinson (1999:177)

James and Wolf (2000:101) have also identified four new areas that can benefit from current ERP systems:

- *Sell-side e-commerce* – to be a high-class online retailer the firm needs to have exceptional order fulfilment and distribution capabilities. New technologies can allow firms to build on current ERP systems and handle order fulfilment, returns, partial shipments and refunds. This will ensure that the firm is able to offer high-quality services.

- *Electronic procurement* – linking an e-procurement module to the ERP system can restrict purchases to certain preferred suppliers and reduce unnecessary spending.
- *Continuous relationship marketing* – electronic purchases often reveal much more about the customer than regular over-the-counter sales. Linking the information gathered from these sales to the ERP system can allow the firm to cater to individual needs and build extensive relationships with customers.
- *Supply chain optimisation* – certain applications can use the production schedules generated by the ERP system to scan for the ideal suppliers who can offer the right volumes of raw materials at the lowest price and correct time.

Many of the advances in the field of ERP have some connection to the Internet or e-commerce, the topic of chapter 7. ERP software can provide many advantages, not only by saving costs, but also by giving the firm a strategic advantage in certain areas. The firm might also be able to gain some unexpected returns from these advantages. Furthermore, ERP can speed up decision-making and problem-solving, as well as broaden the firm's operations.

6.4 OTHER TECHNOLOGICAL APPLICATIONS THAT CAN IMPROVE LOGISTICS

The systems and applications that have been discussed so far are the mainstays of the logistics industry. Every day new technology is being created to improve logistics in some way. Lately, the focus has been on supply chain management and warehousing.

There are many products to choose from as far as Supply Chain Management (SCM) software is concerned. Each product offers a variety of services. The most common services include:

- *Billing and sales analysis;*
- *Distribution resources planning;*
- *Forecasting;*
- *Inbound logistics management;*

- *Order processing;*
- *Outbound logistics management;*
- *Promotions, deals and pricing;*
- *Purchasing;*
- *Release management;*
- *Warehouse management.*

Packages will differ and the firm should contact the vendors to enquire about the services that their packages include. Certain applications might have to be purchased and installed separately.

Recently, more focus has been placed on warehouse management. Due to this trend, various individual warehouse management systems (WMS) packages exist. These packages tend to be quite comprehensive and the firm might wish to install one of these packages, even if it has warehouse management software as part of the SCM software. There could be some problems with compatibility, and some might view the purchase of this software as unnecessary. This decision will be affected by the firm's strategy regarding the level of automation and control that is required.

According to Cooke (1999b: 73) many firms are adopting a 'best practices' approach to logistics. This entails identifying the leaders in the market and finding out what processes they incorporate. Once this has been done the firm can go about implementing these practices in its own environment. Ultimately, the firm reengineers certain processes. However, in most cases where no strict controls are present, the firm will tend to go back to its old habits. Software that is installed and constantly measures performance can help to avoid this situation. Many applications are being developed to include the philosophy of best practices. For years ERP software has used this method, but their focus has been mainly on finances and manufacturing. Distribution falls under the area of SCM, and individual Warehouse Management Systems (WMS) are being developed. These packages enforce rules that promote efficiency in receiving, storage and shipping. The focus is thus on labour and equipment practices, and will give rise to lower costs and greater efficiency.

Another development on the SCM side is Transportation Management Systems (TMS). TMS helps the firm plan shipments and can identify carriers that can transport the shipments. When dealing with Less-Than-Truckload (LTL) shipments carriers often impose weight-penalties for shipments that are too heavy or too light. TMS can be used to identify these carriers and co-ordinate shipments accordingly (Cooke, 1999b: 76).

A final innovation in this field is Advance Planing and Scheduling (APS). Cooke (1999b: 76) states that "APS applications can solve more complex distribution problems and analyse trade-offs between inventory and production across the entire supply chain". The advantages of such a system are obvious, but, as is the case in many of these applications, high costs can offset the advantages.

Logistics has also seen developments such as radio frequency devices to replace bar-coding systems, mobile cellular tracking, GPS tracking and much more. The Internet, however, is by far the most important and exciting development in logistics and is the topic of chapter 7.

CHAPTER 7

THE INTERNET AND LOGISTICS

The Internet is a technological application that has, and will continue to change the world. Television changed the worlds of people in the 1950s and 60s, and it continues to break new ground every day. The introduction of the Internet has had the same sort of effect at the turn of the twenty first century. The Internet has opened many doors to millions of people around the world. One of these doors is the possibility of using the Internet as a business tool. The Internet can help the firm improve its logistics processes and gain a competitive advantage.

In this chapter many aspects related to the Internet and logistics will be discussed. To allow everyone to gain a clear understanding of the Internet, the history and mechanics of the Internet will be discussed briefly. The massive impacts that the Internet has had on the world of business and logistics will also be examined.

7.1 THE ORIGIN OF THE INTERNET

The phenomenon called 'the Internet' is widely known, but very few people know how it all started.

In the 1960s the United States Department of Defence tried to curtail the possible chaos that could ensue if its computers were damaged during a nuclear attack. Most of the defence systems were under computer control and they realised that this was the future of weapons systems. At that stage the computers were controlled by large mainframes, and the department devised a system to link all the computers via telephone lines. Once this link had been set up, encoded messages were sent via the telephone lines and decoded at the destination. Later, in the 1960s, university researchers began to develop means of speeding up these networks and incorporated the technology in their own

environments. The idea of linking computers and using them to transfer encoded files was expanded upon in 1972, when one of the researchers developed a system that allowed messages to be sent in their original form. This was the birth of electronic mail (e-mail). Included in his programme was software that allowed the system to operate. One of these elements was the File Transfer Protocol (FTP), which allowed users to transfer files between computers. Telnet allowed users to access the network and their accounts from remote locations. Other scientists and scholars developed new and improved applications, but the system and its uses remained within these communities (Schneider & Perry, 2000:13).

In the 1980s the boom of personal computers changed things dramatically. The increase in competition amongst businesses also helped a great deal, since firms seeking a competitive advantage made use of computer technology. The proliferation of computers soon allowed firms to set up their own internal networks. Later the use of the system expanded along with the firms. Firms needed to be linked to remote branches and leased phone lines to accomplish this. At this stage the primary users of the system were businesses, academic institutions and the military. The information travelling along the network was purely business related. The move towards leased phone lines gave rise to commercial e-mail use (Schneider & Perry, 2000:14).

In 1989 two scientists, Tom Berners-Lee and Robert Calliau, were working on a project at CERN, the European Laboratory for Particle Physics. CERN had its own network and the two scientists made use of it, but they wanted to make their findings available to a much wider audience. They set about developing a system where computers could connect to one another and 'read' information off each other. They used a system called hypertext server, which used Hypertext Markup Language (HTML) to code the data and allowed another computer to connect to it. This computer then decoded the data and the user could read the relevant documents. Berners-Lee called the system of interconnected hypertext documents the World-Wide Web (or the Web, or WWW) – a name that immediately caught on and is still used today (Schneider & Perry, 2000:16).

The Web was expanded to include people from all walks of life when web servers and navigators were developed. A team of students at the University of Illinois wrote a programme called Mosaic that could read HTML and use the hyperlinks to move from page to page on the Web. In 1994 the members of this team joined forces with Silicon Graphics and launched the company Netscape Communications and the browser Netscape Navigator. This was the start of a new era in computing, technology and business.

7.2 THE MECHANICS BEHIND THE INTERNET

Computers are linked to telephone lines, which are connected to the servers, which control the various websites. All Internet operations are governed by TCP/IP protocols. The Transmission Control Protocol (TCP) controls the breakdown of information into smaller units before transmission and their assembly upon arrival. The Internet Protocol (IP) ensures that each package has the correct destination address. Every 'homepage' that is visited has its own IP address. This address is currently represented by a 32-bit number and will later be replaced by a 128-bit number. This 32-bit number consists of up to four separate numbers and is called a dotted quad. Each of the four numbers can range from 0 to 255. It is obviously difficult to remember an address like 126.204.89.56, which is why the Uniform Resource Locator (URL) notation is used. The URL notation consists of names and abbreviations and is referred to as the domain name. The URL also specifies the protocol that is used to access the website, with HTTP being the most common. The protocols operated by TCP/IP are:

- *HTTP* – used daily for the transfer and display of web pages.
- *SMTP/POP/IMAP* – common mail servers that deal mainly with e-mail.
- *FTP* – allows files to be transferred in two directions as binary data or ASCII text, and is often used to download data and software applications.

As mentioned earlier, most websites display their data in HTML, and the HTTP is therefore the most commonly used protocol. One of the biggest advantages

of HTML is the incorporation of hyperlinks, where one can connect to other documents on other sites via a link set up on the page currently viewed, (Schneider & Perry, 2000:34).

The basic course of any Internet session is thus as follows:

- *Connect to service provider via modem (the service provider acts as a switchboard, connecting our computer to various others);*
- *Type in the URL address/domain name;*
- *HTTP 'guides' our computer to the site and decodes the data;*
- *HTML is displayed in a format readable to the user;*
- *Links to other sites/pages accomplished by clicking on the hyperlink.*

A phenomenon such as the Internet will have a serious effect on all aspects of business. The business world has been transformed by the Internet, and continues to be affected on a daily basis. As a business tool the Internet can be very effective. The Internet is an amazingly popular business application and has many advantages over other IT applications. Some of these advantages are:

- *It is relatively simple to use.*
- *It has a wide breadth of access.*
- *It has synergistic capabilities with other forms of media.*
- *It has relatively low investment costs when compared to other IT applications.*
- *It can easily interface with existing systems, making training less of a burden.*
- *It can enhance communication between people in remote locations.*

(Stroud, 1998:54)

These advantages are causing many firms to use Internet to give them the edge over their competitors. More and more firms are also conducting transactions over the Internet. This has had a great impact on the logistics industry. Using the Internet as a business tool will affect the day-to-day business processes of the firm. This is the topic of the next section.

7.3 THE EFFECT OF THE INTERNET ON BUSINESS PROCESSES

In chapter 3 the effects of IT on the structure of the firm and the industry were discussed. Attention was paid to the possible competitive advantages that could be gained and how the firm might have to alter its strategies. Closer attention was paid to the effects of IT on logistics in chapter 6. Although the Internet is an IT application, it is a new phenomenon with more far-reaching effects than any other IT application. This section focuses on the effects and benefits of using the Internet in the day-to-day running of the firm. Attention will also be paid to the firm's intranet, since it can often dictate the effectiveness of the firm's Internet strategies. A well-structured intranet can improve business processes, save time and money and create a strong platform from which the firm can operate.

In the previous section several core features of the Internet were mentioned. These core features translate into several tangible benefits. Figure 7.1 represents the core features and their benefits diagrammatically.

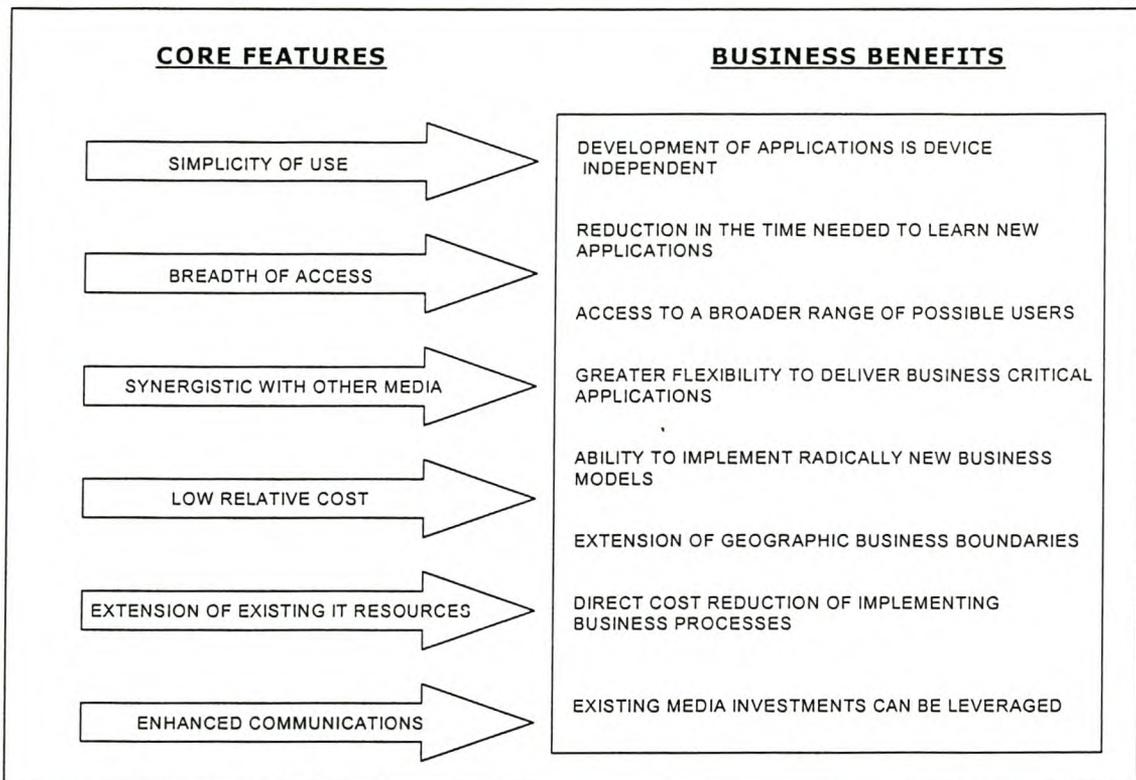
The Internet affects many business areas but the focus of this section will be limited to four main areas of business, namely:

- *Human resources and corporate communications;*
- *Purchasing;*
- *Accounting and finance;*
- *The sales channel and customer support.*

7.3.1 HUMAN RESOURCES AND CORPORATE COMMUNICATIONS

Information is a key asset to any firm. The information often has to be passed on to staff members in all the departments. The flow of documentation can be replaced by using e-mail or posting notices on the firm's website. Communication between the firm's human resources department and the staff therefore becomes easier. A large amount of this information will only be available via the firm's intranet.

Figure 7.1: Tangible business benefits created by the Internet



Source: Stroud (1998:62)

Some of the corporate information that can be made available on the intranet includes:

- *Employment policies and procedures;*
- *Quality manuals and procedures;*
- *Directories (telephone, approved suppliers, etc.);*
- *Recruitment opportunities;*
- *Organisational charts and details about the company's structure.*

(Stroud, 1998:63)

The employees can also use the intranet to notify the firm about address changes, vacation dates, purchase requests, payroll information and various other administrative issues.

The Internet can be utilised to great effect when the firm wishes to train staff members. The Internet makes distance learning ideal and promotes flexibility

and cost-effectiveness. The implementation of new software can also make nation-wide or world-wide training easier, (Stroud, 1998:65).

One area that has seen massive growth on the Internet is the sites dealing with employment. Not only are agencies getting involved in online recruitment, but many firms are also using the Internet to advertise posts and screen possible candidates. The only disadvantage is that if the firm only makes use of the Web it might exclude many prospective candidates (Stroud, 1998:66).

7.3.2 PURCHASING

Information technology has assisted the purchasing function for many years. EDI was the main tool in this process, yet was limited to larger organisations. The Internet has changed this situation. Smaller firms can now make use of their intranet and Internet facilities to purchase supplies.

The firm can allow employees to generate purchase orders and supply them with a catalogue of items and potential suppliers. Having all the various functions connected to the intranet can reduce errors and speed up processes. Taking the intranet one step further and allowing access to strategic suppliers can simplify matters even more. An extranet will be created where suppliers can regularly supply information about products. The suppliers could also access the inventory levels of the firm and generate orders automatically. Similar systems were discussed when dealing with EDI. Some retailers connect their Point Of Sale (POS) systems to their inventory, which is in turn connected to the supplier. As soon as inventory levels reach a certain point, an order is automatically generated and the goods replenished (Stroud, 1998:68).

The Internet offers the firm an even greater scope to reach and interact with suppliers. Firms are doing away with traditional purchasing departments and allowing each department to do their own purchases online. The B2B e-commerce market has shown dramatic growth and will continue to grow. Firms can prevent overspending by allowing the system designers to install certain

safeguards. If necessary the firm can, as in the case with the intranet, control the specific suppliers (Stroud, 1998:69).

7.3.3 ACCOUNTING AND FINANCE

In the business world banking was one of the first areas to make use of the Internet as a business tool. Today countless transactions are being conducted over the Internet. If firms were to make use of online banking services they could save time and money and reap some other benefits in the process.

Firms could allow their shareholders to access certain information regarding the firm's financial position. Some firms allow their clients to access the Annual Report, the financial statements, stock performance and certain cash flow data. The client can accurately assess the firm's position in the market as well as its current performance. Firms in turn can make use of their intranet to pass on secure financial information to managers. Budget figures and other financial data can be sent via e-mail, or the managers can access the data from a PC connected to the network. Security plays an important role and the firm must insure that the proper measures are taken (Stroud, 1998:70).

7.3.4 THE DISTRIBUTION CHANNEL AND CUSTOMER SUPPORT

In chapter 2 the importance of customer service was highlighted. Customer support is one of the areas in customer service that can be changed dramatically by using the Internet. Higher levels of customer support results in higher levels of customer service, leading to higher levels of satisfaction and more sales. The Internet does not only have an impact on the after-sales component, but can have far-reaching effects on the distribution channel as well.

The distribution channel is the link between retailer and customer. The channel can be complex, with many intermediaries responsible for a variety of functions, or rather straightforward, with a direct link between retailer and customer. The

Internet has already changed the distribution channel by excluding many of the intermediaries and bringing the customer into direct contact with manufacturers. Many of the components of the distribution channel are supposed to add value to the product and the question now is whether the Internet has any effect on this. According to Stroud (1998:134) a distribution channel has various elements that can add ten components of value. These value components are:

- *Lead generation – generating sales leads;*
- *Provision of market knowledge;*
- *Provision of focus for customer contact;*
- *Service prospect enquiries;*
- *Distribution of product information;*
- *Analysis of customer requirements;*
- *Negotiating the terms of purchase;*
- *Processing of orders and payments;*
- *Fulfilment of the sale;*
- *Maintaining customer contact.*

The firm should clearly identify and define each element of the distribution channel and decide on the key components of each element. Once this has been done the firm can evaluate which elements can be enhanced or eliminated by the Internet (Stroud, 1998:135).

Stroud (1998:136) also provides a handy checklist that highlights how the Internet can affect the role of sales staff and the retailer. Tables 7.1 and 7.2 are adaptations of this checklist.

In the area of customer support most firms tend to follow a system where they have planned ongoing assistance and 'ad hoc' assistance. The 'ad hoc' assistance proves to be problematic for many firms. The 'ad hoc' support service tends to cost more, since it is normally of a specialised nature. Many firms will have certain after-sales services, yet a seemingly unique situation often arises. If systems are not set in place to deal with these problems the firm could lose customers. Some of the support tasks have been mentioned in the

tables above and commonly include new product information, monitoring customer satisfaction and providing documentation.

Table 7.1: How the Internet can change the role of sales staff

CURRENT FUNCTIONAL TASKS	POTENTIAL INTERNET SOLUTIONS
<ul style="list-style-type: none"> ▪ Maintain the company's presence with the customer ▪ Process orders, arrange purchase agreements ▪ Negotiate terms of purchase ▪ Analyse customer specific requirements ▪ Respond to logistics and accounting queries ▪ Understand the customer's future product requirements ▪ Provide a reactive point of contact to customer purchase requests 	<ul style="list-style-type: none"> ▪ Provision of relevant updates of product data via e-mail ▪ Direct entry into the supplier's back-office order entry systems that provide customer specific terms of business ▪ The 'seller' and 'bidder' can use the WWW to conduct an interactive auction to purchase goods ▪ Enable the customer to use configuration tools to specify their own requirements ▪ Customer has direct entry to the company's back-office order entry systems ▪ Customer can customise the type and regularity of the information they wish to receive ▪ Customer has immediate access to the supplier's customer service staff and can trade around the clock

Source: Stroud (1998:136)

'Ad hoc' services are situations that are not common to every customer. Certain customers might be unhappy with their purchase, others might encounter technical problems and others might have payment or shipping problems. The firm's ability to deal with these issues can set it apart from its competitors. The Internet can facilitate the solution to these problems by allowing customers to contact the firm via the website and explain their problem. The main advantage is that the Internet is not time-specific, which means that any problems can be

reported 24 hours a day. The customer also has direct access to the firm, and in some cases the firm can directly access the customer.

Table 7.2: How the Internet can change the role of the retailer

<u>CURRENT FUNCTIONAL TASKS</u>	<u>POTENTIAL INTERNET SOLUTIONS</u>
<ul style="list-style-type: none"> ▪ Provide customers with the convenience of local purchasing ▪ Supply additional services (product finance, maintenance etc.) ▪ Maintain local inventory ▪ Distribute product information and service customers' questions ▪ Analyse customer specific requirements 	<ul style="list-style-type: none"> ▪ Customer can purchase at any time via the supplier's WWW site ▪ A supplier's WWW site can provide access to providers of other related services ▪ Fast delivery of orders utilising electronic ordering and rapid freight delivery services ▪ Immediate access to latest product information distributed via the WWW and the ability to resolve questions ▪ Use of configuration tools

Source: Stroud (1998:136)

Having a system that allows the firm and customers to deal with 'ad hoc' problems via the Internet is brilliant, but it could fail very easily. The firm might save the customer time and money by running the operation this way, but it will not necessarily save large amounts of money. A critical aspect of such a system is the staff that manages it. It is not beneficial to have an online help centre if there is nobody manning that centre. It is also not a case of hiring just anyone, the firm has to ensure that the people are properly trained and informed. Having a system that is properly manned and managed and allows extensive use by the customer can be of great benefit to the firm (Stroud, 1998:147).

Harnessing the immense power of the Internet is a fun and exciting challenge for any firm. If the firm is able to do this successfully they will set themselves apart from competitors and manage to become more efficient. However there

are some people who claim that the Internet has done more to destroy certain areas of logistics than help it.

7.4 THE EFFECT OF THE INTERNET ON LOGISTICS

The Internet is the latest IT application to have far-reaching effects on the logistics industry. The effects on business processes have already been discussed, and now the focus turns to the effects on logistics. With the amount of transactions taking place over the Internet, logistics has had to adapt to facilitate these transactions. Transactions conducted over the Internet are referred to as electronic commerce (e-commerce), and will be dealt with in the next chapter. For now it is imperative to realise that e-commerce has brought about many of the changes in the logistics industry. Some people believe that the Internet is doing more harm than good, and could prove to be a thorn in the side of logistics.

Firms that have entered the world of e-commerce and have not ensured that all the back-end systems are in place are having a negative effect on the world of e-commerce. These firms inadvertently manage to harm other firms involved in e-commerce. Firms that host a website that cannot deliver the goods, both literally and figuratively, can seriously damage their reputation. In a recent study conducted by DHL (The Journal of Commerce, 2000:2), they confirmed that many firms are not delivering their products as promised. This is causing dissatisfaction amongst customers and could signal the end of the e-commerce boom. At the moment more people are turning towards e-commerce and this is placing extra strain on an already struggling distribution system.

According to Beth Enslow (Cooke, 1999a: 59), an analyst at The Gartner Group, the problem is that “many cyberstores still haven’t given enough thought to the back end or distribution part of the business – the filling and shipping of orders.” Companies have to turn from container loads to individual products. This brings about a new way of picking and packing and interfacing current systems with new ones. Neglecting to pay attention to this is what is causing all

the problems. She also mentions that firms like Amazon are not reaping huge benefits due to high distribution costs. The firms tend to rely on established express couriers to mask their inefficiencies, which leads to high distribution costs.

This situation would seem to be highly beneficial to all the couriers, but it is in fact problematic for them. Freight patterns are changing and this is changing the transport industry, which in turn affects logistics. The changes might benefit express carriers, but they could prove to be detrimental for normal carriers. With all the focus on less than truckload shipments being the norm in the e-commerce industry, it could bring about several changes. Some experts predict that it will consolidate the market by forcing different carriers to merge. Sharing capacity is becoming the norm, but firms have to decide where to place their focus. The reason for this is that firms often have to quote low prices to get the contract. The prices quoted do not always cover costs and this is where their problems arise. The current system also sees carriers sign contracts for a specific period. This situation could come to an end, with transport being more like a commodity, and transport services being auctioned off to the different retailers (The Journal of Commerce, 2000:2).

Returned goods are also causing great problems. Many firms have not resolved the issue of returned goods. There is a large amount of backward flow, which is proving to be a big problem for firms with virtual inventories and without bricks and mortar stores.

Part of the services that many couriers offer today is the tracking of parcels. In chapter 2 mention was made of the parcel tracing services that couriers such as DHL, UPS and FedEx offer. Advances in technology have brought about Global Positioning Systems (GPS) and have allowed firms to track their goods all over the world. The Internet has broadened the scope of package tracking and tracing. Some firms scan the bar-code on the parcel at various points in the system. The information is sent to a database, via EDI, and allows access to anyone via the Internet. The sender and receiver of the goods can therefore monitor the progress of the item. Alternatively, the firm could make use of e-mail

transmissions to the sender to inform him/her about the whereabouts of the parcel.

Transport is not the only area that is affected by the Internet. It is believed that the Internet can start to replace many of the current IT applications. ERP is one system that seems to be under threat. The debate about the continued validity of ERP systems is one that continues to rage on. Many feel that if the firm has a well managed effective ERP system it can assist the firm in its entrance into e-commerce. Some firms may even choose to implement ERP systems to ensure that they have the proper systems in place when entering into e-commerce. Many of the top software companies are writing programmes that allow the current systems to be incorporated with e-commerce solutions. SAP is one of these firms, and their R/3 application has made them the second largest software firm in the world – second only to Microsoft. Kalakota and Robinson (1999:166) feel that “ERP is the backbone of e-business. In the early 1990s, only large manufacturers felt the pull of ERP, but medium-sized firms must now recognise the necessity of an integrated back office if they wish to succeed in the e-commerce world.”

The effects that the Internet and e-commerce have had on logistics have only become apparent recently. With e-commerce still in its proverbial infancy there are certainly many more changes that will occur. All firms can do is to keep tabs on the latest developments and try to keep abreast of the situation. In chapter 8 closer attention will be paid to e-commerce.

CHAPTER 8

ELECTRONIC COMMERCE

The Internet was originally developed to allow people to gain access to information on a wide variety of subjects. Soon it became the worldwide phenomenon it is today, for which many alternative uses were found. One of these uses was to conduct business over the Internet.

Advances in the transport industry had already brought about changes in the world market and the Internet made the market so much bigger. Global corporations no longer had that crucial advantage, because with the Internet anyone from anywhere could purchase just about anything. This new trading system was referred to as electronic commerce (e-commerce).

This chapter will briefly discuss the concept of e-commerce and give some insight as to why it is so popular. Possible strategies for success for any firm considering venturing into the world of e-commerce will also be outlined.

8.1 AN INTRODUCTION TO ELECTRONIC COMMERCE

The Internet has become the business tool of the twenty first century. Many firms are turning towards the Internet and e-commerce to tap into new markets and remain competitive. However, an important distinction has to be made between e-commerce and e-business. Many authors have different definitions, while some just use the term e-commerce to refer to all electronic transactions.

In general when anyone refers to e-commerce these days, one generally tends to associate it with transactions that are conducted over the Internet. Some authors feel that the term electronic commerce refers to any transaction that has some sort of electronic (IT) component, and that Internet commerce refers

to online transactions. It is the author's view that electronic business is a better description of the overall process of conducting business by means of computerised systems. Any firm that does not conduct business over the Internet, but makes use of IT applications, such as EDI or ERP systems, is thus involved in e-business. Any transaction that is conducted solely over the Internet is referred to as electronic commerce (e-commerce).

Currently there are three main forms of e-commerce, namely:

- *Business-to-business e-commerce (B2B)*
- *Business-to-consumer e-commerce (B2C)*
- *Consumer-to-consumer e-commerce (C2C)*

Business-to-consumer e-commerce makes up 80% of the trade over the Internet, and C2C refers to auction sites. The question that arises is: "why is e-commerce so popular?"

The main reason is the possibility of lower prices. According to Schneider and Perry (2000:10) a good advertising campaign on the Internet can introduce the firm and its products to millions of potential customers worldwide. Another cost-saving element is the advantages of B2B e-commerce. Because the Internet allows consumers to obtain so much information about a variety of products, firms can get the best prices from their suppliers and thereby reduce their overall product costs. There is no need for staff to deal with sales inquiries, quotes and to determine stock availability. Firms can also avoid costs by not having 'bricks-and-mortar' stores. This move will allow them to cut out cost elements such as rent, sales staff, shop fitting costs and inventory.

Buyers also benefit from e-commerce. They have greater access to information about the product and the firm. They have a much wider variety of vendors to select from, and have access to these vendors 24 hours a day. People in remote locations can obtain goods that may not be available there.

One of the disadvantages of e-commerce is that not everything can be sold over the Internet. Many have tried to sell just about anything, but only certain

products succeed. One of the key issues is the high distribution costs, a point that will be examined further when discussing the influence e-commerce has on the logistics industry. The integration of e-commerce software with that of traditional systems such as EDI and ERP often proves troublesome. Cultural and legal differences can also be stumbling blocks. One of the most important factors is the scepticism of many 'traditional' shoppers. Many view e-commerce as unsafe, with massive security risks as far as credit card fraud is concerned. Most shoppers also tend to be tactile shoppers, wanting to touch, fit on and physically inspect the goods they are buying (Schneider & Perry, 2000:11).

With all the talk about Internet safety and credit card fraud, many wonder if it is in fact safe to shop online. The answer is yes, but some measures have to be taken to ensure that the retailer is credible. Working through service providers that endorse their sites and stores is a good start. If a retailer is accessed directly, protection can be ensured by checking if they have a secure link (provided by a Secure Sockets Layer/SSL) to their site when the prospective customer's credit card details are entered. Normally a special window will appear to indicate that the user is now in a secure link. No retailer may record the consumer's credit card details, and in most cases the details are sent directly to the banks for authorisation. The retailer then only gets told if the card and transaction is authorised. A retailer must obtain a merchant ID from a bank to have these capabilities. In South Africa merchant ID's are only granted if:

- *A retailer has a legal business (according to SA law).*
- *The retailer complies with the rules set out by Visa/MasterCard.*
- *The business has a registered address in SA.*
- *Payment details are not recorded.*
- *The product does not entail pornographic material or online gambling.*

(M-Web, 2000:2)

The typical transaction thus follows a route similar to this:

- *Customer 'surfs' the site and selects certain products to add to his online shopping cart;*
- *All the costs, including VAT (if applicable) are added up;*
- *The customer enters his details including delivery address;*

- *Electronic payment is made via a secure link;*
- *The vendor receives notification of the sale;*
- *The product is shipped ;*
- *The buyer receives his goods.*

This all sounds quite easy, but there are many factors to consider before any firm can enter into the world of online retailing.

8.2 TAKING ON THE WORLD OF ELECTRONIC COMMERCE

As firms continue to strive for that competitive advantage, many new avenues are being explored. For any smaller to medium sized firm seeking an opportunity to expand, e-commerce could be the solution. The importance of IT in business today has been emphasised, as well as how IT can assist the firm in improving its logistics activities and thereby provide it with a competitive advantage. E-commerce is one crucial IT application that can transform a struggling firm into a successful global competitor. As with any business strategy e-commerce can only prove successful if the proper research is done and the firm sees to it that all necessary steps to ensure success have been taken. Electronic commerce is more than simply establishing a website and marketing your products. Proper planning can make it a success, whereas a lack of planning can be disastrous. The important factors any firm has to consider when attempting to enter into the world of e-commerce and, more specifically, the B2C area of e-commerce will now be discussed.

The most important step is to establish whether the firm will be able to compete successfully in the e-commerce economy. This is based on the type of product and the quality of the merchandise. The type of product is probably the more important factor of the two, since many products do not lend themselves to successful e-commerce. Books, CDs, computer software and hardware and other technological products tend to be the most successful commodities in the B2C market. This is by no means the golden rule and efficient marketing and high quality customer service can make any venture successful. The quality of

the firm's merchandise can also be a critical factor in determining e-commerce success. If the firm has been unable to gain market superiority based on poor products, venturing into e-commerce will by no means help to resurrect the firm. It is therefore essential that the firm evaluates its position in the market very carefully before making any decisions about e-commerce. If the firm already has a website it can use the information gathered from there to evaluate its position. Based on the number of 'hits' the web site generates, the firm can assess the popularity of its product(s), and hopefully determine whether a venture into online retailing will be successful.

If the firm has a website and the results obtained from it are good, the next point to consider would be the current distribution system. The firm has to examine the current logistics activities and determine how efficient they are. Entering into e-commerce will mean that the firm might have to build new partnerships with certain couriers and other transport companies, but if effective partnerships already exist the job will be so much easier. Therefore, if the firm has a distribution system that runs smoothly and is involved in a strategic alliance with the carrier, it can further explore the possibilities of e-commerce. If such a partnership does not exist the firm has to build a relationship from scratch. In many early cases this is exactly what firms had to do, but the whole process becomes much easier if the firm is already capable of handling the distribution in some way. Firms may even have to adopt a do or die attitude with the carriers, with bad service resulting in losing the contract. The issue of logistics – especially transportation – is the key factor in deciding whether the firm will be able to cope. If the firm is capable of setting up a system that will at least ensure domestic success, they are already on the right track.

Transport is not the only logistics activity that will be crucial to the success of the firm's e-commerce venture. Effective supply chain management will also play a big part in the firm's success. If the firm does not have the backing of its suppliers it will not succeed. In a time when customer service is vital, out of stock situations cannot occur. Normally, firms enter into e-commerce to get rid of inventory and the costs associated with keeping it. This normally means that the firm controls a 'virtual inventory' and obtains the goods or raw materials

directly from suppliers. Amazon is a perfect example of this trend. They do not have any bricks-and-mortar stores and get the material directly from publishers/distributors and then send it to the customers. Firms that engage in e-commerce and still run normal shops can easily overcome this problem. These stores are referred to as 'clicks-and-mortar' stores, operating both physically and virtually – i.e. by means of e-commerce. These stores can hold extra inventory to curb potential out of stock situations, but this can increase costs in the long run. Effective supply chain management and good relationships with suppliers can help to eliminate these problems.

If the firm has considered all these aspects and decides that e-commerce will be a worthwhile endeavour, it has to take the next steps. Up to now, only the broader aspects have been looked at. The focus now switches to the specifics. What exactly will the firm have to do to achieve success in the e-commerce industry? Since the world of e-commerce is still relatively new there are not any rules for success, but there are certain tactics that will at least help. These basic tactics provide some idea of what is needed to host a good website. There is an astounding amount of literature on this topic because of its new status as a world-wide business phenomenon.

Once the firm has established whether it has a customer base and a product that will sell, and figured out all the relevant costs, it has to appeal to the customers. In the retail sector this is achieved by:

- *Offering good deals to the customers;*
- *Treating the customer well by having good returns policies and money-back guarantees;*
- *Using the brand and its image to your advantage;*
- *Keeping the site simple and making it easy for customers to find what they need;*
- *Establishing trust by emphasising how secure the site is – as already mentioned, security is a key factor and a constant point of concern.*

(Marusich & Blackthorn, 1998:21)

Marusich and Blackthorn (1998:37) identify four steps in the e-commerce cycle, and identify ways in which the firm has to meet the demands of the customer in each of the four steps. These demands can be met by the services the firm offers or the layout and design of the website.

The first step is to *attract the customers*. In the case of clicks-and-mortar stores, this is done by incorporating the firm's website in all the other fields of its business. Employee business cards, letterheads and all other correspondence should display the URL address. Firms that are purely virtual stores have to use tactics such as banner advertising, registration with search engines and associate programmes. Banner advertising refers to the banner message that appears on the top of most websites. People often use search engines to find what they are looking for on the Internet. Associate programmes involve a partnership between the firm and a website that is somehow related to the firm. If, for example, the firm sells CDs it might ask a music review site to promote its CDs and offer them a percentage of the sales. Other methods include frequent buyer discounts, e-mail advertising and digital coupons.

The second step is *interacting*. Once the firm has attracted customers it has to be able to keep them on its website. Interacting consists of the following:

- *Setting up a catalogue;*
- *Having a shopping cart;*
- *Offering promotions and sales;*
- *Making product literature available* – very important, consumers want to know everything about the product;
- *Having 'click here to buy' technology* – makes purchasing so much easier;
- *Having a dynamic catalogue* – linked to inventory levels and gives constant updates;
- *Including a search feature on your site* – once again making things easier;
- *Making it easy for repeat customers to reorder.*

The third phase is *acting*. The customer has visited the site, ordered products and the firm now has to deliver the goods. One of the steps is capturing the order online. Allowing the customer to place the purchase order online is

crucial; requiring them to log off and place the order through conventional methods is a recipe for disaster. The customer also has to be provided with a variety of shipping choices, with the price of each choice clearly stated. The total costs of the product, shipping and taxes have to be relayed to the customer on his bill. The firm also has to support a variety of payment options such as traditional credit cards and e-commerce debit cards. The importance of a link with a bank is crucial. Using a Secure Sockets Layer (SSL) to authorise the credit card transaction can also save the firm money by protecting them from possible fraud. Using e-mail to inform the shippers of the customer's order and delivery address, and also to notify the customer that the order has been received, can help to stay ahead of competitors. This system will not only be quicker, but also offer more personalised service and improve customer service. Linking the e-commerce system to current ERP systems can further improve this and allow the firm to benefit. The firm also has to be able to deal with partial orders and backorders (Marusich & Blackthorn, 1998:46).

The final step in the process is *reacting*. This is the process that takes place after the sale has occurred. The most important area of concern in this process is the firm's ability to deal with returns and refunds. It should not only be possible, but easy for the customer to return goods if they are unsatisfactory. With the technology that exists today customers can trace their products through the distribution channel. Having facilities such as this will set the firm apart from its competitors. The crucial part of e-commerce is the people that man the site and deal with customer enquiries and problems. Having a link to a page that deals with frequently asked questions (FAQ's) is one option. Call centres also provide the same solution. The firm has to weigh up the costs of each option and decide which is the best. Publishing a variety of reports about the firm to keep the customers informed, or offering loyalty incentives can also prove to be beneficial (Marusich & Blackthorn, 1998:48).

Once firms have decided what to incorporate in their website they have to set it up. Here they are faced with three options, namely: self-hosting, partially outsourcing and complete outsourcing of the website. Self-hosting is generally a very expensive option. In a partially outsourced situation the firm hosts the

website, while a third party controls the transaction process. The final option is the best for smaller firms, and allows a service provider to host, design and create the website. The content of the site still remains the decision of the firm. This option is the one favoured by many firms. The premier Internet Service Provider (ISP) in South Africa is M-Web.

If the firm feels that enough information has been gathered about the Internet and e-commerce, it can take the next step, to get connected. If the firm has planned the whole process carefully it should be successful. Chapter 9 deals with Cybercellar and its success in the e-commerce industry. Cybercellar is a successful online store that planned accordingly and is now reaping the benefits

CHAPTER 9

A CASE STUDY IN ELECTRONIC COMMERCE – CYBERCELLAR

Cybercellar is one of the South African success stories in the world of e-commerce. The website sells selected South African wines to global customers. Cybercellar ships a large amount of wine to overseas customers.

The firm started in 1998 and is the brainchild of Fiona Phillips, a BComm MBA graduate. The business was started purely by doing market research into the wine industry and by setting up a supply chain. The deliveries were outsourced to third party carriers. The business focussed primarily on the B2C market, but has also made a move towards the B2B market.

The site offers a selection of wines that are available and they are tasted and approved before being placed on the site. They employ a full-time sommelier that acts as a wine buyer for the site. The site also incorporates the ratings of the Platter's guide (written by John Platter, the guide lists and rates almost all of South Africa's wines) to give their customers a chance to make an informed choice. They also get inundated with requests from wine estates to sell their wines. The site updates their 'inventory' on a daily basis to avoid situations where stock is not available.

The inventory in question is a virtual one, and the firm collects wine from the estates on a daily basis. The only inventory that they keep is stored in a cool room and this is normally only on an overnight basis. The firm is notified of an order by e-mail and dispatches a driver to the various wine farms. This is normally done every morning, and, depending on the orders generated during the day, in the afternoon as well. The firm has set guarantees from their couriers and make sure that they deliver on time. Once all the orders for the day have been collected and consolidated the couriers dispatch them. The delivery

lead-time depends on the destination and can vary from 24 hours in South Africa to three months for a container carrying wine overseas.

At present Cybercellar ships wine per case, but they also get requests for mixed batches. They do provide this service should the customer require it and they also have special offers where they put their own collections of different wines together. Customers can also request wines that are not offered on the site, and they do their best to track these wines down.

At the time of the interview the firm only had one instance of a broken bottle, which was replaced within 48 hours by the couriers. The couriers repack the wines in special cases that prevent breakage. The firm has had no returns as of yet, but they do have a policy in place to deal with returns. Their policy is to refund the customer fully – no questions asked. If the wine is corked they replace it and carry the costs of the shipping.

The firm is one of M-Web's best online stores and their business is growing daily. The reason for their success is a well-planned and well-marketed website that focuses on the needs of the customer. If any other firm wants to achieve some success in e-commerce, they can certainly learn from Cybercellar. More information about Cybercellar can be found on their website at, www.cybercellar.co.za.

CHAPTER 10

CONCLUSION

Many reasons have been offered to promote the incorporation of IT as a business tool in the digital business world firms are faced with today. However, incorporating technology does not necessarily insure success. The world of technology is moving along at a rapid pace and firms have to adapt their information systems accordingly. Today's business world places more emphasis on the effective flow of information than the manufacturing and distribution of products. It does not mean that firms should ignore the importance of the distribution of the product, but the effective flow of information between the firm and the carrier might make distribution easier and more effective.

Firms who are willing to make the changes must realise that in modern times these changes will become more frequent, due to the fact that technology changes on a daily basis. The firm must have a structure that will allow them to change often and with relative ease. Outsourcing could play an important role in this area and is one of the many difficult decisions firms are faced with.

The key factor that will determine success or failure in the world of IT, is the level of integration. Many smaller to medium sized firms do not have the resources to acquire information systems packages such as SAP, BAAN and JD Edwards. These firms rely on individual packages to control various functions. It is crucial that the firms integrate their systems and business processes. Technology has created bigger markets, but it has also created a greater choice of vendors. Firms can no longer rest on their laurels, as customers will no longer tolerate inefficiency. The firm has to plan the information system architecture to promote integration and efficiency. The firm must thus incorporate IT to streamline operations, improve customer loyalty and ultimately increase profits.

Some firms might be technologically geared to become global competitors and might therefore wish to enter the world of e-commerce. It is not that easy to set up a store on the Internet; many large firms in possession of the most sophisticated technology have failed. Planning is once again the key factor. The firm should study all the relevant literature carefully and decide whether e-commerce is really for them. Just because e-commerce is the latest trend, does not necessarily mean that the firm, or the industry it is in, is ready to join the world of e-commerce.

Whether the firm is a struggling local store, or a national competitor, competitive advantage is the edge it is looking for. IT, be it bar-code scanning, EDI or e-commerce, can help firms gain that competitive advantage and operate an efficient and effective business that enables them to excel in their business endeavour. Firms must harness the power of IT, not only to improve their products and systems, but to improve the customer's experience as well.

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