

**THE IMPLEMENTATION OF E-BUSINESS IN THE SOUTH AFRICAN
AUTOMOTIVE INDUSTRY**

BY

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degree of
Magister in Business Administration
at the Nelson Mandela Metropolitan University**

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DECLARATION

This work has not been previously accepted in substance for any degree and is not being submitted in candidature for any degree.

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ABSTRACT

Globally, the automotive industry has progressed through various stages of manufacturing paradigms over many decades. The automotive industry is one of South Africa's most important sectors, with many of the major automotive multinationals using South Africa to source components and assemble vehicles for both the local and international markets. Lean production has been recognised as the most effective manufacturing strategy that generates high quality products at low costs, while still producing different varieties of products. The effectiveness of the lean production lies in the relationships that exist between the original equipment manufacturer and its suppliers. Klopping and McKinney (2004) state that the evolution of the Internet as a business tool enhanced by the development of the World Wide Web has led to the emergence of the fast growing e-commerce applications.

This quantitative research study aims at investigating the e-business relationships that exist between a selected Eastern Cape Original Equipment Manufacturer and its first tier suppliers. The primary objective of the study was to obtain and document direct feedback from the South African Automotive Manufacturing Industry about their perceptions, opinions, plans and activities in respect to Business to Business Electronic Commerce - called "e-Business" for the remainder of this study.

The study shows that most automotive suppliers are comparatively heavy users of e-business. Many of these suppliers are also using e-mail and have a website, but comparatively few engage in more complex e-business operations. The greater majority of respondents reported that e-business has facilitated efficiency of their operations. However, e-business is not being utilised effectively between the OEM and its suppliers even with the introduction of Covisint which is a common e-business interface that was created through collaboration between major OEMs and their suppliers to ease e-business in the automotive industry.

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LIST OF COMMONLY USED ACRONYMS

GMSA: General Motors South Africa

OEM: Original equipment manufacturer

CHAPTER 1

INTRODUCTION, PROBLEM STATEMENT AND OVERVIEW OF STUDY

1.1 INTRODUCTION

Cameron (2003) states that supply chains encompass all of the diverse activities that are associated with the flow and transformation of goods, right from the beginning stage of the raw materials, all the way through to the consumer. Since the inception of the automotive industry, buyers and suppliers have been linked in rigid, inflexible relationships. With the advent of the Internet, however, supply chains are becoming less rigid and more efficient. E-enabling an automotive supply chain involves two distinct spheres of interest, namely, the sphere of automotive supply chains and that of e-business. Both spheres are evolving fast and becoming increasingly complex. Due to the increasing complexity, there is a lack of understanding with regard to incorporating e-business principles effectively into automotive supply chains.

E-Business encompasses aspects wider than the commonly published focus on procurement and sales between businesses, to include online distribution of information, collaboration between companies in various parts of a product life cycle, manufacturing and logistics operations support, to name a few (Federal Chamber of Automotive Industries, 2001). The use of E-business technologies enables OEMs to improve their efficiency and competitive position. However despite its importance, the application of E-business is facing various challenges in this sector. This has in turn has affected the effective streamlining of this process amongst OEMs and their suppliers. This leads to the following research question formulated under the Problem statement.

1.2 PROBLEM STATEMENT

The main problem of this research study is:

“Has E-business been implemented successfully throughout the automotive sector?”

1.2.1 Sub-problems

In order to solve the main research problem, the following sub-problems need to be solved:

- What infrastructure and e-business software systems are being utilised in the automotive sector?
- What electronic means are being used to communicate between OEMs and suppliers?
- What skill requirements and costs have been acquired by various companies to keep up with technological changes?
- What concerns prevent suppliers from implementing e-business fully for transactions?

1.3 SIGNIFICANCE OF THE RESEARCH

The automotive industry is one of the leading manufacturing sectors in the South African economy. Organisations throughout this sector are increasingly pressurised to become more efficient and cost-effective. Lean manufacturing has been proven to be the ideal practice to encompass in order for these companies to succeed in this industry. Concepts like Just in time derived from Lean manufacturing require suppliers to provide to OEMs the right components at the right time of the right quality. E-business enables these organisations to transact quickly and efficiently to ensure that they meet their customers' demands. However e-business is not as widespread in the auto industry and therefore this study aims to find out what problems are inhibiting this process. These results can then be used to highlight any issues hindering e-business from flourishing in the auto industry and recommendations given.

1.4 DELIMITATION OF THE RESEARCH

Delimiting the research ensures that the research undertaken is not too broad or generalised and therefore makes the information more manageable.

1.4.1 The Organisation

This research will be conducted at General Motors South Africa, an Original Equipment Manufacturer, located in the Port Elizabeth. The focus will be on the relationship between GMSA and its first tier suppliers nationally.

1.4.2 Geographic Delimitation

The research will be limited to the General Motors South Africa plants, located on Kempston Road and Struanway in Port Elizabeth in the Eastern Cape and its first tier suppliers around the country. No international suppliers will be considered for this study.

1.4.3 Level of management.

The research study will be conducted to include senior, middle and salaried staff levels within the supplier community. Hourly staff will not be considered for this study.

1.5 RESEARCH METHODOLOGY.

An extensive literature study will form the basis of the research. The literature study will comprise chapters that discuss Lean manufacturing, E-business and their relationship. A quantitative approach will be used utilising an explorative and descriptive survey questionnaire to complete the research study. The purpose of the questionnaire will be to acquire relevant information from the respondents as regards the topic in question. The questionnaire has been chosen to collect data because it provides a simple and logical way for the respondents to provide information that can be analysed about the topic.

1.5.1 Method of data collection.

A pilot study will be done to assess the efficiency and validity of the chosen data collection instrument of this research study.

1.5.2 The target population and sampling.

Random sampling will be used to collect data for this study. This method provides an equal chance for every member of population and will provide the same chance that they will be selected without any bias. The data collection instrument used for the survey is a questionnaire designed specifically to elicit responses that will provide relevant information for the study. The questionnaire will be emailed randomly to respondents, to complete anonymously, and they will be given a deadline to submit the completed document. The efficiency of the data collection instrument will be tested in the pilot study. The reason for doing a pilot study is to see whether the questionnaire is sufficient to collect the relevant data. The pilot study also gives an indication whether the questionnaire is clear and easy to understand for the respondents.

1.5.3 Method of data analysis.

Statistical analysis will be done with assistance from Dr Jacques Pietersen using STATISTICA software which is a common tool used to analyse research results. The data will then be interpreted and presented to highlight the findings of the study.

1.6 CHAPTER OUTLINE

The treatise is divided into six chapters which are as follows:-

Chapter 1 provides an introduction to the research study. The problem statement, main and sub-problems, the significance and delimitation of the research, and key concepts are presented. An explanation of the significance of the research project is also provided.

Chapter 2 comprises of a literature review about lean manufacturing. A brief history and implementation of lean manufacturing is discussed. Supply chains and their subsequent automation is also discussed.

Chapter 3 focuses on E-business and related concepts. A brief history, significance and benefits of E-business are also discussed.

Chapter 4 aims to illustrate the research methodology utilised to complete the study. The data collection tool is discussed as well as the data interpretation procedures.

Chapter 5 contains the results of the empirical study and a brief interpretation given.

Chapter 6 is the final chapter which includes a brief summary of the research, conclusions and recommendations as well as areas for further research.

1.7 SUMMARY

In this chapter the research topic has been discussed in order to introduce the study to that will be undertaken. The main problem and the sub-problems have been defined. The delimitations of the research study have been explained. The significance of the research has been explained to explain why the topic is important. In addition, the research methodology used during the research study has been briefly explained.

In chapter 2 the lean manufacturing will be discussed in detail. Supply chains and their automation will also be discussed.

CHAPTER 2

LEAN MANUFACTURING

2.1 INTRODUCTION

In this chapter, a summary of lean manufacturing including a brief history will be given with focus on the supply chain. The purpose of this chapter is to establish the link between lean manufacturing and the use of automated supply chains in order to create greater advantages for Original Equipment Manufacturers (OEMs).

2.2 LEAN MANUFACTURING DEFINED

Principles of lean thinking have been broadly accepted by many manufacturing operations and have been applied successfully across many disciplines (Poppendieck, 2002). While many researchers and practitioners have studied and commented on lean manufacturing, it is very difficult to find a concise definition which everyone agrees. Different authors define it distinctively (Wong, Wong & Ali 2009).

Liker and Wu (2000) define lean as a philosophy of manufacturing that focuses on delivering the highest quality product on time and at the lowest cost. Worley's and Doolen's (2006) definition revolves around the systematic removal of waste by all members of the organisation from all areas of the value stream. According to Kotelnikov (2007), lean is about doing more with less: less time, inventory, space, labour, and money.

Lean manufacturing is most frequently associated with the elimination of seven important wastes in order to restructure the effects of variability in supply, processing time or demand (Shah and Ward, 2007). When referring to Lean Manufacturing (also known as the Toyota Production System) Kotelnikov (2007) states that in its most basic form, the process involves the systematic elimination of waste that comprises of overproduction, waiting, transportation, inventory, motion, over-processing, defective units, and the implementation of the concepts of continuous flow and customer pull. Liker (2004) also concurs and insists that lean manufacturing is about eliminating

waste and by eliminating these wastes, the organisation will benefit financially. Nauhuria Wadhwa & Pandey (2009) affirm that lean manufacturing can help to reduce waste by 40 per cent, cut costs by between 15 and 70 per cent, decrease space and inventory requirements by 60 per cent, push productivity up between 15 and 40 per cent whilst cutting process changeovers by 60 per cent

Liker (1998) mentions that lean manufacturing implies an uninterrupted production flow, a pull system that cascades back from the customer demand by replenishing what the next operation takes away in short intervals and a culture where everyone strives for continuous improvement. Liker (1998) also states in order for lean manufacturing to work efficiently, first-second- and third-tier suppliers must participate on an equal footing with original equipment manufacturers' (OEM) operations in the production flow. Typically the OEM will single source orders and select suppliers on quality rather than cost criteria. They establish long term contracts to ensure supplier dedication and commitment. Finally suppliers are expected to maintain high quality standards commensurate with the OEM and inspect components before delivery. Consequently you can evaluate supplier performance in a lean production system by decreased order lead times and low reject rates.

2.3 ORIGIN OF LEAN MANUFACTURING

The origins of lean thinking can be found on the shop-floors of Japanese manufacturers and, in particular, innovations at Toyota Motor Corporation (Nauhria, Wadhwa and Pandey, 2009). The release of Womack and Jones' book called 'The machine that changed the world' in 1990, introduced Lean Manufacturing which is used to describe the Toyota Production System (Liker, 2004). McGivern (1998) says that Lean manufacturing is a performance-based process used in manufacturing organisations to increase competitive advantage. The basics of lean manufacturing employ continuous improvement processes to focus on the elimination of waste or non value added steps within an organisation. The challenge to organisations utilising lean manufacturing is to create a culture that will create and sustain long-term commitment from top management through the entire workforce. Lean manufacturing processes

are being used predominantly in the automotive industry. Toyota Motor Company, considered the leader in lean manufacturing techniques, started using the techniques during the 1950s and 1960s. They have since built their reputation as quality leaders and boast one of the fastest growing market shares in the automotive industry (McGivern, 1998)

These innovations, resulting from a scarcity of resources and intense domestic competition in the Japanese market for automobiles, included the just-in-time (JIT) production system, the kanban method of pull production, respect for employees and high levels of employee problem-solving/automated mistake proofing. This lean operations management design approach focused on the elimination of waste and excess from the tactical product flows at Toyota (the Toyota “seven wastes”) and represented an alternative model to that of capital-intense mass production (with its large batch sizes, dedicated assets and “hidden wastes”). The focus was on quality, cost and delivery (Nauhria et al 2009).

Liker (2004) explains that the material handling system of lean manufacturing is based on Just-in-Time production. Companies produce parts in small lot sizes as they are needed rather than mass produced and inventoried for future use. JIT production is based on the concept of pulling rather than pushing parts through the manufacturing process. In an ideal JIT world, the customer triggers production when ordering a finished product. There are immediate benefits of JIT through lowered inventory. However the biggest benefit of JIT is product quality. By producing parts in small quantities, companies can detect and quickly correct quality problems before they produce large inventories of defective parts.

2.4 RATIONALE FOR IMPLEMENTING LEAN MANUFACTURING

Navsaria (2007) reports that because of globalisation competition is increasing and the demand by customers for high quality goods that are customised to the needs of the customer, and is sold at a low price is increasing. Navsaria (2007) also reports that lean is focused on getting the right things, to the right place, at the right time, in the

right quantity to achieve perfect work flow while minimising waste and being flexible and able to change. Lean manufacturing provides a system that addresses the needs of both the organisation and hence the customer. Lean manufacturing provides a system that addresses the needs of both the organisation and hence the customer. Kotelnikov (2007) cites that when implemented correctly, lean manufacturing provides the following benefits to the organisation in order to satisfy the customers' needs:

- Waste reduction by 80 per cent;
- Production cost reduction by 50 per cent;
- Manufacturing cycle times decreased by 50 per cent;
- Labour reduction by 50 per cent while maintaining or increasing throughput;
- Inventory reduction by 80 per cent while increasing customer service levels;
- Capacity in current facilities increase by 50 per cent;
- Higher quality;
- Higher profits;
- Higher system flexibility in reacting to changes in requirements improved;
- More strategic focus; and
- Improved cash flow through increasing shipping and billing frequencies.

Kotelnikov (2007) also believes that these results will only improve by continuously focusing on continuous improvement programmes to reduce waste. This would require the workers to have the mindset to continuously look for means to reduce waste. Many companies also have realised higher employee morale, in part because lean manufacturing includes listening to workers and their ideas about how to perform operations more efficiently.

2.5 BARRIERS TO LEAN MANUFACTURING IMPLEMENTATION

Nauhria et al (2009) argue that some of the problems OEMs face is the constant striving towards lower costs through improved productivity, better floor space utilisation, reductions in scrap and rework, increased employee participation, and simplified administrative routines. One of the major factors in this problem is the inability of suppliers to meet the required needs. In modern automotive manufacturing

new approaches to just-in-time supplies have been developed. As part of the outsourcing activities performed by the Original Equipment Manufacturers (OEM's), suppliers are brought to a just-in-time method of supplying components and, in some cases, built up sub-assemblies. The creation of satellite assembly units within reach of the assembly line and often alongside the assembly line, has geared manufacturers to the shortest possible assembly time. Lean manufacturing contributes substantially to cutting costs and providing competitive advantages through reduced work-in-process, increased inventory turns, increased capacity, cycle-time reduction and improved customer satisfaction (Nauhria et al, 2009).

2. 6 SOUTH AFRICA'S AUTOMOTIVE INDUSTRY

2.6.1 Sector overview

The manufacture of motor vehicles sector includes the manufacture of motor vehicles for the transport of persons and goods, as well as tractors for semi-trailers, and engines for all of these. The vehicle components sector includes the manufacture of parts and accessories for motor vehicles and their engines (including electrical equipment) and the manufacture of vehicle bodies and trailers (Esselar, Miller, James & Sibthorpe 2002).

The automotive industry is one of the World's largest industries with a turnover of more than 10-trillion Dollars and over 10 million employees (Robertson, 2005). The world's automobile industry made over sixty six million cars, vans, trucks and buses in 2005. This level of output is equivalent to a global turnover of 1.9 trillion Euros. Building sixty-six million vehicles requires the employment of more than eight million people directly in making the vehicles and the parts that go into them. This is over five per cent of the world's total manufacturing employment. In addition to these direct employees, about five times more are employed indirectly in related manufacturing and service provision, such that an estimated more than 50 million people earn their living from cars, trucks, buses and coaches. The automobile industry is also a major innovator, investing almost 85 billion Euros in research,

development and production. The auto industry plays a key role in the technology level of other industries and of society and is one of the largest investors in Research and Development. Vehicle manufacture and use are also major contributors to government revenues around the world, contributing over 430 billion Euros in twenty six countries alone (OICA is the voice speaking on automotive issues in world forums, 2010).

2.6.2 Automotive sector statistics

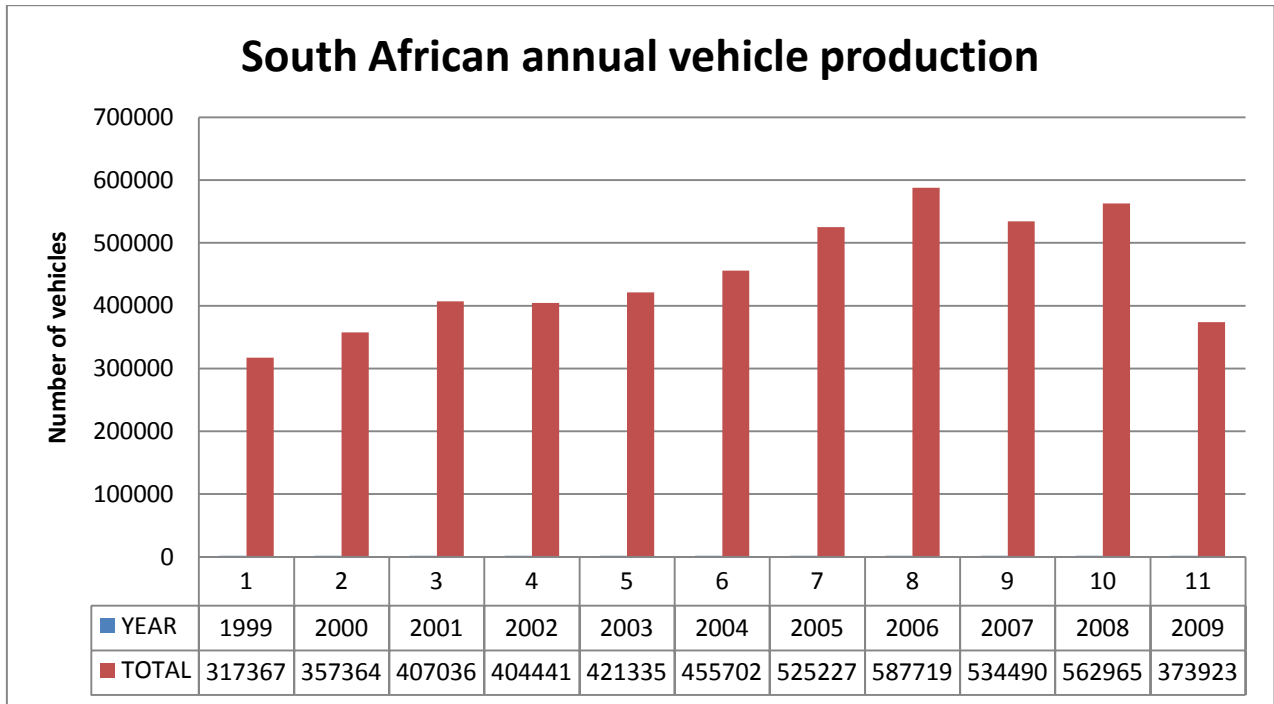
The South African automotive sector, regarded as the leading manufacturing sector accounts for 6-7 per cent of South Africa's nearly 280 billion dollars a year economy and about half of the 420 000 cars made in the country are exported to other African states, Europe and the United States. This also accounts for about 10 per cent of South Africa's manufacturing exports, making it a major contributor to the country's Gross Domestic Product (GDP) (Strike could endanger South Africa's status as car hub, 2010). The sector has been identified in government's 2007 and 2010 revised National Industrial Policy Framework and Industrial Policy Action Plan as one of the priority sectors to fast-track growth and development (The SA Auto Industry in Brief, 2010). South Africa's auto industry represents 83 per cent of Africa's total vehicle output but only one per cent of the world market. In comparison, the US produces about 30 per cent of the total global output. South Africa is the 18th largest manufacturer of vehicles in the world (Maninal, 2002) During July 2010, a total of 29203 new passenger cars were sold with total new passenger car sales increasing by nine per cent compared to June this year, and by 32.4 per cent when compared to July 2009, bringing the year-to-date July market this year to a level 28.6 per cent above the same period for last year (NAAMSA, 2010). This indicates that there is growth in the automotive sector after the recent global financial crisis that lead to low vehicle sales. The 2020 vision under the new Automotive Production Development Programme (APDP), shared by government and industry, is to double vehicle production from the 2006 levels of about 600 000 units to 1,2 million units by 2020, with a much stronger development of the automotive component sector (South Africa Investor's Handbook,2009).

2.6.3 Automotive sales figures

In August 2010, new vehicle sales were in line with expectations with new car sales – boosted by pre-emptive buying to avoid the CO² new car emissions tax - registering strong gains and new light commercial sales registering modest improvements. Aggregate industry sales at 46,377 units registered an improvement of 12,502 vehicles or 36.9 per cent compared to the 33,875 vehicles sold during the corresponding month in 2009. Aggregate export sales, whilst down in volume terms by 15.7 per cent on the previous month of July 2010, registered strong gains during August, 2010 in relation to the very low base figure of the corresponding month in 2009 when exports had been severely affected as a result of the impact of the global financial and economic crisis at the time (NAAMSA, 2010).

There has been a significant improvement in the annual vehicle production in the country between 1999 and 2009 as indicated in figure 2.1. There was a substantial increase between 2004 and 2006 although this dropped in the following year by more than 50,000 vehicles.

FIGURE 2.1: ANNUAL VEHICLE PRODUCTION IN SOUTH AFRICA 1999-2009



Source: OICA, 2010

2.6.4 Auto component industry

There are more than 200 automotive component manufacturers in South Africa and upwards of another 150 that supply the industry on a non-exclusive basis. The component industry has a turnover of about R50-billion, or approximately 2 per cent of the country's GDP, and is looking to strong growth as export potential continues to increase. South Africa exported R30.3-billion worth of auto components in 2006, a 32 per cent increase over 2005. Catalytic converters continued to be the country's most exported vehicle part, accounting for almost half of all component exports. Other key exports include engines, silencers and exhausts, radiators, wheels and tyres, stitched leather car seat covers, car radios and sound systems, and axles, especially for heavy trucks. Germany, Spain, the UK, the US, France and sub-Saharan Africa are the leading destinations for South African auto parts exports (South Africa's economy: key sectors, 2010).

Esselar et al (2002) accounts that the components industry is critical to the automotive sector as automotive parts and raw materials make up almost 70 per cent of the cost

of any vehicle. It is a complex industry to describe and the standard “tier one, tier two, tier three” model is not wholly adequate on four reasons. Firstly, the length of the supply chain varies from product to product. For instance, Shatterprufe is a one-stop supplier of windscreens whereas for car seats or electronics subsystems, the supply chain is much longer. Secondly, many supply companies manufacture for other industries such as defense, chemicals and aerospace. Thirdly, some companies are simultaneously first tier suppliers for some products and second or third tier for others. Finally, many automotive components companies, such as ArvinMeritor, produce not only for Original Equipment Manufacturers (OEMs) but also for the aftersales market that supplies auto parts for vehicle repair and maintenance.

The automotive and components industry is perfectly placed for investment opportunities. Vehicle manufacturers such as BMW, Ford, Volkswagen, Daimler-Chrysler and Toyota have production plants in the country, while component manufacturers (Arvin Exhaust, Bloxwitch, Corning, Senior Flexonics) have also established production bases nationally. The industry is largely located in two provinces, the Eastern Cape (coastal) and Gauteng (inland). Companies with production plants in South Africa are placed to take advantage of the low production costs, coupled with access to new markets as a result of trade agreements with the European Union (EU) and the Southern African Development Community (SADC) free trade area (South Africa's economy: key sectors, 2010).

2.6.5 Geographical information

According to The SA Auto Industry in Brief (2010), South Africa’s vehicle assembly industry is concentrated in three of the country’s nine provinces, namely Gauteng, the Eastern Cape and KwaZulu-Natal, and in close proximity to its suppliers. However, increasingly some automotive development is also taking place in the Western Cape. The three automotive clusters and the Western Cape automotive features are illustrated as shown in table 2.1 and figure 2.2:

TABLE 2.1: Automotive cluster information

Automotive clusters	Gauteng	Eastern Cape	KwaZulu-Natal	Western Cape
Capital	Johannesburg	Bisho	Msunduzi/ Pietermaritzburg	Cape Town
Population (per cent of SA total of 49,32 million)	10,53 million (21,4 per cent)	6,64 million (13,5 per cent)	10,44 million (21,2 per cent)	5,35 million (10,9 per cent)
GDP contribution as per cent of SA total GDP of R2 423 billion	33,5 per cent	7,8 per cent	16,2 per cent	14,5 per cent
OEMs (manufacturing plants)	BMW SA, Nissan SA, Renault SA, Ford Motor Company of Southern Africa incorporating the assembly of Mazda	Volkswagen of SA Mercedes-Benz SA General Motors SA	Toyota SA Motors	-
Number of automotive component companies	164	82	84	20

Source: The SA Auto Industry in Brief, 2010

FIGURE 2.2: Location of OEMs in South Africa



Source: The SA Auto Industry in Brief, 2010

2.6.6 Vehicle programmes

Kaggwa, Pouris & Steyn (2007) report that in 1995, the South African government implemented the Motor Industry Development Programme (MIDP), a policy framework to support industry growth under a liberalised trade environment. The adoption of the MIDP was necessitated, in part, by the re-integration of South Africa into the global economy after many decades of economic isolation. The South African economy, in general, had to deal with new challenges of a competitive nature, as cheap imports from the rest of the world found their way into the country. The Motor Industry Development Programme is comprised of two components:

- The Car and Light Commercial Vehicle Programme; and
- The Medium and Heavy Commercial Vehicle Programme

The motor industry development programmes (MIDPs) were implemented to reshape the future direction of the South African automotive and associated industries. The MIDPs took account of the international realities facing the motor industry in South Africa, namely trade liberalisation, globalisation of markets against the background of rapid technological change, rising customer expectations and markets which were becoming increasingly demanding and fast moving in terms of fashion and trends. (Esselar et al 2002).

The sector has exhibited significant growth under the Motor Industry Development Programme (MIDP). Introduced in 1995, the programme will be gradually phased out until 2012. The Motor Industry Development Programme (MIDP) is aimed at making the South African automotive sector internationally competitive through phased global integration, increasing the volume and scale of local production, expanding exports, and modernising and upgrading the industry. Its successor, the Automotive Industry Programme, has been developed to stimulate production of automotive vehicles and components in South Africa and to encourage the expansion of motor-industry investment and employment (South Africa's economy: key sectors, 2010).

2.6.7 Key objectives of the MIDP

According to the annual NAAMSA (2010) report, the following are the main objectives of the MIDP:

- To improve the international competitiveness of the South African automotive manufacturing and associated industries;
- To improve vehicle affordability in the domestic market;
- To stabilise employment levels in the industry;
- To create a better balance between the industry's foreign exchange usage and foreign exchange earnings; and
- To encourage growth in the vehicle market and in the component manufacturing industry particularly in the field of exports.

Essentially the essence of the MIDP is to encourage the OEMs in South Africa to specialise in one or two high volume models on behalf of parent companies, obtain economies of scale benefits via exports and in turn import those low volume models not manufactured in the country to complement their domestic model mix. This approach also assists the component suppliers in obtaining higher volumes (The SA Auto Industry in Brief, 2010).

Kaggwa et al (2007) reports that one of the MIDP objectives was the integration of domestic component suppliers into the global automotive value chain. It was envisaged that through support of locally-based vehicle manufacturing subsidiaries to supply to international markets by taking advantage of supply contracts negotiated and facilitated by parent companies in developed countries, domestic suppliers would be afforded an opportunity to participate in the global automotive business. The interactions between the domestic suppliers would also have other positive spin-offs in terms technological transfer and ex-efficiency.

Kaggwa et al (2007) also state that despite the progress made in integrating the local industry into the global automotive value chain, taking forward the industry support has been characterised by tension among stakeholders. Hence, government has been

compelled to review MIDP performance periodically and seek new consensus on the nature of its industry support. Apprehension has persisted within the industry, creating uncertainty among potential investors – one of problems the MIDP sought to solve in the first place.

2.7 SUPPLY CHAINS

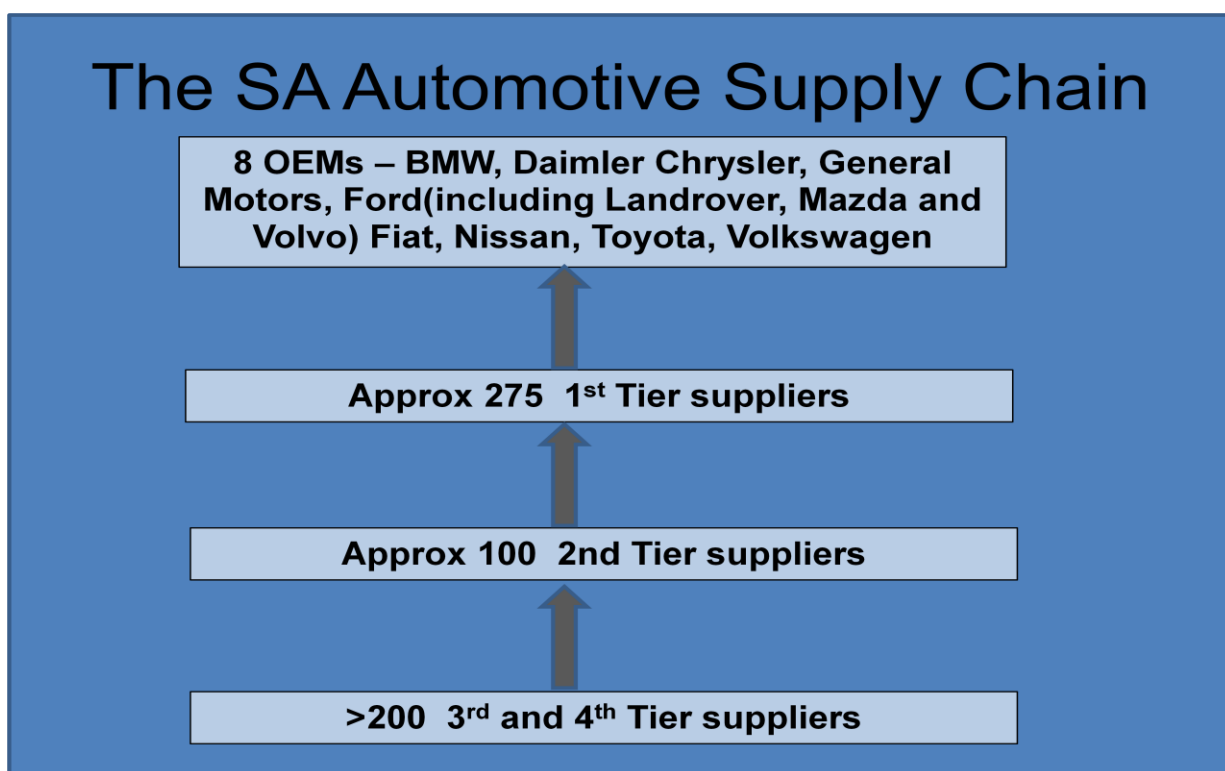
Supplying value to the customer, in the form of goods and services, is the core of business. A supply chain is a network of organisations and all of their associated activities that operate jointly, most often in a sequential manner, to produce value for the consumer (Kumar, 2001). Cameron and Botha (2002) affirm that supply chains encompass all of the diverse activities that are associated with the flow and transformation of goods, right from the beginning stage of the raw materials, all the way through to the consumer. Supply chains are broken into three distinct parts, upstream activities involving all of the material and service inputs from suppliers, internal activities involving the manufacture and packaging of the goods, and downstream activities which involves the distribution and sale of the goods. Since the inception of the automotive industry, buyers and suppliers have been linked in rigid, inflexible relationships. With the advent of the Internet, however, supply chains are becoming less rigid and more efficient.

Cameron (2003) states that in the current economic climate, companies not only have to rely on themselves, but on their entire supply chain in order to remain competitive. By having an effective supply chain, companies may become more efficient and more competitive. Efficient supply chains, can offer streamlined collaboration and coordination between suppliers, business partners and customers. Njokweni (2005) reports that in order to support lean manufacturing, vehicle manufacturers are increasingly demanding greater insight into their suppliers' logistics concepts to uncover potential new savings. This is of particular importance for systems as complex as the circuitry of a vehicle. It is imperative to tailor each logistics concept at the planning stage of each project and optimise inventory control and materials handling.

Lamming (1993) confirms that competition in a lean supply environment is global. A first tier supplier to an assembler in one country must also be able to supply that assembler in other parts of the world. The supplier must also be willing to set up transplant production units close to the customer's assembly plant or establish joint ventures with local suppliers. The lean supplier will contribute to produce technology in collaboration with the assembler, but the requirements go even further. The lean supplier is expected to become a technology leader, developing new technologies independently of the assembler.

The South African automotive Supply chain is segmented as indicated in figure 2.3 below. It comprises eight major OEMs who are supplied by approximately 275 first tier suppliers, 100 second tier suppliers and more than 200 third and fourth tier suppliers.

FIGURE 2.3: Segmentation of SA Automotive supply chain.



Source: Maninal, 2002.

Njokweni (2005) summarises that, for today's vehicle manufacturers, there are basically four criteria that play a decisive role in supplier selection: cost; development know-how and resources; product quality and logistics. Whereas in the past vehicle producers were mostly interested merely in the interface to the supplier and in the inventory days on hand, today's suppliers are frequently called on to reveal their complete supply chain, from component manufacture through to delivery to the production line. This is because with the cost pressure constantly increasing, vehicle manufacturers want to make sure that their supplier's logistics operations are optimised as well as being incorporated effectively into their own concept.

2.8 COMMUNICATION WITHIN SUPPLY CHAINS

Cameron et al (2002) Supply chains have always been large and complex. This complexity stems from companies purchasing the majority of their parts, opposed to manufacturing the parts themselves. According to Feld (2000), in order for lean manufacturing to truly function, direct lines of communication between customers and suppliers must be identified and strengthened. For every product produced within a manufacturing cell, there is a corresponding customer that will be consuming that product. Whether the supplier cell is part of an internal customer/supplier relationship within a multi-plant or part of a larger supply chain involving several different companies the same edge applies, align with the customer. Njokweni (2005) states that a good logistics concept reduces the cost of inventory control and materials handling to a minimum. It ensures that optimum use is made of assembly line space and makes sure that the product is delivered at exactly the time it is needed. Parts received on a regular basis and in sequence have also substantially reduced the volume of line side material in the plants. The creation of a comprehensive logistics concept brings the original equipment manufacturers the best results in terms of costs and efficiency in subsequent production, because it allows expensive reworking to be avoided.

Cameron (2003) states that automotive supply chains are an integral part of the automotive manufacturing process. The automotive manufacturer establishes a supply

chain with its suppliers, partners, distributors and customers. This supply chain, which enables the manufacturer to obtain and move the required material from the supplier to the manufacturing plant and finally to the customer is a static supply chain which has fixed ends (Simon, 2001). It consists of the suppliers, on the one end, the manufacturer in the middle, and the customer at the destination. Therefore there are three parts to an automotive supply chain, the demand side, the automotive manufacture, and the supply side. The aim of an efficient supply chain is to have collaboration from the demand side, right through to the supply side. Supply chains entail, not only product, but also process and information flows across an entire enterprise, its suppliers, customers and partners (Promatis, 2001). Supply chain collaboration has many benefits for manufacturers, such as enabling them to have visibility into their suppliers' inventory availability. This collaboration within a supply chain, allows companies to anticipate events, such as a delay in parts that have been ordered. Companies are therefore able to plan properly for these events and take the necessary corrective action to rectify any problems or realign themselves for the new situation (Forger, 2000).

Brown (1996) notes that collaboration and partnerships have been seen as important factors in strategic planning and implementation. Partnerships occur in order to develop products to share technology, to learn from each other or any other reason which might be perceived as mutually beneficial for the two or more partners involved in collaborating. According to Brown the nature of collaboration tends to fall into two key areas:

- Vertical collaboration where firms within the supply chain share technology and form long-term strategic partnerships; technology development with suppliers will be one of a number of reasons for this type of alliance.
- Horizontal collaborations where firms within the same or related industries gain access to each other's market segments or other mutually beneficial arrangements.

Mische (2001) believe that collaboration is born out of a common interest and desire, the need to marshal specialisation and often costly equipment and personnel, the

need to share the risk and the requirement for specialised subject matter expertise and competencies. Njokweni (2005) states that collaboration is the key to ensuring the long- term sustainability of the automotive industry in South Africa. The pressing need to lower logistics costs was identified by the industry. Collaboration and consolidation are prerequisites for the reduction of the cost of the value chain. The concept of the automotive supplier park implies the grouping together of logistics and non- logistics services and technology in one park, in order to create synergies and optimisation through economies of scale to drive down logistics costs. The bottom line is to maintain long- term competitiveness in the global playground.

Brown (1996) advises that lean supply is appropriate if it means that many firms are:

- Drastically reducing the supply base to fewer, better, suppliers;
- Forming strategic alliances, or buyer- supplier relationships within the supply chain where the nature of the alliance is long term and both parties benefit, not necessary in equal measure;
- Integrated production, with low inventories throughout, using just-in-time management;
- Emphasis on prevention, rather than detection in quality;
- Production is pulled in response to customers, rather than pushed to suit machine loading or other in-house ideas of scheduling;
- Work is organised in teams, using multi-skilled workforce problem solving to eliminate all non-value adding activities;
- Close vertical relationships, integrating the complete supply chain from raw material to customer; and
- Forming tiers on the part of the suppliers, whose role will include research and development and involvement at early stages with new product development and innovation.

Supply cost influences an organisation`s overall cost position. Location may influence supply cost, which is why, historically, steel or glass manufacturing was close to raw material and energy sources. In some instances, ownership of raw materials gave cost

advantage too. How supplier relationships are fostered and maintained is of major importance in sustaining this position (Johnson & Scholes, 2002). Supply costs are of particular importance to organisations which act as intermediaries, where the value added through their own activities is low and the need to identify and manage input cost is critically important to success. Since all traders now have access to similar information systems, advantage will be eroded and staying ahead will be about the innovative ways in which those systems are exploited – all of which will be short-lived. So the core competencies are the processes of innovation and development and not any particular system (Johnson & Scholes, 2002).

According to Kalakota and Robinson (2001) “Supply Chain Management will be a focal point of business strategy during the next decade”. Currently a customer-centric environment exists, where meeting customers’ needs is a fundamental necessity for existence, not merely a competitive advantage (Buelow, 2001). Delivering products on time, with a greater level of service is a standard expectation. Companies need to employ innovative ways to reduce costs, while still meeting their customers’ needs. Companies will have to improve their fragmented and complex supplier networks, in order to minimise operational inefficiencies, reduce costs and gain a competitive advantage. Buelow (2001) therefore concludes that because e-enabled supply chains are still in their infancy, they offer companies a tremendous competitive advantage and can have a dramatic impact on the bottom line. Although supply chains have existed since the inception of business, e-enabled supply chains are a relatively new concept. The need for e-enabling is mainly due to customers being more cost and value conscious, and often demanding individualised products from the supply chain.

2.8.1 The Move to Automation in Supply Chains

Historically, many of the activities in a supply chain, especially the upstream and downstream activities, have been performed manually. These transactions include purchase orders, invoices, delivery notes and the likes. With the advent of the Internet, however, many of these transactions can be automated at a relatively low cost. This automation has the ability to reduce direct operational costs and to

simplify business processes (Rahman & Raisinghani, 2000). The Internet has become an essential component for business in today's competitive markets (Lancioni, Schau & Smith, 2003). For example, a customer can send an order to a supplier electronically through the Internet, as opposed to faxing or phoning the order through. This enables the supplier to streamline the order process and possibly reduce their head count.

2.8.2 Benefits of an Automated Supply Chain

In the constantly evolving world of local and global supply chains, one can derive many benefits by automating processes in one's supply chain. Benefits such as achieving value and cost advantages are some of the few. Automating processes in supply chains may also help to reduce demand-uncertainty, as well as optimise product and data flows (Kumar, 2001). In order to achieve these benefits companies must focus on different competitive strategies (O'Brien, 1999). These competitive strategies can help companies to improve their businesses. Each of these strategies has different benefits associated with it;

- The first competitive strategy is cost reduction. An e-enabled supply chain can assist a company in reducing its costs in many ways. For instance, if a company can access real-time demand information through an e-enabled supply chain it can reduce its inventory holding and in so doing reduce its costs (Lee and Whang, 1998).
- Differentiation is another competitive strategy. Companies can make use of technology to differentiate themselves (García-Dastugue and Lambert, 2003). Dell for instance makes use of the Internet as a sales medium.
- Promoting growth is the third competitive strategy. By using the Internet as a sales medium, companies can often reach a larger customer base, and in so doing also increase their market share.
- An e-enabled supply chain can also assist in developing alliances. If a company can monitor its customer's inventory levels via an e-enabled supply chain it can better fulfill these requirements and hence develop a better alliance (Asmus & Griffin, 1993).

- The last competitive strategy is that of improved quality and efficiency. E-enabled supply chains can affect the quality and efficiency of a company. For instance increased data accuracy can be achieved by submitting orders electronically through an e-enabled supply chain (Buelow, 2001).

According to Boyn (2001) states that most transactions in the automotive sector are now done across EDI (electronic data interchange) links using customised interfaces--systems set up over the last decade or more. All sides see it as a low priority to update these links, simply because the benefits to the organisation of upgrading to full web-based commerce are minimal, but the costs and associated technical risks are high. Instead, the effort is being placed on creating web solutions for activities where no EDI solution exists. Within the auto sector, therefore, most web-based e-commerce programmes will be built around new contracts and the use of distributed applications to improve co-working among multi-disciplinary teams.

2.9 CONCLUSION

In this chapter, lean manufacturing was defined and a brief history of its development represented. The main goal of lean manufacturing i.e. the elimination of waste, was discussed as well as the benefits of lean manufacturing, the barriers to, challenges and principles of lean manufacturing. These principles sum up the critical requirements or success factors needed in order for lean manufacturing to be successful.

Supply chains are getting more attention lately, due to increased competition and the availability of collaborative business models. As a result of this, this chapter has reviewed the automotive supply chain as well as the move towards the e-enabling of this supply chain. The different benefits that pertain to an e-enabled supply chain have been discussed. In the current economic climate, companies not only have to rely on themselves, but on their entire supply chain in order to remain competitive. By having an effective supply chain, companies may become more efficient and more competitive. Efficient supply chains, can offer streamlined collaboration and coordination between suppliers, business partners and customers.

In the next chapter, ecommerce in the automotive industry between OEMs and suppliers will be discussed. The focus will be more on First tier suppliers and how they interact with OEMs when facilitating transactions.

CHAPTER 3

E-BUSINESS AND THE INTERNET

3.1 INTRODUCTION

In the previous chapter, lean manufacturing was discussed in detail. E-business has been utilised within the industry to assist suppliers support OEMs. This chapter will discuss e-business and show the relationship between the OEMs and suppliers using this form of transaction. A brief history of the origin of ecommerce, its growth, present form and future shall be included.

3.2 UNDERSTANDING E-BUSINESS

Daniel, Wilson and Myers (2002) state that electronic business is one of the most discussed topics in business today. It is already leading to the reshaping of customer and supplier relationships, the streamlining of business processes and, in some cases, even the restructuring of whole industries. Goldstein & O'Connor (2001) states that e-business is primarily a product of six significant transformations in the global economy:

- the globalisation of markets;
- shift towards an economy based on knowledge and information;
- the growing prominence of ICTs in the economy;
- innovations in business organisation and practice (such as Just-In-Time Production, Total Quality Management, Knowledge Management, etc.);
- the liberalisation of the telecommunications sector in primarily OECD countries; and
- technological innovations such as email, the World Wide Web, Internet browsers, and the expansion in the volume and capacity of communication networks.

These six factors are closely linked to the emergence of e-business.

Bartel (2000) states that E-Business and E-Commerce are terms that are sometimes used interchangeably, and sometimes used to differentiate one vendor's product from another. But the terms are different, and that difference matters to today's companies. In both cases, the "e" stands for "electronic networks" and describes the application of

electronic network technology - including Internet and electronic data interchange (EDI) - to improve and change business processes.

Shiferaw (2010) states that the high penetration rates in Internet usage worldwide is making the global trade environment to integrate E-commerce in a very rapid pace. Today World estimated Internet users reached above 1.7 billion people with average penetration rate of 25.6 per cent in 2009. The average growth rate from 2000-2009 is 380.3 per cent. By 2012, there will be more than one billion online buyers worldwide making business to consumer (B2C) transactions worth 1.2 trillion dollars. Business to business (B2B) ecommerce will be ten times larger, totaling 12.4 trillion dollars worldwide in 2012, according to IDC research. Consumers are 50 per cent more likely to be influenced by blogs and e-mails than radio or TV advertising. In general E-commerce is growing at a rate of roughly 25 per cent per year.

Bartel (2000) argues that E-business includes e-commerce but also covers internal processes such as production, inventory management, product development, risk management, finance, knowledge management and human resources. E-business strategy is more complex, more focused on internal processes, and aimed at cost savings and improvements in efficiency, productivity and cost savings. E-business has a higher payoff in the form of more efficient processes, lower costs and potentially greater profits. E-commerce and e-business both address these processes, as well as a technology infrastructure of databases, application servers, security tools, systems management and legacy systems. Both involve the creation of new value chains between a company and its customers and suppliers, as well as within the company itself. Electronic networks in general and the Internet in particular are too important for firms to ignore if they want to interact with customers, suppliers or distribution partners.

3.2.1 Ecommerce definition

Molla and Licker (2001) declare that there exists a wide variety of e-commerce definitions and conceptualisations covering a plethora of issues, applications, and business models. Zwass (1999) defines e-commerce as “the sharing of business

information, maintaining business relationships and conducting business transactions by means of telecommunications networks”.

Kalakota and Whinston (1997) define ecommerce as ‘the buying and selling of information, products and services via computer networks’; the computer networks primarily being the Internet. Kennedy (2001) declares that e-commerce is defined simply and broadly as any business transaction that occurs over or is enabled by the internet.

Futcher (2003) considers E-commerce as the front office of the electronic world, and is defined as a variety of market transactions that are enabled by information technology and represents the entire collection of actions that support commercial activities on a network.

Bartle (2000) states that E-commerce covers outward-facing processes that touch customers, suppliers and external partners, including sales, marketing, order taking, delivery, customer service, purchasing of raw materials and supplies for production and procurement of indirect operating-expense items, such as office supplies.

3.2.2 E-business definition

There are various definitions of an electronic business or e-business. Kalakota and Robinson (2001) view e-business as the overall business strategy that encompasses e-commerce. E-business is the conduct of business on the Internet, not only buying and selling but also servicing customers and collaborating with business partners. Allen and Fjermestad (2000) suggest that e-business tends to be used as a more general term to describe the use of the internet or any type of electronic mechanism to conduct an organisation’s business processes. This definition implies that e-business is a term used to describe utilising Internet technologies to improve the productivity or profitability of a business. Andam (2003) describes e-commerce as on-line trading. In other words, e-commerce consists of the buying and selling of

products or services over electronic systems such as the Internet and other computer networks.

Laudon and Laudon (2002) define three different types of electronic business:

- Business to Consumer (B2C): This involves retailing products and services from the business to individual shoppers;
- Business-to-Business (B2B): This involves the sale of goods and services among businesses, like a retail outlet to smaller concern; and
- Customer-to-Customer (C2C): One consumer sells directly via the Web to another consumer.

3.2.3 Differentiating B2B and B2C

Srikanth (2000) states that Amazon.com, which sells books over the Internet and gets in touch with its consumers directly, is an example of a B2C E-commerce initiative. On the other hand, ChemConnect.com and Chemdex.com (which deal with chemicals) are B2B E-commerce initiatives that bring two firms together on the virtual market place. A B2B initiative needs a large infrastructure and a company would need to restructure its systems and business processes. It involves many participants with complex rules, higher purchasing amounts and complex products. Unlike B2C, greater certainty is required for order fulfillment. Raisch and Kane (2002) claim that the future of e-commerce lies in business-to-business transactions which have overtaken business-to-consumer transactions since the beginning of this century.

Srikanth (2000) states that there are three different types of B2B exchanges that operate namely:-

- buyer-controlled: It is a consortium of buyers who aggregate their purchases. The recently-formed consortium among DaimlerChrysler, Ford and General Motors (to which Toyota recently joined) is an instance. By this process the buyers are looking to manage efficiently the procurement process; lower administration cost, and ensure uniform pricing;

- seller-controlled. Here the sellers who cater to fragmented markets such as chemicals and auto components come together to create a common trading place for the buyers. While the sellers aggregate their market power, it greatly eases the buyers search for alternative sources; and
- third-party exchanges that are neither buyers nor sellers. They thrive purely on the fees generated by matching buyers and sellers. For example, ChemConnect.com, Chemdex.com and so on.

3.3 HISTORY OF E-COMMERCE

Molla et al (2001) states that the practice of e-commerce has been in existence since 1965 when consumers were able to withdraw money from Automatic Teller Machines (ATMs) and make purchases using point of sale terminals and credit cards. This was followed by systems that crossed organisational boundaries and enable organisations to exchange information and conduct business electronically. Such systems were commonly known as inter-organisational systems (Senn, 2000). Until the widespread deployment of Internet-based technologies in the early 1990s, enterprises that conducted e-commerce used almost exclusively a closed and standardised form of computer-to-computer communication known as “electronic data interchange” (EDI). In fact, the term “electronic commerce” was virtually synonymous with “EDI” (Fellenstein and Wood, 2000). E-commerce as such, however, has come to attract the interest of many following the commercialisation of the Internet and especially the advancement of the World Wide Web and its business applications. Hence, in the evolution of e-commerce, it is possible to differentiate between traditional e-commerce and Internet based e-commerce (Molla et al, 2001)

3.4 BENEFITS OF B2B E-COMMERCE

Metzger (2004) suggests that e-commerce companies have a widened market base. The wide market base gives the companies an opportunity to grow at very low costs. Srinkath (2000) also suggests that B2B E-commerce helps to remove barriers raised by geographic fragmentation of the market. While buyers get to know about new sellers with better products, suppliers discover new buyers.

Mohindroo (2002) suggests that automating manual processes can also reduce transaction costs. It is no longer necessary for employees to enter, process, and re-enter data into different applications, which also greatly reduces the occurrence of errors associated with the high degree of human interaction involved in processing transactions manually.

Mostert (2004) states that other cost savings include lower operational, production and inventory costs. Automating administrative processes, such as procurement, results in significant operational cost savings. It is estimated that the automation of procurement by integrating order systems directly with suppliers can drive down handling costs by up to 85 per cent, while also cutting the cost of supplies. Poor communication between designers and subcontractors often results in production delays and budget overruns in manufacturing, which drives up costs. These delays can be eliminated and production costs reduced by integrating and automating business processes that support the manufacture and supply of products and components.

Srinkath (2000) suggests that B2B also helps in eliminating unnecessary inventory build-up for both buyers and sellers. Lack of information about production schedules of the buyers lead to inventory build-up for the sellers. At the same time, the difficulty associated with finding alternative supply sources forces the buyers to build-up inventory. As B2B promotes information flow and enhances transparency, supply-chain management becomes possible. In addition, both the sellers and sellers enjoy reduced order processing costs and lower cost of interacting with each other.

In addition, Lublinsky (2002) comments that inventory levels are influenced by a number of factors that include market trends, sales projections, pipeline status, production planning and supplier reliability. By sharing this information in real-time with customers, distribution channels and suppliers, inventory planning can be improved and unnecessary high inventory levels reduced, which lowers inventory costs.

3.5 INFLUENCE OF ECOMMERCE

Cameron et al (2002) state that e-commerce is changing business around the world by reducing or eliminating the constraints of time and geographic location. Even small businesses can function across different time zones and remote destinations, which previously they would not have been able to penetrate. E-commerce, facilitated by the proliferation of the Internet, allows people to purchase goods and conduct business transactions online. Although the use of the Internet for business has been a fairly recent development, it nevertheless is making a large impact on the business community. Ecommerce has influenced how we do business as indicated in table 3.1.

According to Proctor (2001) the Internet is making more of an impact than any other business channel has made in the past decade. It is inevitable, therefore, that utilising the Internet to facilitate business collaboration will before long become an important requirement for any business (Cameron, 2003).

Table 3.1: How ecommerce has changed how we do business

Business activity	Before e-commerce	With e-commerce
Inventory	count by hand tracking & reporting	computerised sales
Communicating with suppliers	order forms mailed or faxed, order by phone	inventory tracking with automatic ordering system
Marketing	newspapers, flyers, business cards, letterhead radio & television ads trade shows word-of mouth	web site, links, e-mail, e-newsletter, word-of-mouth "send this web site to a friend"
Communication with customers	phone, catalogues, in person	web site, e-mail, e-zine, on-line catalogue, fax, telephone
Customer service	in person or by phone	e-mail, telephone, fax, in person, call centre
Internal communications	face-to-face meetings, memos	internal e-mail, telephone conferencing, chat rooms

Source: WEE society, 2009.

3.6 SIGNIFICANCE OF ECOMMERCE

While E-commerce has not necessarily allowed businesses to produce more products, it has allowed them to provide consumers with more choices. Increasing choice, however, has also increased the amount of information that consumers must process before they are able to select which items meet their needs (Ben, 2001).

Laudon and Laudon (2002) emphasise the benefits of integrating information across the enterprise so that this can flow seamlessly from one part of the business to another, and from within the organisation to all stakeholders. They argued that this level of integration was required by the emerging digital firm in order to remain efficient and to have a competitive advantage.

However, growth in e-commerce in South Africa is fuelled by the realisation that online procurement and supply-chain management can trim costs and improve customer relationships. Moreover, many of the largest companies in South Africa—financial institutions, mining, chemical and manufacturing businesses—conduct business globally and have thus kept pace with the demands of global customers. Procurement marketplaces continue to grow, enabling vendor sourcing, order and transaction processing, and system integration. Because of the nature of e-commerce, territorial boundaries represent no barriers to web transactions (Economist Intelligence Unit, 2006).

In addition, E-commerce provides a level playing field where small companies can rub shoulders with large enterprises. Overseas, small businesses provide ample competition to prevent large business from monopolising various industries. Unfortunately due to various factors affecting local business in South Africa, these small companies are not benefitting from this advantage. Without utilising these resources most small companies fail to reach their target market and hence fail within a year or two. Many a time, most of these companies apply all the basic requirements to facilitate e-commerce but still do not achieve their desired results. It is important for entrepreneurs who are willing to engage in ecommerce to fully understand the

implications and countermeasures to implement in case of any setbacks in the process of implementing this strategy for competitive advantage (Economist Intelligence Unit, 2006).

3.7 COVISINT IMPLEMENTATION

Esselar et al. (2002) state that by 2002, the automotive industry was moving towards making use of ICT. Business-to-Business technology has been introduced into various motor manufacturers. An example of this is the COVISINT initiative that was formed between Daimler Chrysler, Ford Motor Company and General Motors, which form a single global B2B supplier exchange. On February 25, 2000, DaimlerChrysler, Ford Motor Company and General Motors jointly announced plans to combine efforts and form a single global business-to-business supplier exchange. Each company brought together its individual e-business initiatives to avoid the burdens suppliers would endure if asked to interact with redundant proprietary systems.

Esselar et al. (2002) claim that Covisint's solutions are targeted at transforming all key business processes within the automotive industry. Baldi and Borgman (2001) state that Covisint intends to cover the three functional areas of vertical buy-side e-markets identified as:

- *E-Procurement*: Covisint plans to create a global marketplace in which industry participants can buy and sell a wide range of both production and non-production material and services. Auctions, catalogues, requests for quotes as well as a management tool for idle assets will be included;
- *Supply Chain Management*: Covisint will allow individual organisations to observe the current and future status of their respective supply chains' material flows, inventory levels, and capacity constraints. Trading partners will communicate and develop production and shipment schedules using standardised information and common systems; and
- *E-Development*: A virtual product workspace will allow real time collaboration and integration among various partners via the Internet in a secure environment. These solutions will help to synchronise a company's product development

community around a common set of objectives, aiming at a faster time-to-market and better product-innovation capabilities. Covisint stresses that its applications will not replace existing solutions – such as ERP systems – in the participating companies but merely provide a common interface.

3.8. INTERNET AS A GROWING GLOBAL TREND

The Internet is an extremely important new technology, and it is no surprise that it has received so much attention from entrepreneurs, executives, investors, and business observers (Porter, 2003). Globalisation and the rise of the internet are the two most powerful forces affecting business right now and probably will continue to be for the next decade at least (Sip, 2000). Poon and Lau (2006) states that an increasing number of businesses today are using the Internet as a fundamental communication tool to conduct business. The Web is an extremely efficient medium for accessing, organising, and communicating information. Both large and small companies are embracing the Web in order to communicate and conduct businesses with their current and potential customers. The success of Internet based businesses in the Business to Customer segment in recent years is an indication of the events to unfold at the dawn of the new millennium. It is widely projected that the Business to Business segment is poised for a spectacular growth (Mahadevan, 2000). Earlier forms of electronic trade, electronic data interchange (EDI), required pre-existing relationships, expensive and complex custom software, and dedicated communication links between specific parties. Consequently, the main users of EDI were large corporations and their first-tier suppliers. At a conceptual level, the Internet is a powerful tool for promoting fast, synchronous communication among large groups of people, without a need to invest in a specific asset (such as specialised software). The Internet is often seen as having two types of impacts on commerce:

- aggregation of buyers and suppliers; and
- facilitation of information exchange.

3.8.1 The internet as strategic complement

Porter (2003) states that although the Internet makes it difficult to sustain operational effectiveness, it makes it easier to maintain strategic positioning. The following are some of the strategic complements:-

- The internet creates a customised, common information technology platform for all company activities—resulting in unique, integrated systems that reinforce the strategic fit among the firm’s many functions. Even better, competitors can’t easily imitate these systems;
- Rather than cannibalising traditional ways of competing, the internet can complement them. For example, the major drugstore chains provide on-line prescription ordering but because 90 per cent of customers who order over the Web prefer to pick up their prescriptions at the store, the brick and mortar business benefits; and
- By integrating virtual and physical activities to compensate for the Internet’s performance limits (e.g., customers can’t physically touch and test products), companies gain competitive advantage. For example, if the company uses its Web site to attract customers and draw them to flesh-and-blood sales people who provide personalised advice and after-sales service, connections are reinforced and sales strengthened.

3.8.2 The internet and industry structure

Porter (2003) articulates that the Internet has created some new industries, such as on-line auctions and digital marketplaces. However, its greatest impact has been to enable the reconfiguration of existing industries that had been constrained by high costs for communicating, gathering information, or accomplishing transactions. Helper and MacDuffie (2000) state that at a conceptual level, the Internet is a powerful tool for promoting fast, asynchronous communication among large groups of people, without a need to invest in a specific asset (such as specialised software). The Internet is often seen as having two types of impacts on commerce which include aggregation of buyers and suppliers; and facilitation of information exchange. Since the automotive market is already so large, the aggregation benefits of the

Internet are relatively small in this industry (In contrast, aggregation benefits have already proven to be substantial for specialised markets, such as used books or industrial equipment). On the other hand, the information-exchange aspects of the web have huge potential in this industry. The reason is the vast amount of coordination necessary to manage the design, production, and assembly of thousands of parts into each of millions of vehicles every year.

Porter (2003) also ascertains that whether an industry is new or old, its structural attractiveness is determined by five underlying forces of competition: the intensity of rivalry among existing competitors, the barriers to entry for new competitors, the threat of substitute products or services, the bargaining power of suppliers, and the bargaining power of buyers (commonly referred to as Porter's five forces). In combination, these forces determine how the economic value created by any product, service, technology, or way of competing is divided between, on the one hand, companies in an industry and, on the other, customers, suppliers, distributors, substitutes, and potential new entrants.

Reimer (2004) comments that Information becomes increasingly important in today's economies and likewise information-based services play a vital role in the portfolios of companies. The growth and the large global population of people using the Internet has represented huge opportunities for businesses. A chief reason why many people use the Internet of late includes commerce; for example 17 per cent of online Americans, the equivalence of about 25 million people, have sold something online. Many of the largest companies in South Africa conduct business globally and have thus kept pace with the demands of global customers. The online sale of airline tickets, whose value reached R1.8bn in 2005, is the leading e-commerce business. Other major online retail marketplaces include Kalahari.net, Digit Mall and websites of traditional retailers such as Pick 'n Pay, which provides an online grocery-ordering service (Economist Intelligence Unit, 2006).

However Porter (2003) argues that the Internet weakens industries' profitability as rivals compete on price alone. It no longer provides proprietary advantages, as virtually all companies now use the Web. The Internet is no more than a tool—albeit a powerful one—that can support or damage the firm's strategic positioning. The key to using it most effectively is to integrate Internet initiatives into the company's overall strategy and operations so that they complement, rather than cannibalise, the established competitive approaches and create systemic advantages that competitors cannot copy.

However, according to McKnight, Choudhury and Kacmar (2002) evidence suggests that consumers often hesitate to transact with Web-based vendors because of uncertainty about vendor behavior or the perceived risk of having personal information stolen by hackers. Trust plays a central role in helping consumers overcome perceptions of risk and insecurity. Trust makes consumers comfortable which in turn makes them share personal information, make purchases, and act on the Web vendor's advice.

3.8.3 The internet's influence on e-commerce

Schaeffer (2003) confirms that the internet is popular due to the fact that it offers a channel where buyers and sellers are able to complete transactions cheaply, instantaneously and anonymously whilst overcoming geographic and time barriers. The internet provides a channel to remove multiple layers of middlemen by bringing companies and their customers and suppliers together directly and cheaply.

Shingh (2003) contends that the Internet enables a company to expand its market reach. Small companies are able to utilise the internet to reach markets far beyond their traditional vicinity while also gaining access to markets beyond their current customer base. Given this advantage, small companies can also have greater visibility against large companies and hence a chance to level the playing field to some extent.

Shingh (2003) also argues that the blossoming and adoption of the Internet has seen businesses realise enormous cost savings by moving a myriad of services online. The range of business areas positively impacted are immense, from customer service centres, online tracking of packages, to online brokerages. The Internet can also be used to gain competitive advantage through linkages with suppliers in order to cut costs.

3.9 STRATEGIC ROLE OF E-COMMERCE

However, growth in e-commerce in South Africa is fuelled by the realisation that online procurement and supply-chain management can trim costs and improve customer relationships. Moreover, many of the largest companies in South Africa—financial institutions, mining, chemical and manufacturing businesses—conduct business globally and have thus kept pace with the demands of global customers. Procurement marketplaces continue to grow, enabling vendor sourcing, order and transaction processing, and system integration. Territorial boundaries represent no barriers to web transactions because of the nature of e-commerce (Economist Intelligence Unit, 2006).

In addition, E-commerce provides a level playing field where small companies can rub shoulders with large enterprises. Overseas, small businesses provide ample competition to prevent large business from monopolising various industries. Unfortunately due to various factors affecting local business in South Africa, these small companies are not benefitting from this advantage. Without utilising these resources most small companies fail to reach their target market and hence fail within a year or two. Many a time, most of these companies apply all the basic requirements to facilitate e-commerce but still do not achieve their desired results. It is important for entrepreneurs who are willing to engage in ecommerce to fully understand the implications and countermeasures to implement in case of any setbacks in the process of implementing this strategy for competitive advantage. (Economist Intelligence Unit, 2006)

3.10 E-BUSINESS IN THE AUTOMOTIVE INDUSTRY

The automotive industry is one of the largest and most complex in the world and many activities concerning electronic markets can be observed. Table 3.2 provides an overview of some electronic markets in the automotive industry.

TABLE 3.2: Electronic markets.

Name	Main companies	Announcements	Market focus
Private			
Auto-Xchange	Ford	November 1999	New Car components
TradeXchange	GM	November 1999	New Car components
iStarXchange	Toyota	February 2000	New Parts Aftermarket
RubberNetwork	Continental, Good year, Michelin	April 2000	Tires
Volkswagen Exchange	Volkswagen	April 2000	New components
Consortia			
Covisint	GM, Ford, Daimler Chrysler	February 2000	New car components
SupplyOn	Bosch,Continental,ZF	June 2000	New car components
Third party			
ChoiceParts	ADP,CCC, Reynolds & Reynolds	February 2000	New Parts Aftermarket

Figure 3.2 Adapted from Baldi and Borgman, 2001.

The impact of e-business is being felt in many different ways across the value chain of the automotive industry. On the production side, OEMs (Original Equipment Manufacturers) who assemble the vehicles are focusing on connecting and communicating with their suppliers. At a service after market level, the challenges revolve around predictability of demand for parts and accessories. Then there is the dealer relationship with the client, where e-business plays a role in sourcing of vehicles and maintaining the client relationship (Strydom, 2003).

The purpose of this chapter was to give an in depth literature review of e-business and the internet. In chapter 4, the research methodology used to complete the study will be discussed in detail.

CHAPTER 4

RESEARCH DESIGN

4.1 INTRODUCTION

The preceding chapters dealt with the concepts of lean manufacturing and e-business and how they relate to each other. This chapter will focus on the research methodology which Collis and Hussey (2003) refer to as the approach adopted by the researcher towards the entire process of the research study. In order to achieve this aim, a brief synopsis is given of the various research methods that can be utilised with reference to the preferred method that was used by the author. Angloher (2010) states aspects of the design together with the underpinning methodology are discussed in order to justify the quality and significance of the procedures that were applied. This is achieved by addressing the following:

- Methodology defined: The term methodology is delineated, steps in the process defined, and the main and sub-problems clarified;
- Research method. The method used to conduct the research is explained;
- Survey method. Data collection instruments are discussed, and the chosen method for this study is explained in more detail;
- Measuring instrument. The importance of validity and reliability of the measuring instrument that is used in the study is explained;
- Construction of the questionnaire. The questionnaire design, the pilot study, and the cover letter are described;
- Survey population. The population used in the study as well as survey sampling is explained;
- Administering the questionnaire. The process followed in collecting the data by the use of the questionnaire is discussed; and
- Statistical treatment of the data. The methods used in manipulating the raw data received from the questionnaires are described.

4.2 RESEARCH METHODOLOGY

This process is defined differently by various schools of thought. Punch (2005) broadly defines research as “the collection of data about the world, to build theories to explain

the data, and then to test those theories against further data". Bless and Higson-Smith (2004) define research as "a systematic investigation of a question, phenomenon, or problem using certain principles" Leedy and Ormrod (2005) state that research design includes the planning, visualisation of the data and the problems associated with the employment of the data in the entire research project. Cooper and Schindler (2001) define research design as the outline for accomplishing research objectives and answering research questions. The research design used in this study was to investigate the primary problem to be resolved, in addition to analysing four sub-problems. The problems are given below:

4.2.1 Primary Problem

Automotive companies in South Africa have adopted world-class or Lean manufacturing principles in order to improve their manufacturing efficiencies and throughput. In order to enhance this process, e-business has recently been implemented to facilitate better communication between the OEMs and suppliers. The use of e-business in this sector gives rise to the following research problem: Has e-business been implemented successfully throughout the automotive sector?

4.2.2 Secondary Problems

To resolve the main problem, the following sub-problems were identified:

- What infrastructure and e-business software systems are being utilised in the automotive sector?
- What electronic means are being used to communicate between OEMs and suppliers?
- What skill requirements and costs have been acquired by various companies to keep up with technological changes?
- What concerns prevent suppliers from implementing e-business fully for transactions?

In an attempt to solve these problems it is necessary to gather empirical information concerning the current situation in the automotive sector and compare this with the results of the literature study.

4.3 DELIMITATIONS OF THE RESEARCH

In order to ensure that the research conducted was manageable, the following demarcations were established:

- **Demarcation of Organisations Researched**

The organisational scope of the research was limited to first tier automotive suppliers dealing directly with General Motors South Africa;

- **Geographical Demarcation**

The companies studied in this research have manufacturing locations throughout South Africa; and

- **Organisational Level**

The study was limited to responses from employees at Senior and Middle management levels and staff members. Hourly employees were not considered for the study.

4.4 RESEARCH METHOD

There are mainly two types of data involved in the research which are primary data and secondary data. Primary data refers to original data that is collected for the research projects, while secondary data is available data from sources other than the current research project. As in the case of this study, researchers need to collect data from either primary or secondary sources in order to provide adequate information and the comparativeness of the data (Leedy & Ormrod, 2005).

Leedy & Ormrod (2005) report that researchers might use observation, interviews, objects, written documents, audiovisual materials, electronic documents (e.g. e-mail messages, Web-sites) and anything else that can help answer research questions.

The primary data can be collected by the following methods:

- **Interviews:** In either qualitative research or quantitative research, interviews are composed of two types, personal interviews and telephone interviews. Advantages and disadvantages of both interview types are described as follows;

- Personal interviews: An advantage of personal interviews is that the respondents are willing to co-operate in terms of good response rates while the disadvantage is that it is expensive and time consuming in terms of transport costs and long lead time;
- Telephone interview: An advantage of telephone interviews is the quick and direct response from respondents, lower cost compared to the personal interviews. However, it is difficult to obtain sufficient quality answers from respondents as the respondent may lose interest if the interviewer asks lengthy questions; and
- Observations: Conducted in quantitative research, observations are structured and objective while in qualitative research, they are intentionally unstructured and free flowing (Leedy & Ormrod, 2005). When the observation method is used, data is collected by recognising and noting people's behaviour, objects and occurrences. The major advantage of this method is that the researcher does not have to rely on the willingness and ability of respondents to report data accurately.

In order to promote a logical and formalised approach to the research when addressing the primary and secondary problems, the following steps were followed:

- In Chapter 2, a literature study was conducted on Lean manufacturing. Definitions, South African Automotive industry, rationale for implementing and barriers to Lean manufacturing were discussed; and
- In Chapter 3 a literature study was conducted on e-commerce and e-business. The understanding of these processes, the supply chain and the strategy involved between the OEMS and first tier suppliers were discussed in this chapter. The understanding of e-business, the business model and strategic roles of e-business were focused on in this chapter.

Empirical data were obtained by means of self-completed questionnaires that were distributed to the target population in the demarcated geographical area. This method allowed respondents to maintain complete anonymity, answering closed questions with the option of adding details. This investigation had the following features:

- The sample comprised various levels of managers and staff from organisations as detailed in the delimitations of the research;
- The questionnaire was based on information gained during the literature study;
- The questionnaire comprised of five sections. The first section was used to ascertain the biographical data about the respondents, the second investigated the infrastructure and e-business software systems, third surveyed automated data exchange, fourth explored skills requirements and cost and lastly the fifth probed IT impacts, driver and inhibitors; and
- Lastly, the results gained through the survey were analysed to ascertain if the extent to which the automotive industry is using e-business and identify problems hindering them from exploiting this process.

4.5 THE QUESTIONNAIRE

Lancaster (2005) asserts that questionnaires are the most widely used means of data collection and depending on their design can vary greatly according to their structure, purpose, how they are administered, method of analysis and interpretation. Key aspects to be considered by researchers, pertaining to questionnaire design as follow:

- The range and scope of questions to be included;
- Question types for example, open or closed;
- Content of individual questions;
- Question structure; and
- Question wording;

Some of the advantages of questionnaires as given by Angloher (2010) include:-

- It is usually the lowest cost method;
- Respondents perceive this method to be more anonymous;

- It gives respondents enough time to think about questions;
- The stimulus provided to each respondent is identical in all cases, since the questionnaire is the only means of communication between the researcher and the respondent;
- Information can be speedily obtained from many respondents; and
- Postal questionnaires are usually highly structured and little use is made of open-ended questions. These two facts make the postal questionnaire relatively easy to prepare for data capture on a computer.

On the contrary, Angloher (2010) gives disadvantages as:-

- A low response rate is perhaps the major disadvantage of this method. Respondents who do not return the questionnaire may have definite opinions on the subject under investigation. Bias may be introduced into the data by a poor response rate;
- It is not possible for respondents to qualify their answers or to discuss their answers with the researcher;
- There is a negative attitude towards questionnaires. People receive many forms and questionnaires via the post, consequently many questionnaires are not completed; and
- The researcher has no control over how the respondents complete the questionnaire. Some respondents may purposefully fill in questionnaires incorrectly.

There are three types of questions that can be used in questionnaires, namely, open-ended questions, multiple choice questions and scaled response questions. Scaled response questions are often used to gather data on attitudes. A Likert type 5-point scale is linked to a number of statements to measure perceptions. Struwig and Stead (2001) suggest that the following general guidelines be considered when designing the questionnaire:

- Provide precise and clear instructions on how to answer the questions;
- Divide questions into logical sections by subject;

- Start with questions that are easy to answer;
- Proceed from general to specific questions;
- Ask sensitive questions last;
- Avoid technical jargon; and
- Minimise the number of questions to avoid respondent fatigue.

The questionnaire, shown in Appendix 2, was the primary source of data for this research. The questions were formulated with the objective to determine the most relevant information required to complete the research. Frazer and Lawley (2000) are adamant that a cover letter should accompany each questionnaire which serves as an introduction to the survey and attempts to motivate people to respond. A cover letter was drafted that explained the reason of the questionnaire and the deadline to submit the completed form.

Collis and Hussey (2003) describe open-ended questions as those where respondents are able to provide a personal opinion in his or her own words. Closed questions, on the other hand, are questions where the respondent's answer is selected from a number of predetermined alternatives. Open-ended questions offer the advantage that respondents are able to give their opinions as precisely as possible in their own words. However, questions of this nature can prove difficult to analyse. Closed questions are convenient for collecting factual data and are mostly easy to analyse, since the range of potential answers is limited. Collis and Hussey (2003) also state that multiple-choice questions are those where the participant is asked a closed question and selects the answer from a list of predetermined responses or categories. For the purpose of this research study, primarily close ended questions were used with an option in some of the questions to add more information if there is no choice that suits the respondents.

The document was divided into five parts:-

- Section A consisted of biographical questions that offered choices for the respondent to choose from. This section enabled important information to be

collected to assist when cross-tabulation of data is performed to establish relationships that might exist between variables. The questions in this section surveyed the age group, gender, occupation, time in current position and education level of the respondent;

- Section B was comprised of questions to ascertain from the respondent what infrastructure and e-business software that the respondent's company was utilising to facilitate this process in their daily activities;
- Section C consisted of questions that asked the respondent what means their company used to transact with their internal customers when performing business functions;
- Section D encompassed the training needs and skill levels required by the company to practice e-business to ensure 100 per cent conformance to the process; and
- Section E queried what drivers and inhibitors influenced the respondent's company from adopting or rejecting the use of e-business to transact with its customers.

The questionnaire was designed using simple terms and avoiding complex explanations to ensure easy understanding of the questions asked. Also the time allocated to complete the document was designated as twenty minutes maximum to keep the interest of the respondent.

A draft questionnaire was tested in a pilot study to ensure the clarity and user-friendliness of the document. The expertise of personnel in the industry was obtained in order to ensure the validity of the measuring instrument used in this study. According to Fink (2006) a questionnaire must be pilot tested to determine whether it is user friendly and will produce the results that it is intended for. This questionnaire

was distributed to three senior managers in different companies to ensure that all the questions were understood and answered properly. This included the Sales Manager from BOSAL-Africa PE, the Logistics Manager from LEAR Corporation and the Production Manager from ONVLEE Engineering. The pilot study also verified the relevance of the questions asked to the research topic. A number of amendments were made to the document once the study was complete.

4.6 THE RESEARCH SAMPLE

Leedy (2001) categorises sampling into probability and non-probability sampling. All types of sampling techniques will fall into one of these categories.

a) Probability Sampling

Probability sampling is described as a sample that can predict that each segment of the population will be represented. These types of sampling are outlined below.

- *Simple random sampling*: This sample is taken randomly, with each segment having an equal chance of being selected.
- *Stratified random sampling*: This sample is taken from the different levels or strata of the population.
- *Proportional random sampling*: This sample is taken from different levels or strata of the population that are not equal in size.
- *Cluster sampling*: This sample is taken randomly from a population, which was broken up into its smallest unit.
- *Systematic sampling*: This sample is taken by using a predetermined sequence.

b) Non Probability Sampling

These categories of sampling techniques describe techniques that have no guarantee that it would be representative of each element in the population. These types of sampling are outlined below:

- *Convenience sampling*: This type of sampling makes no pretence that the sample is representative of the population. The sample is taken of people that are readily available.
- *Quota sampling*: This sampling is the same as convenience sampling except that the ratio of the different strata coincides with the population.
- *Purpose sampling*: The sample is taken from people or units for a particular purpose.

For the purpose of this study convenience sampling will be used because of the convenience with respect to time and expense. The first tier suppliers are currently transacting with GMSA and it relatively easy to contact them directly.

4.6.1 Sampling Frame

A total of 122 self-completion e-mail questionnaires were distributed electronically to various levels of employees at first tier supplier organisations. The survey was disseminated on the 2 August 2010 and the due date was given as 13 August 2010. Fifty respondents returned the questionnaire completed by the due date which represents a response rate of 41 per cent. This was large enough to draw valid conclusions with a fairly high level of confidence.

4.6.2 Expertise Available

In order to ensure accuracy and credibility of the questionnaire, testing was done on a small sample group prior to distribution. Three senior management personnel were consulted about the questionnaire by giving them a sample and asking them to evaluate if the questions formulated were relevant to the topic. The personnel were also asked to give their views about e-business in their organisation and further topics that can be tackled by the questionnaire. The questionnaire was then edited based on their responses in order to ensure that the document would be answered correctly without any problems.

4.6.3 Research Duration

The research project was planned to be completed within two months. The questionnaire was sent out, collected and information compiled within the first month and the second month used for the analysis of the information.

4.6.4 Questionnaire distribution

The questionnaire was electronically distributed amongst the sample population with a two week grace period given to allow them to answer the document as accurately as possible. The completed questionnaire were then returned to the other author for analysis. Follow up emails were sent to clarify any mistakes or omissions of data.

4.6.5 Non responses

According to Spence (2003), a common bias factor in self-completed instruments and particularly postal or e-mailed surveys is the problem of non response, with the response rate norm being between 15 per cent and 25 per cent. Collis and Hussey (2003) cite non-response bias as a major problem associated with questionnaires, especially those distributed by post or email. Typically, those people who are indifferent to the topic being researched do not respond. This survey had a good response rate of 43 per cent, which is more an indicator of the amount of follow-up than the commitment of the individuals to the topic of research.

4.7 VALIDITY AND RELIABILITY

Collis and Hussey (2003) state that two measures exist to describe the credibility of research findings, namely reliability and validity. Leedy and Ormrod (2005) argue that validity and reliability take different forms, depending on the nature of the research problem, the general research methodology and the nature of the data collected.

According to Struwig and Stead (2001) reliability is the extent to which test scores are accurate, consistent or stable. Collis and Hussey (2003) reason that reliability concerns itself with the repeatability of research findings. Leedy and Ormrod (2005)

argue that reliability is the consistency with which a measuring instrument yields a certain result when the entity being measured has not changed. A test score's validity is dependent on the score's reliability because if the reliability is inadequate, the validity will also be poor. It is always important to test the reliability before the validity is examined. A test score can also be highly reliable but invalid. Reliability can therefore be seen as the degree of similarity of the information obtained when the measurement is repeated on the same subject (Cormack, 2000).

The following are ways that Leedy and Ormrod (2005) determine the reliability of a test score:

- Test-retest reliability; is the extent to which the same instrument yields the same results on two different occasions;
- Internal consistency reliability; is the extent to which all participants within a single experiment yield similar results;
- Equivalent forms reliability; is the extent to which two different versions of the same instrument yield similar results; and
- Interrater reliability; is the extent to which the results of two or more independent analysts concur.

Validity can influence the research process and can refer to the degree to which an instrument measures what it is supposed to measure (Cormack, 2000). Collis and Hussey (2003) state that validity is the extent to which a research finding accurately represents what is actually happening in the situation. Leedy and Ormrod (2005) identify that the validity of a measurement instrument is the extent to which the instrument measures what it is supposed to measure.

There are several types of validity, the more common types according to Struwig and Stead (2001) and Leedy and Ormrod (2005) being:

- Face validity – relies basically upon the subjective judgement of the researcher;
- Criterion related validity – is established when the measure differentiates individuals on a criterion it is expected to predict. This is done by establishing concurrent validity or predictive validity. Concurrent validity is established when

the scale distinguishes individuals who are known to be different. Predictive validity refers to the instrument's capacity to differentiate among individuals on a future criterion;

- Content validity refers to how representative the scale or instrument is of the universe of the content of the property or characteristic that is being measured. It is the accuracy with which an instrument measures the factors or situations under study;
- Construct validity refers to how well the results obtained from the use of the instrument fits the theories around which it was designed. Construct validity comprises three sub-categories, namely convergent, discriminant and nomological validity. Convergent validity is established when the scores of two different instruments measuring the same concept are highly correlated. Discriminant validity is achieved when, based on theory, two variables are predicted to be uncorrelated, and the scores obtained are found to be empirically so. Nomological validity involves relating measurements to a theoretical model that leads to further deductions, interpretations and tests that allows constructs to be systematically interrelated;
- Internal validity – is the freedom from bias in forming conclusions in view of the data; and
- External validity – is concerned with the generalisability of the conclusions reached from a sample to other cases. It refers to the extent that conclusions made by the research can be generalised to the broader population and not merely applied to the sample studied.

The findings obtained in this study can be judged to be reliable, because the research instrument i.e. questionnaire was designed to obtain pertinent responses from the respondents. Closed questions were used which provided a set amount of responses that the respondents could choose from. Uncertainties to responses in the completed questionnaires were dealt with by sending follow up emails to clarify any misconceptions.

The researcher is confident that the study had a high degree of validity, because the sample consisted of actual first tier suppliers that are actively transacting with the selected OEM. This sample can therefore be considered to represent the entire first tier supplier relationship to OEMs in the country. Also the positive response when answering the questionnaire also justifies the validity of the study.

4.8 CONCLUSION

This chapter provided a review of the research methodology used in the research study. The use of a questionnaire was also expounded on and all the important aspects that should be kept in mind while using this measuring instrument during interviews. The importance of sampling and the types of data were also covered. In Chapter five, the results of the survey will be examined and evaluated. The analysis will then be represented.

CHAPTER 5

RESULTS AND ANALYSIS

5.1 INTRODUCTION

The purpose of this chapter is to assimilate the findings of the literature study with those of the empirical survey in order to ascertain and similarities or differences that affect e-business within the automotive industry. The research methodology, as described in chapter four and the questionnaire used for data collection was primarily used to provide data that could be analysed with the aim of evaluating the e-business relationship between GMSA and its first tier suppliers. This chapter analyses the empirical survey according to the structure of the questionnaire and represents the empirical findings with the aid of tables, figures and pie charts. The tables, figures and pie charts will provide a graphical representation of the of the questionnaire responses. These findings will then be discussed in details as well as summarised to give a general view of the entire study.

5.2 RESULTS FROM THE QUESTIONNAIRE

As indicated in chapter four, a total of 122 self-completion e-mail questionnaires were distributed electronically to various levels of employees at first tier supplier organisations. Fifty one respondents returned the questionnaire completed by the due date which represents a response rate of 41 per cent. The percentage response is deemed acceptable, since response rates for questionnaire surveys are often found to be low (Collis & Hussey 2003). The questionnaires, duly completed, were successfully consolidated and analysed using STATISTICA software with the assistance of Dr Jacques Pietersen. This program provided a statistical summary of the number of responses and their Percentage to the total response per question. Statistical calculations will then be represented and results interpreted.

5.2.1 Representation and analysis of section A

Section A of the questionnaire focused on demographical information about the respondents. In this section respondents were asked to provide information about their Age group, gender, Occupation, time in current position and educational background. Each of these categories were analysed and represented by the author.

Question 1 asked the respondents to classify themselves within different age categories. Table 5.1 displays the age of the managers and staff at the survey organisations. The majority (43.1 per cent) fell into the 30-39 years age bracket and 92 per cent of the respondents were thirty and older. This implies that the majority of the respondents have had a number of years working experience and therefore may have sufficient knowledge about the relationship between GMSA and their respective suppliers.

TABLE 5.1: Age of the respondents

Age category	No.	Percentage
20 - 29 years	4	7.8
30 - 39 years	22	43.1
40 - 49 years	11	21.6
50 and older	14	27.5
TOTAL	51	100

The second question focused on the gender of the respondents. The gender category of the questionnaire was answered by 68.6 per cent male and 31.4 per cent female respondents as indicated in table 5.2 and figure 5.2. This does not indicate that the first supplier industry is dominated by male personnel. This may just be a coincidence as convenience sampling was used to represent a sample of the population.

TABLE 5.2: Gender of the respondents

Gender category	No.	Percentage
Male	35	68.6
Female	16	31.4
TOTAL	51	100

The occupational representation of the respondents, which was the third question, is depicted in table 5.3 and graphically illustrated in figure 5.3. Majority of the respondents are from senior and middle management levels which means they will be able to have a fairly good understanding of the organisations they are working for. They may also be able to provide insight into knowledge not shared by the organisation to all its employees.

TABLE 5.3: Occupation level of the respondents

Occupation category	No.	Percentage
Senior management	21	41.2
Middle management	20	39.2
Staff	10	19.6
TOTAL	51	100

The respondents answered the fourth question about their time in the current positions in different ways as indicated in table 5.4 and figure 5.4. It is evident that more than 81 percent of respondents had worked for more than three years for their respective companies. This ensures that the respondents are familiar with the internal systems of their companies and would be in a position to provide information relevant to the topic. Their experiences in various working environment provided a good base to survey the effects of e-business in the respective companies.

TABLE 5.4: Time in position of the respondents

Time in position category	No.	Percentage
1-2 years	9	17.6
3-5 years	12	23.5
6-10 years	17	33.3
10+ years	13	24.5
TOTAL	51	100

The fifth question required the respondents to indicate their highest qualification. The results are represented in table 5.5 and figure 5.5. Majority of the respondents indicated high levels of education that is from Matric upwards which indicates that they would be able to understand the questionnaire without much difficulty.

TABLE 5.5: Education of the respondents

Education category	No.	Percentage
Postgraduate	20	39.2
Undergraduate	15	29.4
Matric	12	23.5
Other	4	7.8
TOTAL	51	100

5.2.2 Representation and analysis of section B

Section B contained questions on Infrastructure and e-Business Software Systems. These questions were asked to ascertain if the suppliers had the basic infrastructure to conduct e-business with the OEM. The first question focused on the availability of a computer network by the suppliers. The response was given as 100 per cent which indicated that all the suppliers had installed computer networks to assist with the daily running of business at their premises. This is indicated in table 5.6

TABLE 5.6: Availability of computer network

Response	No.	Percentage
Yes	51	100
No	0	0
TOTAL	51	100

The second question asked the respondents about e-mail facilities in the company. This also had a 100 per cent response as indicated in table 5.7. This indicated that e-mail is a common denominator for communication within the supplier community.

TABLE 5.7: Availability of Email facilities

Response	No.	Percentage
Yes	51	100
No	0	0
TOTAL	51	100

Table 5.8 shows the response to the third question that asked if the computer users within their organisation used e-mail to do business, for example, quotes or purchase order numbers. The response was given as 100 per cent which indicates that e-mail is a standard communication tool used to facilitate business in the automotive industry.

TABLE 5.8: Use of email to do business

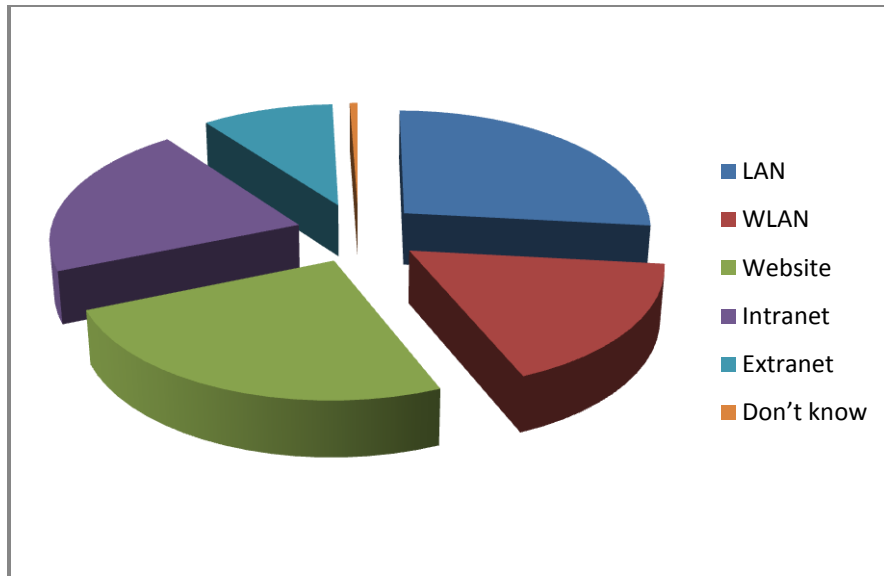
Response	No.	Percentage
Yes	51	100
No	0	0
TOTAL	51	100

Question four of this section continued to query about the software systems that the respective companies had at their respective businesses. The question focused on whether the companies had a local area network (LAN), a wireless LAN, its own website on the internet, an Intranet within the business with access restricted to employees, or an Extranet with access restricted to business partners. The results for this question are indicated in table 5.9 and figure 5.9. A larger percentage (89.8) have internal networks that they use for their daily functions while a much smaller percentage (9.7) have an extranet which they use to transact with business suppliers.

TABLE 5.9: Type of networks

Type	No.	Percentage
A Local area network	47	26.7
A Wireless LAN	30	17.1
Own website	44	25
Intranet	37	21
Extranet	17	9.7
Don't know	1	0.6
TOTAL	176	100

FIGURE 5.9: Graphic illustration of table 5.9



Source: Author's own construction

For Question five, the respondents were asked if they have a software application to manage the placing or receipt of orders. Majority of the companies (86.3 per cent) had such software applications to assist with their business. The most common software used by most suppliers was identified as SAP. Other software applications used were QMuzik, Hyperion, MFGP10, GAEC21, BAAN IV, Contact BOSAL IT, Microsft Dynamics, SYSPRO, PASTEL EVOLUTION,AS 400 SYSTEM 21,BPCS, Oracle, my KANBAN CXchange, FLEXGEN, ACCPAC and BOLTPAK. Convisint was not mentioned by any of the suppliers as software package used for communication

TABLE 5.10: Use of software applications to manage or receive orders

Response	No.	Percentage
Yes	44	86.3
No	6	11.8
Don't Know	1	2
TOTAL	51	100

5.2.3 Representation and analysis of section C

Section C contained questions on automated data exchange. This section focused on how the suppliers communicated with the OEM when performing transactions. Question one focused on whether the respondents' respective companies used the internet or other computer-mediated networks to order goods or services from other suppliers online, not counting manually typed e-mails. As indicated in table 5.11, 68.6 per cent of the respondents used the internet or other software to communicate with other suppliers online. Only 25.5 per cent did not have such facilities while 5.9 per cent were not aware of such software at the respective companies.

TABLE 5.11: Use of internet or other computer-mediated networks

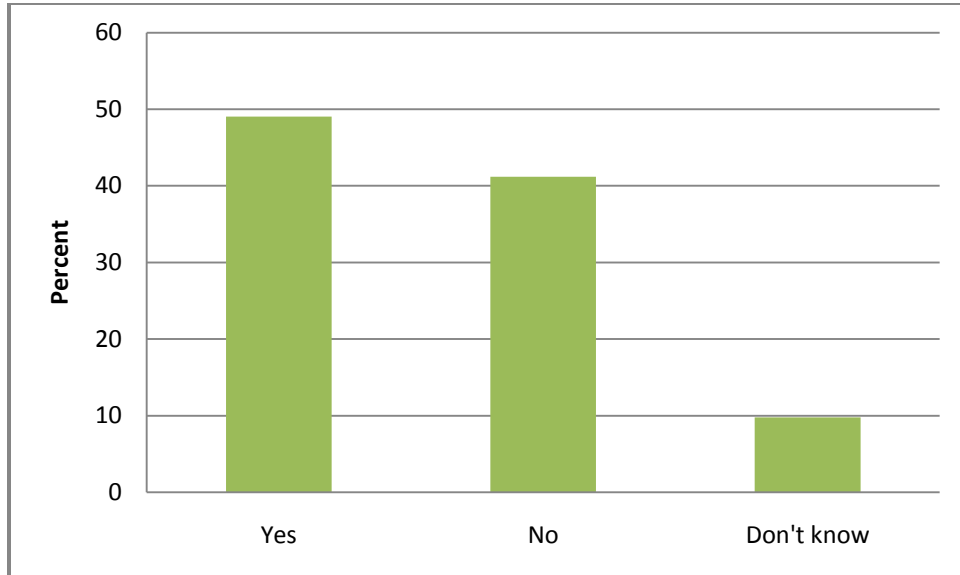
Response	No.	Percentage
Yes	35	68.6
No	13	25.5
Don't Know	3	5.9
TOTAL	51	100

Question two queried whether the respondent's companies shared information on inventory levels or production plans electronically with business partners. Table 5.12 and figure 5.12 represent the respondents who agreed as 49 per cent, those who disagreed as 41.2 per cent while only 9.8 did not know if this was occurring at their companies.

TABLE 5.12: Sharing of information with other companies electronically.

Response	No.	Percentage
Yes	25	49.0
No	21	41.2
Don't Know	5	9.8
TOTAL	51	100

FIGURE 5.12: Graphic illustration of table 5.12



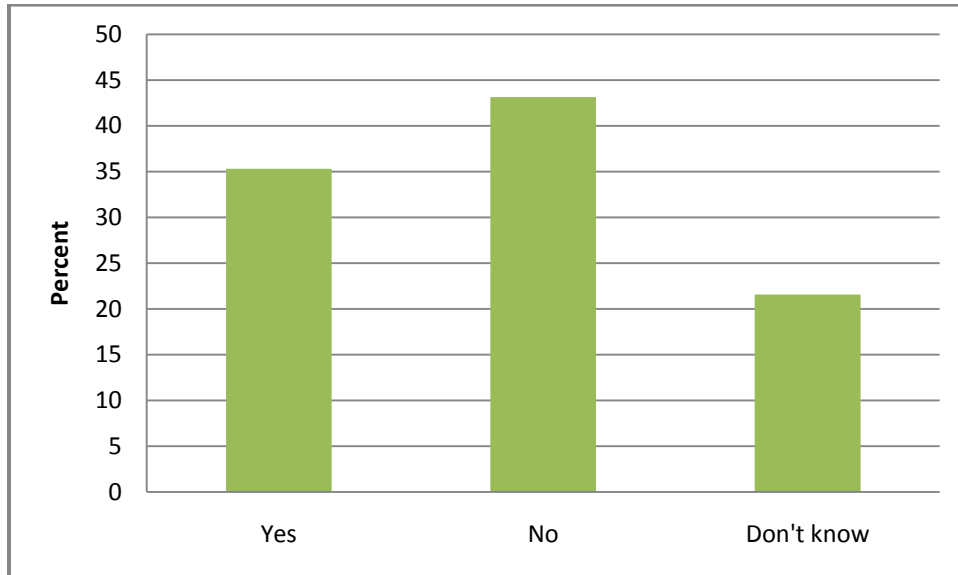
Source: Author’s own construction

The third question focused on the use of software applications other than e-mail to collaborate with business partners in the design of new products or services. The results are represented in table 5.13 and figure 5.13. Respondents who agreed were 35.3 per cent; those who disagreed were 43.1 per cent while only 21.6 did not know if such software applications existed at their companies. Some examples of the software applications used include CX collaborative, Catia, Solid Works, Customer Portals, CAD, BOLTPAK, WEBEX, Intralink, Proengineer and AutoEdi.

TABLE 5.13: Use of software applications to collaborate with business partners

Response	No.	Percentage
Yes	18	35.3
No	22	43.1
Don't Know	11	21.6
TOTAL	51	100

FIGURE 5.13: Graphic illustration of table 5.13



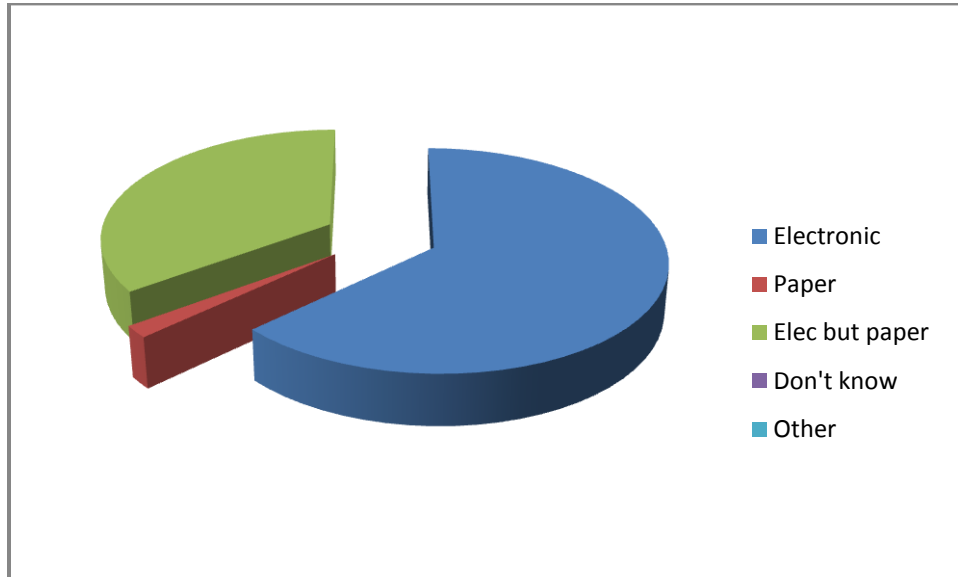
Source: Author’s own construction

The fourth question probed in what format the respondents’ companies exchanged data with business partners. Table 5.14 and figure 5.14 indicate that the data exchange is mostly electronic (63.2 per cent) or electronically based but exchanged in paper based format (35.1 per cent).

TABLE 5.14: Format of data exchange with business partners

Response	No.	Percentage
Mostly electronic	36	63.2
Mostly in paper based form	1	1.8
Electronic but paper form	20	35.1
Don't know	0	0
Other	0	0
TOTAL	57	100

FIGURE 5.14: Graphic illustration of table 5.14



Source: Author's own construction

Question five focused on whether customers could order goods or services from the respondents' company online on the internet or through other computer-mediated networks. Table 5.15 indicates that 62.7 per cent of customers could do so while 35.3 per cent could not.

TABLE 5.15: Customers order goods or services online

Response	No.	Percentage
Yes	32	62.7
No	18	35.3
Don't Know	1	2
TOTAL	51	100

Question six queried whether the respective companies experienced pressure from suppliers to upgrade their IT solutions or data exchange formats to comply with their requirements. Table 5.16 represents the response as 51 per cent for those who have experienced such pressure, 41.1 per cent who have not experienced it and 7.8 per cent for those who do not know if such requests have been received by their companies.

TABLE 5.16: Demand from suppliers to upgrade of IT solutions

Response	No.	Percentage
Yes	26	51
No	21	41.1
Don't Know	4	7.8
TOTAL	51	100

The seventh question queried whether the respondent's company demands from suppliers that they implement new IT solutions or exchange formats in order to facilitate data exchange with their company. Table 5.17 represents the response as 25.5 per cent for those who have demand such compliance, 58.8 per cent who have not done so and 15.7 per cent for those who do not know if such requests have been given to other companies by their respective companies.

TABLE 5.17: Demand suppliers to implement new IT solutions

Response	No.	Percentage
Yes	13	25.5
No	30	58.8
Don't Know	8	15.7
TOTAL	51	100

5.2.4 Representation and analysis of section D

Section D contained questions on skills requirements and costs experienced by the respondents company while facilitating transactions. Question one queried whether the company had hired IT practitioners. These persons are hired primarily to take care of the company's IT infrastructure. A large majority (76.5 per cent) had such people, 19.6 per cent did not have while 3.9 per cent of respondents did not know if they had such people employed in the company.

TABLE 5.18: Employ IT practitioners

Response	No.	Percentage
Yes	39	76.5
No	10	19.6
Don't Know	2	3.9
TOTAL	51	100

Question two queried whether e-business developments require certain employee skill requirements in the respondents' respective companies. Table 5.19 represents the respondents who agreed as 84.3 per cent, those who disagreed as 7.8 per cent while 7.8 also did not know if this was necessary as indicated in table 5.19.

TABLE 5.19: Need for e-business skill requirements

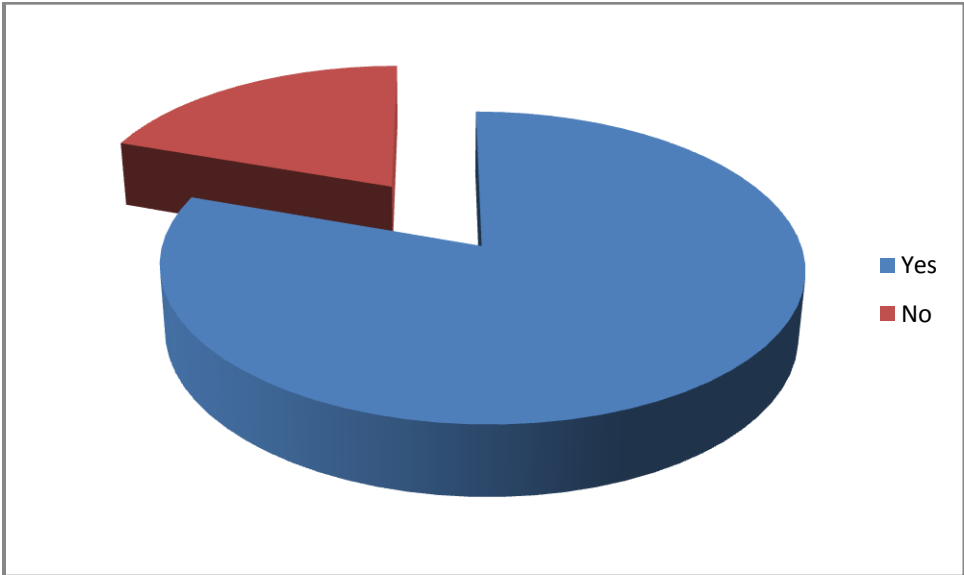
Response	No.	Percentage
Yes	43	84.3
No	4	7.8
Don't Know	4	7.8
TOTAL	51	100

The third question probed whether the respondents' respective companies provide training for personnel to use the IT systems for business. 80.4 per cent agreed that they provide such training while 19.6 did not. This is illustrated in table 5.20 and figure 5.20.

TABLE 5.20: IT training

Response	No.	Percentage
Yes	41	80.4
No	10	19.6
TOTAL	51	100

FIGURE 5.20: Graphic illustration of table 5.20



Source: Author's own construction

The fourth question queried if the respondents' companies had made investments in IT during the past twelve months, for example by purchasing new hardware, software or networks. Table 5.21 and figure 5.21 illustrates that 90.2 per cent had made such significant changes, 2 per cent had not and 7.8 per cent were not sure if any such implementation had taken place.

TABLE 5.21: IT investments since the last twelve months

Response	No.	Percentage
Yes	46	90.2
No	1	2
Don't Know	4	7.8
TOTAL	51	100

5.2.5 Representation and analysis of section E

Section C contained questions on IT Impacts, Drivers and Inhibitors. This section focused on factors that affected the implementation of IT to propagate business in the automotive industry. Question one queried whether most of the suppliers' business transactions are conducted as e-business? Table 5.22 and figure 5.22 illustrates that 51 per cent were positive that most of their transaction were e-business; 43.1 per cent only agreed some were; 3.9 per cent responded their transactions did not involve e-business while 2 per cent did not know.

TABLE 5.22: Use of e-business

Response	No.	Percentage
Good Deal of Them	26	51
Some	22	43.1
None	2	3.9
Don't Know	1	2
TOTAL	51	100

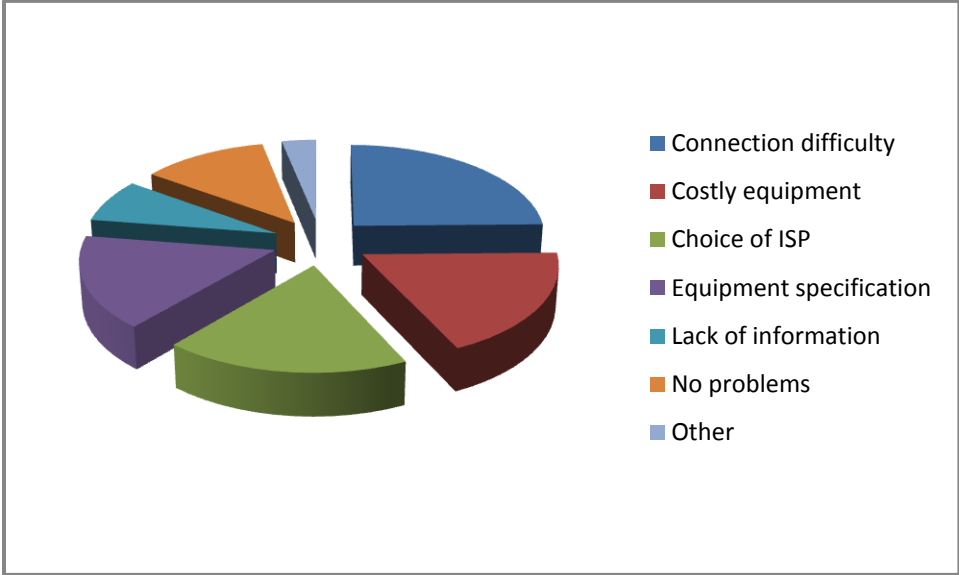
Question two asked whether the respondents experienced a myriad of problems when they first started using e-business for transactions. These problems are indicated in table 5.23 and figure 5.23 with the resultant responses. The respondents were allowed to select multiple answers. The problems included Difficulty getting

connected / using equipment (24.7 per cent), Equipment more costly than expected (18.3 per cent), Deciding which ISP / comparing cost and service (18.3 per cent), Deciding on equipment specification (16.1 per cent), Lack of information / advice / support on how to set up etc (7.5 per cent), No problems experienced (11.8 per cent) and others (3.2 per cent) which consisted mainly those who did not use e-business.

TABLE 5.23: Problems experienced when first implementing e-business

Problems	No.	Percentage
Connection difficulty	23	24.7
Costly equipment	17	18.3
Choice of ISP	17	18.3
Equipment specification	15	16.1
Lack of information	7	7.5
No problems	11	11.8
Other	3	3.2
TOTAL	93	100

FIGURE 5.23: Graphic illustration of table 5.23



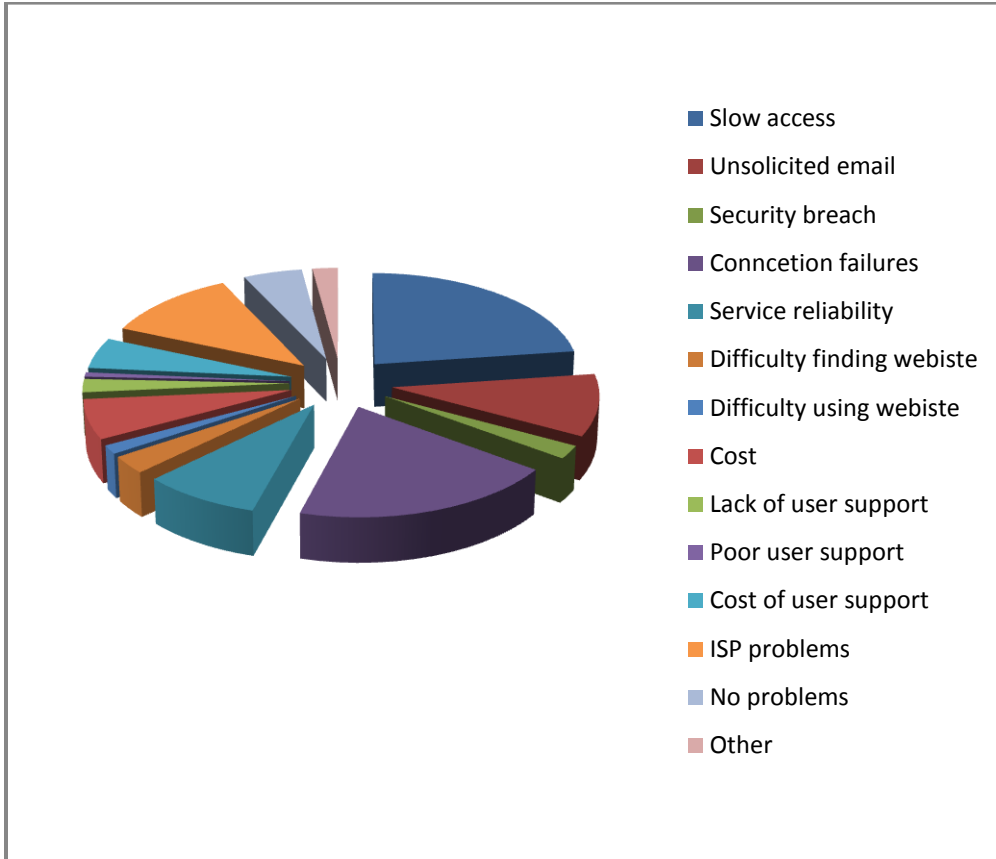
Source: Author’s own construction

Question three asked the respondents what extent they experienced a list of problems with the Internet or e-commerce since they started using it. The respondents were allowed to choose multiple answers. As illustrated in table 5.24 and figure 5.24 the respondents were asked to chose from the following problems:- Slow access/downloading (22.9 per cent), Unsolicited email (10 per cent), Security breach / fraud (2.1 per cent), Internet connection failures (19.3 per cent), Reliability of service (8.6 per cent), Customer difficulty in using / finding our website (2.9 per cent), Difficulty using / finding websites (1.4 per cent), Running and maintenance more costly than expected (6.4 per cent), Lack of user support (2.1 per cent), Poor advice from user support (0.7 per cent), Poor advice from user support (5 per cent), Cost of user support(11.4 per cent) ,Problems between ISP and telecoms supplier taking responsibility for service failures/problems(5 per cent), No problems experienced (2.1 per cent).

TABLE 5.24: Problems associated with the internet

Problems	No.	Percentage
Slow access	32	22.9
Unsolicited email	14	10
Security breach	3	2.1
Connection failures	27	19.3
Service reliability	12	8.6
Difficulty finding website	4	2.9
Difficulty using website	2	1.4
Cost	9	6.4
Lack of user support	3	2.1
Poor user support	1	0.7
Cost of user support	7	5
ISP problems	16	11.4
No problems	7	5
Other	3	2.1
TOTAL	140	100

FIGURE 5.24: Graphic illustration of table 5.24



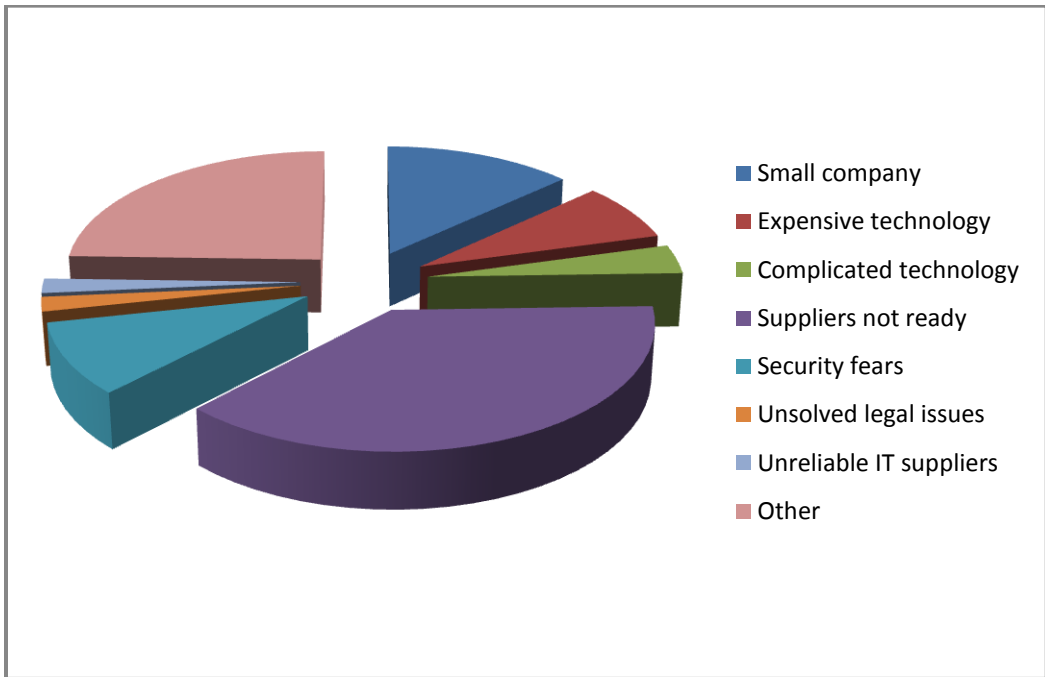
Source: Author's own construction

The fourth question identified important reasons why supplier companies did not use e-business more intensively and asked the respondents to choose multiple answers. Table 5.25 and figure 5.25 represent the responses which include: - the supplier company is too small to benefit from e-business activities (13.2 per cent), required technologies are too expensive (7.6 per cent), required technologies are too complicated (3.8 per cent), Many of suppliers or customers are not prepared for e-business (37.7 per cent), potential security risks and privacy issues (9.4 per cent), important unsolved legal issues involved (1.9 per cent) and difficulty to find reliable IT suppliers (1.9 per cent).

TABLE 5.25: Reasons not to use internet more intensively

Reasons	No.	Percentage
Small company	7	13.2
Expensive technology	4	7.6
Complicated technology	2	3.8
Suppliers not ready	20	37.7
Security fears	5	9.4
Unsolved legal issues	1	1.9
Unreliable IT suppliers	1	1.9
Other	13	24.5
TOTAL	53	100

FIGURE 5.25: Graphic illustration of table 5.25



Source: Author's own construction

Question five asked the respondents to retort on how concerned they are about various internet issues. The first issue (5a) was security or fraud that may be used to steal from the company. Table 5.26 represents the information as very concerned (58.8 per cent), fairly concerned as (31.4 per cent) and not concerned (7.8 per cent).

TABLE 5.26: Internet issues: 5a

Responses	No.	Percentage
Very Concerned	30	58.8
Fairly Concerned	16	31.4
Not Concerned	4	7.8
TOTAL	50	100

The second issue (5b) was protection from viruses in the company’s IT network. Table 5.27 represents the information as follows: - very concerned (68.6 per cent), fairly concerned as (25.5per cent) and not concerned (3.9 per cent).

TABLE 5.27: Internet issues: 5b

Responses	No.	Percentage
Very Concerned	35	68.6
Fairly Concerned	13	25.5
Not Concerned	2	3.9
TOTAL	51	100

The third issue (5c) was unsolicited email otherwise known as spam. Table 5.28 represents the information as follows: - very concerned (39.2 per cent), fairly concerned as (47.1 per cent) and not concerned (9.8 per cent).

TABLE 5.28: Internet issue: 5c

Responses	No.	Percentage
Very Concerned	20	39.2
Fairly Concerned	24	47.1
Not Concerned	5	9.8
TOTAL	49	100

The fourth issue (5d) was ability to use technology. Table 5.29 represents the information as follows: - very concerned (19.6 per cent), fairly concerned as (29.4 per cent) and not concerned (45.1 per cent).

TABLE 5.29: Internet issues: 5d

Responses	No.	Percentage
Very Concerned	10	19.6
Fairly Concerned	15	29.4
Not Concerned	23	45.1
TOTAL	48	100

The fifth issue (5e) was inappropriate material that is not conducive to the work environment and may lead to distraction at the workplace. Table 5.30 represents the information as follows: - very concerned (19.6 per cent), fairly concerned as (51 per cent) and not concerned (19.6 per cent).

TABLE 5.30: Internet issues: 5e

Responses	No.	Percentage
Very Concerned	10	19.6
Fairly Concerned	26	51
Not Concerned	10	19.6
TOTAL	46	100

The sixth issue (5f) was how expensive it was to run and maintain the internet at a company's premises. Table 5.31 represents the information as follows: - very concerned (37.3 per cent), fairly concerned as (47.1 per cent) and not concerned (11.8 per cent).

TABLE 5.31: Internet issue: 5f

Responses	No.	Percentage
Very Concerned	19	37.3
Fairly Concerned	24	47.1
Not Concerned	6	11.8
TOTAL	49	100

The seventh issue (5g) was invasion of privacy which refers to the ability of people referred to as hackers who may penetrate the security measures of the company and steal important information for illegal purposes. Table 5.32 represents the information as follows: - very concerned (35.3 per cent), fairly concerned as (27.5 per cent) and not concerned (31.4 per cent).

TABLE 5.32: Internet issue: 5g

Responses	No.	Percentage
Very Concerned	18	35.3
Fairly Concerned	14	27.5
Not Concerned	16	31.4
TOTAL	48	100

The eighth issue (5h) was lack of personal contact while performing transactions over the internet. Table 5.33 represents the information as follows: - very concerned (21.6 per cent), fairly concerned as (41.2 per cent) and not concerned (31.4 per cent)

TABLE 5.33: Internet issues: 5h

Responses	No.	Percentage
Very Concerned	11	21.6
Fairly Concerned	21	41.2
Not Concerned	16	31.4
TOTAL	48	100

The ninth issue (5i) was expensive it was to run and maintain the internet at a company's premises. Table 5.34 represents the information as follows: - very concerned (37.3 per cent), fairly concerned as (49.1 per cent) and not concerned (11.8 per cent)

TABLE 5.34: Internet issues: 5i

Responses	No.	Percentage
Very Concerned	19	37.3
Fairly Concerned	25	49.1
Not Concerned	6	11.8
TOTAL	50	100

5.3 SUMMARY OF RESULTS

5.3.1 Infrastructure and e-Business Software Systems

It is evident from the results above that nearly all companies are using internal computing and network facilities. Most suppliers have state of the art equipment and software systems that can be readily used to facilitate e-business. A large percentage of the respondents confirm that they have email facilities and readily use them to communicate with other suppliers or their customers. They also have their own company web site that they use to advertise their products and services. The suppliers can use these websites to facilitate sophisticated transactions like online sales or collaboration with other suppliers or OEMs. In addition a large majority of the suppliers have software applications that manage the placing and receipt of order. This indicates that the suppliers are already using IT technology to manage their businesses. As matter of interest none of the respondents referred to the use of CONVISNT. This may indicate that this software is not been used widely in the auto industry as a common interface between GMSA and the suppliers. The impending migration from the common IT solutions to e-marketplaces like Covisint creates a risk that some standardisation benefits may be lost along the way. This would create significant cost issues and difficulties, particularly for small businesses. Also the use of different software packages amongst the suppliers may lead to confusion and time wasting.

5.3.2 Automated data exchange

With reference to the communication of the suppliers with its customers, a large majority use the internet or other computer-mediated networks excluding emails to transact. This is indicative of the electronic exchanges that are happening throughout the automotive sector. A large proportion of the respondents agreed that they shared information on inventory levels or production plans electronically with business partners. Although the results indicate that this is not common, such a relationship leads to faster responses to requests and problem solving. For the design of new products and services, leads more efficient collaboration especially for the development of new products. This however is not the case as a smaller proportion of the respondents agreed that they do collaborate with their business partners. Integration between internal business systems and external B2B communications and data flow is often lacking, especially in small businesses. Transferring information from one system to another creates delays, leads to inefficiencies and human errors, which may cause supplier quality issues and potential disruptions of production to other parts of the supply chain. As relates to the format of data exchange amongst the suppliers most of the information is exchanged electronically which is a good base for e-business transactions. A large portion of customers are utilising the Internet to order goods or services online from these suppliers as indicated by the respondents. Many of the suppliers have been requested by other companies to upgrade their IT solutions in order to transact more efficiently whereas very few have requested other companies to upgrade theirs.

5.3.3 Skills Requirements and Costs

A large percentage of the supplier companies had hired IT practitioners to assist in installing and maintaining their IT solutions. This indicates how important the companies consider IT as tool used frequently to facilitate business. E-business skills' training was largely considered by most companies as a requirement for their employees to assist with business transactions. Many of the companies provided

such training to their employees. A large proportion of the respondents agreed that they had made significant investments within the last 12 months to assist with their business transactions.

5.3.4 IT Impacts, Drivers and Inhibitors

E-business is not prevalently used in the respondents' companies. Most of the larger companies have implemented the process while the smaller companies have not. Majority of the respondents confirmed that they experienced several problems while first implementing e-business. One of the main challenges is slow implementation of e-Business and IT capabilities in general by the company's suppliers. Small companies still unable to equip themselves state of the art computer equipment systems and online connectivity that would ease implementation of the process. Implementation of the internet at these companies was also marred with numerous problems that may have hindered a flawless launch of the e-business process. The respondents also gave various reasons why they did not use e-business more extensively and it was evident that their main reason was because the tier 2 suppliers were not ready to encompass this technology. In addition, many of the respondents were concerned about various issues that hindered them from utilising the internet. Examples of these included security, protection from viruses, unsolicited email and ability to use the technology.

5.4 SUMMARY

In this chapter, the results of the empirical study were analysed and presented. Bar graphs and pie charts were used to illustrate the data obtained from the completed questionnaires. In the last chapter, the summary, conclusions and recommendations are made.

CHAPTER 6

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

The main objective of the study was to investigate the implementation of E-business in the automotive industry. In Chapter 5, the results of the research were interpreted and the findings of the survey conducted presented. This chapter contains the conclusions and recommendations drawn from all the information gathered in the previous chapters. Based on the findings, a number of conclusions are made, with specific recommendations suggested for each conclusion.

This chapter briefly represented a synopsis of the previous chapters and gives conclusions and recommendations based on the empirical findings.

6.2 SYNOPSIS OF THE STUDY

Chapter 1 begins with a brief description of the research design of the dissertation. The researcher presented the research problems, which consisted of the main problem and sub-problems. The research significance and research methodology were also introduced in this section.

Chapter 2 consists of a literature overview of lean manufacturing. Automation of supply chains was also discussed.

Chapter 3 comprises of internet marketing and E-business literature review. A brief introduction was given and internet usability which supports e-business was studied.

Chapter 4 contains an explanation of the methodology used in this study. Exploratory and descriptive research was introduced at the beginning of the study. Lastly, the data analysis methods of the study were explored in terms of the different techniques being required.

Chapter 5 includes descriptions of the results and empirical findings of the study.

6.3 CONCLUSIONS AND RECOMMENDATIONS

From the study, it is unclear whether strategic directions exist that the suppliers are supposed to use as a guideline to implement a common e-business process. Many of the suppliers appear to recognise the need to implement e-business in order to compete more effectively however it seems that there is no common drive to achieve such a strategy. The respondents seem to have common goals to embrace this process and therefore these should be addressed with the intervention of government or relevant industry associations

6.3.1 OEM Communication of e-Business Strategies

Vehicle manufacturers have an important role to play in assisting their suppliers to implement e-business as quickly as possible. By fast tracking these issues, the OEMs will benefit in order to satisfy the ever increasing customer demand. It is also understandable that local OEM staff and management are facing similar issues to their supply chain counterparts in identifying strategies and courses of action in light of conflicting directions from overseas parent companies, their applicability to local conditions, viability of business cases, difficulties of resourcing local initiatives etc. (Federal Chamber of Automotive Industries , 2001)

Nevertheless, from the feedback received during this study it is important that emerging directions are communicated widely within the supply chain. OEM's should be prepared to listen or obtain feedback from their suppliers about planned initiatives in order to reach win-win situations wherever possible. As a concrete action to facilitate the process we propose an information seminar and workshops about coordinated e- Business activities in the automotive supply chain. The seminar should encompass statements of directions and executive sponsorship from senior of each of the local vehicle manufacturers. Opening overviews would be followed by workshop sessions on specific topics, e.g. product development collaboration, EDI future directions, online procurement (direct and indirect goods) and supplier communications The event should possibly be planned as a first in a series of regular

updates in order to ensure ongoing information flow and cooperation in the supply chain. Training and education content and material could possibly be at least partly sourced from Government sources or educational institutions or other industries, which have successfully embarked on e-Business developments.

6.3.2 Case Studies, Business Plans, Cost/Benefit Analysis and Justifications

E-Business initiative documentation and case studies can be shared amongst the suppliers. This will ensure that common practices can be learnt and implemented at the suppliers' premises. This material can be sourced from other companies in different industries that have successfully implemented these strategies. Feedback channels should be opened up to ensure that this work delivers results addressing the needs of all significant sectors in the industry and to ensure that regular input from the industry is listened to.

6.3.3 Creating adequate regulatory and institutional frameworks

Discussion and adoption of industry standards within the automotive industry should be conducted in industry-association sponsored workgroups and committees consisting of volunteers from within the industry (Federal Chamber of Automotive Industries, 2001). The outcomes and directions of standards activities emanating from these meetings can then be communicated to a wider industry audience. Developing countries need to take a proactive role in developing a robust, flexible regulatory framework for e-business. It is equally important to ensure effective coordination of government agencies, industry associations and other facilitators. E-business will succeed only if a stable physical and virtual infrastructure of trust, shared by all parties concerned, including public authorities exists.

6.3.3 e-Marketplaces

The emergence of e-Marketplaces locally and overseas, for direct and indirect goods and services needs to be rolled out cautiously. While Internet technologies are global and standardised, their applications can and must be adapted to local

circumstances. Also, assistance should be provided to those suppliers who are lagging behind to implement this process.

6.3.4 Education

Given the perceived or real difficulties in finding staff or resources with e- Business as well as auto-industry skills and expertise, the utilisation of existing job networks and search facilities should be explored, with particular attention to the needs of this industry. E-business modules should also be lectured at university to ensure that graduates can be prepared to fill this gap.

6.3.5 Government involvement

The Government can play an active role by creating a nurturing environment for e-business through the adoption of a national e-strategy developed with the participation of all relevant stakeholders. Such a strategy should take into account issues such as access to ICT facilities, the legal framework for e-commerce, awareness raising, training and community involvement. An important part of the national e-strategy might be to ensure that local industry can choose the operating system and applications that best suit its needs, with a full understanding of the benefits to them. Awareness campaigns, training programs and the adaptation of university curricula may be needed to ensure that the local automotive industry as well as the local business sector can take full advantage of the opportunities offered by the government to utilize e-business.

This study illuminates the fact that there is a gap as regards e-business between the OEMs and its suppliers. The OEMs need to be more proactive to assist the suppliers to close this gap. By adopting the above recommendations, the selected OEM can assist in closing the e-business gap in the auto-industry. Such actions will therefore assist the South African auto-industry to compete favorably against its international counterparts.

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APPENDIX 1: Cover letter

Valued Supplier,

E-BUSINESS QUESTIONNAIRE

In order to complete my studies towards attaining an MBA degree at the Nelson Mandela Metropolitan University, I have been tasked to investigate the implementation of e-business in the automotive sector. I have chosen to conduct my study between General Motors SA and its suppliers as a representative sample of this industry's dynamics. The investigation is aimed at gaining an increased understanding of the nature and extent of e-business currently being executed in the automotive industry.

Kindly assist by spending 20 minutes of your time completing the accompanying questionnaire. Please answer ALL questions.

Please E-mail the completed questionnaire to Silas.Khayundi@gm.com **by no later than Friday, August 13th, 2010.**

Your assistance will be highly appreciated.

Kind regards,

Silas Khayundi
Quality Planning Coordinator
General Motors South Africa
P.O. Box 1137
Port Elizabeth
6000
Tel: ++ 27 41 403 3260
Silas.Khayundi@gm.com

APPENDIX 2: Research questionnaire

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SECTION A: Biographical data

SECTION B: Infrastructure and e-Business Software Systems

SECTION C: Automated data exchange

SECTION D: Skills Requirements and Costs

SECTION E: Impacts, Drivers and Inhibitors

SECTION A: Biographical data

Company Name: _____

Email address: _____

(Indicate your choice by means of an X)

A. Age Group

20 – 29 years	
30 – 39 years	
40 – 49 years	
50 and older	

B. Gender

Male	
Female	

C. Occupation

Senior management	
Middle management	
Staff	
Other	

If other, please specify

D. Time in current position

1 – 2 years	
3 – 5 years	
6 – 10 years	
10+ years	

E. Education

Postgraduate	
Undergraduate	
Matric	
Other	

If other, please specify

SECTION B: Infrastructure and e-Business Software Systems
INSTRUCTIONS

Please place a cross (X) in the appropriate box

1. Does your organisation have a computer network?

Yes	No	Don't Know
-----	----	------------

2. Does your organisation have e-mail?

Yes	No	Don't Know
-----	----	------------

3. Do the computer users within your organisation use e-mail to do business, for example, quotes or purchase order numbers?

Yes	No	Don't Know
-----	----	------------

4. Does your company have.....(multiple answers possible)

A Local area network	
A Wireless LAN	
Its own website on the internet	
An Intranet within the business with access restricted to employees	
An Extranet with access restricted to business partners	
Don't know	

5. Does your company have a software application to manage the placing or receipt of orders?

Yes	No	Don't Know
-----	----	------------

If Yes, name of application(s) _____

**SECTION C: Automated data exchange
INSTRUCTIONS**

Please place a cross (X) in the appropriate box

1. Does your company use the internet or other computer-mediated networks to order goods or services from suppliers online, not counting manually typed e-mails?

Yes	No	Don't Know
-----	----	------------

2. Does your company share information on inventory levels or production plans electronically with business partners?

Yes	No	Don't Know
-----	----	------------

3. Does your company use software applications OTHER THAN e-MAIL to collaborate with business partners in the design of new products or services?

Yes	No	Don't Know
-----	----	------------

If Yes, name of application(s) _____

4. All in all, which of the following statements best describes the way your company exchanges data with business partners: Orders and related messages are...

Mostly electronic	
Mostly in paper based format	
Electronically based but exchanged in paper based format	
Don't know	
Other:	

5. Can customers order goods or services from your company online on the internet or through other computer-mediated networks?

Yes	No	Don't Know
-----	----	------------

6. Has your company experienced pressure from suppliers that your IT solutions or data exchange formats should be adapted to comply with their requirements?

Yes	No	Don't Know
-----	----	------------

7. Is your company demanding from suppliers that they implement new IT solutions or exchange formats in order to facilitate data exchange with your company?

Yes	No	Don't Know
-----	----	------------

SECTION D: Skills Requirements and Costs
INSTRUCTIONS

Please place a cross (X) in the appropriate box

1. Does your company currently employ IT practitioners? These are persons who were hired primarily to take care of the company's IT infrastructure.

Yes	No	Don't Know
-----	----	------------

If Yes, how many _____

2. Do you think that e-business developments require certain employee skill requirements in your company?

Yes	No	Don't Know
-----	----	------------

3. Does your company provide training for personnel to use the IT systems for business?

Yes	No	Don't Know
-----	----	------------

4. Did your company make investments in IT during the past 12 months, for example new hardware, software or networks?

Yes	No	Don't Know
-----	----	------------

SECTION E: IT Impacts, Drivers and Inhibitors
INSTRUCTIONS

Please place a cross (X) in the appropriate box

1. **Would you say that most of your business processes are conducted as e-business?**

A good deal of them	
Some	
None	
Don't know	

2. **Did you experience any of the following problems when you first started using e-business for transactions?(multiple answers possible)**

Difficulty getting connected / using equipment	
Equipment more costly than expected	
Deciding which ISP / comparing cost, service	
Deciding on equipment specification	
Lack of information / advice / support on how to set up etc	
No problems experienced	
Other:	

3. **To what extent did you experience any of the following problems with the Internet or e-commerce since you started using it?(multiple answers possible)**

Slow access / downloading	
Unsolicited email	
Security breach / fraud	
Internet connection failures	
Reliability of service	
Customer difficulty in using / finding our website	
Difficulty using / finding websites	
Running and maintenance more costly than expected	
Lack of user support	
Poor advice from user support	
Cost of user support	
Problems between ISP and telecoms supplier taking responsibility for service failures/problems	
No problems experienced	
Other:	

4. Which of the following is (are) an important reason(s) why your company does not use e-business more intensively? (Multiple answers possible)

Our company is too small to benefit from e-business activities.	
The required technologies are too expensive.	
The required technologies are too complicated	
Many of our suppliers or customers are not prepared for e-business.	
We are concerned about potential security risks and privacy issues.	
We think that there are important unsolved legal issues involved.	
It is difficult to find reliable IT suppliers.	
Other:	

5. How concerned are you about the following Internet issues?

	Very concerned	Fairly concerned	Not concerned
Security / fraud			
Protection from viruses			
Unsolicited email (spam)			
Ability to use technology			
Inappropriate material			
Expensive			
Invasion of privacy			
Lack of personal contact			
Staff using email/Internet for personal business			
Other:			

End of questionnaire.

Thank you very much for your time.