INCREASING COMPETITIVENESS THROUGH THE ENHANCEMENT OF LOGISTICS PROCESSES IN THE SOUTH AFRICAN AUTOMATIVE INDUSTRY.

BY

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Dissertation presented in fulfilment of the requirements for the Degree of Master of Technology (Business Administration) at the Port Elizabeth Technikon.

PROMOTER: DR S. KRAUSE

JANUARY 2005
 DECLARATION

“I, Thobela Lincoln Njokweni, hereby declare that:

♦ The work in this dissertation is my own original work;

♦ All sources used or referred to have been documented and recognised; and

♦ This dissertation has not been previously submitted in full or partial fulfillment of the requirements for an equivalent or higher qualification at any other recognised education institution.
ACKNOWLEDGEMENTS

♦ Dr Shaun Krause, my supervisor, for his professional and constructive guidance during the start and finalisation of the dissertation.

♦ Dr Jacques Pietersen for his professional and constructive guidance in developing and structuring of the questionnaire.

♦ The staff of Logistics Planning at Volkswagen of South Africa for their encouragement and support

♦ The respondents of the study who supplied the empirical data

♦ My family for encouragement, assistance and patience during the study
ABSTRACT

Logistics has become one of the automotive industry's most crucial sub-sectors. Previously, logistics had to step aside to make way for production considerations. Today it is regarded as being every bit as crucial as production in the global village. Advancement of logistics in South Africa is crucial because original equipment manufacturers are producing to developed world standards but are having to cope with low developing world logistics standards. The logistics processes that need to be enhanced in order for the South African automotive industry to be more competitive were investigated. To examine the main problem, three sub-problems were identified.

The first sub-problem that has been identified dealt with logistics processes that will enhance the competitive advantage of the South African automotive industry.

The second sub-problems looked at key logistics opportunities and threats to the environment in which South African motor manufactures trade. They were investigated by assessing the nature of the South African motor manufacturing industry.

Finally, the third sub-problem investigated conclusions that can be arrived at concerning the appropriateness and strategic value of the analysis.
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LIST OF ABBREVIATIONS

♦ TISA – Trade and Industry Investment South Africa

♦ OEM’s – Original equipment manufacturers

♦ MIDP – Motor Industry Development Plan

♦ FMS – Flexible manufacturing systems

♦ JIT – Just in time

♦ CONWIP – Constant work in process

♦ WIP - Work in process

♦ Naacam - National association of automobile component and allied manufacturers

♦ SILS - Supplier in line sequence

♦ BOTT - Build-operate-train-transfer
CHAPTER 1
THE PROBLEM AND ITS SETTING

1.1 INTRODUCTION

The development of global competition in the automobile industry over recent decades illustrates the issue of finding core competencies in the changing environment. During the 1950's and 1960's, the US giants such as Ford and General Motors dominated the global market through the critical success factor of market access, supported by core competencies of establishing dealer networks and, later, overseas production plants. Meanwhile, Japanese manufacturers were developing competencies in defect-free manufacture.

By the mid-1970's they were slightly out-performing Ford on quality and reliability which became critical success factors in allowing them to achieve global sales. By the mid-1980's both Ford and the major Japanese companies had achieved similar competencies in achieving these critical success factors. Although maintaining a global network was a critical success factor which continued to distinguish Ford and the Japanese from many European companies such as Peugeot, the production and supplier management activities underpinning quality were becoming threshold competencies.

The competitive arena then switched to competencies which would create some uniqueness of product in an increasing 'commodity-like ' industry. The new critical success factor become the ability to provide unique product designs and features at low volume of manufacture - underpinned by core competencies in 'life niche' marketing by companies like Mazda. The agility in design and manufacturing techniques also become a core competence in the global competition. This example of the automotive industry is provided to demonstrate the need for constant review and innovation (Johnson & Scholes, 1999:161).
A new shift in emphasis is at present once again taking place in the South Africa motor vehicle and component industry. Logistics has become one of the automotive industry's most crucial sub-sectors. Previously, logistics had to step aside to make way for production considerations. Today it is regarded as being every bit as crucial as production in the global village, where delivery and pick-up times have to be spot-on, with emphasis on customer satisfaction. In fact, the cost of logistics has risen to the level of the cost of production (Engineering News, 30 September 2002:39).

Advancement of logistics in South Africa is crucial because original equipment manufacturers (OEM’s) are producing to developed world standards but are having to cope with low developing world logistical standards. The prompt supply of components and materials is also crucial to the attainment of global competitiveness in the production arena.

The effective management of supply chains is a means for organisations, and ultimately countries, to enhance their global competitiveness, as logistics is a fundamental and critical part of all sectors of the economy. Companies worldwide realise the need to enhance their supply chain management and logistics abilities in order to remain competitive. The same applies in the South Africa context. Although South Africa is geographically remote from major world markets, its manufacturing industry is dependent on exporting goods globally. It is therefore essential, and almost an imperative, that South Africa companies strive towards the same level of supply chain management excellence as elsewhere in the world to gain a competitive advantage. In fact, South Africa companies need to be excellent just to level the playing field, given the sheer distance separating them from their main markets (Logistics news: Business Special 2003:16).

The scenario sketched above would entail that an in-depth analysis be made of the effects of these changing critical success factors on the industry as a whole.
1.2 MAIN PROBLEM

The main focus of the study is to identify those logistics processes that will enhance the automotive industry competitiveness:

An investigation into what logistics processes the South African automotive industry needs to enhance in order to become more competitive.

1.2.1 Sub-problems

In order to develop a research strategy to deal with and solve the main problem, the following sub-problems have been identified:

(a) What logistics processes does the research literature reveal that will enhance the competitive advantage of the South African automotive industry?

(b) What key logistics opportunities exist and what threats are there to the business environment that the South African motor manufacturers operate in?

(c) What conclusions concerning the appropriateness and strategic value of the analysis regarding logistics can be arrived at?

1.3 OBJECTIVES

The objective of this study is to provide an overview of the evolution of the motor industry in South Africa and to identify and highlight potential opportunities and solutions to problems as they relate to logistics.

1.4 DEMARCATION OF THE RESEARCH

Demarcating the research serves the purpose of making the research topic manageable from a research point of view. The omission of certain topics does not imply that there is no need to research them.
1.4.1 The motor manufacturers referred to as "Original equipment manufacturers" (OEM's).

The research is focused mainly on the manufacturing and assembly of fully built-up vehicles for use in both the local and export passenger markets. This would include all seven manufacturers, namely Ford Motor Corporation (South Africa), Volkswagen (South Africa), Daimler Chrysler (South Africa), Toyota Motor Corporation (South Africa), Nissan (South Africa), General Motors (South Africa) and BMW (South Africa).

1.4.2 Motor component industry

The study will also research the impact that the component industry has on the motor manufacturing industry as a whole.

1.4.3 Size of the industry

The total workforce consists of 250 000 people plus 90 000 people in manufacturing. The automotive industry has become one of South Africa's biggest gross domestic product earners, contributing 5.6 percent, third only to mining and agriculture. Although the industry has such a large pool of human resources, the study would in essence focus on the impact of logistics processes on the competitiveness of the South African motor industry (Http://www.cartoday.co/content/conference/slides/0930rp/sid004.htm).

1.4.4 Geographical demarcation

The empirical component of this study will be limited to mostly OEM's and suppliers within Nelson Mandela Metropolitan Municipality.

1.4.5 Inbound logistics

These are the activities concerned with receiving, storing and distributing the inputs to the product or service. They include materials handling, stock control, transport, etc (Johnson & Scholes, 2002:160).
1.5 DEFINITION OF SELECTED CONCEPTS

For the purpose of this study the following meanings are associated with the concepts in the title and the problem statement of the study:

1.5.1 Logistics

The technology of control of the physical flow of materials and goods and related information that a firm sends, transfers and receives, appears as an organisational approach that can conserve and improve the flexibility and reactivity of the firm (Costes & Colin, 1994:37).

Logistics is that part of the supply chain that plans, implements and controls the efficient, effective flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customer's requirements (Logistics News: Business Special 2003:2).

1.5.2 Supply chain management

The means by which firms engaged in creating, distributing and selling products can join forces to establish a supply network with an unbeatable competitive advantage (Poirier, 1999: 2).

Supply chain management is defined as the systematic strategic co-ordination of the traditional business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole (Logistics News, June 2003:14).

Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers and customers. In essence, supply chain management integrates supply and demand management within and across companies (Logistics News, November/December 2003:39).
Supply chain management is an integrating function with the primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high performing business model. It includes all of the logistics management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities within and across marketing, sales, product design, finance and information technology (Logistics News, November/December 2003:39).

1.5.3 **Motor manufacturers**
Motor manufactures are those firms engaged in the assembly of motor vehicles to be sold on the South African market or for export to other markets (Porter, 1998:77).

1.5.4 **Motor Industry Development Plan “MIDP”**
The introduction of the Motor Industry Development Plan (MIDP) introduced in 1995 is aimed at ensuring that the local motor industry integrates into the larger global automotive industry. It further seeks to make the motor industry more competitive as well as allowing international companies to sell their vehicles locally.

For the purpose of this study, the motor industry development plan will be defined as follows:

The policy as adopted by the government for the motor industry to ensure the long-term survival and global competitiveness of the South African motor industry (www.aidc.co.za).

1.5.5 **Component manufactures**
The component manufacturers are those firms that supply the motor manufacturers with components or exist to export components overseas to enable a manufacturer to take advantage of the forex credits (Porter, 1998:77).
1.5.6 Motor industry cluster

Clusters are geographic concentrations of interconnected firms and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. They include suppliers of specialised inputs such as components, machinery, services and providers of specialised infrastructures. Clusters are often extended downstream to channels, customers and manufacturers of complementary products and so to companies in industries related by skills, technologies, or common inputs. Many clusters include governmental and other institutions such as universities, standard setting agencies, vocational training providers and trade associations that provide specialised training, education, information, research and technical support (Porter 1998:77).

1.6 THE SIGNIFICANCE OF THE RESEARCH

South Africa's isolation prior to 1994 was a factor in the stagnation of the automotive industry, with logistics competitiveness taking a back seat. This changed rapidly once South Africa democratised and, in the last eight years, exports and imports have increased at an impressive rate, leading to the new focus on transport infrastructure and a striving for global best practice. Advancement of logistics in South Africa is crucial because original equipment manufacturers (OEM's) are producing to high developed world standards, but are having to cope with low developing-world logistical standards (Engineering News, August/September 2003). It is necessary to take action to reduce the cost of logistics and optimise every link of the supply chain. The South African automotive logistics industry cannot hide behind its developing country status. Logistics standards have to be raised to those of Europe, Japan and the United States, just as it has been done in manufacturing. The improvement of logistics processes will help steer the automotive industry towards long-term sustainability by increasing its competitiveness (www.aidc.co.za). This research project is aimed at indicating the options available to manufacturers attempting to do this.
1.7 **SUMMARY OF THE MOST IMPORTANT FINDINGS FROM PRIOR RESEARCH**

Research by the World Bank has revealed that the economies of Japan, Singapore, Hong Kong, Taiwan and South Korea are extremely competent in technology transfer and diffusion, world class manufacture and export trading, productive investment, education, people development and domestic savings (Joubert, 1995: 24). The economies of Malaysia, Thailand, Indonesia and China have demonstrated similar performances using similar economic drives. This indicates that these developing countries are focusing their development activities on core competencies that will propel them towards being the benchmark for other developing countries to follow.

Hayes and Pisano (1994: 78) argue that the key to long-term success is being able to do certain things better than your competitors can. These superior organisational capabilities provide a competitive advantage that is much more sustainable than one based on something that can be built or bought. A person may be able to buy access to a certain technology, for example, but the human effort or ability to, first of all, produce it effectively, then sell it effectively, and then show the commitment to improve continuously over time is where the real advantage lies.

Prior research indicates that the South African automotive industry is becoming increasingly competitive and that new strategies need to be developed to remain competitive. The underlying technologies, design and development programmes of new model types will require world volumes to amortise their costs (Maxton & Wormald, 1995: 144). Also, the local product adaptation, applications engineering, production and sourcing will be organised into mega regions. This alignment of process-related functions will incorporate both first and second world countries into tightly managed innovation and delivery chain structures (Maxton & Wormald, 1995: 144).
1.8 **RESEARCH DESIGN**

In this section the broad methodology that will be followed in the study is described.

1.5.2 **Research methodology**

Literature review and empirical study will be adopted to solve the main and sub-problems:

1.8.2 **Literature review**

Logistics processes that should enhance the competitiveness of the motor industry will be identified from the literature.

1.8.3 **Empirical study**

♦ A mail survey:
  A questionnaire will be developed by the researcher to examine the most important issues relating to the automotive industry and the strategies underway in dealing with the challenging logistics processes. The mail survey will be conducted among various senior personalities across the spectrum and directly involved in the industry.

♦ The empirical study includes:
  A questionnaire that tests the theoretical analysis that addresses the impact of logistics processes. The questionnaire will also be designed to determine strategies that can be employed within the industry, to leverage the competitive advantage through logistics processes.

1.9 **OUTLINE OF THE STUDY**

The study has been divided as shown and is presented in the following chapters:

Chapter 1: Introduction of the study
Chapter 2: Core competencies
Chapter 3: Assessing the nature of the South African motor manufacturing industry.
Chapter 4: Importance of logistics processes as part of strategy and competitive advantage
Chapter 5: Research methodology and design
Chapter 6: An integration of the findings of the empirical survey with theoretical survey development for the study
Chapter 7: Conclusion and Recommendations

1.10 CONCLUSION

In this chapter the main problem and sub-problems have been identified. The key terms are also explained to introduce the reader to the topic being studied. Methods of research have been illustrated. The discussion will now focus on the impact of logistics processes on South African automotive industry's competitiveness. It will also provide some insight into the background of the industry.
2.1 INTRODUCTION
In this chapter the researcher will focus on the paradigm shift of the twentieth century, core competence, the value chain as a source of core competence and lean supply as a core competence.

2.2 COMPETING IN WORLD MARKETS
When considering how great companies compete and what makes them so successful, many questions come to mind, but the following six questions stand out as important (Mische, 2000: 1):

♦ What makes an organisation great and what factors are influencing new competitive dynamics?
♦ Why and how do certain companies consistently outperform their peers and the business community at large?
♦ Why is it that having great high-quality products and competitive prices no longer guarantees competitive advantage, breakthrough performance, and extraordinary financial results?
♦ How did once-dominant companies fall from their lofty positions of industry dominance and investor infatuation?
♦ What do high-performance organisations, irrespective of industry, have in common?
♦ What are the warning signals of strategic and performance decline, and can these declines be predicted and avoided?

In the hunt for competitive advantage and strategic positioning, the challenge is not necessarily the ability to predict the future, but to create it. According to Mische (2000:3), there are four certainties of competing:

♦ The velocity at which change occurs is at the highest level that it has ever been and continues to accelerate at high rates every day.
The level, scope and breadth of change are increasingly unpredictable and more systemic, affecting more and more people, organisations and societies and processes and technologies.

The classic boundaries that once demarcated industries, economies, markets and countries are becoming increasingly blurred, porous and transparent.

The historical sources of competitive advantage and methods of forming strategy that most organisations have used and rely upon have been largely neutralised or significantly mitigated by global political and economic changes, rapidly developing technologies and changing demographics. Figure 2.1 is a representation of fundamental changes that are driving new business dynamics:

Figure 2.1 Fundamental changes that are driving new business dynamics

<table>
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<tr>
<th>Industrial Model 1900-1985 (RIP)</th>
<th>High-Performance Model 2000+</th>
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<tr>
<td>♦ Vertical integration</td>
<td>♦ Desegregation; outsourcing and collaborative partnerships</td>
</tr>
<tr>
<td>♦ First mover advantage</td>
<td>♦ Compete on speed, excellence and agility</td>
</tr>
<tr>
<td>♦ Achieve critical mass and economies of scale</td>
<td>♦ Compete on process and service</td>
</tr>
<tr>
<td>♦ Compete on cost, price, and location</td>
<td>♦ Sell-through/pull-through marketing</td>
</tr>
<tr>
<td>♦ Sell-in/push-through marketing</td>
<td>♦ Knowledge is strategic</td>
</tr>
<tr>
<td>♦ Information is important</td>
<td>♦ Industry structures are blurred; uncertainty prevails</td>
</tr>
<tr>
<td>♦ Well-defined industry boundaries and predictable dynamics</td>
<td></td>
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</table>

Source: Mische (2000: 10)

Todd (1995:4) provides an analysis of the implications of competing in the world markets, from the perspective of the motor industry. According to him,
Henry Ford led the way by using mass production to make cars affordable so that many more people could buy them. The number of cars on the road increased rapidly, with Ford by far the market leader. Other industries have adopted similar techniques to make their product better and cheaper, so that today the average home is equipped with mass produced goods.

According to Todd (1995:5), this process of continuous improvement has its drawbacks:

♦ We need to improve our manufacturing efficiency at least as fast as all our competitors, just to survive.

♦ We really need to improve a lot faster than our competitors if we want to keep the job security and prospects for promotion that come from success.

The situation as Todd (1995:5) discusses it for the European situation also applies to South Africa. According to Todd, the industrial revolution started in the western world, and until relatively recently, the standards of manufacturing efficiency, against which companies all had to compete, were set by companies in the United States of America and Europe. Further, manufactures tended to compete mainly with firms similar to themselves, all of them trading in similar markets and having similar costs of production.

Todd (1995:5) contends that the pace of change has dramatically speeded up in the last few years and that by responding positively, we can turn this changing situation to our advantage by becoming a world-class manufacture ourselves.

2.3 THE PARADIGM SHIFT OF THE TWENTIETH CENTURY.

The word ‘paradigm’ means a set of expectations: the factors which one expects to be constants. In manufacturing, this has changed twice during this century (Lamming and Cox, 1995:41).
Figure 2.2 Paradigm shifts of the twentieth century

According to Womack et al (1990: 11), the automotive industry has twice changed our most fundamental ideas of how we make things in the twentieth century. How things are made dictates not only how we work, but also what we buy, how we think and the way we live.

After World War I, Henry Ford and others moved world manufacture away from centuries of craft production, led by European firms, into the age of mass production. Largely as the result of this, the United States soon dominated the global economy.

The twentieth century's second paradigm in manufacturing began after the Second World War, in Japan. After the war, the Japanese had nothing other than their skills, their equity and their self respect. With these they developed a new way of running production, a new paradigm which, like mass production before it, spread beyond the domain of manufacturing. This system uses significantly less of every resource: effort, time, space and materials, to develop products which provide lean manufacturers with an advantage over mass producers.
According to Schary (1998:97), the new paradigm is a direct response to the industrial requirements. It has been characterised as a bimodal, able to combine both centralising and decentralising operations in a coherent pattern. Centralisation is a management drive toward strategic direction. Decentralisation comes from the diffused power to make decisions at operating levels in the organisation.

The pendulum has swung away from mass production toward more flexible operations. Production can now be organised in separate stages, even in separate locations. The organisation itself becomes flexible, meeting new needs through connections to different organisational units. Specific suppliers are brought into the network to produce a specific product component and then held in abeyance until another project comes along (Schary, 1998:97).

According to Brown (1996:154), flexibility manifests itself in a number of ways, including both flexibility in manufacturing and flexibility in market requirements. Manufacturing flexibility includes the following: machines, process, products, routing, volumes, expansion, operations and production. See this flexibility linking together as depicted in figure 2.3. According to Brown (1996:154), we can also add that market requirements in the 1990's and beyond include at least the flexibility set out in Table 2.1. Brown (1996:154) suggests that there should be benefits along the following lines with successful flexible manufacturing systems installations:

♦ Inventory reduction of 60-80 per cent.
♦ Direct labour savings of 30-50 per cent.
♦ Increased asset usage approaching 80-90 per cent.
♦ Floor-space reduction of 40-50 per cent.
Figure 2.3 Manufacturing flexibility.

![Diagram showing relationships between different types of flexibility: Machine flexibility leads to Product flexibility, Process flexibility, and Operation flexibility. Routing flexibility leads to Volume flexibility, Expansion flexibility, and Production flexibility.]

Table 2.1 Market requirements in terms of flexibility

<table>
<thead>
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<th>Requirement</th>
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<tbody>
<tr>
<td>Product variety</td>
<td>More different models, styles, colours, etc.</td>
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<tr>
<td>Product customisation</td>
<td>Increasing tailoring products to suit a particular customer's requirements.</td>
</tr>
<tr>
<td>Product innovation</td>
<td>Frequent changes of model and introduction of new products to the marketplace.</td>
</tr>
<tr>
<td>Delivery flexibility</td>
<td>Delivering on short lead times and in quantities to suit customer needs, not manufacturing efficiency.</td>
</tr>
<tr>
<td>Demand flexibility</td>
<td>Coping with seasonality, fashion and other types of demand variation – matching capacity to demand.</td>
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</tbody>
</table>


Raturi and Evans (2005: 58) define flexibility as the ability to make rapid changes to a production process, thereby providing a wide variety of products, highly customised products and services, or a rapid response to changing market conditions. The proportion of orders delivered on time is one way of measuring the ability of a firm to meet its customer commitments. According to Raturi and Evans (2005:59), flexibility can also be viewed in terms of volume which can be defined as the ability of a firm to quickly adapt to
changes in product or service demand. One measure of volume flexibility is the change in cost when volume changes. A firm is more flexible if this change is small. Table 2.2 summarises dimensions for six different types of flexibility and Table 2.3 summarises characteristics of volume flexibility.

Table 2.2 Characteristics of process flexibility

<table>
<thead>
<tr>
<th>Flexibility type</th>
<th>Range</th>
<th>Time</th>
<th>Nature of uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mix</td>
<td>Variety of parts</td>
<td>Lead-time</td>
<td>Demand for products offered</td>
</tr>
<tr>
<td>Changeover</td>
<td>Variety of major design changes</td>
<td>Startup time</td>
<td>Product life cycles</td>
</tr>
<tr>
<td>Modification</td>
<td>Variety of minor design changes</td>
<td>Time to make a minor design change</td>
<td>Appropriate product characteristics</td>
</tr>
<tr>
<td>Volume</td>
<td>Ammount of change in the production level</td>
<td>Time to change production level</td>
<td>Ammount of aggregate product demand</td>
</tr>
<tr>
<td>Rerouting</td>
<td>Degree that operations sequence can be changed</td>
<td>Time to reroute and process</td>
<td>Machine downtime</td>
</tr>
<tr>
<td>Material</td>
<td>Range of compositions and dimensional variation</td>
<td>Time to make the adjustments</td>
<td>Meeting raw material standards</td>
</tr>
</tbody>
</table>

Source: Raturi & Evans (2005: 117)
Table 2.3 Characteristics of volume flexibility

<table>
<thead>
<tr>
<th>Volume flexibility responses</th>
<th>Cost</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquire and operate with more than needed capacity</td>
<td>Very expensive since the plant has very low utilisation and much idle capacity is reserved for demand surge</td>
<td>Almost instantaneous response to a surge in demand</td>
</tr>
<tr>
<td>Produce more on overtime</td>
<td>Moderately expensive since overtime labor is paid at 150% of the normal rate; quality problems due to overwork</td>
<td>Can respond to a demand surge fairly quickly</td>
</tr>
<tr>
<td>Produce more by going from one shift to two shifts</td>
<td>Not very expensive since scale of operations fits level of demand and factory operates at high utilisation levels</td>
<td>Very slow as additional workers have to be hired and trained, additional equipment and resources have to be bought, etc.</td>
</tr>
</tbody>
</table>


2.4 DEFINITION OF CORE COMPETENCE

Core competencies are activities or processes that critically underpin an organisation's competitive advantage. They create and sustain the ability to meet the critical success factors of particular customer groups better than other providers in ways that are difficult to imitate (Johnson & Scholes 2003:156).

Brown (1996: 295) points out that, coupled with the concept of organisational focus, is that of determining a firm's core competence; the firm must decide what its strengths are and to focus on these as a means of competitive advantage, rather than being involved in all areas of the firm's business activity. Core competencies are discussed here, because much of the firm's competence depend on the skills, abilities and learning acquired by human resources over a period of time. Competencies are not limited to human resources. Hamel and Prahalad (1994) define core competencies as a bundle of skills and technologies rather than a single discrete skill or technology.
Brown (1996: 295) also adds that a number of important issues are involved in the idea of core competencies:

♦ Core competencies provide a competitive advantage – a core competence should be difficult for competitors to imitate.

♦ It is a strategic issue, vital to chief executive officers – according to Prahalad and Hamel (1990), chief executive officers are judged on their ability to identify, cultivate and exploit core competencies.

♦ Core competencies reveal learning in the organisation.

♦ Core competencies provide opportunities, rather than limitations for the firm.

Raturi and Evans (2005:134) add that the competency of the facility should focus on cost reductions, customer access or innovation. Rowe, Mason, Dickel, Mann and Mockler (1994:57) comment on the fact that competitiveness depends on the company’s ability to build an organisation that can produce products at a lower cost, in a more timely manner, with value added in new products that were not previously anticipated. The organisation simply needs to identify its core competency and to allocate resources to develop a differential advantage. This competitiveness stems from the ability to produce at a lower cost, and more rapidly, than others. The source of competitive advantage is the ability to focus skills to produce competencies.

Johnson and Scholes (2002:149) maintain that core competencies provide the basis on which strategies may be built to exploit opportunities in other markets where the same critical success factors are valued. They can also provide the basis of creating opportunities in new arenas where the same critical success factors would be valued above those that currently prevail.
“Competence is created when resources are deployed into the separate activities of the organisation and into the process through which these activities are linked together”. Competence is about the activities of an organisation and the process that links activities together, both within and beyond the organisation. Core competence creates and sustains the ability to meet the critical success factors of particular customer groups better than other providers in ways that are difficult to imitate. Relative competitive position can be measured by looking at the relative market share (Johnson & Scholes 2002: 149).

Rowe et al (1994:173) define core competencies as the unique combination of the resources and experience of a particular firm. Rowe et al adds that it takes time to build these core competencies and they are difficult to imitate. Rowe et al also maintain that critical to sustaining these core competencies are their:

♦ *durability* – Their lifespan is longer than individual products or the technology life cycle, as are the lifespans of the resources used to generate them, including people.
♦ *transparency* – It is difficult for competencies to imitate these competencies quickly.
♦ *immobility* – These capabilities and resources are difficult to transfer.

Rowe et al (1994:174) argue that excellence in delivering core competencies to the customer often requires organisational delivery mechanisms that are based on:

♦ *Speed of response* – the ability to preempt the competition with faster new product introduction or a faster, more responsive service.
♦ *Quality* - this increases customer satisfaction and allows the firm to win market share.
♦ *Responsiveness to the customer* – the ability to better understand customer and competitive developments.
♦ *Team organisation* - the ability to be faster and more effective by breaking down traditional functional departmentalisation.
Organisational learning – the ability to learn through shared insights, models, knowledge and experience and the ability to increase know-how and competencies within the firm.

Schary (1998: 100) is of the opinion that the emphasis on core competencies creates opportunities for strategic focus and rapid response to changing conditions. Opportunities arise because the firm concentrates management attention on achieving competitive advantage within its own area of competence. It is free of other non-value adding activities. It can configure production to meet its needs by adding suppliers and service providers and dropping others. At the same time, it must manage relationships with these external organisations.

According to Schary (1998:100), the concept of the core states that specific activities are critical to the firm and add value to the firm’s products. The supply chain is normally not a core activity in itself but acts in concert with the core to realise core strategy.

2.5 LEAN THINKING AS A CORE COMPETENCY

Womack and Jones (1996) summarised the principles of lean thinking to act as a guide for action to managers that want to transcend the day-to-day chaos of operations. Five basic principles associated with lean thinking were identified:

- specify value by specific product
- map the entire value stream
- make value flow without interruptions
- customers pull value from the producer
- and pursue perfection.

2.5.1 Value

The critical starting point for lean thinking is value. The value is specified by the ultimate consumer and is expressed in terms of a specific project, which meets the customer’s needs at a specific price at a specific time. Value is
created by the producer but is determined by the customer. The definition of value can become distorted by the manufacturer through aspects like the needs of the shareholders, through available technologies and through consideration of economies of scale or standardisation of services or products.

Lean thinking should start with a conscious attempt to precisely define value in terms of specific projects with specific capabilities offered at specific prices through dialogue with specific customers. According to Raturi and Evans (2004:259), providing the wrong good or service the right way is *muda*.

The appropriate definition of the product changes as soon as one begins to look at the whole through the eyes of the customer. A whole product or service may need to be redefined if the needs of the customer, and not of the people in design and manufacture, are taken as being less important. This will require producers to talk to customers in new ways and for the firms along a value stream to talk to each other in new ways.

A product, in the opinion of Raturi and Evans (2004:259), may actually be made cheaper by eliminating all *muda* from the process. A new target cost can then be determined. This can lead to reduced prices, extra features or capabilities, extra services added to the physical product, an expansion of the distribution network or underwriting of new products.

### 2.5.2 The value stream

The value stream is the set of all the specific actions required to bring a specific product (good or service) through the three critical management tasks of any business:

- the problem-solving tasks, running from concept through detailed design and engineering to production launch
- the information management tasks, running from order-taking through detailed scheduling to delivery,
physical transformation task proceeding from raw materials to a finished product in the hands of the customer.

According to Lead (2004), identifying the entire value stream for each product, or product family, is the next step in lean thinking.

There are basically three kinds of actions along the value stream:

- many steps create value unambiguously
- many steps do not create value but are essential with current technologies and production assets (type one \textit{muda})
- many steps create no value and may be avoided immediately (type two \textit{muda}).

Lean thinking, according to Lead (2004), has to go beyond the firm to look at the whole: the entire set of activities entailed in creating and producing a specific product, from concept through detailed design to availability, from the initial sale through order entry and production scheduling to delivery, and from raw material right into the hands of the customer.

Just as activities that cannot be measured cannot be properly managed, the activities necessary to create, order and produce a specific product which cannot be precisely identified, analysed and linked together cannot be challenged, improved (or eliminated altogether) and, eventually, perfected.

Once all the activities in the value stream have been identified, they can be sorted into the three categories mentioned above. Type two \textit{muda} may be removed straight away, clearing the way to go to work on the remaining non-value-creating steps through the use of flow, pull and perfection techniques.

2.5.3 Flow

Once the value has been specified, the value stream for a specific product fully mapped and wasteful steps eliminated, the remaining value-creating
steps must be made to flow. Instead of producing articles or supplying services in batches, flow must be achieved by learning to quickly change over tools from one product to the next and by “right-sizing” machines so that processing steps of different types can be conducted immediately adjacent to each other with the object undergoing manufacture being kept in continuous flow. Productivity can virtually double and errors and scrap eliminated just by rearranging from departments and batches to continuous flow.

According to Womack and Jones (1996:52), the first step, once value is defined and the entire value stream is identified, is to focus on the actual object – the specific design, the specific order, and the product itself – and never let it out of sight from beginning to completion. The second step, which makes the first step possible, is to ignore the traditional boundaries of jobs, careers, functions and firm's to form a lean enterprise removing all the impediments to the continuous flow of the specific product or product family. The third step is to rethink specific work practices and tools to eliminate backflows, scrap and stoppages of all sorts so that the design, order and production of the specific product can proceed consciously.

Flow thinking is not restricted to conventional, discrete-product manufacturing. The principles remain the same: concentrate on managing the value stream for the specific product or service, eliminate organisational barriers by creating a lean enterprise, relocate and right-size tools and apply the full complement of lean techniques so that value can flow continuously.

2.5.4 Pull

The conversion from departments and batches to product teams and flow causes a dramatic fall in the time required for the product to land in the hands of the customer. Furthermore, lean systems can make any product currently in production in any combination, so that shifting demand can be accommodated immediately.
Being able to make what the customer wants just when the customer wants it means that the sales forecast can be thrown away and just the products that the customer wants are made. The customer, according to Raturi and Evans (2004:261), pulls the product as needed, rather than the organisation pushing products, often unwanted, onto the customer.

Womack and Jones (1996:24) mention the fact that half the books printed in the United States each year are shredded without finding a reader because they cannot predict the demand accurately in advance. The appropriate solution will be found once the members of the publishing value stream embrace the fourth principle of lean thinking: pull.

The alternative to Senge’s (1993) learning organisation is to get rid of lead times and inventories so that demand is instantly reflected in new supply rather than the current situation of misjudged supply perennially searching for demand and creating chaos in the process.

2.5.5 Perfection

Once value has been specified, the value stream has been identified, flow has been assured and customers start pulling their products from the system, an organisation finds that the process does not end there. Reducing effort, time, space, cost and mistakes are all part of a process to achieve perfection, to offer even more precisely what the customer actually wants.

Implementing the lean production process leads to the exposure of problems in the system that can be eliminated systematically. The technologies and concepts are usually quite simple and can be implanted directly. Also, in lean system the subcontractors, first-tier suppliers, system integrators, distributors, customers and employees can see everything and so it is easy to discover better ways to create value.
As mentioned in the previous section, two approaches are possible: that of radical improvement (\textit{kaikaku} in Japanese) or incremental improvement (\textit{kaizen}). Both approaches may be necessary at suitable stages in the process.

Managers should visualise what they want to achieve so that the object of improvement is visible and real to the whole enterprise. The effort to do so provides inspiration and direction essential to making progress along the path. Managers also need to set a stringent timetable for steps along the path.

The two or three most important steps to achieve the vision should be selected and the other steps deferred until later to focus the energy and available resources.

Finally, the organisation will need an outsider, a change agent, who breaks all the traditional rules of batch and queue. These “tyrans” must be understood by the participant to be promoting a set of ideas that have enormous potential for benefiting everyone, like a kind of ‘beneficent despot’.

\subsection*{2.6 THE VALUE CHAIN AS A CORE COMPETENCE}

According to Johnson and Scholes (2002:160), the value chain describes the activities within and around an organisation, which together create a product or service. It is the cost of these value activities and the value that they deliver that determines whether or not best value products or services are developed. In turn this underpins competitiveness. Figure 2.3 is a representation of a typical value chain with in an organisation.

Brown (1996: 7) states that all activities within the firm form part of the value chain. The task for the manufacturing firm is to analyse those activities which it does best and focus on these. This means focusing on its core strengths and using this capability to provide added value for the firm’s customers. The firm must then become reliant upon partnerships with other firms in order to provide value in those areas and activities which the manufacturing firm has now subcontracted.
Naylor (2002: 21) supports Brown and Scholes by adding that the value chain has become a well-known tool for setting out the key process of the organisation as a whole. Schroeder (2000: 186) notes that measuring supply chain management is the first step towards improvement. A base line of performance needs to be established and goals set for improvement. He states that there are generally four measures of supply chain performance, which compare closely to the cost, quality, flexibility and delivery measures for operations.

Slack, Chambers and Johnston (2001: 413) point out that there are substantial benefits to be gained from managing a whole chain of operations so that they satisfy end customers. These benefits centre on the two key objectives of supply chain management: effectively satisfying customers and doing so efficiently.

**Figure 2.4 The value chain within an organisation**

According to Rowe et al (1994: 175), each system receives inputs, performs transformation process on them and sends them as outputs to other systems on the map. These three activities are carried out via the value chain. How value chain activities are carried out determines costs and affects profits.
The value chain identifies nine strategically relevant activities that create value and cost in a specific business. These nine value-creating activities consist of five primary activities and four support activities. The primary activities represent the sequence of bringing materials into the business (inbound logistics), converting them into final products (operations), shipping out final products (outbound logistics), marketing them (marketing and sales) and servicing them (service) (Kotler, 2000:44).

In figure 2.4 inbound logistics relate to all of the activities involved in organising a reliable source of supply of all of the input materials used by organisation (Macbeth & Ferguson, 1992:61).

Support activities help to improve the effectiveness or efficiency of primary activities. The value system is the set of inter-organisational links and relationships, which are necessary to create a product or service. It is this process of specialisation within the value system on a set of linked activities that often underpins excellence in creating best value products (Johnson & Scholes, 2002:161).

According to Kotler (2000:45), the firm’s success depends not only on how well each department performs its work but also on how well the various departments activities are co-ordinated. To be successful the firm also needs to look for competitive advantage beyond its own operations, into the value chains of its suppliers, distributors, and customers.

According to Johnson and Scholes (2002:162), much of the cost and value creation will occur in the supply and distribution chains. Managers need to understand this whole process and how they can manage these linkages and relationships to improve customer value. Johnson and Scholes agree with Kotler on the fact that it is not sufficient to look at the organisation’s internal position alone. The ability of an organisation to influence the performance of other organisations in the value chain may be a crucial important competence and a source of competitive advantage.
Schary (1998:70) views the normative supply chain as a series of connected organisational value chains, a value system, a linking initial supplier to final customers. It extends across organisational boundaries to include all organisational units in the flow of products and materials, regardless of ownership and responsibility. The chain links operations that cumulatively add value to the entire process, regardless of organisational boundaries and whose contributions are evaluated to the whole rather than to their individual members.

As organisations gain improved knowledge about this wider value system and understand better where cost and value are created, they are able to make more informed choices on issues such as:

♦ whether they should make or buy a particular activity or component (this is the outsourcing decision)
♦ who might be the best partners in the various parts of the value system
♦ what kind of relationship to develop with each partner (supplier or strategic alliance)

The collective know-how in an organisation on how to make all of this work is organisational knowledge, which might give competitive advantage to some organisations over others (Johnson & Scholes, 2002:162).

The world class supply management philosophy reflects those actions and values responsible for continuous improvement of the design, development and management process of an organisation's supply system, with the objective of improving its profitability and ensuring its survival, as well as the profitability and survival of its customers and suppliers (Burt, Dobler & Straling, 2003:6). From this definition it is clear that the world class supply management organisation strives to do better and to continuously improve supply process. Improvement or value can only be added by doing the same thing at a lower cost, or doing a better thing or doing the same thing faster at the same cost. In
this process the world class supply management company organisation leverage the potential of its suppliers and customers.

The supply chain management philosophy can be explained by means of the following definition: Supply chain management is a management philosophy aimed at integrating a network of upstream linkages, internal linkages inside the organisation and downstream linkages (distribution and the ultimate customer) in performing specific processes and activities that will ultimately create and optimise value for the customer in the form of products and services which are specifically aimed at satisfying customer demands (Hugo, Badenhorst-Weiss & Van Biljon, 2004:5).

The aim of supply chain management is to create a competitive edge for all the organisations in the supply chain. The implementation of the supply chain management means that alliances have to be formed with supply chain partners in terms of the planning-sourcing-creating-distributing processes of specific materials, products and services. The implication is that organisations have to create seamless supply chain operations by co-ordinating and integrating all activities and processes. This will only be possible by breaking down silos within organisations, forming multifunctional and inter-organisational teams to manage processes with a common vision within and between organisations and by linking processes and information and communication systems with supply chain partners.

2.7 LEAN SUPPLY AS A CORE COMPETENCE

According to Raturi and Evans (2005: 258), lean production refers to approaches initially developed by the Toyota Motor Corporation that focus on the elimination of waste in all forms, including defects requiring re-work, unnecessary processing steps, unnecessary movement of material or people, waiting time, excess inventory and overproduction. It involves identifying and eliminating non-value-added activities throughout the entire value chain to achieve faster customer response, reduced inventories, higher quality and better human resources.
Gaither and Frazier (2002: 464) give the following definition for lean manufacturing: “A philosophy of production that emphasises the minimisation of the amount of all the resources used in the various activities of the enterprise. It involves identifying and eliminating non-value-adding activities in design, production, supply chain management, and dealing with the customers”.

Brown (1996: 330) believes that the adoption of lean manufacturing, as it inevitably spreads beyond the auto industry, will change everything in almost every industry – choices for consumers, the nature of work, the fortune of companies and ultimately, the fate of nations. The characteristics of lean manufacturing are shown in Table 2.4.

Table 2.4 Characteristics of lean manufacturing

| ♦ 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 inhouse ideas of scheduling. |
| ♦ Work is organised in teams, using multiskilled workforce problem solving to eliminate all non-added value. |
| ♦ Close vertical relationships, integrating the complete supply chain from raw material to customer. |


Brown (1996: 333) 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.
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, 2002:166).

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, 2002:166).

Lamming and Cox (1995:36) identified pressures faced by business at the beginning of the 1990’s. They are shown on figure 2.5:
The arrow in the top left hand corner of figure 2.5 is thus a pressure that every business recognises. In order to satisfy these new types of customers, firms need clear organisational strategies which will support responses to the market.

The arrow in the top right hand corner reflects the emergence of readily available technological tools – solutions to problems. Strategists know that if they do not exploit these technologies, competitors probably will. They come in the form of hard technologies such as computers, components or products, and in the form of soft technologies – new ways of doing things. It is vital for firms to know about these technologies – hence the pressure. Firms must be able to keep their eyes and ears open in a much more broad sense than was previously necessary.

The lower right arrow shows the pressure of time. Development processes must be completed in less time than has previously been acceptable, as product life cycles continue to shrink and markets crave cheaper, smaller, lighter and more powerful products.

Source: Lamming and Cox (1995:36)
The last arrow needs little explanation: the need to do more with less using optimised resources. This translates, for all organisations, into the need for innovative ways of doing things (Lamming & Cox, 1995:36).

2.7.1 Features of lean supply

The lean supply key features are discussed below:

2.7.1.1 The relationship as a quasi firm

Lean supply means that it is the relationship which becomes the entity within these people, from both organisations, see themselves working. Their job is to ensure that the relationship actually works perfectly and therefore they can see it as some sort of organisation which actually has its own requirements, rights and responsibilities and interfaces with the customer and the supplier. Their role becomes one of looking at their company from the outside, to ensure that it satisfies its obligation to its partner. The relationship thus become a quasi-firm – an organisation within which people work towards its goals (Lamming & Cox, 1995: 47-57).

According to Womack (1990:153), one of lean supply features is the supply associations where all the first tier suppliers to the assembler meet to share new findings on better ways to make parts. Suppliers to a lean producer know that as long as they make a good faith effort to perform as they should, the assembler will ensure that they make a reasonable return on their investment. So sharing with other group members means that the performance of the whole group will improve and every member will benefit.

According to Womack supplier associations are integrating suppliers and buyers into a seamless whole. A supplier association is a mutually benefiting group of a company’s most importantly suppliers brought
together on a regular basis to co-ordinate, co-operate and share best practice.

2.7.1.2 Cost transparency

The concept of open-book negotiation is now commonplace in many industries. The idea is that the supplier should explain its process cost structures to the customer and that in return, the customer will help the supplier to achieve cost savings. The exchange of data must be two-way, in order for both organisations to concentrate jointly on the removal of duplications. Thus in lean supply the customer is prepared to divulge data on internal processes to the supplier at the same time as requiring open book dealing (Lamming & Cox, 1995: 47-57).

Mutual sharing of information among channel members is especially required for planning and monitoring processes. The philosophy of effective supply chain management also requires mutually sharing channel risks and rewards that yield a competitive advantage. Furthermore, effective supply chain management needs co-operation among the channel members of the supply chain having the same goal and the same focus of serving customers (Logistics News, June 2003:14).

According to Womack (1990:148), at the heart of lean supply lies a different system of establishing prices and jointly analysing costs. Firstly, the lean assembler establishes a target price for the car, with the suppliers, working backwards, figuring how the vehicle can be made for this price while allowing a reasonable profit for both the assembler and the suppliers. To achieve this target cost, both the assembler and the supplier use value engineering techniques to break down the cost of each stage of production, identifying each factor that could lower the cost of each part.

2.7.1.3 Search and selection environment

Lean supply requires exploitation of new technologies. How does a firm ensure that it becomes aware of such matters? The concept of search and
selection environments is well established in the literature on innovation. The new collaborative roles within lean supply develop the need for a shared search environment in which the supplier is effectively an intrinsic part of the eyes and ears of the customer. The two technologies share the technological knowledge that comes in from the environment (Lamming & Cox, 1995: 47-57).

2.7.1.4 Relationship assessment
The essence of lean production and supply is the removal of inappropriate activities: these may be wasteful or constraining, or they may perpetuate some non-lean thinking. Both partners (customer and supplier) should develop joint approaches to assessing the relationship itself as a value-adding part of the chain (Lamming & Cox, 1995: 47-57).

According to Womack (1990:149), once a part is in production a technique called value analysis is used to achieve further cost reductions. Value analysis, which continues the entire time the part is produced, is again a technique for analysing the cost of each production step in detail, so that cost-critical steps can be identified and targeted for further work to reduce cost still further.

Partners should be treated as partners. Some companies are reluctant to share information with suppliers. Some even have adversarial relationships with partners. If suppliers try to raise prices, buyers will cut them off. In a value net, companies need relationships that last and broadly shared information is the key (Logistics News, March 2004:5). Slack, Chambers and Johnston (2001: 432) argue that in lean supply the supplier and customer are equal partners.

According to Feld (2000:52), 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.

2.7.2 The lean supply model
Lamming (1993: 194) developed a nine-factor framework that is mainly aimed at the motor industry. The model in Table 1 is an expansion of the feactures of lean supply and provides a practical and specific framework of the characteristics:
Table 2.5 The lean supply model of customer–supplier relationships

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>LEAN SUPPLY CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of competition</td>
<td>Global operation; local presence</td>
</tr>
<tr>
<td></td>
<td>Based upon contribution to product technology</td>
</tr>
<tr>
<td></td>
<td>Organic growth and merger and acquisition</td>
</tr>
<tr>
<td></td>
<td>Dependent upon alliances/collaboration</td>
</tr>
<tr>
<td>Basis of sourcing decisions</td>
<td>Early involvement of established supplier in new product</td>
</tr>
<tr>
<td></td>
<td>Joint efforts in target costing/value analysis</td>
</tr>
<tr>
<td></td>
<td>Single and dual sourcing</td>
</tr>
<tr>
<td></td>
<td>Supplier provides global benefits</td>
</tr>
<tr>
<td></td>
<td>Resourcing as the last resort after attempts to improve</td>
</tr>
<tr>
<td>Role/mode of data/information exchange</td>
<td>True transparency: cost et cetera</td>
</tr>
<tr>
<td></td>
<td>Two-way: discussion of cost and volumes</td>
</tr>
<tr>
<td></td>
<td>Technical and commercial information</td>
</tr>
<tr>
<td></td>
<td>Electronic data interchange</td>
</tr>
<tr>
<td></td>
<td>Kanban system for production deliveries</td>
</tr>
<tr>
<td>Management of capacity</td>
<td>Regionally strategic investment discussed</td>
</tr>
<tr>
<td></td>
<td>Synchronized capacity</td>
</tr>
<tr>
<td></td>
<td>Flexibility to operate with fluctuations</td>
</tr>
<tr>
<td>Delivery practice</td>
<td>True JIT with Kanban</td>
</tr>
<tr>
<td></td>
<td>Local, long-distance and international JIT</td>
</tr>
<tr>
<td>Dealing with price changes</td>
<td>Price reductions based upon cost reductions from order onwards: from joint efforts</td>
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<td>Attitude to quality</td>
<td>Supplier vetting schemes become redundant</td>
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<td>Mutual agreement on quality targets</td>
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<td>Continual interaction and kaizen</td>
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<td>Perfect quality as a goal</td>
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<td>Role of R&amp;D</td>
<td>Integrated: assembler and supplier</td>
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<td>Long-term development of component systems</td>
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<td>Supplier expertise/assembly systems integration</td>
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<tr>
<td>Level of pressure</td>
<td>Very high for both customer and supplier</td>
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<td></td>
<td>Self-imposed</td>
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<td>Not culturally specific</td>
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Source: Adapted from Lamming (1993:194) and Slack, Chambers and Johnston (2001; 432)
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 (Lamming 1993: 195).

Sourcing practice will be single or dual, with long-term contracts with the suppliers to establish a stable basis for production. The suppliers become involved in the development of new models in the earliest stage, and engineering teams from the suppliers will work side by side with the engineers and technical staff of the assemblers. The level of pressure for continuous improvement will be high for both the customer and the supplier. In the lean supply model the ability to provide product quality at defect levels measured in parts per million is an entrance requirement (Lamming 1993: 201).

Reduced numbers of suppliers reduce the complexity of supply chain. Unnecessary, extra players can run counter to improving the process with collaboration (Logistics News, March 2004:9).

2.8 CONCLUSION

The organisations are becoming a combination of a set of core activities and complementary skills supplied by others within a network. The core becomes the strategic centre. The core cannot function without the connections to necessary but complementary operations and services.
CHAPTER 3
ASSESSING THE NATURE OF THE SOUTH AFRICAN MOTOR MANUFACTURING INDUSTRY

3.1 INTRODUCTION
In this chapter the researcher will focus on how South Africa can develop a sustainable motor industry, South Africa’s opportunities and advantages.

3.2 HOW SOUTH AFRICA CAN DEVELOP A SUSTAINABLE MOTOR INDUSTRY

3.2.1 Overall view of the industry
South Africa is the 18th largest manufacture of vehicles in the world and represents eighty percent of Africa's vehicle output, but only 0.9 percent of the world market. Whilst global production increased by 3.8 percent in 2000, South Africa's production expanded by 9.6 percent. All major original equipment manufacturers are represented in South Africa: BMW, Daimler Chrysler, Delta, Fiat, Ford, Nissan, Toyota and Volkswagen.

The automotive industry contributes to 5.7 percent of the gross domestic product and is the third-largest sector in the South African economy, accounting for 29 percent of the country's manufacturing output. It employs 261000 people directly and many more indirectly.

Eight of the top ten global component manufacturers have invested in South Africa, as well as three of the four largest tyre manufacturers. Many large multinational companies have recently increased their investment in South Africa to support the growing production of vehicles for export. There are currently over four hundred component suppliers in South Africa. Vehicle imports have grown from 18000 units in 1995 to approximately 70000 units in 2001 and are expected to account for 25 percent of vehicle sales by 2007.
Exports have increased at an average annual rate of 39 percent since 1995. Vehicle exports increased 54 percent in 2001, reaching almost 140000 units from only 18000 in 1997. There has been a corresponding increase in component exports over the same period, reaching a value of R18.6 billion in 2001. Vehicle production in 2001 rose above 400000 units for the first time since 1984. Total revenue from the industry is expected to reach R110 billion in 2002, with component and vehicle exports amounting to R40 billion.

Direct labour cost per vehicle has reduced by thirty percent over the past five years. Productivity has increased by 68 percent in the last five years, but is still lagging behind international standards (http://www.aidc.co.za).

The South African automotive industry is one of the most rapidly growing and changing industries, transforming from manufacturing for the relatively small local market to state of the art, fully integrated assembly plants supplying world-wide markets to internationals standards. This transformation process posed enormous new challenges to the industry:

- Exports of automotive products have grown exponentially over the past few years.
- Although the industry strives to shorten the lead time from when a customer places an order to the delivery of the car, personalisation of motor vehicles has become fashionable and customers have the facility to change specifications as close as 4 - 6 days before assembly. Manufacturers, therefore, are no longer building for stock but rather building to order.
- Manufacturers must remain cost competitive in the global network whilst balancing with the economic pressure on South Africa export programmes as required by the Motor Industry Development Plan (MIDP), and maintaining international quality standards at the same time.
- All this places great pressures on the logistics environment, which has transformed from being only a service to a fully-integrated and controlling part of the manufacturing, production and assembly processes, with the
integrated supply of parts and assemblies (Logistics News, November/December 2003: 13).

Logistics and supply chain management are growing in importance and are fast becoming the central functions in companies and organisations. Many Chief Executive Officers and leaders are realising this impact in South Africa, but there is still a long way to go. Why is this function becoming so important in our country?

Firstly, there is the emphasis that government is placing on the manufacturing industry and its growth in the future. The aim is clearly for South Africa to become a major exporter of a wide range of high quality goods and products in future. For the future prosperity of the country this is critical.

Secondly, for South Africa companies to compete in the world market, it is imperative that they operate world class supply chains. If the supply chains are not world class, quality products from this country will simply not be competitive on the world market. Given the reality of the long distances to major markets for South Africa goods we have no choice but to drive towards supply chain excellence in all regards (Logistics News Business Special, 2004:10).

3.2.2 The Motor Industry Development Plan (MIDP)

Introduced in September 1995, the Motor Industry Development Plan is focused on the gradual reduction in rebates and import duties. The objective is to encourage South African vehicle assemblers and component manufacturers to become globally competitive through the economies of scale of high production volumes or by identifying and serving specialist niche markets. Credits earned through the export of components and vehicles from South Africa are used to offset import duties on fully built-up vehicles. This means that retailers of vehicles into the South African market are actively encouraging the export of both components and vehicles into their own global original equipment manufacturers or after-market supply chains. Various
strategies are being followed, with some marques opting to import all their models and to offset the duties against the exports of components from third party suppliers.

Others, like BMW, Daimler and Volkswagen, have concentrated their efforts on the export of vehicles. With the slowdown in the world economy affecting new car sales, most of these companies are also becoming active in component exports. Others, like Ford Southern Africa, are focusing on the export of components while retaining local assembly for models which are popular in the home market. This has seen Ford’s RoCam engine plant in Port Elizabeth becoming the sole global supplier of the 1.3 Liter RoCam engine, and one of two manufactures of the 1.6 litre RoCam, while assembly of Ford and Mazda models largely for local consumption continues in the company’s Gauteng plant.

South Africa’s government views the MIDP as the mechanism by which its vision for the automotive industry can be fulfilled, to “establish a viable local and internationally competitive industry, capable of achieving both continuous growth and sustainable job creation” (http://www.aidc.co.za).

3.2.3 Vehicle assemblers (OEM's) in South Africa

Local manufacturers are largely assembling vehicles for sale from kits of imported parts and a certain amount of locally manufactured components. Some models, for example the Mercedes C-Class and the BMW, are manufactured locally as part of a global strategy. Current assembly activities can be characterised by: large export contracts, examples of which are the E46 BMW 3 Series, A4 Golf, and the W203 C-class Mercedes-Benz. The primary characteristics of these models are zero deviation from source design, quality figures comparable to world class manufacturer and more aggressive development and start of production timing than previously was the norm. Adherence to these factors allows seamless integration into global sourcing and supply chains of vehicle by each manufacturer (www.naamsa.co.za).
3.2.4 Component manufacturers in South Africa

Many component manufacturers are in the process of establishing technology sharing arrangements with European, Japanese or American component and system suppliers.

This allows the local supplier access to the required intellectual property for the component or system that in many cases is no longer owned by the original equipment manufacturer itself. Opportunities for export are then increased as well with the role of a lower tier supplier being played by the South African operation. South African component suppliers have definite advantages in low and medium production runs and in supplying the after-market (www.naacam.co.za).

South Africa has become a global supplier of a wide range of components into both the original equipment manufactures and after-markets. These components range from mass-produced catalytic converters to highly specialised magnesium castings for high-tech sports cars. The South African Automotive Industry has entered a period of rapid change, brought about by the globalisation and international trend alignment of what was previously a highly protected local industry. The role of the South African government is mainly focused through the motor industry development plan (MIDP). This means that South Africa can be seen as a sustainable supplier over the medium to long-term. Components and fully built-up vehicles are being sold internationally because they are competitive on price, quality and delivery and not because of government subsidies. In trying to understand the drivers behind change in local industry it is useful to identify some of the primary global automotive trends. Several of these are identified below:

♦ Platform engineering - A large number of models can be created off shared major systems and components. Typically the development of the major platforms systems would remain with the parent companies, but the supply of lower volume niche models becomes increasingly viable in manufacturing locations such as South Africa. This can already be seen in
South Africa assemblers being awarded contracts as sole global suppliers of right-hand drive Mercedes C-Class and right-hand drive BMW three series cars. The country also exports left-and right-hand drive Golf 4's to Europe.

♦ **Design in** - Significant supplier engineering capacity to fulfil the original equipment manufacturers requirements for an ever-increasing development and ownership role by the suppliers. The move towards lighter vehicles, lower emissions and lower fuel consumption has large implications on the technology being used, as in the case of the move towards composite body structures and different methodology of construction. Here South Africa has expertise in the aviation industry, which can be applied to automotive manufacturing.

♦ **Cost out** - “Cost out” has a ripple effect right through out the supplier base. E-commerce is seen as a method by which vehicle manufacturers can achieve cost reductions. Most South African suppliers and original equipment manufacturers are using E-commerce.

♦ **Increased customer perceived quality requirements** - therefore reductions in tolerances, with commensurate impact on process tolerances.

♦ **Reduced vehicle maintenance** – moving to newer engine technologies and maintenance-free components.

♦ **Increased levels of vehicle personalization** – the trend towards a built-to-order vehicle is becoming more prominent. The built-to-order philosophy will also reduce stock holding levels, minimising manufacturers exposure to market downturns. Volkswagen South Africa is building Golf 4 cars to order for customers in Europe and the United Kingdom ([http://www.aidc.co.za](http://www.aidc.co.za)).
3.2.5 South Africa’s opportunities

Gaps in the international market have been identified by a team made up of original equipment manufacturers, the Department of Trade and Industry and Investment South Africa (Tisa). The opportunities include: airbags and air bag packs; air-conditioning compressors; engine components; centre consoles; chassis modules and components; new generations manifolds; aluminum forgings and castings; instrument panels; metal substrates; electric power-assisted steering wheel systems; plastic moldings and paintings; leather products; body parts and electronic components.

Although many of these components are already manufactured in South Africa, certain of the technology is changing and this creates new opportunities. There are numerous routes for companies and entrepreneurs wanting to take the high road to the global motor industry. The standard approaches would be investment, a merger, acquisition or a joint venture. The National Association of Automobile Component and Allied Manufactures of South Africa (Naacam) also promotes other types of industry co-operation. These include: technical collaboration in design of products, systems or production methods/layouts; research and development; supplier/customer relations; joint production; technology transfer; licenses and patents; marketing and co-operative promotion of projects and market sharing; commercial representation; franchising; financing; strategic alliance and third country collaboration.

3.2.6 South Africa’s advantages

South Africa has a lot to offer foreign companies, according to the Department of Trade and Industry. Some of the South African country’s main comparative advantages relevant to the automotive industry are:

3.2.6.1 Infrastructure

South Africa has one of the best infrastructure and service industries among developing nations, particularly in roads, telecommunication, harbours, banking systems, insurance and shipping. It functions as a hub for commercial
traffic to and from Europe, Asia, the Americas as well as the rest of the African continent.

3.2.6.2 First world production testing
South Africa’s unique range of first and third world vehicle operating conditions coupled with sophisticated resources are now recognized around the world for providing low cost vehicle testing and development opportunities.

3.2.6.3 Emerging market cost advantages
South Africa has a mixed first/third world economy offering cost advantages in many areas. A comparison of electricity costs indicated that South Africa’s cost are among the lowest in the world. Average labour costs to the employer are lower than developed nations and on par with developing nations.

3.2.6.4 Flexible production ability
South Africa has a unique competitive advantage when it comes to low volumes, such as the case with low volume vehicles and niche markets or at model run out, compared to other countries where production is set up for long high production runs.

3.2.6.5 Raw material availability
South Africa holds the worlds largest reserves of gold, platinum ground metals, manganese ore, chrome ore, titanium minerals, alumino silicates and vanadium.

3.2.6.6 Low tooling costs
With the lower labour and material costs in South Africa, tooling can be produced at about half the European cost.

3.2.6.7 Government support
Government support to the automotive industry, based on a recent study by Deloitte and Touche, is in line with most developed and developing nations.
The South African government offers a range of supply side measures to encourage investment, development and growth of which the Motor Industry Development Plan is the most notable.

3.3 CONCLUSION

The Motor Industry Development Plan has helped lift sales of imported vehicles from 25.4 percent in 1999 to 32.2 percent in 2002. Exports have increased at an even bigger rate, up from 24.6 percent of local car production in 1999 to 40.9 percent in 2002. All the local manufacturers are rationalising production line. They tend to produce models here with high potential in the domestic market and models with excellent export potential. The tendency is to import low volumes, niche models and to supply local production.
CHAPTER 4
IMPORTANCE OF LOGISTICS PROCESSES AS PART OF STRATEGY AND COMPETITIVE ADVANTAGE

4.1 INTRODUCTION
In this chapter the researcher will focus on the corporate role of logistics strategy, competition and collaboration and new learn supply concepts implemented by the industry.

4.2 CURRENT SITUATION
Car 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. For today's car 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 producers want to make sure that their supplier's logistics operations are optimised as well as being incorporated effectively into their own concept (Automotive Logistics: January/March 2003:56).

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 (Automotive Logistics: January/March 2003:57).

Original equipment manufacturers (OEM's) do not only compete with each other in today’s macro environment, but find that they compete with their parent manufacturing plants on a global basis. One of the major driving factors of high product cost is the cost culminating from expensive, scattered supply chains. Consolidation and collaboration of efforts can play a significant role in the reduction of high logistics costs which led to the birth of the logistics concept of the Automotive Supplier Park (ASP) in Rosslyn (Logistics News November/December 2003:28).

Brown (1996: 308) 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:

(a) 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.

(b) Horizontal collaborations where firms within the same or related industries gain access to each other’s market segments or other mutually beneficial arrangements.

According to Mische (2001:36), when an organisation selects collaboration as a strategy, it signals that:

♦ it can be trusted and will assume co-ownership and responsibility for success and failure
♦ it will dedicate the necessary resources and competencies to ensure the success of the collaborative effort
♦ it can provide value-added subject-matter expertise and services that complement or replace those of the other party
♦ it can perform complex processes and achieve the desired outcomes with greater precision, lower costs and higher value, relative to the other party
♦ it signals that it is willing to assume all or part of the risk for a particular aspect or portion of a process or function

Mische (2001: 137) 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.

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 (Logistics News, November/December 2003:28).

4.3 THE CORPORATE ROLE OF LOGISTICS STRATEGY

Brown (1996:3) defines strategy as the determination of the basic long-term goals and objectives of an enterprise and the adoption of courses of action and the allocation of resources necessary for carrying out these goals.

According to Johnson and Scholes (2002:10), strategy is the direction and scope of an organisation over the long term, which achieves an advantage for the organisation through its configuration of resources within a changing environment and fulfils stakeholder expectations. Corporate level strategy is
concerned with the overall purpose and scope of an organisation and how value will be added to the different parts of the organisation.

Many international markets are now extremely competitive owing to the liberalisation of the world trade and investment environment. In industry capable competitors confront each other around the globe. To be profitably in such an environment, a firm must reduce the cost of value creation. Strategy is often concerned with identifying and taking actions that will lower the costs of value creation (Charles, 2003:408).

According to Schary (1998:305), the major requirements for supply chain design is to serve corporate strategy. Supply chain management seeks to play one of two distinct roles:

♦ To establish competitive advantage through unique logistics performance
♦ To achieve higher efficiency through cost leadership.

Supply chain management becomes important where markets are sensitive to logistics cost or performance. Management must balance supply chain effectiveness against efficiency by developing strategic alternatives.

Schary (1998:305) states that one of strategic alternatives is using the supply chain to influence the competitive forces. Porter (1980) defined five forces that influence strategy: products, customers, the bargaining power of suppliers, current and potential competitors and the threat of substitute products. This strategy builds on close relationships to customers and suppliers, strategic alliances with competitors and entry barriers to potentially competitive products through product development and efficient operations.

The car manufacturer, Volkswagen, and its bumper supplier, Peguform, established a just-in-time relationship that provides reliable market and supply relationships. Peguform’s plant is two hours from Volkswagen’s assembly operations. Peguform became a first-tier supplier delivering complete front end assemblies of fenders, radiator grill, lights and bumpers on six hours notice to the VW plant, freeing VW of sub-assembly and inventory. For Peguform, this
close integration becomes a barrier against potential entrants in the supply chain

Any company dependent on moving goods from point A to point B can improve its bottom line through better supply chain logistics. But first it has to get the strategy right. Any efficient logistics sequence begins with a clear link to the company’s strategy for delivering customer value.

Expects say it is possible to achieve a savings of up to ten percent on logistics cost if a company has yet to focus on an end-to-end improvement drive. But increased efficiencies in the supply chain must first be linked to a corporate strategy that is maniacally focused on providing value to the customer, such as delivering products by a certain time once a firm order is placed. Only then can one determine the ways in which one can compress time and cost to create the most flexible and responsive supply chain possible (www.aidc.co.za).

4.4 COMPETITION AND COLLABORATION

The concept of the organisational field is a reminder that advantage may not always be achieved by competition alone. Johnson and Scholes (2002:126) define organisational field as a community of organisations that have a common meaning system and whose participants interact more frequently with one another than with those outside the field. According to Johnson and Scholes, this concept of an organisational field emphasises the following issues:

♦ The boundaries of an industry are not rigid - The success or failure of an organisation depends on activities of organisations other than direct competitive rivals.

♦ An organisational field may also be ‘permeable’- This means that the boundaries are changed or eroded by the influence of adjacent fields even to the extent that two fields start to merge.
♦ The various organisations in the organisational field are often tied to each other by economic relationships; therefore their successes or failures are intertwined.

♦ A critical important feature of an organisational field is that the various parties are tied together in ways that create economic dependency.

♦ The implications of this institutionalisation is that any individual organisations strategies are likely to change slowly – the organisational field creates inertia.

According to Johnson and Scholes (2002:339), organisations may compete in some markets and collaborate in others or even simultaneously compete and collaborate. Collaboration between potential competitors or between buyers and sellers is likely to be advantageous when the combined costs of purchase and buying transactions are lower through collaboration than the cost of operating alone. In buyer-seller collaboration component manufactures might build close links with customers so as to reduce lead times for delivery, to help in research and development activities, to build joint information systems and to reduce stock.

According to Lamming (1993: 84), some companies pursue collaboration as a way to improve the flexibility and responsiveness of the organisation to emerging opportunities. Reasons for collaboration are follows:

♦ risk reduction
♦ economies of scale and rationalisation
♦ technology exchanges
♦ blocking competition
♦ overcoming government-mandated trade or investment barriers
♦ facilitating initial international expansion of inexperienced firms
♦ vertical quasi-integration advantages of linking the complementary contributions of the partners in a value chain. The international networking of the automotive industry has led to extensive opportunities for assemblers
and component firms to amalgamate production in partnership and subsidiaries in order to gain economies of scale (Lamming.1993: 86-88).

Collaboration, according to Mische (2001: 184), is a process in which a group of motivated and talented people come together for a specific purpose to produce results through individual and collective learning, knowledge sharing and problem solving. Collaboration involves bringing individuals and teams together from all sorts of different sources into interactive learning and knowledge-sharing environments to attack complex problems and produce exciting results. The high performers understand that collaboration is about discovering, sharing and creating knowledge, and that occasional failure is inevitable and a necessary part of the process.

4.5 NEW LEAN SUPPLY CONCEPTS IMPLEMENTED IN THE INDUSTRY.

One of the lessons South Africa's original equipment manufacturers (OEM’s) learnt from overseas plants is the need for lean supply. Delivery practices have changed and variations on Just-in-time developed:

4.5.1 Just in time

Slack, Chambers, Hartmand, Harrison and Johnston (1998:548) define just-in-time (JIT) as a disciplined approach to improve overall productivity and eliminate waste. Heitzer and Render (2004:376) define JIT as a philosophy of continuous and focused problem-solving that drives out waste. Finally, Stevenson (1999:667) defines JIT as the repetitive production system in which processing and movement of materials and goods occur just as they are needed, usually in small batches to eliminate waste.

Waste represents unproductive resources and the elimination of waste can free up resources and enhance production. According to Stevenson (1999:670), the JIT philosophy of waste includes overproduction, inventory storage, scrap, inefficient work methods and product defects.
The existence of such wastes is an indication that improvements are possible. The ultimate goal of JIT is a balanced system, that is, one that achieves a smooth, rapid flow of materials through the system. The idea is to make the process time as short as possible by using resources in the best possible way. The degree to which the overall goal is achieved depends on how well certain supporting goals are achieved. These goals, according to Stevenson (1999:669), are to eliminate disruptions, make the system flexible, reduce set-up times and lead times, minimise inventory and eliminate waste. Figure 4.1 summarises and depicts a model of JIT goals and its building blocks:

**Figure 4.1: Model of JIT goals and building blocks**

The diagram illustrates how the ultimate goal of JIT, which is a balanced rapid flow, is achieved through supporting goals such as eliminating disruptions, making the system flexible, reducing set-up and lead times, and eliminating waste. Supporting these goals are product design elements like standard parts, quality, and modular design, as well as process design elements such as small lot sizes, set-up time reductions, manufacturing cells, and limited work in process. Personnel and organisational elements include workers as assets, cross-trained workers, continuous improvement, accounting leadership, and project management. Building blocks such as manufacturing, planning, and control contribute to the overall goals.

According to Brown (1996: 246), the essence of JIT is that the exact number of components will arrive at a workstation exactly at the time required and in JIT, the supply of materials will exactly match the demand of materials, both in terms of quantity and time. Brown argues that in order for JIT to be successful, firms need to move away from short-term cost-cutting ideas to a long-term view of continuous improvements.

Raturi and Evans (2005: 264) state that the underlying principles of the JIT philosophy are:
- Exposing fundamental problems and correcting them with permanent, not temporary, solutions
- Striving for simplicity, because simple processes have fewer opportunities for error and are faster to accomplish
- Reducing manufacturing throughput times, effectively replacing traditional batch with continuous processing through the use of small lot sizes, cell manufacturing and set-up reduction
- Improving supplier performance to eliminate the need for re-work or returns
- Improving quality and implementing continuous improvement, because poor quality disrupts the flow and coordination required
- Improving labour flexibility through cross-training and increasing empowerment for making decisions on the production line.

Naylor (2002:114) supports the above authors by adding that at the operational level, JIT aims to cut the high stocks hindering the performance of many companies. He argue that in this sense JIT can be seen as a set of production management techniques designed to:
- improve purchasing procedures by linking suppliers more closely into the production schedules
- identify and eliminate bottlenecks
- ensure higher quality and thereby eradicate scrap and rework
- cut machine and other process failures
4.5.2 Kanban

According to Black (1998:), the concept behind the kanban system is to reduce costs in high volume production lines. One way to do this is to smooth and balance material flows by means of controlled inventories. A kanban system allows an organisation to reduce production lead-time, which in turn reduces the amount of inventory required.

A kanban is a card containing all the information required to be done on a product at each stage along its path to completion and which parts are needed at subsequent processes. Kanban system allows a company to use just-in-time (JIT) production and ordering systems, which allow them to minimise their inventories while still satisfying customer demands.

Dramatic changes away from high product throughput and high capacity loads towards the new idea of lower production times and work-in-progress have lead to the idea of incorporating kanban systems in manufacturing industries. These systems are most commonly used to implement the pull-type control in production systems which aims at reducing cost by minimising the work-in-progress inventory. This allows the organisation the ability to adapt to changes on demand. The flow of parts through the overall facility is controlled by a combined push/pull control policy which is established by the kanbans. Parts are pulled between the production stages in accordance with the rate at which parts are consumed by the downstream stages.

Slack, Chambers and Johnston (2001: 495) point out three different types of kanban:

♦ The move or conveyance kanban which is used to signal to a previous stage that material can be withdrawn from inventory and transferred to a specific destination. This type of kanban would normally have details of the particular part's name and number, the place from which it should be taken and the destination to which it is being delivered.

♦ The production kanban which is used to signal to a production process that it can start producing a part or item to be placed in an inventory. The
information contained on this type of kanban usually includes the particular part's name and number, a description of the process itself, the materials required for the production of the part, and the destination to which the part (or parts) needs to be sent when it has been produced.

♦ The vendor kanban which is used to signal to a supplier to send material or parts to a stage. In this way, it is similar to a move kanban but it is usually used with external suppliers.

Naylor (2002: 383) and Slack et al (2001:496) present the following set of rules that must be followed in order for the system to operate consistently:

♦ Each bin has a kanban with details of the parts, their routing and quantity
♦ Parts are pulled by the next process
♦ Work is not started without a card
♦ Bins contain exactly their stated number of parts
♦ Defective parts must not be sent to succeeding processes
♦ When parts are taken by the next process, only enough to replace them can be made.

4.5.3 Constant work-in-process (CONWIP)

Raturi and Evans (2005:274) present CONWIP as an alternative to kanban. The idea behind CONWIP is that a new job is introduced to a production line whenever a job is completed. This approach maintains a constant amount of WIP in the line, providing benefits similar to those of a kanban approach, namely, reduced cost and shortened lead-times. Unlike kanban, CONWIP does not deal with specific part numbers, as long as a common measure of WIP exists. CONWIP is more flexible than kanban in two respects:

♦ Kanban caps WIP at each workstation, whereas CONWIP caps WIP within an entire production line. This can be important when variability exists in a line. For example, if a downstream operation breaks down, under kanban the upstream pipeline is blocked and processing stops, but under CONWIP, upstream stations can still work on all of the orders that have been released.
Of course, eventually the line will stop because of lack of order releases, but at least some production continues.

♦ In a mixed-product environment CONWIP can be a better alternative than kanban because COWIP deals with a common measure of the work content.

4.5.4 JIT delivery directly from the supplier

JIT delivery direct from the supplier is usually used when the installation location or the supplier’s production site is close to the plant. This close proximity means the supplier can produce, sequence and deliver the required JIT modules to the plant punctually throughout the controlled time frame. Generally, with this form of delivery the supplier own special JIT containers are used and transported by truck to the place of use or transfer area (Krog, 2001:2). See figure 4.2 below:

**Figure 4.2**

JIT delivery directly from the supplier (supplier’s production location near to the plant).

Source: Adapted from Volkswagen standard logistics process by Volkswagen JIT strategy group (Unpublished document)
4.5.5 JIT delivery via a sequence warehouse

If the supplier is further away from the customer plant to be supplied, then JIT supply to the places where the parts are required is only possible within the basic control time framework if there is an interim sequence warehouse or similar arrangements. This sequence warehouse can be located on the customer production site or outside, on an industrial estate or supplier’s premises close to the plant and responsibility for the warehouse is in the hands of the supplier. This means that production of the modules themselves takes place in the supplier assembly house. From there the modules are transported to the sequence warehouse by truck (Krog, 2001:2). See figure 4.3 below:

Figure 4.3

JIT delivery via sequence warehouse (greater distance between the supplier and plant)

Source: Adapted from Volkswagen standard logistics process by Volkswagen JIT strategy group (Unpublished document)

The supplier in line sequence requires several key components. The supplier delivers direct to the production line on a virtual just-in-time bases. Gone are the days of huge parts inventories. Some suppliers complete assembly of their product inside the original equipment manufacturers plant.
Supply in line sequence is a vital step in the quest to meet international standards of efficiency. SILS is an acronym for supplier in line sequence. In plain English, key suppliers deliver direct to the original equipment manufacture production line. More importantly it requires suppliers to build and supply at short notice according to the production volumes (Volkswagen standard logistics process by Volkswagen JIT strategy group: Unpublished document).

Traditionally South Africa's vehicle plants have held vast inventories of stock. Now, following the trend towards "Just-in-time" manufacturing, stock levels must be kept to a minimum. For supply in line sequence components the original equipment manufacturer hold no more than a few hour's stock of each, with the supplier expected to keep another one or two day's stock at his premises.

Smaller parts which do not take up so much space are stored at original equipment manufacturing in greater numbers, but nowhere near the levels of the past. The original equipment manufacturers supply chain is now driven by day-to-day consumption rather than by long-term forecasting. The supply in line sequence concept is a hard one for a manufacturer or supplier used to traditional assembly systems to understand. It is not easy having a production dependent on a single truck arriving at a particular time.

The drive towards single suppliers brings added pressure. In the past, fears of labour disputes and other forms of disruption persuaded most vehicle assemblers to use at least two suppliers of many parts. If one lets you down, switch to the other. That is no longer feasible in a market where suppliers must strive for high volumes. Original equipment manufacturers have almost totally abandoned dual sourcing of parts. The quest for efficient sourcing has forced original equipment manufacturers to find external suppliers for some components currently produced within the company. Certain activities can be better handled by outside suppliers.
4.6 BENCHMARKING

According to Van Biljon (1999:8), environmental scanning provides the business firm with information both on potential threats and opportunities that may exist within the macro or supply chain environment, as well as on strengths and weaknesses within the macro environment. The nature and scope of turbulence identified and experienced by the firm will shape the way it reacts to it. The firm further needs to determine the effect of turbulence on its competitive position. In other words, it must determine the size of the gap that may exist between it and its major competitors. This is usually done through a benchmarking study. A benchmark is the point of reference that serves as a standard against which operating data can be compared.

Bendell et al (1993:73) believe that benchmarking provides an opportunity for a firm to look at how industry leaders and even firms in other non-competing industries are operating and to use the information thus gained to drive improvements. It involves a comparison of processes, functions, results and related issues. These comparisons yield a listing of specific differences between the attributes compared. Gap analysis techniques evaluate the differences to determine their significance and the potential for improvement.

Waters (2002: 257) notes that there are several steps in benchmarking. These start with an organisation recognising the need to improve a process. Then it has to define the most appropriate measure of performance, identify the leading competitor in the industry and examine their operations to see how they achieve this superior performance (see Figure 4.4).
Gaither and Frazier (2002: 288) support Van Biljon and Bendell by adding that benchmarking is the practice of establishing internal standards of performance by looking to how world-class companies run their businesses. Raturi and Evans (2005:121) define benchmarking as “measuring your performance against that of best in class companies, determining how the best in class achieve those performance levels, and using the information as a basis for your own company’s targets, strategies, and implementation”.

Source: Waters (2002: 258)
Mische (2001: 225) notes that benchmarks are useful in a variety of situations, especially to stimulate knowledge sharing, as targets for setting operational excellence goals or as corroborative evidence to address barriers and organisational objections. Mische states that benchmarks can communicate three important items:

♦ What is possible
♦ What other companies have accomplished, and
♦ What others are doing

Brown (1996:325) comments that benchmarking is most useful when comparing against the very best competitor rather than simply against another long-standing competitor.

4.7 BOTT TECHNOLOGY
The build-operate-train-transfer (BOTT), according to McKechnie (1999:15), works on the premise that the client awards a concession to an implementation consortium to design, build, finance, train and operate a particular section of infrastructure for a defined period. At the end of the period, according to Jones (2004), ownership of the infrastructure either reverts back to the client at no cost, or in some variations ownership can remain with the implementer.

McKechnie (1999:15) states that during the concession period, the implementer/investor gains access to a defined revenue stream in order to repay the financing costs and to derive a return on investment. The project model offers an excellent alternative to full privatisation of state, with the political problems associated with that approach in many developing countries. It is a form of privatisation; it is for limited and defined periods, after which the assets revert to the state, fee of charge, having been essentially user-financed. In addition, opportunities for skills transfer exist.
With the implementation of projects in the developing world facing many difficulties, in particular the financing of projects, a viable alternative for technology-based projects, according to PMG (2000), can be formulated around the BOTT model. McKechnie (1999:15) views the BOTT model as public-sector outsourcing of infrastructure provision.

According to McKechnie (1999:15), the BOTT model has been used less in the time technology-related sector than in other infrastructure sectors, such as roads and bridges, because of factors such as identifying and securing revenue streams, financier wariness of technology and the mind-set shift necessary to think about technology projects in terms of this paradigm. Projects range in scope from roads through airport terminals, power-generation plants, light rail systems, telecommunications and IT systems.

McKechnie (1999:15) and Waddell (2000) state that in South Africa the use of this methodology is also gaining momentum. The use of this methodology has gained prominence through its application in various toll road projects, the Maputo development corridor, provision of IT infrastructure and Zimbabwe’s railway project.

BOTT projects are based on a partnership, according to BPD (2000), between the client and implementer with both parties having to contribute towards the success of the project. According to McKechnie (1999:15), the terminology used in South Africa refers to public-private partnership and this is a good description of what is required in respect of this project model. From the government side, there are a number of contributions required:

♦ Provision of the concession
♦ Making and enforcing the necessary legislative amendments to facilitate the implantation and operation of the project
♦ Guaranteeing rights to repatriate moneys including profits in the designated investment currency
Ensuring the cooperation of the relevant government bodies and
Making sure that future government policy and actions do not negatively affect the project and assisting with the user-base relations.

From the implementer side, the requirements include conducting feasibility/viability studies to ensure a sound financial model, provision of financing, design and implementation, operation of the system including collection of revenues, ongoing maintenance and updating and training as well as transfer.

In order to plan and implement such a project successfully, it is essential that the project be treated as a stand-alone business in respect of its viability and the potential revenue stream must be identified and analysed.

In terms of the risk profile associated with such projects, BOTT projects are different from more conventional projects in that:

- many of the risks normally carried by the client are either shared or transferred to the implementer; and
- the old risk-reward scenario is relevant; returns can be higher and there are also significant opportunities to share in the upside of any project.

To conclude, one of the factors that significantly differentiate technology-based projects from other projects implemented is the technology lifecycle. This is as a result of the typically short technology lifecycles companies are faced with as opposed to the medium-to long-term project agreements dictated by implementation and financial considerations. Technology renewal, therefore, has to be realistically factored into the project plan and financial model.
4.8 CONCLUSION

With car manufacturers increasingly demanding greater insight into their suppliers logistics concepts to uncover potential new savings, it become imperative to tailor each logistics concept at the planning stage of each project and optimise inventory control and material handling.
CHAPTER 5
RESEARCH METHODOLOGY AND DESIGN

5.1 INTRODUCTION
The objective focus of this chapter is to establish an appropriate research strategy for a given research problem. The research strategies must be applicable to the nature of the problem.

It will be assumed that the nature of the research problem, the objectives of the research and the methodology of the research focus the research strategy towards triangulation, with the primary research methodology focused on quantitative research and the secondary research on qualitative research.

5.2 WHAT IS RESEARCH DESIGN?
5.2.1 The concept of research
Various definitions can be given of the concept italicise. Mouton and Marais (1992:7) define research as a collaborative human activity in which social reality is studied objectively with the aim of gaining a valid understanding of it. Another definition states that research can be seen as a process of expanding the boundaries of our ignorance (Melville & Goddard 1996:14). The Oxford Dictionary (1995:1169) defines research as "the systematic investigation into sources in order to establish facts and reach new conclusions or collate old facts by the scientific study of the subject or by a course of critical investigation". Finally, Leedy (1993:11) defines research as studious inquiry or examination, having for its aim the discovery of new facts and their correct interpretation.

A closer look at this definition reveals the importance of the italicised words, in comprehending the nature of basic research. These ideas are listed below:

♦ If there is no discovery, there is no research.
♦ There must be interpretation of data for the enlightening awareness of what the facts mean.
♦ Research must always answer questions to solve problems.
♦ Research is a human activity that promotes critical thinking in a cross-functional approach.
♦ Effective research is rational, systematic and is guided by constructive, critical assumptions and measurable data (Leedy, 1993:12).

5.2.2 The concept of design

Yin (1994:20) defines design as the preparation of a working plan aimed at systematically assembling, organising and integrating data in order to solve the research problem. Leedy (1993:125) states 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. The Oxford Dictionary (1995:1169) states that design is a preliminary plan, concept or purpose.

From the above definitions, research design can be interpreted as the preparation of an action plan aimed at organising and integrating data in an overall framework in order to solve the research problem. Basic to design are four fundamental questions that must be resolved with respect to the data:

♦ What are the data needed?
♦ Where are the data located?
♦ How will the data be secured?
♦ How will the data be interpreted?

5.2.3 Validity and reliability

There does seem to be a broad consensus amongst theorists on a framework for research design. Some researchers focus on the philosophical aspects of design (Mouton & Marais 1992; Dooley 1995), while others have developed useful pragmatic frameworks (Yin 1994; Neuman 1994; Jackson 1995).
The views of these authors have been consolidated into a conceptual model of decision steps. This model, as illustrated in Figure 5.1, forms the foundation on which the research design for this research project has been based.

Figure 5.1: A conceptual model for research design

```
Choice of research project and problem formulation

 Decide on unity of analysis

 Qualitative research

 Methodological influences

 Triangulation

 Quantitative research

 Research goals and strategy decision

 Research process decisions

 Validity and reliability
```

Source: Structure of literature study and theoretical model.

With any type of measurement, two considerations are very important. One of these is validity and the other reliability. Validity is concerned with the soundness, the effectiveness of the measuring instrument. The following
questions can be asked: Does the measuring instrument measure what it is supposed to measure? What is the accuracy of the measurement?

There are several types of validity, the more common types according to Struwig and Stead (2001:139) and Leedy and Ormrod (2001:103) being:

♦ Face validity – relies basically upon the subjective judgement of the researcher
♦ Criterion related validity – employs two measures of validity, the second as a criterion checks against the accuracy of the first measure
♦ Content validity – is the accuracy with which an instrument measures the factors or situations under study
♦ Construct validity – is any concept such as honesty that cannot be directly observed or isolated
♦ Internal validity – is the freedom from bias in forming conclusions in view of the data
♦ External validity – is concerned with the generalisability of the conclusions reached from a sample to other cases

Reliability deals with accuracy. According to Leedy and Ormrod (2001:31), it is the extent to which, on repeated measures, the indicators yield similar results. Reliability in quantitative research projects can be evaluated by repeating a question in a questionnaire. Reliability asks one question above all others: with what accuracy does the measurement, test, instrument, inventory or questionnaire measure what it is intended to measure?

5.3 METHODOLOGICAL APPROACHES
There are three important contemporary methodological research approaches, namely: the positivist, interpretative and the critical approaches. Researchers usually adopt one of these approaches and then formulate a strategy that is consistent with the approach selected by them.
5.3.1 The positivist approach

The positivist approach is the approach used in the physical sciences and believes society is organised according to scientific observations and experiments (Jackson 1995:5; Dooley 1995:5). With this paradigm it is always possible to establish a cause-and-effect relationship between variables systematically and statistically. Scientists supporting positivism would argue that the general laws of science would be just as applicable to the social sciences as to the physical sciences. Positivist research is likely to do quantitative research and use experiments, surveys and statistics (Gummesson 1991:152).

5.3.2 The interpretative approach

According to the interpretative approach, doubt is expressed over the question whether it is always possible to establish cause and effect between variables in the social sciences. An example: can the effect of poor project management decision-making on a project always be linked to a specific objective cause? The interpretative approach represents a reaction against the unqualified application of positivism in the social sciences. Instead of trying to explain causal relationships by means of objective truth and statistical analysis, hermeneutics use an interpretation process in order to understand or reconstruct reality. Language, pictures, sound, text and symbols play a central role in qualitative projects and replace quantitative data such as facts and figures as the primary sources of information (Neuman 1994:61; Jackson 1995:9).

5.3.3 The critical approach

The critical approach is based on the argument that the researchers cannot distance themselves from people in their research. They have to empower people through their research in order to bring about social justice (Jackson 1995:11). The relative success of research in South Africa may in the future be measured against its ability to conform to the requirements of the critical approach. It is important to state that there is no specific method or technique associated with this research approach and this method or technique does not
seem to be that important. According to Jackson (1995:11, 13), researchers using this approach show a preference for the historical method of research.

5.4 QUANTITATIVE VERSUS QUALITATIVE RESEARCH

Quantitative research is usually associated with positivism and qualitative research with interpretativism. It is best to visualise the distinction between quantitative and qualitative research as a continuum. All research methods could be placed somewhere between the extremes of pure quantitative and pure qualitative research (Jackson 1995:13). It is, however, plausible to indicate whether research projects have a more qualitative or more quantitative nature. This, in turn, would play an important role in decisions on processes to follow and measuring instruments to select (Van Biljon 1999:37). A summary of the main differences between qualitative and quantitative research is given in Table 5.1:
Table 5.1: Differences between qualitative and quantitative research

<table>
<thead>
<tr>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Test hypothesis that researcher begins with. Hypotheses are stated explicitly and are formulated beforehand.</td>
<td>♦ Capture and discover meaning once the researcher becomes immersed in data. Hypotheses are frequently undeclared or stated in the form of a research goal.</td>
</tr>
<tr>
<td>♦ Concepts are in the form of distinct variables. Concepts have an ambiguous meaning.</td>
<td>♦ Concepts are in the form of themes, motifs, generalisations, and taxonomies. Concepts can be interpreted in a number of ways.</td>
</tr>
<tr>
<td>♦ Measures are systematically created before data collection is standardised. The researcher remains largely aloof.</td>
<td>♦ Measures are created in an ad hoc manner and are often specific to the individual or researcher. The researcher is involved with the events/phenomena.</td>
</tr>
<tr>
<td>♦ Data are in the form of numbers from precise measurement.</td>
<td>♦ Data are in the form of words from documents, observations and transcripts.</td>
</tr>
<tr>
<td>♦ Theory is largely causal and is deductive.</td>
<td>♦ Theory can be causal or non-causal and is often inductive.</td>
</tr>
<tr>
<td>♦ Procedures are standard, and replication is assumed.</td>
<td>♦ Research procedures are particular, and replication is very rare.</td>
</tr>
<tr>
<td>♦ Analysis proceeds by using statistics, tables or charts and discussing how what they show relates to hypotheses.</td>
<td>♦ Analysis proceeds by extracting themes or generalisations from evidence and organising data to present a coherent, consistent picture.</td>
</tr>
</tbody>
</table>

Source: Adapted from Neuman (1994:317) and Mouton and Marais (1992:159)
An important choice that researchers face is the research method to be used. Leedy (1993:145) believes that the answer to this question can be found in the nature of the data, the problem of the research, the location of the data, obtaining of data and the intention with the data. If the data is verbal, the methodology is qualitative: if it is numerical, the methodology is quantitative (Van Biljon 1999:37).

5.4.1 Quantitative research

Mouton and Marais (1992:159) define quantitative research as more highly formalised as well as more explicitly controlled, with a range that is more exactly defined, and which, in terms of the methods used, is relatively close to the physical sciences. This definition once again shows a preference for the positivist approach.

Quantitative research seeks to quantify, through numbers, observations about human behaviour. The emphasis is on precise measurement, the testing of hypotheses based on a sample of observations and a statistical analysis of the data. Relationships among variables are described mathematically and the subject matter is, as in the physical sciences, treated as an object (Van Biljon 1999:40). Variables play key roles in quantitative research. Variables take on two or more values. Attributes, on the other hand, are the values of categories of a variable and people sometimes confuse variables with attributes.

A quantitative research project would usually test the most important causal links to be found in the research domain. This relationship between variables is usually expressed as a hypothesis and hypotheses are tested to answer the research question or to find empirical support for a theory (Neuman 1994:99).

5.4.2 Qualitative research

Qualitative research relies on interpretative and critical approaches to social sciences. The aim of qualitative research is to study individuals and phenomena in their natural settings in order to gain a better understanding of them. It is also evident that qualitative research does not follow a fixed set of
procedures. The researcher will, however, need to develop a set of strategies and tactics in order to organise, manage and evaluate the research (Neuman 1994:317; Dooley 1995:258). Scientists who wish to describe everyday life from the point of view of the phenomenological perspective prefer qualitative research. Quantitative researchers manipulate figures and statistics: the data of the qualitative researcher is in the form of words, sentences and paragraphs. Qualitative research is more at risk in terms of validity and reliability (Miles & Huberman 1994:2).

Mouton and Marais (1992:155) define qualitative research projects as those in which the procedures are not strictly formalised, while the scope is more likely to be under-defined, and a more philosophical mode of operation is adopted.

5.4.3 Triangulation

Leedy (1993:143) describes the situation where it is possible to combine qualitative research methods with quantitative research methods in the same project. This process is called triangulation and many research projects could be enhanced considerably if a triangulation approach were taken. According to Struwig and Stead (2001:19), the triangulation method could include various methods such as interviews, Likert-type questions and focus groups. The interactions between quantitative and qualitative research are illustrated in Figure 5.2:
5.5 CHOOSING THE MOST APPROPRIATE RESEARCH METHOD

From the problem setting it can be concluded that the research project firstly adheres to quantitative research methods as it supports deductive reasoning and analysis. Secondly, this research project adheres to defined themes to solve stated research problems through a well-defined methodical process of investigation, analysis and reconstruction. A deductive design begins with an explicit conceptual framework developed from existing theory and models.
To further enhance this research project, qualitative research was introduced in the form of interviews. This methodological triangulation was used to ensure that the data from the questionnaire was tested in more than one way in relation to the theory.

5.6 RESEARCH GOALS

The research goals provide a broad indication of what a researcher wishes to accomplish with the research. The researcher needs to determine whether the aim of the project is to describe, explain or to explore (Neuman 1994:18; Jackson 1995:18).

The primary aim of this research project was to accurately portray the characteristics of a particular individual, group, situation, or organisation, tribe, subculture, interaction or social objective. The outcome of a descriptive project is a detailed picture of the subject. The aims of descriptive projects may be to:

♦ provide an accurate profile of a group
♦ describe a process, mechanism or relationship
♦ give a verbal or numerical picture
♦ find information to stimulate new explanations
♦ present basic background information in context
♦ create a set of categories or classify types
♦ clarify a sequence, set of stages or steps and
♦ document information that contradicts prior beliefs about a subject.

The description of some phenomena may arise from a narrative type of description as in historical analysis to a highly structured statistical analysis (Mouton & Marais 1992:43; Neuman 1994:19; Van Biljon 1999:54).
5.7 RESEARCH STRATEGIES

Mouton and Marais (1992:49) explain that the two research strategies are firstly contextual, dealing with projects such as historical sciences, languages, arts, jurisprudence and theology and secondly, general research strategy that deals with experimental studies, comparative research and various types of surveys. For the purpose of this research project, the focus was on a general research strategy: To determine logistics processes that the South African automotive industry needs to enhance in order to become more competitive.

5.8 THE POPULATION

The research project was conducted in three phases: the pilot survey, the actual empirical survey and interviews.

The population for the pilot survey comprised five respondents and the goal of this survey was to test the ease of use of the questionnaires. The actual survey population comprised of original equipment manufacturers and suppliers. The population of respondents is non-homogeneous in nature and varies in terms of:

♦ business turnover;
♦ number of employees;
♦ types of products
♦ technological level of expertise
♦ organisational structure
♦ percentage of work outsourced
♦ education levels
♦ level of competence and experience
♦ professionalism of management and
♦ leadership

Although the sample will be randomly chosen, it may in fact be biased, since the total population of 40 was based on the official supplier list of one of the
original equipment manufacturers. To further enhance this research project, interviews were conducted. The sample distribution from the total of 40 is depicted in Table 5.2:

Table 5.2: Sample population

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEM's</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Suppliers</td>
<td>37</td>
<td>92.5</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

To further enhance this research project, interviews were conducted with an additional five respondents. This resulted in the sample distribution from the total population of 37 changing as reflected in Table 5.3:

Table 5.3 Population as per collection instrument

<table>
<thead>
<tr>
<th>Collection instrument</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires</td>
<td>24</td>
<td>82.8</td>
</tr>
<tr>
<td>Interviews</td>
<td>5</td>
<td>17.2</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100</td>
</tr>
</tbody>
</table>

5.9 GENERAL PROCEDURES

The methodology adopted in this research project was discussed earlier in this chapter. The body of data collected consisted of questionnaires and interviews and this collection of data which was required to test the hypotheses. The secondary data used in this research project was obtained from various local and international sources in various forms such as articles, books and reports, the most predominant being international books originating in America and Europe. The primary data used in this research project was acquired from observations by way of interviews, questionnaires and consultations.
For the pilot survey five respondents were asked to fill in the standard questionnaire (see Appendix B) and were interviewed. The actual survey in the form of an e-mail survey questionnaire (see Appendix B) was forwarded under a covering letter dated 27 October 2004 (see Appendix A). Although the questionnaire was sent to 37 potential respondents, the response by 24 (64.8%) was satisfactory. According to Welman and Kruger (1999:152), responses are frequently below fifty percent. Emory and Cooper (1991:333) state that thirty percent is an acceptable response rate for postal surveys. During the telephonic follow-up on outstanding questionnaires, the following problems and excuses were given as to why questionnaires had not been completed and forwarded:

♦ A sudden increase in work pressure had made it impossible to complete the questionnaire.
♦ Export programmes had taken top priority.
♦ The person who dealt with projects was overseas on business.
♦ The respondent was too busy right now but requested to be kept in mind for the next survey.

The telephone interviews conducted on logistics managers of original equipment manufacturers yielded a favourable outcome with some interesting observations and facts that would not have surfaced from any postal survey questionnaires. These interviews were unstructured to gain a better understanding within those companies.

5.9.1 The empirical study

The questionnaire was developed by using the various models illustrated in Chapter Two and Three. The questions were formulated with the objective of determining the most relevant points.

The questions address the issue of lean manufacturing and are aimed at uncovering the factors which influence lean supply. The questions selected are mainly a multiple choice type.
According to Thomas (1996:121), the questions should not lead the respondents to a set answer. The questions have been kept simple and the wording has been kept basic to allow respondents to understand the question unambiguously.

According to Thomas (1996:121), the questionnaire should not be too long and should be user-friendly. The questionnaire should be evenly spaced in a way to avoid misunderstanding of the various sections.

5.9.2 The questionnaire

The questionnaire has seven questions. Each has a direct relationship to a theory explained in Chapter Two, Three and Four.

All the questions are based on the lean supply concept.

♦ The first question is related to the basis of sourcing decisions. This question is aimed at identification of the implementation stage, reasons for implementation and possible implementation barriers.

♦ The second question is about the role, mode of data and information exchange. The questions aim at getting the views from both the supplier and the original equipment manufacturers about their relationships.

♦ Question three deals with suppliers operating close to customer rate of use or demand. This question will help uncover the difficulties experienced by local suppliers when operating close to customer rate of use.

♦ Question four deals with JIT delivery directly to the original equipment manufactures line-in-line sequence. This question will help uncover the views of both the supplier and the original equipment manufacturers on sequential supply.
Question five is about dealing with price changes. The aim is to determine whether price reductions are based upon cost reductions from order onwards.

Question six is about optimised supply streams. This question will uncover the reasons for reducing the number of suppliers and barriers faced by the companies. Reducing the number of suppliers involves wide ranging product development and supplier partnership improvement measures. When there are too many suppliers, there is no time to establish a firm partnership with any of them. The question deals with optimisation of supply streams. This question will uncover the barriers to optimised supply streams.

Question seven is about the environmental scanning that provides the business firm with information on potential threats and opportunities that may exist within the macro or supply chain environment, as well as on strengths and weaknesses within the microenvironment. Benchmarking provides an opportunity for a firm to look at how industry leaders and even firms in other non-competing industries are operating and to use the information thus gained to drive improvements. It involves a comparison of processes, functions, results and related issues. These comparisons yield a listing of specific differences between the attributes compared. Gap analysis techniques evaluate the differences to determine their significance and the potential for improvement.

The design of the questionnaire was of such a nature that the questions were all categorised according to the three respective hypotheses. This is depicted in Table 5.4:
Table 5.4: Question categories questionnaire

<table>
<thead>
<tr>
<th>Categories</th>
<th>No of questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sourcing decision</td>
<td>7</td>
</tr>
<tr>
<td>Role/mode of data and information exchange</td>
<td>5</td>
</tr>
<tr>
<td>Management of capacity</td>
<td>2</td>
</tr>
<tr>
<td>Delivery practice</td>
<td>2</td>
</tr>
<tr>
<td>Dealing with price changes</td>
<td>1</td>
</tr>
<tr>
<td>Optimised supply streams</td>
<td>4</td>
</tr>
<tr>
<td>Benchmarking</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>

5.10 CONCLUSION

A formal systematic approach to research design is crucial to ensure that a research project conforms to the principles of validity and reliability. The research design decisions guide the researcher in effectively addressing the research problem. A quantitative approach is the most appropriate research strategy for this research project. Questionnaires and interviews are the main methods of data collection.
CHAPTER 6
AN INTEGRATION OF THE FINDINGS OF THE EMPIRICAL SURVEY WITH THE THEORETICAL SURVEY DEVELOPED FOR THE STUDY

6.1 INTRODUCTION

The aim of this chapter is to integrate the findings of the literature study with those of the empirical survey to uncover similarities and differences between the two in an effort to resolve the second sub-problem, which is:

What key logistics opportunities exist and what threats are there to the environment that South African motor manufacturers trade in?

Once the findings of the literature study and empirical study are integrated, recommendations as to other areas of research and potential problems encountered in this study will follow.

The research methodology used during the study is presented in Chapter Six. The data was analysed and interpreted in terms of the framework of the questionnaire. Thirty-seven questionnaires were distributed of which twenty-four were returned, yielding a response rate of ± 64.8%. In addition to the questionnaires, five interviews were conducted. Areas that were investigated included:

♦ Basis of sourcing decision, covered in section 6.2.1
♦ Role, mode of data and information exchange, covered in section 6.2.2
♦ Management of capacity, covered in section 6.2.3
♦ Delivery practice, covered in section 6.2.4
♦ Dealing with price changes, covered in section 6.2.5
♦ Optimised supply streams, covered in section 6.2.6
♦ Benchmarking, covered in section 6.2.7
6.2 An integration of the findings of the empirical survey with the theoretical survey developed for the study

A theoretical model of core competencies, lean thinking as a source of core competence, value chain as a source of core competence and lean supply as a core competence was discussed in Chapter Two. This resolved the first sub-problem of the study: “What logistics processes does the research literature reveal that will enhance the competitive advantage of the South African automotive industry?

The nature of the South African motor manufacturing industry was assessed in Chapter Three, covering the South African opportunities and advantages. In Chapter Four the corporate role of logistics strategy, competition and collaboration, new lean supply concepts implemented in the industry and benchmarking were covered.

Based on the information obtained from Chapter Two, Three, and Four a questionnaire was developed. The questionnaire was sent to knowledgeable people in the automotive industry and was designed to bring closure to sub-problem three and assist in resolving the sub-problem.

6.2.1 Basis of sourcing decision

In this section, sourcing decision factors that were investigated in terms of the implementation with which they had been analysed by the target organisations are described. The results obtained from the empirical study are shown in Table 6.1 and 6.2:
Table 6.1: Implementation of sourcing decision factors

<table>
<thead>
<tr>
<th>Factors</th>
<th>Implementation</th>
<th>Percentage of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early involvement of established supplier in new product</td>
<td>Fully implemented</td>
<td>82.5</td>
</tr>
<tr>
<td>Joint efforts in target costing/value analysis</td>
<td>Partially implemented</td>
<td>17.5</td>
</tr>
<tr>
<td>Single and dual sourcing</td>
<td>Pilot implementation</td>
<td>0</td>
</tr>
<tr>
<td>Supplier provides global benefits</td>
<td>Not implemented</td>
<td>0</td>
</tr>
<tr>
<td>Resourcing as the last resort after attempts to improve</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.2: Barriers and reasons for implementation of sourcing decision factors

<table>
<thead>
<tr>
<th>Reasons for implementation</th>
<th>Implementation barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reap benefits of established customer relationships</td>
<td>Some suppliers were not up to speed</td>
</tr>
<tr>
<td>Establish first tier supplier with global partners</td>
<td>The magnitude of savings made cannot always be split evenly between customer and supplier</td>
</tr>
<tr>
<td>History has shown that joint efforts between OEMs usually produce the best results</td>
<td>Single sources are high risks guarantees should be built-in, For example ensure spare capacity for volume increases.</td>
</tr>
<tr>
<td>Major cost savings can be made with early supplier involvement</td>
<td>Some company logistics systems do not allow dual sourcing (cannot handle two suppliers for one part)</td>
</tr>
<tr>
<td>Early involvement to ensure capabilities to manufacture to specification</td>
<td>Local suppliers not affiliated/supplier too small</td>
</tr>
<tr>
<td>Global supply reduces cost</td>
<td></td>
</tr>
<tr>
<td>Transfer of skills and reduced development cost</td>
<td></td>
</tr>
</tbody>
</table>
The reasons for implementation are in agreement with Lamming’s theory in Chapter Two, which state that:

♦ A first tier supplier to an assembler in one country must also be able to supply that assembler in other parts of the world.
♦ Sourcing practice will be single or dual, with long-term contracts with the suppliers to establish a stable basis for production.
♦ The suppliers become involved in the development of new models in the earliest stage.

One of the implementation barriers is that some of local suppliers are not affiliated and owing to low volumes in the local market it is difficult to set up transplant production units close to the customer’s assembly plant.

### 6.2.2 Role, mode of data and information exchange

In this section, information exchange factors that were investigated in terms of the implementation with which they had been analysed by the target organisations are described. The results obtained from the empirical study are shown in Table 6.3 and 6.4:

**Table 6.3: Implementation of information exchange factors**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Implementation</th>
<th>Percentage of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>True transparency</td>
<td>Fully implemented</td>
<td>86</td>
</tr>
<tr>
<td>Two way discussions of cost and volumes</td>
<td>Partially implemented</td>
<td>14</td>
</tr>
<tr>
<td>Technical and commercial information exchange.</td>
<td>Pilot implementation</td>
<td>0</td>
</tr>
<tr>
<td>Electronic data exchange</td>
<td>Not implemented</td>
<td>0</td>
</tr>
<tr>
<td>Kanban system for production deliveries</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6.4: Barriers and reasons for implementation of information exchange factors

<table>
<thead>
<tr>
<th>Reasons for implementation</th>
<th>Implementation barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Fundamental principle of basic purchasing policy</td>
<td>♦ Suppliers not up to speed with changes and no trust in the system</td>
</tr>
<tr>
<td>♦ Establish core relationship with supplier to provide foundation for continuous improvement</td>
<td>♦ Openness of parties</td>
</tr>
<tr>
<td>♦ Simplification of day to day communication between customer and supplier</td>
<td>♦ Language barriers and unsophisticated local suppliers</td>
</tr>
<tr>
<td>♦ Requirement if you want to be a global player</td>
<td>♦ Distance between suppliers and their customers</td>
</tr>
<tr>
<td>♦ Speed of communication.</td>
<td>♦ Cost to set-up/supplier infrastructure</td>
</tr>
<tr>
<td>♦ Clear targets and plans</td>
<td>♦ Cost of line feed service provider</td>
</tr>
<tr>
<td>♦ Reduced inventory</td>
<td>♦ Small local suppliers need to be built</td>
</tr>
<tr>
<td>♦ Early communication of changes.</td>
<td></td>
</tr>
<tr>
<td>♦ Stability in technology</td>
<td></td>
</tr>
<tr>
<td>♦ Long-term relationship and price stability</td>
<td></td>
</tr>
</tbody>
</table>

The reasons for implementation are in agreement with the following theories. Lamming and Cox theory which mentions the following:

♦ The exchange of data must be two way, in order for both organisations to concentrate on the removal of duplications.

♦ In lean supply the customer is prepared to divulge data on internal processes to the supplier, at the same time requiring open-book dealing.

♦ The supplier should explain its process cost structures to the customer, and in return the customer will help the supplier to achieve cost savings.

The research findings on implementation barriers show that mutual sharing of information among the channel members is still a problem. The philosophy of effective supply chain management also requires mutual-sharing channel risks and rewards that yield a competitive advantage.
Growing competition in national and international markets forced companies as well as the entire supply chains to respond effectively to the changing requirements of customers and to optimise the efficiency of the production and service provision processes. The willingness to share information without reservations and to take joint decisions requires absolute mutual trust. Processes have to be streamlined to reduce lead times, better utilisation of resources, less communication and administrative activities, improvement of service levels and service reliability and improved control and management of processes.

Connectivity is critical to increase performance. To achieve this, sharing of information between a multi-modal logistics chain can potentially improve co-ordination within the chain. A pre-condition for effective planning is interconnecting the information system. This requires the participation and collaboration of multiple parties.

The next critical aspect is the transparency in the supply chain. When different parties in the chain provide each other with information, each of these organisation will be in a position to draw up a much more accurate logistics schedule. A lot of uncertainty can be removed by transferring the appropriate information timeously while it will also provide planning benefits.

6.2.3 Management of capacity

In this section, management capacity factors that were investigated in terms of the implementation with which they had been analysed by the target organisations are described. The results obtained from the empirical study are shown in Table 6.5 and 6.6:
Table 6.5: Implementation of capacity management factors

<table>
<thead>
<tr>
<th>Factors</th>
<th>Implementation</th>
<th>Percentage of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Synchronised capacity</td>
<td>Fully implemented</td>
<td>80</td>
</tr>
<tr>
<td>♦ Flexible to operate with fluctuations</td>
<td>Partially implemented</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Pilot implementation</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Not implemented</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 6.6: Barriers and reasons for implementation of capacity management factors

<table>
<thead>
<tr>
<th>Reasons for implementation</th>
<th>Implementation barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ To support customer demands rapidly while not maintaining excessive inventory</td>
<td>♦ Market fluctuations</td>
</tr>
<tr>
<td>♦ To match the customer demands as close as possible</td>
<td>♦ Extra capacity meant capital investment a very sensitive issue</td>
</tr>
<tr>
<td>♦ Essential requirements for lean manufacturing</td>
<td>♦ Local suppliers often do not have sufficient capacity</td>
</tr>
<tr>
<td>♦ Eliminate waste yet ensure flexibility</td>
<td>♦ OEM’s are not always willing to buy additional tooling to increase capacity, but rather expect suppliers to improve efficiency</td>
</tr>
<tr>
<td>♦ Supplier must work in tandem with OEM’s in order to ensure continuity of supply</td>
<td>♦ Difficulty in establishing more than one local supplier that can cope with volume and quality</td>
</tr>
</tbody>
</table>

The reasons for implementation are in agreement with the theory in Chapter Two. The barriers to implementation show the unwillingness to invest onto more capacity owing to local volumes.

Difficulty in the aggregation and production planning of orders from the original equipment manufacturers leads to buffer stock between original equipment manufactures and first tier to third tier suppliers. Lack of overall supply chain visibility leads to key players being left out of the cycle, reactive management and bad planning.
CONWIP as mentioned in Chapter Four can be used to maintain a constant of work-in-process in the line, providing benefits similar to those of a kanban approach namely, reduced cost and shortened lead-times.

BOTT technology as mentioned in Chapter Four can be used on investments in projects that will create value for both original equipment manufacturers (OEM’s) and suppliers.

6.2.4 Delivery practice

In this section, factors for price changes that were investigated in terms of the implementation with which they had been analysed by the target organisations are described. The results obtained from the empirical study are shown in Table 6.7 and 6.8:

**Table 6.7: Implementation of factors for price changes**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Implementation</th>
<th>Percentage of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ True JIT with Kanban</td>
<td>Fully implemented</td>
<td>43</td>
</tr>
<tr>
<td>♦ Local, long distance and international JIT</td>
<td>Partially implemented</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Pilot implementation</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Not implemented</td>
<td>14</td>
</tr>
</tbody>
</table>

**Table 6.8: Barriers and reasons for implementation of factors for delivery practice**

<table>
<thead>
<tr>
<th>Reasons for implementation</th>
<th>Implementation barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Reduced inventory cost</td>
<td>♦ Supplier expertise</td>
</tr>
<tr>
<td>♦ Improved quality and service</td>
<td>♦ Distance between the supplier and their customers</td>
</tr>
<tr>
<td>♦ Optimum utilisation of in-house space</td>
<td>♦ South African culture paradigm shift required</td>
</tr>
<tr>
<td>♦ Global roll-out of head office objectives</td>
<td>♦ Non-adherence to fixed times/stable process.</td>
</tr>
</tbody>
</table>
The reasons for implementation are in agreement with the theory in Chapter Four which state that the concept behind the Kanban system is to reduce costs in high volume production lines. One way to do this is to smooth and balance material flows by means of controlled inventories. Kanban system allows an organisation to reduce production lead-time, which in turn reduces the amount of inventory required.

Distance between the suppliers and their customers is one of the barriers to the implementation of Kanban. Distance between Volkswagen South Africa and local suppliers is shown in see Table 6.9. The other barriers to implementation are incompetent local suppliers, South Africa culture and no adherence to fixed time in order to have a stable process.

Table 6.9: Distance between Volkswagen South Africa and the company local suppliers

<table>
<thead>
<tr>
<th>Location</th>
<th>% of suppliers</th>
<th>% of parts</th>
<th>Distance in Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Town</td>
<td>8</td>
<td>4</td>
<td>769</td>
</tr>
<tr>
<td>Durban</td>
<td>10</td>
<td>3</td>
<td>984</td>
</tr>
<tr>
<td>East London and Queenstown</td>
<td>8</td>
<td>18</td>
<td>310</td>
</tr>
<tr>
<td>Johannesburg</td>
<td>23</td>
<td>7</td>
<td>1075</td>
</tr>
<tr>
<td>Port Elizabeth and Uitenhage</td>
<td>44</td>
<td>63</td>
<td>5</td>
</tr>
<tr>
<td>Pretoria</td>
<td>7</td>
<td>5</td>
<td>1133</td>
</tr>
</tbody>
</table>

6.2.5 Dealing with price changes

In this section, factors for price changes that were investigated in terms of the implementation with which they had been analysed by the target organisations are described. The results obtained from the empirical study are shown in Table 6.10 and 6.11.
Table 6.10: Implementation of factors for price changes

<table>
<thead>
<tr>
<th>Factors</th>
<th>Implementation</th>
<th>Percentage of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Price reductions based upon cost reductions from order onwards (from joint efforts)</td>
<td>Fully implemented</td>
<td>43</td>
</tr>
<tr>
<td>♦</td>
<td>Partially implemented</td>
<td>14</td>
</tr>
<tr>
<td>♦</td>
<td>Pilot implementation</td>
<td>0</td>
</tr>
<tr>
<td>♦</td>
<td>Not implemented</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 6.11: Barriers and reasons for implementation of factors for price changes

<table>
<thead>
<tr>
<th>Reasons for implementation</th>
<th>Implementation barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Mutual benefit achieved by all parties</td>
<td>♦ Improvement is not seen in monetary terms all the time: there is also quality and material handling, etc.</td>
</tr>
<tr>
<td>♦ Total supply chain optimisation</td>
<td>♦ Money has to be initially spent to be saved</td>
</tr>
<tr>
<td>♦ It's vital to continually look for cost reductions in order to keep the end product price to a minimum</td>
<td>♦ Difficult to come up with a “win/win” situation</td>
</tr>
<tr>
<td>♦ a pre-requisite for becoming globally competitive</td>
<td>♦ It requires a great amount of time and effort to find savings and sometimes requires a dedicated team, which is not always possible</td>
</tr>
<tr>
<td>♦ Improve profitability</td>
<td>♦ Supplier autonomy</td>
</tr>
<tr>
<td>♦ Mutually beneficial relationship with customer</td>
<td>♦ To remain competitive</td>
</tr>
</tbody>
</table>

The reasons for implementation are in agreement with the following theory:
♦ Womack theory in Chapter Two, which mention that at the heart of lean supply lies a different system of establishing prices and jointly analysing costs. The lean assembler establishes a target price for the car, with the suppliers, working backwards, figuring how the vehicle can be made for this price while allowing a reasonable profit for both the assembler and the suppliers.

95
The implementation barriers show that there is a difficulty to come up with a win/win situation.

Export driven auto industry growth requires cost reductions and efficiency in the supply chain to maintain price and order to delivery competitiveness against foreign emerging market competition.

6.2.6 Optimised supply streams

In this section, optimised supply streams factors that were investigated in terms of the implementation with which they had been analysed by the target organisations are described. The results obtained from the empirical study are shown in Table 6.12 and 6.13:

Table 6.12: Implementation of optimised supply streams factors

<table>
<thead>
<tr>
<th>Factors</th>
<th>Implementation</th>
<th>Percentage of companies</th>
</tr>
</thead>
</table>
| ♦ Share networks with suppliers  
♦ Map networks to see where paths cross and synergies could be made  
♦ Work in combined networks regardless of whether those networks include competitors  
♦ One system for suppliers to read electronic data from different customers. | Fully implemented | 59 |
| | Partially implemented | 22 |
| | Pilot implementation | 4 |
| | Not implemented | 15 |
### Table 6.13: Barriers and reasons for implementation of optimised supply stream factors

<table>
<thead>
<tr>
<th>Reasons for implementation</th>
<th>Implementation barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Standardisation</td>
<td>♦ Cost to smaller suppliers</td>
</tr>
<tr>
<td>♦ Quick, direct communication and transparency</td>
<td>♦ Disclosure of own systems and advantages (confidentiality)</td>
</tr>
<tr>
<td>♦ Reduced cost to supply</td>
<td>♦ Optimisation across a spectrum is always difficult with different users specifying different needs. Satisfying these needs is problematic</td>
</tr>
<tr>
<td>♦ Less complexity</td>
<td>♦ Finding the right service provider to support all requirements</td>
</tr>
<tr>
<td>♦ Optimised supply chains to support short lead-times and high frequencies</td>
<td>♦ Convincing suppliers to carry the cost</td>
</tr>
<tr>
<td>♦ One industry standard for South African Motor Industry – Collaborative exchange</td>
<td></td>
</tr>
</tbody>
</table>

The reasons for implementation are in agreement with the following theories in Chapter Four:

- Much of the cost and value creation will occur in the supply and distribution chains. Managers need to understand this whole process and how they can manage these linkages and relationships to improve customer value.

- Organisations may compete in some markets and collaborate in others or even simultaneously compete and collaborate. Collaboration between potential competitors or between buyers and sellers is likely to be advantageous when the combined costs of purchase and buying transactions are lower through collaboration than the cost of operating alone.

Supply streams have to be optimised to reduce waste, to support short lead-times and high frequencies, one industry standard for South African motor industry is required.
Optimisation across the spectrum is always difficult with different users specifying different needs. Satisfying these needs is problematic. Convincing all OEM’s to use one system and convincing suppliers to carry the on cost is identified as one of barriers.

To remain globally competitive, standardisation in the South African automotive industry is an ongoing process. The productivity gains should be realised through better co-ordination of orders, management of lead times and overall transparency through all tiers of the supply chain.

A lack of industry standards in messaging formats for order tracking makes it difficult for suppliers to structure efficient demand, production planning and logistics processes.

**6.2.7 Benchmarking**

In this section, benchmarking factors that were investigated in terms of the implementation with which they had been analysed by the target organisations are described. The results obtained from the empirical study are shown in Table 6.14 and 6.15:

<table>
<thead>
<tr>
<th>Factors</th>
<th>Implementation</th>
<th>Percentage of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Identify practices to be improved</td>
<td>Fully implemented</td>
<td>16</td>
</tr>
<tr>
<td>♦ Identify examples of best practices</td>
<td>Partially implemented</td>
<td>50</td>
</tr>
<tr>
<td>♦ Obtain information from other organisations</td>
<td>Pilot implementation</td>
<td>0</td>
</tr>
<tr>
<td>♦ Implement improvements</td>
<td>Not implemented</td>
<td>33</td>
</tr>
</tbody>
</table>
Table 6.15: Barriers and reasons for implementation of benchmarking factors

<table>
<thead>
<tr>
<th>Reasons for implementation</th>
<th>Implementation barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Best operating practices are beneficial</td>
<td>♦ Language, including terminology and culture differences</td>
</tr>
<tr>
<td>♦ Remaining abreast with improvements positively affect cost, quality and delivery</td>
<td>♦ Many companies refuse to disclose too much information</td>
</tr>
<tr>
<td>♦ Assessing global performance in relation to world class manufacturing</td>
<td>♦ Economies of scale for investment to achieve world class standards</td>
</tr>
</tbody>
</table>

The reasons for implementation are in agreement with Bendell theory in Chapter Four. Most of our local companies are benchmarking against their mother companies overseas. Barriers experienced are those of language, terminology, culture difference and companies refusing to disclose too much information.

6.2.8 Logistics opportunities for South African Motor Industry

The assemblers in South Africa are similar to those in the rest of the world. They hold a strong position in the industry. In fact this strength, historically, often led to confrontational relationships with retailers and component suppliers. With the lifting of protection, however, relationships up and down the supply chain have changed. Partnerships have started to develop simply because people are realising that this is the only way forward.

Local original equipment manufacturers are part of a worldwide network, as are some of the component suppliers. Several initiatives produced the intended results and cars and components are being exported from South Africa to the
global network. Export growth rates have been high and are expected to remain high.

A recent coming together of original equipment manufactures and component suppliers identified that both parties are keen to help each other to export much larger volumes. The government’s help in announcing longer term, predictable plan will give this initiative a major boost.

With the major changes taking place, there are some local component manufacturing companies that feel threatened and need to establish international contacts to survive and there are companies looking for licensing, technology, market access and niche opportunities.

A large part of the local component industry is tied up by international parents. A majority of these international connections have decided to source certain products from South Africa and do reciprocal imports and thus increase volume for South African companies. South Africa is involved in several international sourcing agreements ranging from engines, seat covers, pistons, spark plugs, clutches and brakes, batteries and glasses, et cetera. The local market is seldom attractive to outside people. Successful foreign involvement has centred around partnerships to produce locally for export.

6.2.9 Threats to the South African Automotive Industry
According to Justine Barnes, benchmarking and manufacturing analyst researcher, and University of Kwazulu Natal development studies academic Mike Morris, despite the growing domestic importance of automatic, manufacturing to South Africa’s economy, globally it remains an insignificant player. In 2001 the industry contributed 12 percent of South Africa’s manufacturing sales, up from seven percent in 1993 yet still only contributed 0.6 percent of global production.

For South Africa’s industry to remain competitive, industry policy levels need to encourage investment and upgrade operating standards to world-class
manufacturing levels. Internal inefficiencies measured in the South African Automotive Benchmarking Club include holding too much inventory, high raw material cost, quality control problems and long lead-times.

Competitive advantages South Africa has are in the area of labour stability, where the workforce experiences lower rates of absenteeism and staff turnover than is the international norm.

6.3 CONCLUSION
In this chapter the findings of the empirical study are integrated with the theoretical survey developed for the study. The reasons for the implementation of lean supply theory and implementation barriers in the South African automotive industry are covered.
CHAPTER 7
CONCLUSION AND RECOMMENDATIONS

7.1 INTRODUCTION
No research project can be finalised without investigating the possible implications of the research results. In this chapter the main findings are highlighted and problems and limitations for application of the findings are presented.

7.2 MAIN FINDINGS
The objective of this study is to provide an overview of the evolution of the motor industry in South Africa and to identify and highlight potential opportunities and solutions to problems as they relate to logistics.

Investigation of the literature produced a variety of suggestions that organisations could use to improve their operations. By using some of these suggestions, organisations could become much more competitive.

The feedback from the questions and the interviews showed that:
♦ One of the implementation barriers is that some of local suppliers are not affiliated and owing to low volumes in the local market, it is difficult to set up transplant production units close to customers assembly plants.
♦ The mutual sharing of information among the channel members is still a problem. The philosophy of effective supply chain management also requires mutual-sharing channel risks and rewards that yield a competitive advantage. The willingness to share information without reservations and to take joint decisions requires absolute mutual trust.
♦ Connectivity is critical to increase performance. To achieve this, sharing of information between multi-modal logistics chain can potentially improve co-ordination within the chain. A pre-condition for effective planning is interconnecting the information system. This requires the participation and collaboration of multiple parties.
The next critical aspect is the transparency in the supply chain. When different parties in the chain provide each other with information, each of these organisations will be in a position to draw up a much more accurate logistics schedule. A lot of uncertainty can be removed by transferring the appropriate information timeously while it will also provide planning benefits.

Difficulty in the aggregation and production planning of orders from the original equipment manufacturers leads to buffer stock between original equipment manufacturers and first-tier to third-tier suppliers. Lack of overall supply chain visibility leads to key players being left out of the cycle, reactive management and bad planning.

Distance between the suppliers and their customers is one of barriers for implementation of just-in-time.

Supply streams have to be optimised, to reduce waste, support short lead-times and high frequencies and one industry standard for the South African motor industry.

A lack of industry standards in messaging formats makes it difficult for suppliers to structure efficient demand, production planning and logistics processes.

Synchronising capacity is one of the challenges facing local suppliers and CONWIP can be used to maintain a constant amount of work in process in the line, providing benefits similar to those of a kanban approach, namely reduced cost and shortened lead-times.

There is an unwillingness to invest in tooling to increase capacity by both original equipment manufacturers and suppliers. BOTT technology can be
used as mentioned in Chapter Four on investment in projects that will create value for both the original equipment manufactures and suppliers.

7.3 **RECOMMENDATIONS**

To conclude this research study in a proper manner, recommendations should be made. The following recommendations are made, either as a result of research activities, or from observation during the process:

7.3.1 The aim of the South African automotive industry should be to concentrate automotive component manufactures, suppliers and service providers in one location adjacent to assembly plants in order to save costs and exploit synergies in logistics and processes in the automotive manufacturing chain through automotive supplier parks.

7.3.2 Manufacturers and suppliers should form close-knit networks. The key success factor will be to build lasting relationships with the right partners at an early stage of the game. The shared goals and the distribution of duties will have to be clearly defined if a new quality co-operation is to be achieved.

7.3.3 Early on, automobile makers will have to identify and build up promising business models in their networks in order to gain competitive advantages. They will also have to reinforce key strategic areas of competence and hand off peripheral areas to viable co-operation ventures.

7.3.4 To remain globally competitive, standardisation in the South African Automotive industry is an ongoing process. The productivity gains should be realised through better co-ordination of orders, management of lead-times and overall transparency through all tiers of the supply chain.

7.3.5 A lack of industry standards in messaging formats for order tracking makes it difficult for suppliers to structure efficient demand, production planning and logistics processes. Difficulty in the aggregation and production planning of
orders from the eight original equipment manufacturers leads to buffer stock between original equipment manufactures and first tier to third tier suppliers.

7.3.6 Proposed solutions to the industry challenges include the following:

♦ Industry messaging standards requirement should be replaced with a single industry order to delivery process between original equipment manufacturers and suppliers supported by a central any-to-any format message switching system for the industry.

♦ More efficient supplier forecast and production planning is now possible as messages are switched to supplier formats making original equipment manufacturers order aggregation simpler, thereby reducing the reliance on large buffer stocks to cater for inefficient planning.

♦ Central message switch enables visibility of stock at each point in the supply chain through a web-based portal.

7.3.7 The automotive industry should apply the following five principles associated with lean thinking:

♦ specify value by specific product,
♦ map the entire value stream
♦ make value stream without interruptions
♦ customers pull value from the producer and
♦ persue perfection
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Http://www.aide.co.za
Dear Sir

Survey on the extent of the adoption of lean supply as one of world class manufacturing practices

I am doing research on the extent of the adoption of lean supply as one of world class manufacturing practices. I am in the process of writing my thesis for the MBA qualification. I include a questionnaire that I would like you or an appropriate person in your organisation to fill in.

The questionnaire names several so-called lean supply factors and then provides space for feedback on how and why each of these practices is implemented in your organisation. Please take the time to complete the questionnaire - it shouldn't take long.

If you feel that your actual situation is not covered by any of the options offered, please add your own.

Although the name of the organisation is recorded, the information you supply will be regarded as confidential and will not be shared with any other party.

I would really appreciate it if you would complete the attached questionnaire and return it to me by 05 November 2004.

Yours sincerely

Thobela Njokweni
(MBA student)
### Factors of lean supply

<table>
<thead>
<tr>
<th>Basis of sourcing decision</th>
<th>Typically characterised by…</th>
<th>Implementation: (mark appropriate block)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early involvement of established supplier in new product.</td>
<td>Fully implemented</td>
<td>X</td>
</tr>
<tr>
<td>Joint efforts in target costing/value analysis</td>
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<tr>
<td>Single and dual sourcing</td>
<td>Pilot implementation</td>
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<tr>
<td>Supplier provides global benefits</td>
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<tr>
<td>Resourcing as the last resort after attempts to improve.</td>
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<table>
<thead>
<tr>
<th>Role/mode of data/information exchange</th>
<th>Typically characterised by…</th>
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<tbody>
<tr>
<td>True transparency: cost et cetera</td>
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<tr>
<td>Two-way discussion of cost and volumes.</td>
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<td>Technical and commercial information exchange</td>
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<td>Electronic data exchange</td>
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<td>Kanban system for production deliveries</td>
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<table>
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<td>Flexibility to operate with fluctuations</td>
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<td></td>
<td>Pilot implementation</td>
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<td>Local, long distance and international JIT</td>
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<td></td>
<td>Pilot implementation</td>
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<td>Price reductions based upon cost reductions from order onwards: From joint efforts.</td>
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<td></td>
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<td></td>
<td>Pilot implementation</td>
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<tr>
<td>Share networks with suppliers</td>
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<tr>
<td>Map networks to see where paths cross and synergies could be made</td>
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<tr>
<td>Work in combined networks regardless of whether those networks include competitors</td>
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<td>One system for suppliers to read electronic data from different customers</td>
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<td>Benchmarking</td>
<td>Identify practices to be improved</td>
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<td></td>
<td>Identify examples of best practices</td>
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<td></td>
<td>Obtain information from other organisation</td>
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<td></td>
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**Section 2: adoption particulars**

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<td>Mother company pressure</td>
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<td>Current practices</td>
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<td>Short courses</td>
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<tr>
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