A KNOWLEDGE MANAGEMENT FRAMEWORK FOR AUTOMOTIVE COMPONENT MANUFACTURERS IN THE EASTERN CAPE

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Supervisor: Prof. A. Calitz

November 2011

Nelson Mandela Metropolitan University
Business School
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November 2011

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DECLARATION

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ABSTRACT

It is estimated that each direct job in the automotive industry supports at least 5 indirect jobs in the global community, resulting in more than 50 million jobs to the global auto industry (Ellis, 2006). In South Africa the automotive sector, as an employer, is widely viewed to be second only to mining. In the automotive industry globally, it is being discovered that knowledge, as opposed to "data" or "information", is becoming harder to locate as a knowledge-bleed is occurring due to the phenomenon of the "brain drain", retirement of experienced professionals, changing work behaviours among the younger generations and the general lack of infusion of new talent into the South African automotive industry over the past decade (Liebowitz, 1999).

This realisation has spawned a growing interest in the concept of knowledge management (KM). KM is the development of tools, processes, systems, structures and cultures explicitly to improve the creation, sharing and use of knowledge critical for decision making. The effective use of KM helps organisations to improve the quality of their decision making and correspondingly to reduce costs and increase efficiency (Kinicki and Kreitner, 2008). Most automotive Original Equipment Manufacturers (OEMs) have made some attempt at KM initiatives, and these attempts have been well-documented. However, among the automotive component suppliers, limited evidence exists of attempts at KM (Piderit, 2007). No standard KM application framework could be established in the literature for industry practitioners in automotive component manufacturers within the Eastern Cape. The aim of this research study is therefore to develop a framework for the application of KM in automotive component manufacturers within the Eastern Cape.

The research consisted of a study of the knowledge management literature and the subsequent development of a knowledge management framework and empirical evaluation of the framework in the automotive component supply industry of the Eastern Cape. In conclusion the report presents a knowledge management framework which converts a company assessment to recommended corrective actions to be implemented and also presents the author's findings, conclusions and recommendations derived from the study.

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The global auto industry is a significant contributor to the global economy and the well-being of the world's citizens, producing a total of 66 million cars, vans, trucks, and busses in 2005, the equivalent to a global turnover of €2 trillion (OICA, n.d). It is estimated that each direct job in the automobile industry supports at least 5 indirect jobs in the global community, resulting in more than 50 million jobs from the global automobile industry. Growth in vehicle sales has stabilised considerably with only moderate growth expected in the next few years (Ellis, 2006). Global integration has proceeded the furthest at the level of buyer-supplier relationships, especially between automotive manufacturers and their largest suppliers (Sturgeon and Van Biesebroeck, 2010).

Sturgeon and Van Biesebroeck (2010) note that the close collaboration and co-location of Original Equipment Manufacturers (OEMs) and suppliers that have always characterised the industry is finally working to the advantage of less developed countries. The automotive sector is widely viewed to be the second biggest employer in South Africa, behind mining. Thus, the South African government has made the automotive industry a priority through various policy adjustments. However, in South Africa, as in many other automobile-producing countries, a knowledge bleed has been occurring due to the phenomenon of the "brain drain": retirement of experienced professionals, changing work behaviours among the younger generations and the general lack of infusion of new talent into the South African automotive industry over the past decade (Liebowitz, 1999).

In the automotive industry globally, it is being discovered that knowledge, as opposed to "data" or "information", is becoming harder to locate. Various authors (Mello, 2006; Brewster, Carey, Grobler, Holland and Wärnich, 2008) suggest that these aspects contribute significantly to the reduction in productivity and profitability of organisations. Accordingly, it is human capital and intellectual capital, rather than physical or financial capital, which distinguishes the leaders in the market.

Local automotive component manufacturers in South Africa have a significant part to play in providing world class quality and globally competitive pricing on their products. This contributes to the local automotive industry's gaining a competitive advantage over its global rivals and draws more foreign investment into the country. However, to make this possible, local firms must maintain global standards of productivity. Over the past decade, staff turnover has become a significant problem faced by many companies (Barnes and Meadows, 2008: 43). Companies have found that the investment in its employees through training, that is, formal and informal knowledge transfer, is lost when these individuals resign. This leads to the loss of organisational knowledge and contributes to mistakes, duplication of work and additional investment through training and development of the new, replacement employees.

This realisation has spawned a growing interest in the concept of Knowledge Management (KM). KM is the development of tools, processes, systems, structures and cultures explicitly to improve the creation, sharing and use of knowledge, critical for decision making. The effective use of KM helps organisations improve the quality of their decision making and correspondingly to reduce costs and increase efficiency (Kinicki and Kreitner, 2008). Various KM frameworks are presented in the literature. They are generally descriptive or prescriptive in nature and most automotive Original Equipment Manufacturers (OEMs) have made some attempt at KM initiatives, and these attempts have been well-documented. However, among the automotive component suppliers, little evidence exists of attempts at KM (Piderit, 2007).

1.2 PROBLEM DEFINITION

The following Research Problem will be addressed in this research study:
"No standard Knowledge Management Framework is available to industry practitioners for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape." (Piderit, 2007:59).

A standardised framework is therefore needed to guide practitioners as to the actions required to ensure that the correct KM aspects are pursued in order to enhance decision making, focus actions and avoid costly, wasted efforts.

1.2.1 Research objectives (ROx)

The Main Research Objective (RO_M) of this study is to "*Develop a framework for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape*".

In order to achieve the above-mentioned goal, it is necessary that the following secondary objectives be achieved:

RO_1: Establish the importance of conducting the research study on KM in the automotive industry within the Eastern Cape.

RO_2: Review the literature in order to establish the application of KM.

RO_3: Develop a Proposed KM Framework for applying KM in the automotive industry.

RO_4: Explain the research methodology used for this research study in detail, to allow it to be reproduced in future.

RO_5: Conduct an empirical evaluation of the Proposed KM Framework in the automotive industry within the Eastern Cape Province.

1.2.2 Main research question (RQ_M)

The Main Research Question (RQ_M) was formulated, based on the Main Research Objective, and stated as, *"Can a framework for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape be developed?"*

1.2.3 Secondary research questions

In order to arrive at a resolution to the primary research question, stated above, it is necessary to establish outcomes for the following secondary research questions, which were formulated based on the secondary research objectives:

$RQ_{1:}$ *"What is the significance of the automotive industry within the Eastern Cape?"*

$RQ_{2:}$ *"How can Knowledge Management be employed functionally in the automotive industry?"*

$RQ_{3:}$ *"Can a Knowledge Management Framework be developed for the automotive industry?"*

$RQ_{4:}$ *"How can a detailed research methodology be provided in order to understand and reproduce this research study in future?"*

$RQ_{5:}$ *"What results are obtained from the empirical evaluation of the Proposed Knowledge Management Framework?"*.

Table 1.1 below, provides the reader with a simplified storyline of this research report. The Table illustrates the relationship between the research questions and the respective research objectives and links them to the various chapters in which they are addressed. Table 1.1 also clarifies the nature (i.e. literature or empirical) of the study in each chapter.

Table 1.1 – RQ, RO and Chapter Outline

Secondary research questions (RQ)	Research objective (RO)	Chapter
RQ_1	Establish the importance of conducting the research study on KM in the automotive industry within the Eastern Cape.	Chapter 2: THE AUTOMOTIVE INDUSTRY (Literature Study)
RQ_2	Review the literature in order to establish the application of knowledge and knowledge management.	Chapter 3: KNOWLEDGE AND KNOWLEDGE MANAGEMENT (Literature Study)
RQ_3	Develop a Proposed KM Framework for applying Knowledge Management in the automotive industry	Chapter 4: A FRAMEWORK FOR APPLYING KM (Literature Study)
RQ_4	Explain the research methodology used for this research study in detail, to allow it to be reproduced in future	Chapter 5: RESEARCH DESIGN AND METHODOLOGY (Literature Study)
RQ_5	Conduct an empirical evaluation of the Proposed KM Framework in the automotive industry within the Eastern Cape.	Chapter 6: RESULTS AND ANALYSIS OF THE EMPIRICAL STUDY (Empirical Study)
RQ_M	RO_M	Chapter 7: FINDINGS RECOMMENDATIONS AND CONCLUSIONS

1.3 SIGNIFICANCE OF THE RESEARCH

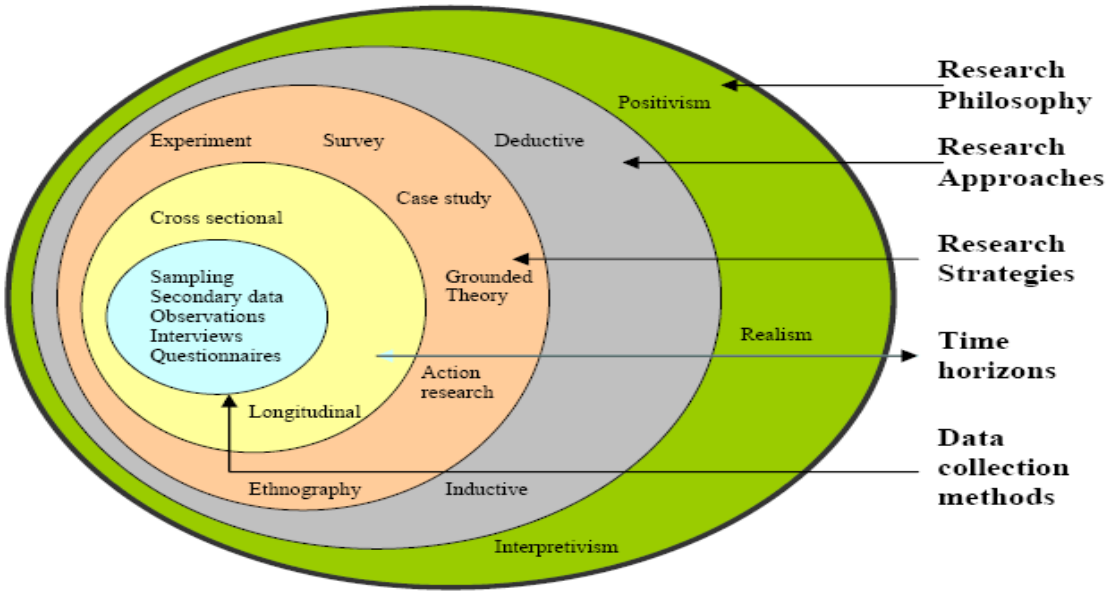
Presently there is no standard KM framework which serves as a guide for practitioners within the automotive industry, to establish a functional knowledge management system for use within the organisation or for the purpose of sharing knowledge with strategic partners within the value chain. An opportunity exists to fill a gap in the literature where there is a lack of guidance or an outline for successfully conducting knowledge management at the level of the 1st tier automotive component suppliers in the Eastern Cape Province of South Africa. This research study aims to provide an instrument for businesses which will help identify the elements of KM which contribute to the company's productivity, allowing it to focus its efforts on those elements where they are required in order to improve productivity and profitability. Potentially, this will help to overcome some of their fears of using a Knowledge

Management System (KMS) but will also motivate others to use the framework in order for KM to proliferate throughout the automotive component supply industry.

1.4 RESEARCH DESIGN

Leedy and Ormrod (2005: 2) describe research as a systematic process of collecting, analysing and interpreting information in order to increase understanding of the phenomenon abouth which there is concern or interest. Research design is the science and art of planning procedures for conducting studies to obtain the most valid findings (Vogt, 1993: 196). The importance of research design stems from its role as a critical link between the theory and argument that informed the research and the empirical data collected (Nachmias and Nachmias, 2008). Establishing a research design reflects the researcher's decisions about the priority given to a range of dimensions of the research process which, in turn, has considerable influence on the lower- level methodological procedures such as sampling and statistical analysis (Bryman and Bell 2007: 40).

Figure 1.1 - The research process onion



Source: Saunders, Lewis and Thornhill (2007: 132)

Figure 1.1 illustrates the different layers of a generic research process (Saunders *et al.*, 2007: 132) that are available and must be consistently employed when conducting a research project. As approaches in the different layers have dependencies, a research design should be developed from the top down, starting with the outside layer, adopting a research philosophy, and thereafter peeling away each layer until the fifth layer, defining data collection methods, is reached. The research process onion will be used to define the research strategy of this study. Establishing a research philosophy to govern the research project provides the researcher with a detailed plan, which guides and focuses the researcher's attention and efforts (Collis and Hussey, 2009).

1.4.1 Research philosophies

Philosophy is the use of reason and argument in seeking truth and knowledge, especially of ultimate reality or of general causes and principles (Oxford Compact Dictionary and Thesaurus, 1997: 557). Collis and Hussey (2009), describe a research philosophy or paradigm as a philosophical framework that guides how scientific research should be conducted, based on people's philosophies and their assumptions about the world and the nature of knowledge. Research philosophies can be considered as a continuum of variations of philosophies with the two major philosophies, positivism and interpretivism located at the extremities. As one moves along the continuum, the features and assumptions of one philosophy are gradually relaxed and replaced by those of the next (Morgan and Smircich, 1980). This study is based on Positivism and ,for the scope of the study, only Positivism will be considered.

Positivism

Positivism has its origin in providing frameworks for studies in the natural sciences. It is based on the assumption that reality is objective, independent of humanity and acts of investigating social reality have no effect on that reality. Positivism is deductive in nature and the purpose or goal is to formulate theories based on empirical research through observation and experiment to understand social phenomena (Collis and Hussey, 2009).

Positivism employs a quantitative methodology. Quantitative techniques seek to describe, explain and predict the outcomes of phenomena. This involves the selection and formulation

of theories and then those theories are tested. Involvement of the researcher is limited and controlled to prevent bias in the results. The sample design is based on the probabilities and frequencies of occurrence. The sample size is large. The research design is determined before commencing the project. The research design may use single or mixed methods which are consistent and critical and may involve a cross-sectional or longitudinal approach. No participant preparation is done to avoid causing bias in the participant. Data is usually collected from surveys and questionnaires in the form of verbal descriptions and reduced to numerical codes for computerised analysis. Computerised data analysis is done and testing of relationships between variables is dominated by statistical and mathematical methods (Cooper and Schindler, 2006).

Data analysis may be ongoing during the project and clear distinction is maintained between facts and judgements. Insight and meaning are limited by the opportunity to question respondents, and by the quality of the original data collection instrument. Insights follow data collection and data entry, with limited ability to reinterview participants. Feedback and turnaround are lengthened by larger sample sizes and data collection processes. Internet methodologies are shortening turnaround but reportedly, inappropriate for many studies. Insight development follows data collection and entry which lengthens the research process. However, the use of interviewing software permits some tallying of respondents' data collection progresses (Cooper and Schindler, 2006).

Due to the nature of the Main Research Question, i.e. *"Can a framework for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape be developed?",* the author has predominantly employed Positivism as a research philosophy to establish the perspective of industry practitioners at the level of the 1st tier component suppliers of the automotive industry through quantitative analysis. The act of this research study is not likely to influence social reality and practises in industry, however, the results are expected to have the potential of significant impact on company practises at the level of the 1st tier component suppliers.

1.4.2 Research approach, strategy and time horizon

Deriving from the research philosophy is the determination of research approach, strategy and time horizon. It is usually argued that the research approaches are attached to different research philosophies (Saunders *et al.*, 2007).

Research approach

The approach of this study is deductive in nature. Deductive research is a study in which a conceptual and theoretical structure is developed and then tested by empirical observation. In this case, particular instances are deduced from general inferences, which is the reverse of the inductive method, and for this reason, the deductive method is referred to as moving from the general to the particular (Collis and Hussey, 2009). Deduction involves the development of a theory that is subjected to a rigorous test. As such, it is the dominant research approach in the natural sciences where laws present the basis of explanation, allow the anticipation of phenomena, predict their occurrence and therefore permit them to be controlled. Deduction emphasises moving from theory to data and is most suitable where there is a wealth of literature from which a theoretical framework and a hypothesis can be defined (Collis and Hussey, 2003).

A wealth of knowledge is available on the subject of KM in general and this phenomenon has been in existence for more than two decades (Stankosky, 2005:3). However, there are significant gaps in the literature regarding KM frameworks for the automotive industry, for application at the level of the 1st tier component supplier. The author has therefore used the deductive approach to deduce methods for application specific to 1st tier automotive component suppliers within the Eastern Cape Province.

Research strategy, time horizon and data collection method

In a Positivist study, a Survey Research Strategy is designed to collect primary or secondary data from a sample, with a view to analysing them statistically and generalise the results to a population. Surveys can be divided into two categories according to their purpose, namely descriptive surveys and analytical surveys (Collis and Hussey, 2009). The purpose of a descriptive survey is to provide an accurate representation of phenomena at one point in time or at various times. An analytical survey is conducted to determine whether there is a

relationship between pairs of variables or multiple variables.

This research study will employ a cross-sectional time horizon technique in order to establish the current status of KM in the automotive industry in the Eastern Cape and reduce the turnaround time of the project. A combination of the descriptive and analytical survey techniques will be used by this study. Firstly the descriptive survey technique will be used in the form of one on one structured interviews at two of the major OEMs in the Eastern Cape Province, to establish current KM practises at their organisations. For this purpose, questionnaires will be used for data collection and to conduct the structured interviews.

Secondly, the analytical survey technique will be used by establishing a theoretical framework from the literature in order to identify the relationships between the dependent and independent variables. Quantitative data collection will then be performed using a questionnaire designed in accordance with the theoretical framework established from the literature.

1.5 DEFINITION OF KEY CONCEPTS

Explicit knowledge: Information that can be easily put into words and shared with others (Kinicki and Kreitner, 2008).

Framework: A theoretical structure or perspective to form the basis of a theory (Webster's Online Dictionary, 2011).

Human capital: The knowledge, skills, and abilities of employees, which have economic value to a company (Brewster et al, 2008).

Knowledge culture: Organisational culture aimed at accumulating knowledge for the purpose of improved decision making.

Knowledge management: Implementing systems and practises that increase the sharing of knowledge and information throughout an organisation (Kinicki and Kreitner, 2008).

Tacit knowledge: Information gained through experience that is difficult to express and formalise (Kinicki and Kreitner, 2008).

Explicit knowledge: Information that can be easily put into words and shared with others (Kinicki and Kreitner, 2008).

Tier: A relative position or degree of value in a graded group (Webster's Online Dictionary, 2011).

1.6 ASSUMPTIONS

The following assumptions are made at the outset of this study:

- Sufficient literature is available on the subject of Knowledge Management and it has proliferated sufficiently throughout the automotive industry in the Eastern Cape in order to conduct a meaningful study, draw valid conclusions and make appropriate recommendations;
- The study will yield valuable output which will be useful to the automotive industry of the Eastern Cape;
- Management of the automotive industry will find value in the proposed outcome of the study (i.e. a Knowledge Management Framework) and agree to participate and contribute to the study;
- Organisations which are assessed, are comparatively similar and that differences, which may offset the results are negligible;
- The author assumes that the basic Information and Communications Technology is in place within the organisation, for example telecommunications and electronic mail, and that these organisations are not dysfunctional.

1.7 DELIMITATION OF THE RESEARCH

This study is delimited to the subject of Knowledge Management in the automotive industry of the Eastern Cape Province and involves automotive Original Equipment Manufacturers (OEMs) and their 1st tier component suppliers, within the Eastern Cape. The study will firstly require the participation of managers at the OEMs whose job function includes production and supplier liaison. Secondly, the study requires the participation of Sales or Commercial Managers at the 1st tier component suppliers of these OEMs.

1.8 ETHICS CLEARANCE

The completed pro-forma for Ethics Clearance was submitted to the NMMU Business School, however, as there were no vulnerable groups involved in this study, full ethics clearance was not requested.

1.9 STRUCTURE OF THE RESEARCH REPORT

This research report is structured as follows:

Chapter 1: Introduction

Chapter 1 serves to provide an introduction, context and outline of the study, present the *Research Problem, Research Questions* and the *Research Objectives*.

Chapter 2: The automotive industry

The research question RQ_1, "What is the significance of the automotive industry within the Eastern Cape?", is addressed in this chapter and an overview of the automotive industry is presented.

Chapter 3: Knowledge and knowledge management

Chapter 3 addresses the research question RQ_2, "How can Knowledge Management be employed functionally as a tool?" and presents an overview of Knowledge and Knowledge

Management, in order to gain an understanding of its use and application in industry.

Chapter 4: A framework for implementing knowledge management

The aim of Chapter 4 is to address research question RQ_3 stating, "How can Knowledge Management be applied in the automotive industry?". In this chapter a review of the literature on knowledge management frameworks is presented in order to establish a KM framework for automotive OEMs and 1st tier component suppliers.

Chapter 5: Research methodology

The research question RQ_4, which states, "How can a detailed description be provided in order to understand and reproduce this research study in future?", is addressed in Chapter 5. The research methodology followed in this research study is developed and outlined in this chapter to allow the study to be reproduced accurately in future.

Chapter 6: Research and analysis of the empirical study

In Chapter 6 the author addresses the research question RQ5 which states, "What results are obtained from the empirical evaluation of the Knowledge Management Framework?" This research question is addressed in order to conduct an empirical evaluation of the Proposed KM Framework, established in Chapter 4, in the automotive industry within the Eastern Cape.

Chapter 7: Findings, recommendations and conclusions

The findings from the literature study and the empirical evaluation of the Proposed KM Framework are presented, conclusions are drawn from the findings and appropriate recommendations are made for corrective actions and also recommendations are proposed for future research.

1.10 SUMMARY

In this introductory chapter, the background to the study was established to provide a brief introduction and context for the study. The Research Problem was identified as, *"No standard Knowledge Management Framework is available to industry practitioners for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape."*. Following this, the main and secondary research questions and objectives of the study were identified and the significance of the research explained. The research design was delineated, key terminology defined and the scope of the research delimited. The proposed program of study was set out to allow the reader an understanding of the structure of the project.

In the following chapter the significance of the South African automotive industry will be explored. In particular attention will be focused on the automotive industry of the Eastern Cape, in order to clarify the setting of this study and emphasise the significance of this study.

CHAPTER 2: THE AUTOMOTIVE INDUSTRY

2.1 INTRODUCTION

The global automotive industry is a significant contributor to the well-being of the global economy and also to the well-being of the citizens of the world because it is a major source of employment globally. Globalisation has ensured that international resources in various geographical locations contribute towards creating an efficient and effective supply system to meet global demands. Though it is presently a minor contributor to the global automotive output, the South African automotive industry is a giant locally, viewed widely as being second only to the mining industry. The Eastern Cape plays a vital role in the South African economy as it is considered the "Detroit of South Africa". Along with its Industrial Development Zones (IDZs), it is a favourable location of investment for manufacturers.

This chapter focuses on the research question (RQ_1), *"What is the significance of the automotive industry within the Eastern Cape?"* The objective of this chapter is to establish the importance of conducting the research study on KM in the automotive industry within the Eastern Cape and investigate and present an overview of the international, national and local automotive industries. In Section 2.2 the author will discuss the global automotive industry, presenting a brief overview thereof. In Section 2.3 the South African automotive industry will be discussed to delineate the relationship and orientation of the South African automotive industry to the Global automotive industry by presenting an overview of the industry in Section 2.3.1. In Section 2.4, the significance of the automotive industry in the Eastern Cape will be discussed and the challenges, faced by the industry, outlined. A summary in Section 2.4 will then conclude the chapter.

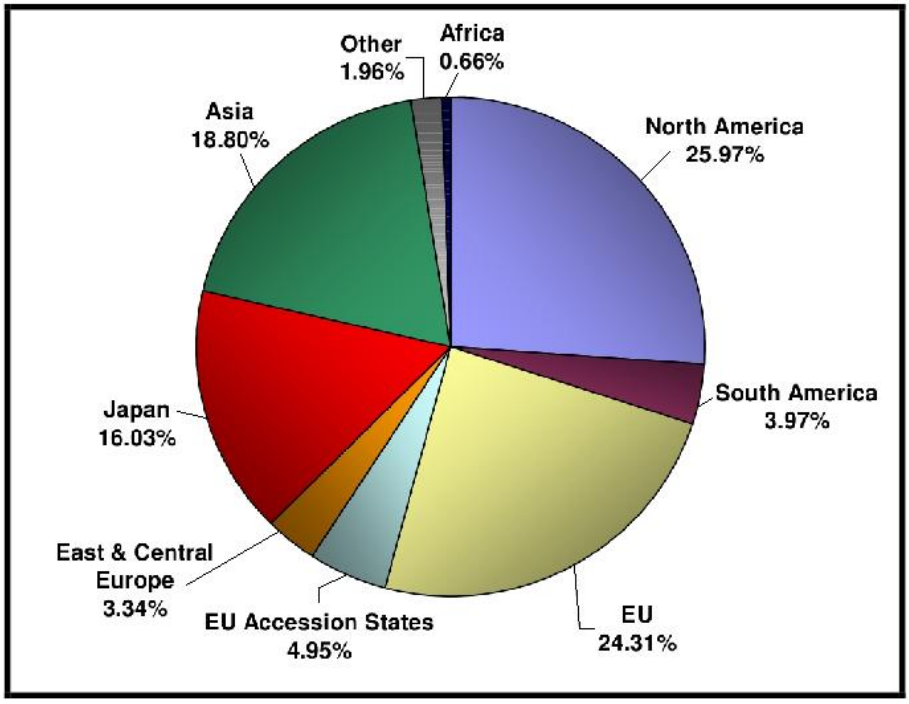
2.2 THE GLOBAL AUTOMOTIVE INDUSTRY

The world's automotive industry made over 66 million cars, vans, trucks and buses in 2005. These vehicles are essential to the working of the global economy and to the well-being of the world's citizens. This level of output is equivalent to a global turnover (gross revenue) of almost €2 trillion (OICA, n.d.). Building 66 million vehicles globally requires the direct

employment of about nine million people in making the vehicles and the parts that go into them. This is over 5% of the world's total manufacturing employment. It is estimated that each direct auto job supports at least another five indirect jobs in the community, resulting in more than 50 million jobs owed to the global auto industry. Many people are employed in related manufacturing and services as automobiles are built using the goods of many industries, including steel, iron, aluminium, plastics, glass, carpeting, textiles, computer chips, rubber and more (OICA, n.d.).

The global perspective of the automobile industry is quite dramatic. The 200 million cars world wide in 1970 have increased to 900 million currently and the figure is set to reach 1.7 billion in 20 years. Considering China alone, 1000 new cars are put into service every day in Beijing, that is 365,000 a year. Automobiles are here to stay. This fact has been reinforced by the steady proliferation of globalisation throughout most industries (Burger, 2011). This globalisation of production facilities can be seen in Figure 2 (below), which breaks down the production of passenger and light vehicles into the responsible regions.

Figure 2.1 - Geographic Location of Global Passenger and Light Vehicle Production in 2004



Source: Ellis (2006: 7)

Ellis (2006) indicates that vehicle sales globally have stabilised considerably over the last five years and the growth of these sales is likely to grow only moderately in the next few years. Global integration has proceeded the farthest at the level of buyer-supplier relationships, especially between automotive manufacturers and their largest suppliers. Production tends to be organised regionally or nationally, with bulky, heavy, and model-specific parts-production concentrated close to final assembly plants. This ensures timely delivery of parts such as engines, transmission, seats and other interior parts and also lighter, more generic parts such as tyres, batteries, and wire harnesses produced at a distance, to take advantage of scale economies and low labour costs (Sturgeon and Van Biesebroeck, 2010).

Sturgeon and Van Biesebroeck (2010) note that the close collaboration and co-location of original equipment manufacturers (OEMs) and suppliers that has always characterised the industry is finally working to the advantage of less developed countries. For a long time, global suppliers have been concentrating on increasing the share of product development in the industry's traditional design centres. Virtually all development work took place in the U.S., Germany and Japan, where most original manufacturers and their suppliers co-located. Now that some large developing countries' (i.e. China, India and Brazil) markets have grown sufficiently to warrant market-specific vehicles, lead firms and suppliers are setting up local design centres. Once these reach sufficient scale, more suppliers will follow. Such industry clusters, based on industry-specific labour markets and skills, once sufficiently established, tend to be very long lived (Sturgeon and Van Biesebroeck, 2010).

Sturgeon and Van Biesebroeck (2010) further report that the experience of successful suppliers in developing countries, suggests that three objectives have to be achieved in turn. The first goal is to achieve worldwide quality standards. This is a necessary condition to start supplying internationally competitive supply chains. The second goal is to improve productivity. Achieving quality standards will already require a great deal of automation. In order to be a viable supplier, productivity levels have to be sufficiently high and improve at the same speed as the average technological progress in the sector to match continuous price declines that are the norm. Third, firms should acquire design capabilities, which is a necessary step to greater independence and also a precondition to becoming a lead supplier on a part when new vehicle programs are started. To achieve the first two goals, working in the value chains of foreign-owned firms accelerates the process. To achieve the third goal, it

is often extremely valuable to also work for leading domestic companies as they tend to give local suppliers greater opportunities (Sturgeon and Van Biesebroeck, 2010).

2.3 THE SOUTH AFRICAN AUTOMOTIVE INDUSTRY

Globally, governments are becoming dedicated to attracting automotive manufacturers to their countries. In South Africa this is no different as government realises the importance of automotive manufacturers to the economy (Fingar, 2002). The automotive sector is widely viewed to be the second biggest employer in South Africa, behind mining. Thus, the South African government has made the automotive industry a priority through various policy adjustments. These include the move from an import substitution policy to one of export-led growth, and new trade and investment incentive schemes such as the Motor Industry Development Programme (MIDP). These policies are all aimed at convincing multinational automotive manufacturers and suppliers to invest in and promote the evolution of their South African operations (Lorentzen, 2006).

South Africa is perceived as being a favourable region for investment. This is evident as most of the major automotive OEMs are represented in the automotive industry, are complemented by the world's top 10 auto component suppliers and three of the four largest tyre manufacturers. Many major multinational companies also use South Africa to source components and assemble vehicles for both the local and overseas markets.

2.3.1 An overview of the industry

The automotive sector forms a major part of the South African economy, accounting for about 10% of South African manufacturing exports in 2007. South Africa can be regarded as a minor contributor to global vehicle production. The output of this industry in 2005 amounted to 85% of Africa's vehicle production, but this was a mere 0.8% contribution to global production (NAAMSA and TISA, 2006). Locally, however, the automotive sector is a giant, contributing about 7.5% to the country's gross domestic product (GDP) and employing around 36,000 people. The South African government has identified the automotive industry

as a key growth sector, with the aim of increasing vehicle production to 1.2 million units by 2020, while significantly increasing local content at the same time (South Africa's Automotive Industry, 2008).

Most of the most prolific automotive original equipment manufacturers (OEMs), including BMW, Mercedes-Benz, Fiat, Ford, General Motors, Nissan, Toyota and Volkswagen, are represented in South Africa. This industry is also supported by eight of the world's top 10 automotive component manufacturers and three of the four largest tyre manufacturers. Many of the major multinational companies use South Africa to source components and assemble vehicles for both the local and overseas markets. Between 2000 and 2006, the industry's investment in production and export infrastructure quadrupled, from R1.5-billion to R6.2-billion, before slowing to R3-billion in 2007 (NAAMSA and TISA, 2006). Most of this has been foreign investment, by the parent companies of local car manufacturers expanding local operations to improve production capacity, export facilities and supporting infrastructure. All of the large manufacturers in the country have launched major export programmes in recent years (South Africa's Automotive Industry, 2008).

The catalyst for the phenomenal growth in the industry has been the government's Motor Industry Development Programme (MIDP). Introduced in 1995, the programme was legislated until 2009 and will be gradually phased out until 2012. The government plans to introduce a successor to the MIDP, which will be aimed at improving the domestic value chain. The new programme, which will last until 2020, will focus on value addition while being consistent with South Africa's multilateral obligations. It is likely to take the form of a subsidy to production. The Department of Trade and Industry says the new support programme will result in more jobs as well as the long-term sustainability of the industry. The plan will support production and investment plans that "intend to reach a minimum volume of output for each platform of 50 000 units a year within a reasonable period of time" (South Africa's Automotive Industry, 2008; DTI, 2005).

Black (1998) notes that significant employment growth within the automotive OEMs is extremely unlikely, and it is far more likely that employment opportunities will arise in the component or services sector. It should be noted that employment statistics of the automotive sector may be skewed due to the fact that measurements are almost entirely based on the

records of the automotive OEMs. Component suppliers and service providers are ignored in this calculation. Franse (2006), however, points out that, to increase efficiency, many automotive OEMs have begun to outsource non-critical activities, and thus employment levels at the automotive OEM have dropped. This shortfall is, however, likely to be realised at some other point along the supply chain.

South Africa's automotive industry offers a number of competitive advantages to international concerns. These include a world-beating cost ability on short or low-volume runs, competitive tooling costs, and a high degree of manufacturing flexibility. The local industry also has good access to southern hemisphere and African markets. The South African industry boasts several unique technologies, such as differential locks for off-road vehicles, aluminium welding technology for radiators, and the ability to design components, such as air cleaners and air conditioners that can cope with the higher temperatures and dust levels in Africa. The country's first-world production facilities are coupled with access to raw materials and relatively cheap electricity, as well as stable transport and telecommunications infrastructure The Automotive Industry Development Centre (AIDC) and the Gerotec testing centre near Pretoria are world-class facilities for research, design, testing and training. New investment opportunities are being created for the industry by the introduction of free trade agreements with the European Union and the South African Development Community (SADC), as well as the US government's African Growth and Opportunity Act (South Africa's Automotive Industry, 2008).

There are more than 200 automotive component manufacturers in South Africa, and upwards of another 150 that supply the industry on a non-exclusive basis. The component industry has a turnover of about R50-billion, or approximately 2% of the country's GDP, and is looking to strong growth as export potential continues to increase. South Africa exported R30.3-billion worth of auto components in 2006, a 32% increase over 2005. Catalytic converters continued to be the country's most exported vehicle part, accounting for almost half of all component exports. Other key exports include engines, silencers and exhausts, radiators, wheels and tyres, stitched leather car seat covers, car radios and sound systems, and axles, especially for heavy trucks. Germany, Spain, the UK, the US, France and sub-Saharan Africa are the leading destinations for South African auto parts exports (South Africa's Automotive Industry, 2008). After mining, the automotive industry is one of the best performing sectors in the

South African economy (DTI, 2005), however, various challenges threaten the sustainability of the industry.

2.4 SIGNIFICANCE OF THE AUTOMOTIVE INDUSTRY IN THE EASTERN CAPE

The Eastern Cape is said to be the "Detroit of South Africa" because of its coastal location, which allows for easy access to global networks . The auto industry in the Eastern Cape is of national importance. Around 40% of South African car sales and 60% of car exports by unit are produced in the Eastern Cape. When the components industry is included, 26% of South African auto sector value added and 30% of employment is provided by the Eastern Cape Province (Eastern Cape Development Corporation Investment Promotion Unit, 2005).

The Eastern Cape Development Corporation (ECDC, 2011) points out that the Eastern Cape is home to three large international vehicle assemblers – Mercedes-Benz in East London and General Motors and Volkswagen in the Nelson Mandela Metro. Ford also produces engines for the domestic and international markets at its plant in Port Elizabeth. Coupled to these major manufacturers are over 150 component suppliers who operate in the province. The Eastern Cape manufactures about half of the country's passenger vehicles and provides 51% of South Africa's vehicle exports (ECDC, 2011).

The ECDC (2011) note that the Eastern Cape Government remains committed to strengthening this automotive sector in the province and this is evident in the fact that they have undertaken the following initiatives:

- Providing funding for the establishment of the automotive logistics park (ALP) in the Nelson Mandela Metro in support of the automotive industry and its OEM's (first, second and third tier suppliers) for international contracts. The government have committed R30 million over the next five years to develop this logistics park;
- Providing funding for the establishment of the automotive supplier park (ASP) in the East London Industrial Development Zone (IDZ);
- The establishment of a multi-OEM model in the East London IDZ in support of the automotive industry.

The ECDC (2011) observes that the significance of the Automotive Industry within the Eastern Cape is emphasised by the following facts and figures:

- The total automotive component exports for South Africa for 2007 amounted to R39,1 billion;
- There are 120 global export destinations for South African component exports;
- Investment by original equipment manufacturers (OEMs) between 1995 and 2007 was R29,9 billion;
- The biggest market for South African automotive component exports is the EU, followed by USA and Canada.

The ECDC (2011) further shows that provincial opportunities exist in terms of the automotive and component sector:

- *New component manufacture* - potential exists for investment into component manufacture in support of the automotive industry in the province;
- *Catalytic converters* - business opportunities exist for investment in stainless steel, ceramic core & assembly operations directly related to the catalytic converter industry based in Port Elizabeth;
- *Automotive tooling, parts and components* - opportunities exist for businesses to invest or expand in the areas of tooling, jigs, assembly lines, auto and safety glass, plastic automotive fittings, engine parts and rubber and plastic components;
- *Automotive supplier park* - the ASP is up and running at the East London IDZ, offering attractive opportunities to component manufacturers, particularly those that supply the nearby Mercedes Benz South Africa operation;
- *Business opportunities in the automotive component cluster* - co-operation with established first and second tier suppliers for storage solutions, JIT distribution, research and development and training initiatives;
- *New vehicle manufacture* - the Eastern Cape has been identified as a potential investment destination of a production and assembly plant for a new electric car for both domestic market and export. The Eastern Cape offers excellent location advantages coupled to access to SADC and African markets.

Industrial Development Zones (IDZs)

Industrial Development Zones (IDZs) are purpose-built industrial estates geared for duty-free production for exports, and they play a hugely important part in South Africa's macro-economic policy. They provide transport, logistics and business services tailored for export-oriented industries (ECDC, 2011).

The Eastern Cape is leading the way. The province's two IDZs, at Coega (Port Elizabeth) and East London, are far more developed than any other IDZ in the country. Both have been granted operators' permits, and investment is flowing in. Both are next to airports and seaports, and have direct road and rail links. Both IDZs are developing automotive production clusters linked to the strong and expanding industry, already established in the Eastern Cape (ECDC, 2011).

Through its IDZ programme, the national Department of Trade and Industry aims to generate sustainable local and foreign direct investment while creating jobs, encouraging skills and technology transfer, encouraging development of small, medium and micro-enterprises, and increasing foreign exchange earnings. The IDZs offer prime, reasonably priced industrial land with easy access to a harbour, airport, rail and road with very competitive costs (ECDC, 2011).

The Coega and East London IDZs offer sophisticated infrastructure; low land costs; easy access to skilled and competitively-priced labour; low energy costs; fast-track construction; compliance with international quality, health and environmental standards; and a clustering of industries for efficiency and to reduce costs (ECDC, 2011).

Investors also benefit from direct cost savings and operational efficiencies. Each IDZ offers a central Customs Secured Area (CSA) that is deemed to be outside South Africa for customs purposes. This allows companies in the IDZs to import raw materials and inputs to be used for export goods, duty-free. Exports from the IDZs are VAT-free if goods and services are sourced from South African customs territory. The CSA is complemented by an adjacent industrial and services area for supplier industries (ECDC, 2011).

Investors in the IDZs can also qualify for a range of national incentives from the Department of Trade & Industry, including the Strategic Investment Programme, the Small Medium Enterprise Development Programme, the Critical Infrastructure Facilitation Programme and the Skills Training Programme (ECDC, 2011).

The automotive industry of the Eastern Cape is undeniably a significant contributor toward the well-being of the South African economy. It is therefore of great importance to investigate avenues of sustaining and improving its functionality as a significant contributor to the South African economy. For this reason, 1st tier automotive component suppliers will be investigated with regard to knowledge management and how they may improve their productivity and profitability through the application of knowledge management.

2.5 CHALLENGES FACED BY THE INDUSTRY

The biggest challenge which the automotive industry currently faces is the increased exposure to international competition since the introduction of the MIDP (Black, 1998). The exports of local manufacturers remain challenged by this exposure due to globalisation, which has meant that producers have had to ensure that global production standards are met (Lorentzen, 2006). Another major threat to the South African automotive industry results from the fact that the Asian manufacturers have managed to reduce their costs dramatically while improving quality of their products. This causes great concern for the continued viability of the South African automotive sector (Franse, 2006). Ford Motor Company (2005) reports that other challenges that are of concern for the automotive industry include:

- the exchange rate and the volatility of the Rand which results in components being imported rather than locally produced and thus lowering the local content portion of completed products;
- pricing pressures enforced by multinational partners in order to retain business;
- the soaring prices of oil and raw materials;
- skills shortages and the volatility of the work force.

The challenges being faced by the South African automotive industry are indeed of great concern. Other factors which exacerbate problems are that the environment is characterised

by high unemployment, slow economic growth, the exodus of knowledge-intensive skills, high rates of poverty and inequality (Barnes, Moodley and Morris, 2001).

2.6 SUMMARY

The global automotive industry is a critical component, essential to the functioning of the global economy because it is a major source of employment and contributor to the well-being of the citizens of the world. The global automotive industry has reached a maturity phase with minimal growth forecast over the next few years. Close OEM-supplier relationships and the globalisation of the automotive industry have ensured that the integration of global production activities employs favourable inputs from various geographical locations to promote an efficient and effective global system.

The South African automotive industry, though a giant nationally, contributes only minimally to the global automotive production output and has been identified by the South African government as a major growth industry with the aim of significantly increasing production output over the following decade. The South African automotive industry is characterised by the presence of all of the most prolific OEMs, the world's top 10 auto component suppliers and three of the four largest tyre manufacturers. Many of the major multinational companies use South Africa to source components and to assemble vehicles for both the local and overseas markets. Some authors (Black, 1998), however, note that significant employment growth within the automotive OEMs is extremely unlikely, and it is far more likely that employment opportunities will arise in the component or services sector.

The significance of the Eastern Cape's automotive industry lies primarily in the fact that it provides about 40% of South African car sales, 60% of car exports by unit and when the component industry is included, it provides 26% of South African auto sector value added and 30% of the country's employment. The Eastern Cape, considered to be the "Detroit of South Africa" provides manufacturers with prime locations in their Industrial Development Zones (IDZs) at Coega and East London, which are further developed than any other IDZs in the country. The IDZs are geared for duty free production for exports and they play a hugely important part in South Africa's macro-economic policy. These purpose built industrial

estates provide manufacturers with prime location, offering transport (harbour, airport and railway) logistics and business services tailored for export-orientated industries.

The South African automotive industry faces various significant challenges of great concern to the sustainability of the national industry, for which solutions must be established. These challenges include, among others, increased international competition, particularly from Asian manufacturers with regard to price and quality; skills shortages and volatility of the workforce; and the exodus of knowledge intensive skills (brain drain).

This chapter has addressed the secondary research question (RQ_1), "*What is the significance of the automotive industry within the Eastern Cape?*" and presented an overview of the international and national automotive industries. The author has established the significance of the automotive industry within the Eastern Cape and the nature of the major challenges of the South African automotive industry and the fact that attention must be focused on automotive component manufacturers. The following chapter discusses the concepts of Knowledge and Knowledge Management as these concepts constitute the fundamentals upon which this research study is based.

CHAPTER 3: KNOWLEDGE AND KNOWLEDGE MANAGEMENT

3.1 INTRODUCTION

The migration of competitive advantage from being information-based toward being more knowledge-based in the modern organisation is highlighted by Davenport and Prusak (1998: 5). The combined knowledge possessed by the human capital of the modern organisation is regarded as being of paramount importance in creating a competitive advantage over rivals in the market (Sveiby, 2000; Davenport and Prusak, 1998). Knowledge is divided into two categories, namely explicit and tacit knowledge. Knowledge management is concerned with the process of identifying, acquiring, creating, storing, disseminating and applying these two forms of knowledge so that other employees may make use of it to be more effective and productive in their work.

A socio-technical knowledge management system is the complex combination of three subsystems, namely the knowledge management process, social context and technological context. These three subsystems interact to allow for the management of tacit and explicit knowledge within and between organisations (Sajeva and Jucevicius, 2010). Profitability, which is achieved as a result of productivity, is the ultimate goal of every for-profit organisation and in the modern organisation this is dependent on the level of competence or knowledge possessed by its human capital. The literature presents an array of knowledge management solutions which have been employed by organisations to harness this knowledge. However, benefits remain elusive for most companies with the failure rate of KM initiatives being at above 70%.

This chapter will address the secondary research question, "*How can Knowledge Management be employed functionally as a tool?*" and will present an overview of the concepts of Knowledge and Knowledge Management. In this chapter the author will present the fundamental elements upon which this study is based by discussing the literature on these elements. In Section 3.2 the author discusses the significance of knowledge and knowledge management, establishing the two forms of knowledge, namely tacit and explicit knowledge and will discuss the value-adding characteristics of KM through knowledge networks and

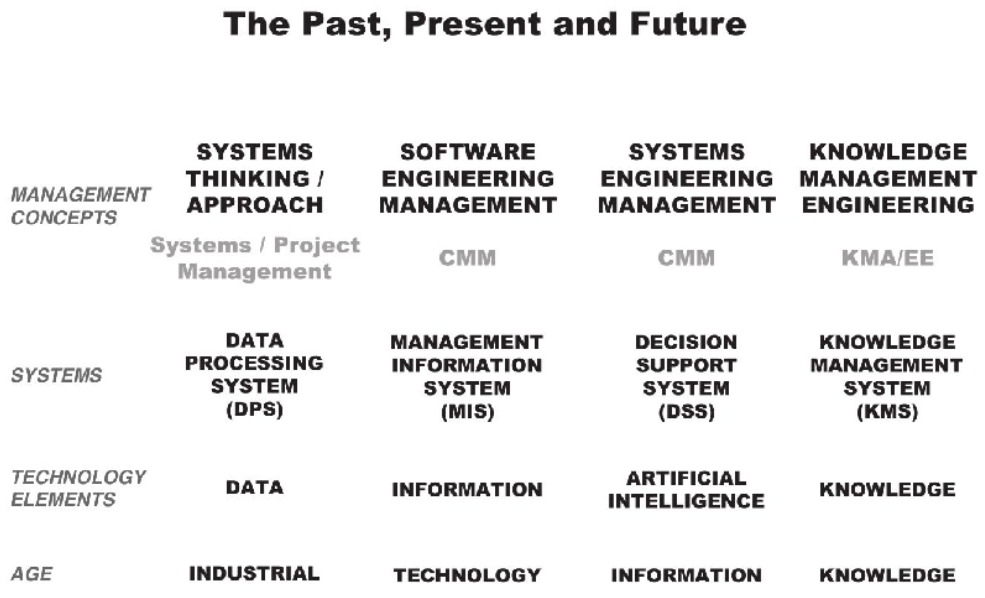
their ability to enhance the competitiveness of the supply chain.

Section 3.3 provides an overview of knowledge management systems and has the following outline: in Section 3.3.1 a brief description of Enterprise Resource Planning systems (ERP), also known as Enterprise Systems (ES), is given; Section 3.3.2 discusses Enterprise Knowledge Portals; Section 3.3.3 outlines the holistic perspective of the socio-technical knowledge management system and identifies its major components; Section 3.3.4 then depicts the challenges and barriers to Knowledge Management; Section 3.3.5 will establish the critical success factors for implementation of KMS, as proposed by the literature; Section 3.3.6 discusses productivity and profitability of the organisation as a result of KM; and in Section 3.3.7 the author discusses knowledge management systems in the South African automotive industry. Section 3.4 will then conclude the chapter with a chapter summary.

3.2 KNOWLEDGE AND KNOWLEDGE MANAGEMENT

Stankosky (2005) illustrates the evolution from the data and information eras to that of the knowledge economy as depicted in Figure 3.1.

Figure 3.1 – Timelines leading to the knowledge age



Source: Stankosky (2005: 2)

Davenport and Prusak (1998: 5) help us avoid confusion between the terms data, information and knowledge by making the distinction and describing the terms as follows:

> ***"Data** is a set of discrete, objective facts about events. In an organisational context, data is most usefully described as structured records of transactions.*
> ***Information** is data endowed with relevance and purpose. It is a message with a sender and a receiver. Information is meant to change the way the receiver perceives something, to have an impact on his judgement and behaviour, it must "inform" him or her.*
> ***Knowledge** is a fluid mix of framed experience, values contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. In organizations, it often becomes embedded not only in documents and repositories but also in organisational routines, processes, practises, and norms."*

It now becomes more apparent that having knowledge implies that it can be used to solve a problem, whereas having information does not carry the same connotation. Knowledge is a complex concept and highly subjective. It is dependent on a number of factors such as culture, beliefs, values, insights, intuitions and emotions of the individual. These factors determine the nature of knowledge creation, management, and sharing (Nonaka, 1994).

The literature refers to the existence of different types of knowledge. Polanyi (1967) suggests that knowledge can be either tacit or explicit in nature. Various authors (Brown and Duguid, 1998; Cook and Brown, 1999) support this statement indicating that this attribute is also expressed as the distinction between knowing and knowledge.

Tacit knowledge refers to the knowledge that has a personal quality that makes it hard to articulate or communicate. Analogously, it means the knowing or the deeply rooted know-how embedded in an organisation's operating practises often observed by a work-study consultant or task analyst and emerges from action in a particular context. It is elegantly embodied in Polanyi's statement that "we know more than we can tell" (Nonaka, 1994).

In contrast with tacit knowledge, explicit knowledge refers to the codifiable component that

can be extracted and articulated or transmitted in the form of text, diagrams, product specifications and so on. A notion analogous to knowledge, the know-what, which can be extracted from the knowledge holder and shared with other individuals. Furthermore, knowledge can be conceived as existing at multiple levels, not just at the individual level but also at the group and organization that transform knowledge between tacit and explicit modes (Nonaka, 1994).

In light of this dynamic process of knowledge creation, linkages between individuals and groups sharing similar tasks, the communities of practice (Brown and Duguid, 1991), play an important role in communicating and sharing knowledge. However, communities have their own unique and context-specific vocabularies that, while facilitating knowledge exchange within the community, impede communication between them. The overlapping of understanding, provided by boundary objects spanning multiple communities, provides a basis for communicating, sharing, resolving and combining disparate perspectives (Boland and Tenkasi, 1995). These issues thus have an important bearing on the configuration of the knowledge assets (employee knowledge, formal and informal social structures and technological infrastructure) of the organisation to accomplish the access and deployment of knowledge in different contexts.

Knowledge assets are of much greater value than any tangible asset that provided organisations with a competitive edge in the past (Davenport and Prusak, 1998). As new technologies, innovation, organisational flexibility and new and better forms of leadership propel the growth and earnings of knowledge-intensive organisations, so the need to extract wealth from brainpower and knowledge (individual and organisational) becomes increasingly pressing. The shift to knowledge as the primary source of value results in the new economy being led by those who manage knowledge effectively.

In the knowledge economy, creation, dissemination, sharing and usage of knowledge are key elements to maintain a sustainable competitive advantage for the organisation. The fact that knowledge is the most important strategic resource is a point of departure for organisations hoping to access and use knowledge as a competitive weapon and has become the focus of organisational competitiveness. However, the organisation must maintain control over the abundance of knowledge flowing between various domains, contain it within boundaries and

leverage it for exclusive use.

Organisations continue to struggle with questions, such as how can they improve what employees know; how can they add creative insights to business decisions; how can they capitalise upon what others, doing same or similar tasks, have learned before; and how can they stop employees from reinventing the same or even suboptimal solutions to problems that were already solved by someone else (Baloh and Desouza, 2009).

The systematic process of identifying, capturing, leveraging and using knowledge is known as Knowledge Management (KM) (Densford, 1996). *Knowledge management is the systematic and organisationally specified process for identifying, acquiring, creating, storing, disseminating and application of knowledge so that other employees may make use of it to be more effective and productive in their work* (Alavi and Leidner, 1999). Through a supportive organisational climate and modern information technology, an organisation can bring its entire organisational memory and knowledge to bear upon any problem anywhere in the world and at any time (Turban and Volonino, 2010).

Sajeva and Jucevicius (2010: 81) argue that KM encompasses a range of concepts, management tasks, technologies and practises. It incorporates ideas and processes from a wide variety of disciplines such as information management, information technology management, communication, human resources management and various others. KM should be developed not only within organisations, but also among organisations, that is, sharing knowledge between partners, allies, intermediaries, suppliers and customers (Mello, 2006). Ultimately, the fundamental purpose of KM is to realise the value of knowledge and create new wealth for the organisation by seeking new inventions, acquiring new knowledge, exploring and mastering the new rules.

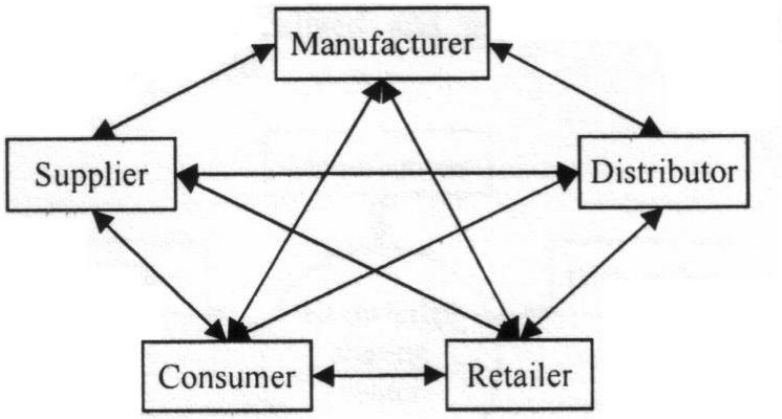
A strong link must exist between the component knowledge held by suppliers and the assembly knowledge held by the manufacturers. How a supplier effectively learns a manufacturer's knowledge is the domain of knowledge transfer among upstream and downstream members of the supply chain. Knowledge may be tacit or system-embedded and hence, transfer of knowledge between enterprises occurs with great difficulty. For this reason knowledge management is required to coordinate knowledge flows (Lin and Chen, 2010).

Application and innovation of knowledge can offer technology and market advantages to firms and directly affects the productivity and profitability of the organisation (Chen, 2010).

Strong interdependence exists among firms of the assembly supply chain and both sides (up stream and down stream) need to strengthen their knowledge transfer activities to gain higher efficiency of innovation. Research information on these issues can help suppliers to correctly select a strategy for knowledge transfer in accordance with their own context, and formulate corresponding transfer strategies to learn from manufacturers and enhance their own innovation capability (Lin and Chen, 2010).

The Network knowledge sharing model (Fig. 3.2) proposed by Feng, Zhang Li and Li, (2010: 524) suggests that the value chain consists of stakeholders, including the supplier, manufacturer, distributor, retailer and consumer. Their model cross-links each stakeholder with every other stakeholder in the supply chain. This represents the knowledge-sharing links of the network. This kind of cross-linked network can rapidly respond to customer demand and forecast the status of supply and demand, allow for reasonable production planning, reduce inventory cost and reduce the Bullwhip Effect to a certain extent thereby improving supply chain competitiveness.

Figure 3.2 - Network Knowledge Sharing



Source: Feng et al., (2010: 524)

Improvements in knowledge management promote those factors that lead to superior performance, organisational creativity, operational effectiveness, and quality of products and

services (Wiig, 1993: xv). Information technologies designed to assist managerial and professional workers have evolved over several decades. They have progressed from systems that process and disseminate vast amounts of information to an organisation's managers, to systems that provide specific decision makers with tools for ad hoc decision analysis, to systems designed to provide updated, often real-time, relevant information to senior and middle managers (Alavi and Leidner, 1999). Modern systems target professional and managerial activities by focusing on creating, gathering, organising and disseminating an organisation's "knowledge" as opposed to "information" or "data". The literature refers to these systems as Knowledge Management Systems (KMS).

3.3 KNOWLEDGE MANAGEMENT SYSTEMS

Knowledge Management Systems (KMS) are tools to effect the management of knowledge and are manifested in a variety of implementations including document repositories, expertise databases, discussion lists and context-specific retrieval systems incorporating collaborative filtering technologies (Davenport and Prusak, 1998). In general, a system is defined as a group of independent but interrelated elements comprising a unified whole (Webster's Online Dictionary, 2011). Bartholomew (2008) notes that one of the most common mistakes in knowledge management is to think about it as a set of separate tools and processes rather than as an integrated system with business objectives.

Hahn and Subramani (2000) state that within the knowledge management context, it is difficult to know, a priori, what information will be requested, who will request the information, who will supply the information, and when and how the information will be used. This makes determining requirements for a KMS development extremely difficult.

In a knowledge management context, the final outcome of development efforts needs to be flexible. Due to difficulties in defining a priori structures for knowledge and the need for ongoing refinement of these structures as new demands from the system surface, traditional approaches to systems development, such as those adopted for organisational databases for instance, may not be appropriate (Hahn and Subramani, 2000).

An implicit assumption of traditional systems development methodologies is that the system developed is a final product. Due to the ill-defined nature of goals and processes of the KMS, a normative criterion with which to evaluate whether the KMS is being effectively used or, a means to identify factors that impede desired usage, are not available. Hence, rather than a final product-oriented approach, an evolutionary (low-tech, bottom-up) approach to systems development may be required (Hahn and Subramani, 2000).

One of the most important factors for success of the KMS is motivating users to use the system. Thus, system acceptance by the users becomes critical. Previous research shows that an effective way to increase system acceptance is user involvement during systems development (Tait and Vessey, 1988).

Merali and Davies (2001) note that most knowledge management systems cater for the organisation, storage and dissemination of explicit knowledge. For access to tacit knowledge, they provide a "yellow pages" facility for the location of people who are considered to be particularly knowledgeable about particular subjects and situations. Some of the tools used for these purposes are Enterprise Resource Planning (ERP) systems also known as Enterprise Systems (ES) and Enterprise Knowledge Portals.

3.3.1 ERP/ES

Enterprise Resource Planning (ERP) systems or Enterprise systems (ES), such as SAP R/3 (www.sap.com), Syspro (www.syspro.com) and Tier 2 Tier, are examples of software solutions, typically provided by a vendor as a package, that provide seamless integration of all information flowing through a company, such as financial, accounting, human resources, supply chain, and customer information. The ES is a key medium for learning, since it provides a key tool for acquiring information about the day-to-day business activity. In other words, organisational learning is mediated, enabled, and confined by the ES (Davenport and Prusak, 1998).

3.3.2 Enterprise knowledge portals

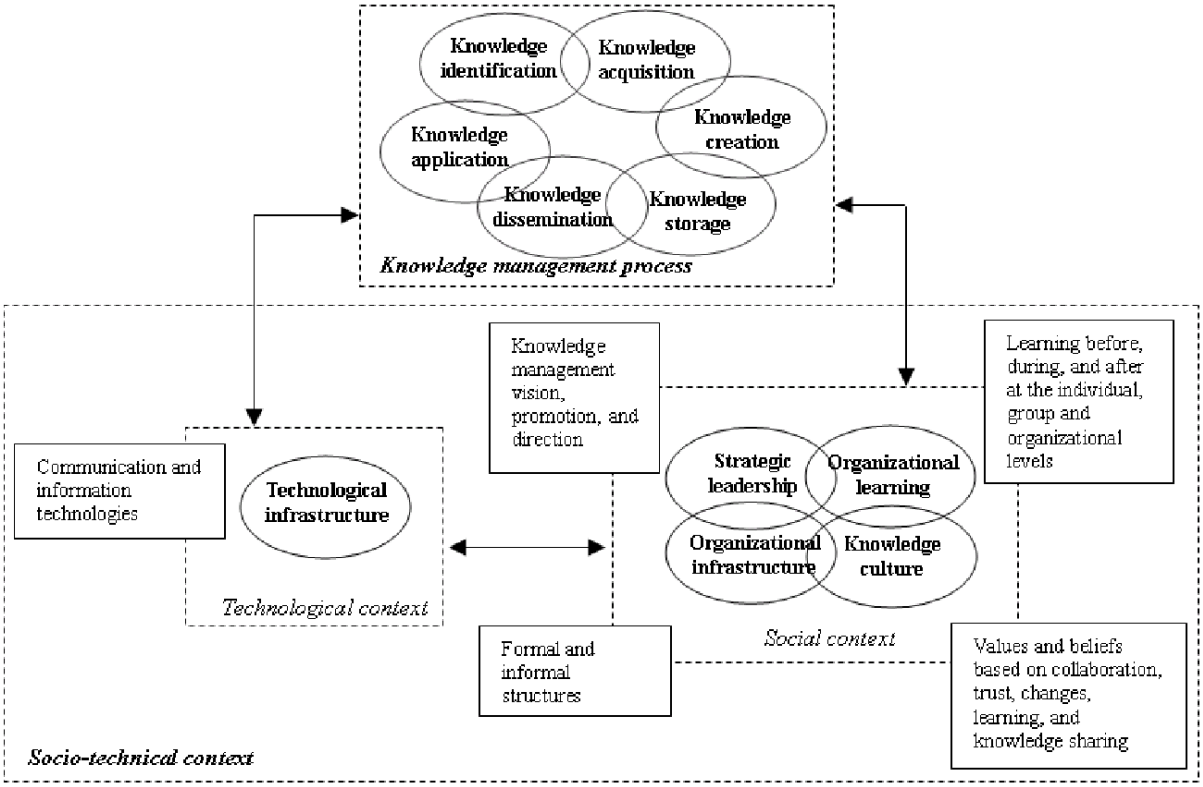
Turban and Volinino (2010) note that individuals may spend as much as 25% of their time looking for information. Enterprise Knowledge Portals (EKPs) are the doorways into many knowledge management systems. An enterprise portal presents a single access point for a vast body of explicit information, such as project plans, functional requirements, technical specifications, white papers, training materials, and customer feedback survey data. Enterprise knowledge portals are a means of organising the many sources of unstructured information in an organisation (Turban and Volinino, 2010).

These technologies enable and provide, to a large extent, the infrastructure and tools to support the KM initiative within the organisation. They further enhance organisational performance by improving the flow of knowledge and promoting the effectiveness of the learning process within the organisation.

3.3.3 Components and structure of a socio-technical knowledge management system

According to Pan and Scarbrough (1998:57) the term “socio-technical” is used to describe organisations which emphasise the interrelatedness of the functioning of the social and technological subsystems of the organisation, and the relation of the organisation as a whole to the environment in which it operates. From this perspective, it is acknowledged that both the technological and social aspects are important components of the KMS. Sajeva and Jucevicius (2010) note from the literature, that three major subsystems exist which comprise the larger socio-technical knowledge management (KM) system. These subsystems are identified as, the knowledge management process, social context and technological context (Figure 3.3). According to this approach, the first subsystem, the knowledge management process, can be broken down into the cyclic and iterative process of, knowledge identification, acquisition, creation, storage, dissemination and application.

Figure 3.3 - Socio-technical knowledge management system



Source: Sajeva and Jucevicius (2010: 83)

Sajeva and Jucevicius (2010) further establish, that the social- and technological contexts can also further be broken down into five major aspects of the KMS. In the organisation's socio-technical context (Figure 3.3), these have been identified as follows:

Strategic leadership

It is imperative for top management to acknowledge the value of knowledge management in order for the knowledge management system to be created and developed successfully. Only in this case will clear objectives be defined, the required resources be allocated, and the general strategic vision formulated. It is imperative that top management sets strategic goals, allocates sufficient budgets, displays and promotes exemplary behaviour to facilitate the changes required to promote the handling of knowledge. Strategic leadership plays a significant role in the knowledge management system because it integrates the knowledge management process (identification, acquisition, creation, storage, dissemination and application of knowledge) with the overall business strategy and other organisational processes and initiatives (Sajeva and Jucevicius, 2010).

Organisational infrastructure

Organisations consist of both formal and informal structures or networks. The formal networks drive and promote order and stability and are delineated by the officially sanctioned structures and constraints established within an organisation. The informal networks represent a dynamic network of social and other informal contacts between people within an organisation and across its boundaries. Thus the organisational infrastructure determines how the employees of the organisation are arranged into the formal and informal networks or teams, and how they interact formally and informally (Sajeva and Jucevicius, 2010).

Organisational learning

Learning is the acquisition of new knowledge by people who are willing and able to apply that knowledge to make decisions or to influence others (Lee and Choi, 2003). Organisational learning occurs on individual, group or organisational (collective) levels with complicated interaction in, and between, the levels (Juceviciene and Burksiene, 2009). According to Grundstein and Rosenthal-Sabroux (2007), the aim of the organisational learning process, in the knowledge management system, is to increase individual knowledge, to reinforce competencies, and to convert them into a collective knowledge through interactions, dialogue, discussions, exchange of experience and observations (Sajeva and Jucevicius, 2010).

Knowledge culture

Organisational culture is the complex composition of values, beliefs, behaviour models and symbols that exists within the organisation. It represents the organisation's values, which can serve as a model for the activities and behaviours of the staff (Ho, 2009). According to Sharkie (2003), culture provides a work environment in which employees are engaged, challenged, motivated and rewarded in a positive way for their performance and contribution to the organisation's success. In order to succeed in creating and developing a knowledge management system a “knowledge culture” with a positive orientation to knowledge and learning should be created in the organisation. According to Oliver and Kandai (2006) a knowledge culture is one particular variety of organisational culture representing a way of organisational life that enables and motivates people to create, share and utilise knowledge for the benefit and enduring success of the organisation (Sajeva and Jucevicius, 2010).

Technological infrastructure

It is often claimed that the role of communication and information technologies in knowledge management is minor compared to the elements of the social context (Figure 3.3). However, according to the socio-technical approach to KMS, the technological context is of significant value for creation and development of the KMS. A proper KMS is unthinkable without the appropriate communication and information technologies which play an important role in supporting the knowledge management process. As McNabb (2007) points out, such technologies facilitate the transformation of data to information, and of information to knowledge. They help distribute knowledge vertically and horizontally, as well as make it easily searched and utilised (Ho, 2009). So, organisations need adequate technological infrastructure that can help them to manage and leverage knowledge systematically and actively. Proper technological infrastructure is acknowledged as the basic technological building block of any knowledge management system (Sajeva and Jucevicius, 2010).

Socio-technical KM system summary

Sajeva and Jucevicius' (2010) socio-technical knowledge management model (Figure 3.3), as discussed above, provides a holistic perspective of the socio-technical knowledge management system. The model helps to foster an understanding of the intimate relationship and interaction of the various subsystems (i.e. knowledge management process, social context and technological context) and their components within the larger socio-technical knowledge management system. Sajeva and Jucevicius (2010) note that it is essential that these components be clearly and officially defined, formalised by rules and have standard policies and procedures. Without such formal definition the knowledge management system would lack support from the members of the organisation.

Sajeva and Jucevicius (2010) further stress the fact that knowledge management activities must be linked to the economic performance of the organisation. Organisations should develop metrics to measure the progress and results of the knowledge management activities. These metrics enable the organisation to observe the process of knowledge management and determine the benefits and effectiveness of performed activities. The literature reveals that most Western managers and organisations have tended to choose an IT-Centric-Top-Down approach to KM, but Nonaka (1994), Sveiby (2000) and Takeuchi (1998) argue that what succeeds is a people-centric approach, from the bottom-up, but properly encouraged and

supervised by top management.

3.3.4 Challenges and barriers to Knowledge Management

Table 3.1 below, illustrates the key challenges related to KM, as they are reported by Alavi and Leidner (1999).

Table 3.1 – Key Challenges Related to KM

Information	**Management**	**Technology**
Eliminating wrong and old data;	Change-management implications;	Determining infrastructure requirements;
Ensuring customer confidentiality;	Demonstrate business value;	Keeping up with new technologies;
Keeping the information current.	Bringing together the many people from various units;	Security of data on the internet.
	Determining responsibility for managing the knowledge.	

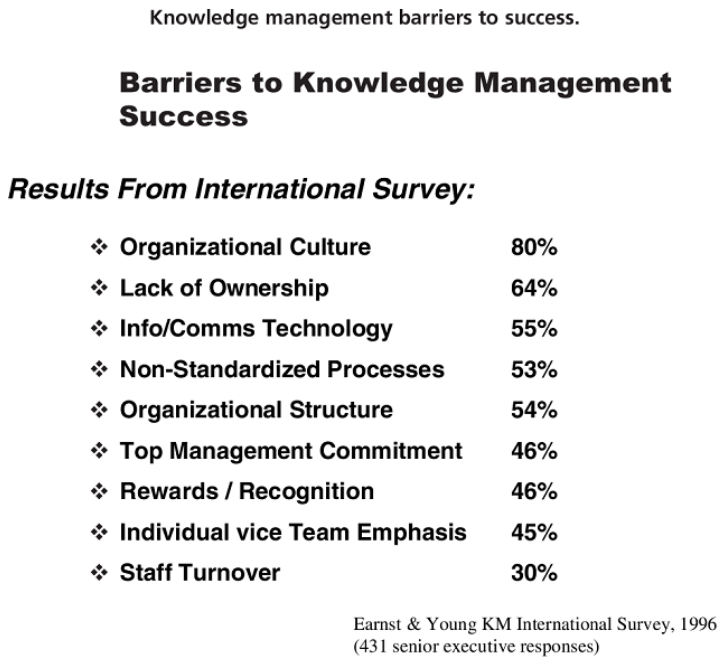
Merali and Davies (2001) note that the main challenges for practitioners include:

- scanning multiple internal and external sources effectively;
- meeting the diverse, dynamic, context specific information needs of individuals and groups of knowledge workers in real time;
- capturing the knowledge that is generated when people use knowledge to do their jobs;
- getting people to disseminate what they have learnt;
- getting people to use knowledge that has been generated by others (overcoming the "not invented here syndrome" and getting people to trust and value the contributions of others).

Non-disclosure agreements may also become an obstacle in the implementation of knowledge management systems involving multiple organisations as enterprises do not want to disclose their results to all participants of the virtual value creation chain (Pontz, Grauer, Metz and Karadgi, 2010).

Figure 3.4 summarises an international study by KPMG, as cited in Stankosky (2005), on the barriers to KM success. Figure 3.4 indicates the ranking by percentage (percentage of respondents) of the most critical to least critical barriers to success.

Figure 3.4 – Knowledge management barriers to success



Source: Stankosky (2005: 5)

Skyrme (1997) also showed that inappropriate behaviours and organisational culture were the greatest obstacles to knowledge sharing, which no amount of technology alone would overcome. Since people often view knowledge as power, they may be very reluctant to divulge some of this knowledge, thereby diminishing their status as expert. Levitt and March (1988) argue that the availability of existing solutions in the KMS may bias employees to adopt existing solutions rather than search for, or develop, novel solutions that may be more effective.

In the long run, reliance on existing solutions may result in reduced competency that inhibits organisational learning and innovation (Levitt and March 1988). Pontz *et al*. (2010) propose that the Information Technology (IT) infrastructure required for an effective KMS generally incorporates expensive hardware and software systems and further, demands highly skilled employees to operate and maintain them. Unfortunately, many Small or Medium Enterprises

(SMEs) from the engineering domain cannot afford the aforementioned IT infrastructure. In addition, these SMEs often do not have sufficient resources to manage the IT infrastructure. Overall, possessing and managing such an IT infrastructure goes far beyond the core competencies of SMEs and hence, should not be encouraged as an in-house solution (Pontz *et al.*, 2010).

The preceding discussion on the challenges and barriers to KM implementation, indicates the complexities of knowledge management implementation, which is a comprehensive course of action that requires focus and commitment throughout the organisation in order to achieve results. Until 2003 no universally accepted framework or methodology for such a process exists (Sunassee and Sewry, 2003). There is also evidence that the formal procedures and strategies, technology and metrics that are in place in the motor vehicle manufacturing sector in South Africa are not very successful. Hence, amongst other things, there is a need for implementation strategies for KM that ensures the success of the KM initiative and of the business itself (Sunassee and Sewry, 2003). In the following section we explore the factors which lead to successful implementation of knowledge management.

3.3.5 Critical success factors for implementation of KMS

Researchers Baloh and Desouza (2009), Skyrme (1997) and McGarrity (2000) delineate the factors which promote successful KMS implementation. These factors correlate with the areas of leadership, organisation, technology and learning – the four domains which are associated with successful knowledge sharing and collaborative cultures (Stankosky, Calabrese and Baldanza, 2003).

Baloh and Desouza (2009), indicate the critical success factors for KM projects. These include, but are not limited to, the following:

- clear KM vision and strategy;
- alignment of KM strategy to business goals;
- promoting a learning culture;
- incentives for knowledge creation and reuse;
- a community that provides a context for KM to flourish;

- continuous top management support;
- employee empowerment;
- a positive attitude to knowledge sharing;
- a flexible organisation structure;
- usable and up-to-date KMS;
- knowledge governance structure for maintaining quality of knowledge content.

However, Baloh and Desouza (2009) also state that there remains a lack of actionable know-how that describes how to actually build a meaningful and business-value-adding KM solution.

Skyrme (1997) recommends several factors to help make a knowledge management project a success:

- a knowledge leader or champion – someone who actively drives the knowledge agenda forward, creates enthusiasm and commitment (e.g. a Chief Knowledge Officer);
- top management support – a CEO who recognises the value of knowledge and who actively supports the knowledge team in its work;
- a clear value proposition- identification of the link between knowledge and the bottom line business benefit; new measures of performance and appropriate rewards;
- a compelling vision and architecture – frameworks that drive the agenda forward;
- effective information and knowledge management processes.

McGarrity (2000: 110) identifies the following critical steps for implementing a KMS:

- develop the KM project from the bottom up;
- heavily involve the line staff from the beginning to tailor-make the system to the perceived needs of the people who will be using it and get their buy-in to make them "own" the system and promote its usage.
- spend time mapping out the structure of the knowledge, for example, carefully conceptualise plan and structure the knowledge-base. (This could be structured in the form of a layered knowledge-base, with the big picture at the top level and more details available at lower levels if needed. The top level would appear more like a descriptive table of contents for a particular topic with links to multiple levels below

it. This allows for ease of use and quick access to required knowledge.);

- make technology the very last step (Technology is by far the least important component but also the most difficult to undo or switch. Spend time using a low-tech or existing way of organising the company's knowledge base. Use planning and testing to clarify exactly what is needed out of the KMS. This insight will be invaluable in first, selecting a commercial software solution or adapting an in-house package, specifically to meet the company needs and then implementing it strategically from the beginning).

Summary of Critical Success Factors for Implementation of KMS

Analysis of the work on the critical success factors for implementation of KMS of the preceding authors in this sub-section, reveals common themes in their findings. We observe that the entire top management team must value and support the KM initiative and also the KM team to accomplish their work. This might be achieved by clarifying the KM value proposition through identification of the link between knowledge and the bottom line business benefits. We find that there is a need for a knowledge leader or project champion who can ensure that a KM vision and strategy is clearly expressed, aligned with the business strategy and that this vision is supported by an architecture or framework which drives the KM initiative toward a successful outcome.

A lack of resources exists in many of the SMEs in the engineering domain. It is therefore recommended that the KM project in 1st tier suppliers utilise a low-tech solution and be developed from the bottom up by empowering employees and by heavily involving line staff, from the beginning, in order to customise the system to the perceived needs of the people who will be using it and get their buy-in on the project objectives. New measures of performance and appropriate rewards will be required to motivate knowledge workers. A knowledge governance structure for maintaining quality of knowledge content and effective information and knowledge management processes becomes essential. This ensures that the system remains usable and up-to-date. Transformational leadership is a critical factor as an organisational community must be developed to provide a context for KM to flourish by establishing a positive attitude toward knowledge sharing and promoting a learning culture.

No universally accepted standard or best practise for the implementation of KM systems currently exists, although organisations have developed multiple approaches to create distinct steps to design, implement and measure KM systems that meet the goals and objectives of the organisation (Smuts, Van der Merwe, Loock and Kotzé, 2009).

3.3.6 Productivity and profitability through KM

Productivity is an important success factor for all organisations. The literature indicates that improvements in productivity have been recognised to have a major impact on many economic and social phenomena, e.g. economic growth and a higher standard of living (Sink, 1983; Uusi-Rauva and Hannula, 1996). Productivity can be defined in its simplest form as output (such as products, services and activities) divided by input (such as material, labour, capital and energy) that is used to generate the output. This relationship is similar to efficiency however, productivity can also include the quality and quantity of the output generated by the operations. This means that productivity can be improved by making more output in relation to the amount of input used and by making output with better quality (Lönnqvist, Kemppilä, Mettänen, Pirtimäki and Uusi-Rauva, 2003:206).

Profitability is the ultimate goal of every for-profit organisation and describes the financial result of business operations. The main difference between the concepts of profitability and productivity is that profitability deals with costs and revenues whereas productivity deals with the amounts of input and output. Productivity is the key determinant of profitability (Lönnqvist *et al*., 2003: 207).

Intangible assets, e.g. knowledge, creativity of employees and relationships with stakeholders, are considered critical for most organisations to maintaining productivity and hence profitability, especially those operating in knowledge-intensive industries. It can be assumed that increasing employee competencies and developing systems to better manage these assets may help to improve productivity and profitability. However, the relationships between intangible assets, productivity and profitability are complex (Lönnqvist et al., 2003: 204). Various authors (Sveiby, 2000; Davenport and Prusak, 1998) suggest that the importance of intangible assets for organisations would be, in some cases, higher than that of the traditional physical assets, e.g. financial capital and machinery. However, both intangible

and tangible assets are usually necessary.

Organisations consciously design and deploy knowledge management (KM) solutions that instigate utilisation of existing knowledge and new knowledge creation with the purpose of improving their efficiency and effectiveness through better decisions (Desouza, Awazu and Tiwana, 2006). Measuring intellectual capital, establishing corporate libraries, building intranets, sharing best practises, leading cultural change, building databases, leading training programs, installing groupware, fostering collaboration in communities of practice, and creating virtual organisations are only a few examples of the initiatives companies implement with the hope of improving how knowledge is created and used in individual and group decision-making (Baloh and Desouza, 2009). However, benefits remain elusive for most of the companies. Various authors (Desouza and Awazu, 2005; Wing and Chua, 2005; Davenport and Glaser, 2002) indicate the failure rate for KM initiatives above 70%.

Senior executives, analysts, and policy-makers in an Economist survey, indicated that improving the productivity of knowledge workers through technology, training, and organisational change will be the major boardroom challenge for the next 15 years (Economist Intelligence Unit, 2006).

The literature portrays an abundance of knowledge regarding the management of intangible assets and applicable measurement and management frameworks (Lönnqvist *et al*., 2003:205) however, the relationship between the factors are complex and the literature reveals that empirical research results are partly contradictory as results seem to depend on the context, i.e. the organisational setting (Lönnqvist *et al*., 2003: 211).

3.3.7 Knowledge management systems in the South African automotive industry

Kruger and Johnson (2008) differentiate organisations as being Small (1–100 employees), Medium (101–2,000 employees), Large (2001-25,000 employees) and Extra-Large (25,000 + employees). Their research indicates that KM is fairly well institutionalised in South African industry with the Automotive and Transport industries showing an average growth in KM of about 50% over the past five years. However, this information is skewed in favour of extra-

large (multinational) organisations, which have the advantage of size and available resources (Kruger and Johnson, 2008). In the South African automotive industry, various packaged ERP systems provided by vendors (such as SAP, Syspro, Tier 2 Tier, etc.) are used by original equipment manufacturers (OEMs, i.e. BMW, Mercedes-Benz, Ford, General Motors, Toyota and Volkswagen) for the storage of all forms of expert knowledge and research information, and allows employees within organisations to form communities and workgroups for sharing knowledge (Rethink IT, 2004).

At BMW knowledge management is achieved by means of the "BMW Knowledge Centre". This allows for the secure control of web-based document management through subject specific bases; access to documentation and information worldwide; reduced time to access knowledge; the collection of know-how from projects in a central repository and advanced search capabilities (Kappe, 2001).

The merger of Daimler-Benz and Chrysler in June 1998 created the fifth largest automaker globally. Soon after the merger, it was recognised that the newly formed DaimlerChrysler needed to embrace KM to realise the full benefit of the merger. As the organisation evolved, the establishment of Communities of Practice (CoPs) drew attention to the need for a formal KM strategy. The strategy helped to identify knowledge areas that had developed in isolation from the company and ensured that these areas were supported by the relevant CoPs. The benefits of the KM initiatives enabled DaimlerChrysler to maintain technological skills, reduce product development times and establish new product markets (Coughlan and Rukstad, 2001).

At Ford the organisational culture emphasises learning as the basis for future growth and Ford views all KM activities as an integral component of daily work. However, the company does not formally acknowledge or reward employees for participation (Coughlan and Rukstad, 2001). Ford uses internet sites and portals which focus on forming relationships between the relevant people to allow knowledge sharing to occur (Rethink IT, 2004). Davenport and Glaser (2002) reports that Ford has also provided templates and job aids so that engineers can make use of pre-existing knowledge resources, however, the company recognises that it is not possible to force these engineers to make use of such tools (Coughlan and Rukstad, 2001).

The literature is vague on KM initiatives at General Motors, however, Coughlan and Rukstad (2001) note that the General Motors plan to evolve into a learning organisation included the establishment of the "General Motors University" and the establishment of centres of excellence, which were each focused on a particular area. It was further recommended that managers document decisions made and discuss their best practises on the company's intranet (Coughlan and Rukstad, 2001).

Toyota uses a know-how (tacit knowledge) database to keep track of ideas that have been either successful or unsuccessful in previous attempts (Liker, 2004). Toyota's KM efforts are not separate implementations, but are rather embedded in everyday practises and the organisation's culture (ICMR, 2005). Toyota's formal KM initiatives include the "Toyota University" and a central repository of information (Coughlan and Rukstad, 2001). Cleveland (2007) reports on the considerations of the Toyota Product Development System, relating to KM. This system provides templates for storage of engineering data, sharing the data with other stakeholders, and ensures that all engineers on a project are equally informed.

The focus of Volkswagen's KM efforts is to make knowledge available to all employees and to distribute solutions to problems throughout the organisation. Volkswagen has successfully implemented a "yellow pages" application that acts as an expert finder within the organisation (Volkswagen, 2007). This allows employees to find the right expert in a given situation, together with relevant information relating to the situation. Volkswagen has also implemented expert rooms to facilitate collaboration between employees in delocalised networks. This ensures that decisions can be made quicker and with more certainty. Furthermore, the Volkswagen knowledge base provides information in a number of subject areas, and is so structured that the relevant information can be easily located (Volkswagen, 2007).

The preceding discussion outlines KM initiatives of OEMs in the South African automotive industry, however, Piderit (2007: 59) notes that there is little evidence of knowledge management by the component suppliers of these automotive Original Equipment Manufacturers (OEMs).

3.4 SUMMARY

Productivity is a key determinant of profitability and is defined as output generated divided by input that is used. Modern organisations harness their knowledge assets by developing systems which better manage these assets to improve productivity and profitability. Organisations consciously design and deploy knowledge management solutions to promote the utilisation of existing knowledge and new knowledge creation with the purpose of improving their efficiency and effectiveness through better decisions. However, the failure rate of KM initiatives remain high at above 70%.

Knowledge is a complex concept which can be categorised as tacit (know-how) or explicit (know-what). It is highly subjective and dependent on a number of factors such as culture, beliefs, values, insights, intuitions and emotions of the individual. To possess knowledge implies that it can be used to solve a problem, whereas having only information does not carry the same connotation. The modern organisation must maintain control over the abundance of knowledge flowing between various domains, contain it within boundaries and leverage it for exclusive use to create competitive advantage.

Knowledge management is the systematic and organisationally specified process for identifying, acquiring, creating, storing, disseminating and application of knowledge so that other employees may make use of it to be more effective and productive in their work. Knowledge may be system-embedded (tacit) and hence, transfer of knowledge between enterprises occurs with great difficulty. For this reason, KM is required to coordinate the flow of knowledge. KM applied to a supply chain has the ability to respond rapidly to customer demand and forecast the status of supply and demand, allow for reasonable production planning, reduce inventory cost and reduce the Bullwhip Effect. Knowledge management systems target professional and managerial activities by focusing on creating, gathering, organising and disseminating an organisation's knowledge as opposed to information or data. KMSs are tools to control the management of knowledge and are manifested in a variety of implementations.

The most comprehensive model on knowledge management systems which the author encountered in the literature is the Socio-Technical Knowledge Management System model.

It is composed of three major sections, namely the knowledge management process, social context and the technological context. These three domains must be integrated and are essential to the KMS as a functional unit. The challenges, barriers and critical success factors for knowledge management implementation can be expressed in the domains of Leadership, Organisation, Technology and Learning. These four domains from the literature have constantly shown the potential to encompass all aspects of effective knowledge sharing.

In the South African automotive industry KM appears to be more prevalent in the large and extra large multinational OEM companies where the necessary resources are available. Most of these multinational automotive OEMs have developed a KMS which complements the organisation's culture and is context specific. The literature reflects a definite lack of information regarding knowledge management in SMEs of the engineering domain. This alludes to the possibility that many of the 1st tier component suppliers in the automotive industry, may not be practising KM due to a lack of resources to manage a complex IT infrastructure.

This chapter has addressed the secondary research question (RQ_2), "*How can Knowledge Management be employed functionally as a tool?*" and has established that KM is predominantly practised in larger multinational companies and is almost non-existent in the smaller component supply or services sector, where significant growth opportunities exist. The application of KM in the component supply industry would significantly improve performance in this industry and make these SMEs more competitive. The following chapter discusses the origins and background of knowledge management frameworks which appear in the literature. The background of KM frameworks will be used as a base from which to develop a new proposed KM framework for applying KM in the automotive industry within the Eastern Cape.

CHAPTER 4: A FRAMEWORK FOR APPLYING KNOWLEDGE MANAGEMENT

4.1 INTRODUCTION

A framework serves as a theoretical structure or perspective to form the basis of a theory (Webster's Online Dictionary, 2011). Various knowledge management (KM) frameworks have been developed in the relevant literature and are discussed in this chapter, in order to establish a KM framework for the application of KM in the 1st tier component suppliers of automotive OEMs in the Eastern Cape Province.

The former, major KM frameworks are presented in this chapter, in order to provide a background to the research conducted. An inclusive KM framework, namely the George Washington Four Pillars of Knowledge Management (G.W. Four Pillar Framework), is recognised and proposed as the platform to be used for deriving the framework for applying KM in the automotive industry. This chapter further investigates a 12-step approach to applying KM and proposes a framework, based on the literature for applying KM in the automotive industry.

This chapter addresses the secondary research question (RQ_3), "*How can a Knowledge Management Framework be developed for the automotive industry?*" in order to meet the research objective, "*Develop a Proposed KM Framework for applying Knowledge Management in the automotive industry*". In Section 4.2 of this Chapter, Knowledge Management frameworks will be presented, in which the earlier major frameworks, before 2000, are discussed. In Section 4.3 the author introduces the G.W. Four Pillar Framework and discusses, in sequence, the four pillars of the framework. In Section 4.4, a framework for the application of knowledge management is investigated and presented, followed by a discussion on KM application frameworks for the automotive industry, in Section 4.5. The Chapter then concludes with a chapter summary in Section 4.6.

4.2 KNOWLEDGE MANAGEMENT FRAMEWORKS

A framework is defined as "a theoretical construct or perspective that forms the basis of a theory in science, politics or philosophy" (Webster's Online Dictionary, 2011). KM frameworks originate from both academic and practitioner sources and from various development methodologies. A number of KM frameworks have grown out of academic study of organisations, ranging from field research into KM phenomena across multiple organisations to a case study examination of an individual organisation. Other frameworks have evolved out of first-hand experiences of practitioners, some in a consulting capacity and others in a management capacity, other frameworks are the result of synthesising concepts from previously published works (Holsapple and Joshi, 1999).

Holsapple and Joshi (1999), have analysed the major KM frameworks in existence and note that KM frameworks can broadly be classified into two categories: descriptive frameworks and prescriptive frameworks. The authors argue that the descriptive frameworks attempt to characterise the nature of KM phenomena, whereas prescriptive frameworks prescribe methodologies to follow for conducting knowledge management. Holsapple and Joshi (1999) further establish that descriptive frameworks can be further classified into specific and broad categories. A specific framework focuses on a particular aspect of the phenomena. A broad framework is one that attempts to describe the whole of KM phenomena.

The five major, broad descriptive frameworks, as discussed and listed by Holsapple and Joshi (1999) include the following:

- Framework of Knowledge Management Pillars - (Wiig, 1993);
- Framework of Core Capabilities and Knowledge Building - (Leonard-Barton, 1995);
- Model of Organisational Knowledge Management - (Arthur Andersen & APQC, 1996);
- Framework of the Knowledge Organisation - (Choo, 1996);
- Framework of Knowledge Management Stages - (van der Spek & Spijkervet, 1997).

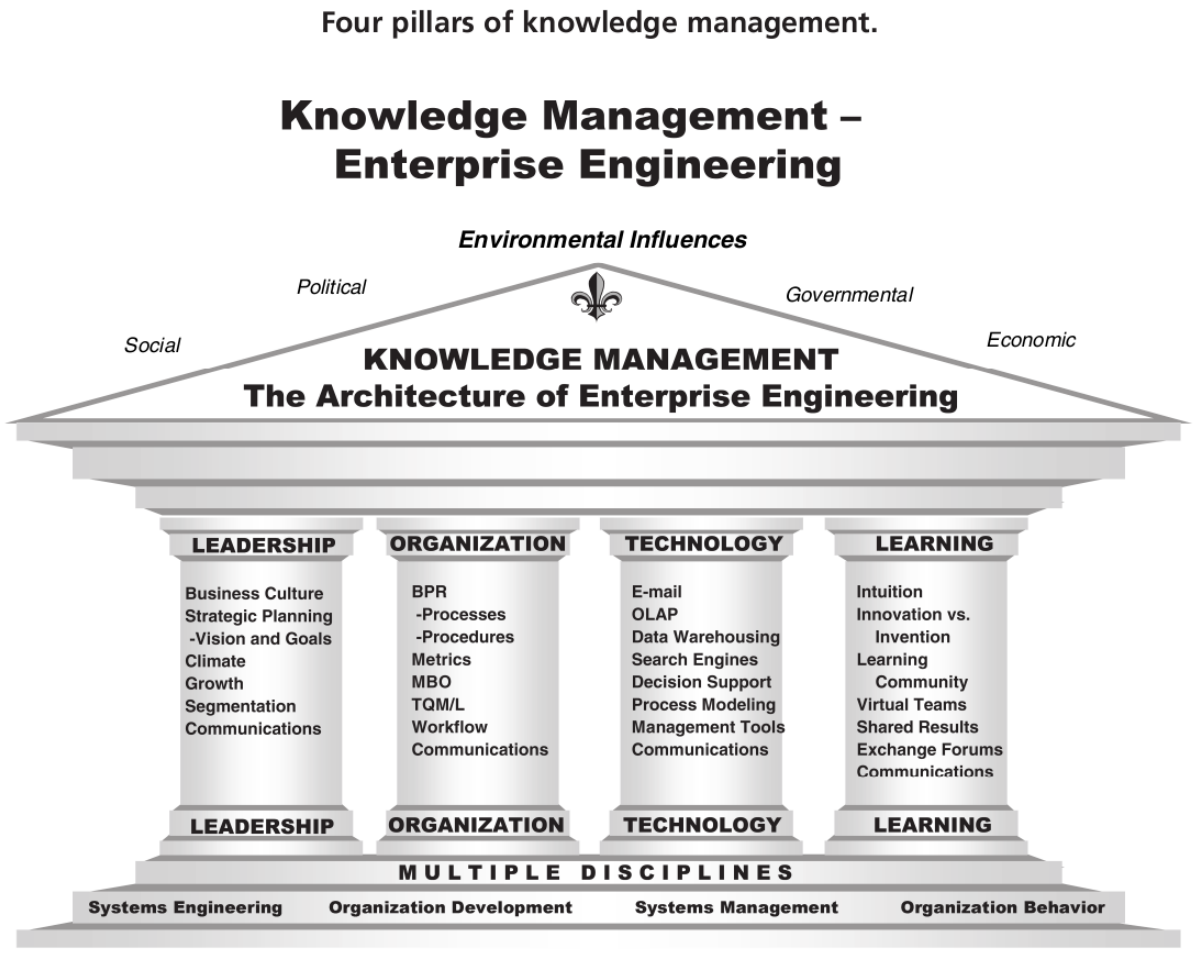
Holsapple and Joshi (1999), however, conclude that from the preceding list, no individual framework subsumes the others and that there is a need for a framework with a common or standard way of characterising influences on the conduct of knowledge management.

A more recent framework developed and refined by the George Washington University between May 2000 and May 2004, namely the "Four Pillars of Knowledge Management" framework, subsumes the work of earlier researchers (Stankosky, 2005:3) and has been identified as an appropriate outline upon which to base this study. The Four pillars of Knowledge Management framework (Figure 4.1) bridges the gap, providing a common way to characterise the influences on the conduct of knowledge management. The four pillars of the framework include *Leadership, Organisation*, *Technology* and *Learning* – four domains that have constantly shown the potential to encompass all aspects of effective knowledge sharing and collaborative cultures (Stankosky *et al.*, 2003).

4.3 THE GEORGE WASHINGTON UNIVERSITY "FOUR PILLARS OF KNOWLEDGE MANAGEMENT" FRAMEWORK

The George Washington University "Four Pillars of Knowledge Management" framework (G.W. Four Pillar Framework) includes complementary environmental influences, including, Social, Political, Governmental and Economic influences as indicated in Figure 4.1, to follow. However, for the scope of this research project, only the four pillars of the model will be discussed as they constitute the components of the model which may be manipulated by management to enhance organisational performance through KM.

Figure 4.1 - Four pillars of knowledge management



Source: Adapted from Stankosky (2005: 6)

4.3.1 The Four Pillars

The G.W. Four Pillar Framework (Figure 4.1) is composed of *Leadership*, *Organisation*, *Technology* and *Learning* in support of enterprise-wide knowledge management initiatives. In application, the pillars represent critical success factors for KM implementation. To achieve a basic entry level KM program, it has been determined that all four pillars must be addressed (Bixler, 2002). An outline of the four pillars of this model, *Leadership*, *Organisation*, *Technology* and *Learning* will now be presented.

Leadership

Leadership is the first pillar of the framework in Figure 4.1 and deals with strategic and enterprise-level decision-making processes involving the values, objects, knowledge requirements, knowledge sources, prioritisation and resource allocation of the organisation's knowledge assets. It stresses the need for integrative management principles and techniques, primarily based on systems thinking and approaches (Stankosky, 2005). *Leadership* develops business and operational strategies to survive and position for success in today's dynamic environment. Business and operational strategies determine vision, and must align knowledge management with business tactics to drive the value of KM throughout the enterprise. Focus must be placed on building executive support and KM champions. A successful implementation of a knowledge management system requires a champion or leader, at or near the top of an organisation, who can provide the strong and dedicated leadership needed for cultural change (Bixler, 2002).

Organisation

Organisation, the second pillar illustrated in Figure 4.1, highlights the fact that the value of knowledge creation and collaboration should be intertwined throughout the enterprise. Operational processes must align with the KM framework and strategy, including all performance metrics and objectives. While operational needs dictate organisational alignment, a KM system must be designed to facilitate KM throughout the organisation (Bixler, 2002). Operational processes must align with the new vision while redesigning the organisation and identifying key levers of change, including roles and responsibilities. Introducing knowledge management requires organisational change, and KM inevitably acts as a catalyst to transform the organisation's culture.

The increasing value placed on highly capable people, rising job complexity and the universal availability of information on the Internet are fundamental changes contributing to the move by organisations to leverage KM solutions. In order to begin changing the organisation, knowledge management must be integrated into business processes (Bixler, 2002). Knowledge networks can be created using virtual business environments such as chat rooms, team web sites and learning communities (weak ties and relationships) with the development of specific applications of technology such as databases, workflow systems, personal productivity applications and enterprise information portals (Smuts et al., 2009).

Research (Constant, Sproull and Kiesler, 1996; Hansen, 1997) has shown that valuable knowledge is gathered through these weak ties, even over an anonymous medium such as electronic mail and that weak ties are crucial to the flow of knowledge though larger organisations. People and projects connected to others through weak ties are more likely to succeed than those that are isolated (Merali and Davies, 2001). The efficiency of these knowledge networks, however, would be almost impossible to maintain without the necessary technologies.

Technology

Technology, the third pillar of the G.W. Four Pillar Framework in Figure 4.1, enables and provides all the infrastructure and tools to support KM within an enterprise. While cultural and organisational changes are vital to achieving a KM strategy, a lack of proper tools and technology infrastructure can lead to failure. Any technical solution must add value to the process and achieve measurable improvements. Proper assessment and definition of IT capabilities are essential, as is identifying and deploying best-of-breed KM software and IT tools to match and align with the organization's requirements. Bixler (2002) states that the Gartner Group defines 10 technologies that collectively make up a fully-functional KMS. The functional requirements that enterprises can select and use to build a KM solution include: capture and store; search and retrieve; send critical information to individuals or groups; structure and navigate; share and collaborate; synthesise; profile and personalise; solve or recommend; integrate with business applications and maintenance (Bixler, 2002).

Learning

Learning constitutes the final pillar of the G.W. Four Pillar Framework in Figure 4.1. Organisational theorists (Miles and Snow, 1986; DeLisi, 1990; Donaldson, 1995) suggest that the ability of an organisation to change relates to internal and external factors including the organisation's technology, structure and strategy, tasks and management processes, individual skills, roles and culture, the business in which the organisation operates and the degree of uncertainty in the environment. The transfer of knowledge between enterprises is subject to certain restriction and the knowledge is more likely to transfer inside enterprises due to the nature of tacit knowledge (knowledge with low expressiveness is difficult to transfer among enterprises). The system-embedded ability of knowledge contains conceptual components with several aspects interrelated: the degree of interdependence among persons or teams who

implement the interrelated task or activity; the task or activity's special requirements in the implementation location – which emphasises that the knowledge is embedded in the organisation's social system (Lin and Chen, 2010).

Knowledge with a higher degree of system embedding depends more on special, physical and social contexts. Departure from the special context makes understanding the knowledge more difficult. Therefore, the higher the systematic embedded ability of the knowledge is, the more difficult is the transfer among enterprises. However, suppliers producing components with higher assembly interface complexity, faster technical change rate, greater influence on consumers and on a larger scale, are likely to exchange more knowledge with the manufacturer, can obtain a higher degree of tacit knowledge and systematically embedded ability and can effectively enhance their own learning, knowledge creation and level of innovation through obtaining the manufacturer's knowledge (Lin and Chen, 2010).

The best tools and processes alone will not achieve a KM strategy. Ultimately, people are responsible for using the tools and performing the operations. Creating organisational behaviour that supports a KM strategy will continue long after the system is established. Organisational learning must be addressed with approaches such as increasing internal communications, promoting cross-functional teams and creating a learning community. Learning is an integral part of knowledge management. In this context, learning can be described as the acquisition of knowledge or a skill through study, experience or instruction. Organisations must recognise that people operate and communicate through learning that includes the social processes of collaborating, sharing knowledge and building on each other's ideas. Managers must recognise that knowledge resides in people, and knowledge creation occurs in the process of social interaction and learning (Bixler, 2002).

G.W. Four Pillar Framework summary

The G.W. Four Pillar Framework (Figure 4.1) reinforces the fact that KM requires the integration and balancing of leadership, organisation, learning and technology in an enterprise-wide setting. It is evident that the need for KM translates throughout the entire enterprise. It is not a separate function characterised by a separate KM department or a KM process; it must be embedded into all of the organisation's business processes. Knowledge management is crucial to achieving permanent performance improvements and innovation.

Efficient knowledge-intensive core processes and a fundamental architecture must be established to effectively initiate and implement KM. The four pillars clearly provide that necessary architecture for effective KM implementation. In the following section the author presents a framework for the application of a knowledge management system (KMS).

4.4 A PROPOSED FRAMEWORK FOR THE APPLICATION OF KM IN THE AUTOMOTIVE INDUSTRY

Calabrese and Orlando (2006) have analysed five KM approaches, two derived from academic sources namely, Tiwana's 10-step roadmap and the George Washington University 8-step blueprint, as well as three approaches formulated by practitioner corporations IBM, SAIC and CSC in order to provide a broader comparative population. A summary of these five approaches is presented in Table 4.1 (Summary of the five KM implementation approaches analysed by Calabrese and Orlando, 2006).

Table 4.1, presents the sequential steps of the five KM implementation approaches. Common underlying themes, which represent some of the basic elements required to establish KM in an organisation, can be identified in the steps of the five approaches as follows:

- Identify knowledge resources
- Analyse organisational knowledge
- Align business strategies to KM strategies
- Build (IT infrastructure; Knowledge resources; KM platform; KM management system)
- Implement (Appropriate leadership; Rewards and incentive systems)
- Evaluate initiatives
- Extract and share lessons learned

Calabrese and Orlando (2006) further identified relationships among the five approaches and derived their 12-step process, which was then logically distributed to the G.W. Four Pillar Framework as summarised in Table 4.2 to follow.

Table 4.1 - Summary of the five KM implementation approaches analysed by Calabrese and Orlando (2006)

Steps	Tiwana's 10-step roadmap	George Washington University 8-step blueprint	IBM (9 event process)	SAIC (6 event process)	CSC (9 event process)
1	Identify knowledge critical to your business.	Locate knowledge critical functions.	Deal with a critical business problem that faces the organisation.	Identify and select pilot projects.	Assess current state of knowledge flow.
2	Align business strategy and knowledge management.	Develop process models for candidate functions and applications.	Align knowledge effort with most pressing business issues.	Customise pilot process and create stakeholder alignment.	Assess state of sponsorship.
3	Analyse existing knowledge in your organisation.	Analyse knowledge critical gaps, opportunities and risks.	Familiarise oneself with expertise and skills within the organisation.	Capture key learning and good practices.	Define and revise business drivers.
4	Build on, not discarding existing IT investment.	Prioritise and select goals.	Implement repositories and technologies.	Establish and leverage communities of practice.	Define and revise principles, directions and gaps.
5	Focus on processes and tacit, not just explicit, knowledge.	Ensure alignment of KM with corporate strategy.	Establish communities of practice and mentoring programs.	Train and coach internal KM practitioners.	Plan and document high level strategy.
6	Design a future-proof, adaptable KM platform.	Develop KM requirements.	Understand unique needs of various user groups.	Monitor, review and optimise pilot learning and impact	Design the measurement program.
7	Build and deploy a results-driven knowledge management system.	Document requirements and describe KM cycle elements required.	Create new products and services and provide better support for existing ones.		Implement strategy and operate knowledge environment.
8	Implement leadership and reward structures needed to make knowledge management work.	Develop and "sell" KM resource(s) and manage reward and management commitment to plan.	Measure contribution KM makes to bottom line.		Monitor, measure and report.
9	Evaluate initiatives using real options analyses.		Share appropriate knowledge.		Extract lessons learned and change requests.
10	Learn from war stories.				

Table 4.2 - Derived 12-step process (Calabrese and Orlando, 2006)

Pillar	Steps	12-Step process
Leadership	1	Identify knowledge critical to your business
	2	Conduct work-centred analysis
	3	Sell high-level plan of action to senior management
Organisation	4	Engage key stakeholders
	5	Develop process model
	6	Identify critical knowledge gaps, opportunities and risks
	7	Establish and prioritise goals
	8	Develop requirements and measurement programme
Technology	9	Plan high-level strategy approach
	10	Implement strategy, build and deploy
	11	Monitor, measure, and report metrics
Learning	12	Learn from results

Table 4.2 provides a broad outline of the various aspects of KM application and serves as a useful tool for mapping KM activities to the four pillars of the G.W. Four Pillar Framework. This method has been employed in this study to map the critical success factors of KM to the four pillars as is outlined in the following Section.

4.5 KM APPLICATION FRAMEWORKS FOR THE AUTOMOTIVE INDUSTRY

A literature review of available sources on frameworks for the automotive industry has confirmed, as established by Piderit (2007:59) that there is a very limited body of research available on KM implementation frameworks for the automotive industry. In the South African automotive industry KM appears to be more prevalent in the large and extra large multinational OEM companies, such as BMW, Mercedes-Benz, Ford, General Motors, Toyota, Volkswagen, etc., where the necessary resources are available (Calitz and Calitz, 2002; Piderit, 2007). Most of these multinational automotive OEMs have developed a KMS which complements the organisation's culture and is context specific. The literature reflects a definite lack of information regarding knowledge management in SMEs of the engineering domain. This alludes to the possibility that many of the 1st tier component suppliers in the automotive industry, may not be practising KM due to a lack of resources to manage a complex IT infrastructure.

4.5.1 A proposed KM application framework for the automotive industry

Aspects of the preceding literature study have been employed by the author in establishing a new, proposed framework for KM application in the automotive industry within the Eastern Cape Province. The critical success factors required for KM, as outlined by Baloh and Desouza (2009) and Skyrme (1997) have been overlaid with the Socio-Technical KMS established by Sajeva and Jucevicius (2010) to identify areas of commonality. They have been merged in order to derive a common list of KM aspects, comprising aspects of the work of all three authors. A designated listing of the combined KM aspects is provided in the final column of Table 4.3 below.

Table 4.3 - Merged KM aspects

Baloh and Desouza (2009)	**Skyrme (1997)**	**Socio-Technical KMS by Sajeva and Jucevicius (2010)**	**Designated label of KM aspect**
Clear KM vision and strategy	A compelling vision and architecture – frameworks that drive the agenda forward	Strategic Leadership	Strategic Leadership
	A knowledge leader or champion – someone who actively drives the knowledge agenda forward, creates enthusiasm and commitment (e.g. a Chief Knowledge Officer)		
Alignment of KM strategy to business goals			Alignment of KM strategy to business goals
Promoting a learning culture		Organisational learning	Organisational learning
A positive attitude to knowledge sharing		Knowledge culture	
Incentives for knowledge creation and reuse	A clear value proposition- identification of the link between knowledge and the bottom line business benefit; new measures of performance and appropriate rewards		Value proposition
A community that provides a context for KM to flourish			Organisational KM context
Continuous top management support	Top management support – a CEO who recognises the value of knowledge and who actively supports the knowledge team in its work		Top management support
Employee empowerment			Employee empowerment
A flexible organisation structure		Organisational infrastructure	Organisational infrastructure
Usable and up-to-date KMS		Technological Infrastructure	Technological Infrastructure

Knowledge governance structure for maintaining quality of knowledge content	Effective information and knowledge management processes	Knowledge identification	KM governance structure and process
		Knowledge acquisition	
		Knowledge creation	
		Knowledge storage	
		Knowledge dissemination	
		Knowledge application	

Proposed framework

In order to align the merged KM aspects (Designated Component Label) from Table 4.3 with the four pillars, *Leadership*, *Organisation*, *Technology* and *Learning* of the G.W. Four Pillar Framework, the merged KM aspects have been mapped to the 12-steps derived by Calabrese and Orlando (2006). Table 4.4, to follow, is a new proposal by the author. The Proposed KM framework (Table 4.4) has been derived from literature and presents the merged listing of KM aspects which are compared with the 12-step framework derive by Calabrese and Orlando (2006). Table 4.4 also indicates alignment with the G.W. Four Pillar Framework as per Section 4.3.1.

Table 4.4 - Proposed KM framework

Table Legend:

Symbol	Description
✓	Relationship exists between KM aspect and element of 12-step process
Blank Cell	No relationship exists between KM aspect and element of 12-step process

	Leadership			Organisation					Technology			Learning
	1	2	3	4	5	6	7	8	9	10	11	12
KM Aspect	Identify knowledge critical to your business	Conduct work-centred analysis	Sell high-level plan of action to senior management	Engage key stakeholders	Develop process model	Identify critical knowledge gaps, opportunities and risks	Establish and prioritise goals	Develop requirements and measurement programme	Plan high-level strategy approach	Implement strategy, build and deploy	Monitor, measure and report metrics	Learn from results
Strategic Leadership	✓		✓	✓	✓	✓	✓	✓	✓			✓
Alignment of KM strategy to business goals	✓	✓		✓	✓	✓	✓		✓			
Organisational learning	✓			✓		✓						✓
Value proposition			✓	✓		✓	✓					
Organisational KM context				✓		✓					✓	
Top management support	✓	✓										
Employee empowerment	✓	✓		✓		✓	✓	✓	✓			✓
Organisational infrastructure				✓	✓	✓	✓	✓	✓			
Technological Infrastructure		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
KM governance structure and process					✓	✓	✓	✓	✓		✓	

Source: Researcher's own construction.

Table 4.5 below is a new proposed KM framework for the automotive industry within the Eastern Cape Province and presents a simplified version of the alignment of the merged KM aspects, in Table 4.5, with the four pillars *Leadership*, *Organisation*, *Technology* and *Learning* of the G.W. Four Pillar Framework.

Table 4.5 - Alignment of KM aspects with Four Pillars

Table Legend:

Symbol	**Description**
✓	Relationship exists between KM aspect and element of 12-step process
Blank Cell	No relationship exists between KM aspect and element of 12-step process

KM Aspect	**Leadership**	**Organisation**	**Technology**	**Learning**
Strategic Leadership	✓	✓	✓	✓
Alignment of KM strategy to business goals	✓	✓	✓	
Organisational learning	✓	✓		✓
Value proposition	✓	✓		
Organisational KM context		✓	✓	
Top management support	✓			
Employee empowerment	✓	✓	✓	✓
Organisational infrastructure		✓	✓	
Technological Infrastructure	✓	✓	✓	✓
KM governance structure and process		✓	✓	

4.5.2 Proposal for empirical study

No specific KM implementation framework could be established for the automotive industry and more specifically for the automotive component suppliers within this industry (Calitz and Calitz, 2002; Piderit, 2007). An empirical study will be conducted, to evaluate the new proposed KM framework, Table 4.5 (Alignment of KM aspects with Four Pillars). The empirical study will be conducted on 1st tier component suppliers of the automotive OEM industry within the Eastern Cape Province. The study will explore the perceptions of management toward KM and also the applicability of the proposed KM framework (Table 4.5), for applying KM at the level of 1st tier component suppliers of automotive OEMs.

4.6 SUMMARY

KM frameworks find their origins in various forms of academic and practitioner sources. Of the earlier, major KM frameworks in existence before 2000, none of them subsumed the others. This created the need for a single inclusive framework. The George Washington Four Pillars of Knowledge Management Framework (G.W. Four Pillar Framework) was developed and refined between May 2000 and May 2004 and is one framework which was designed as an inclusive framework which considers the earlier frameworks to provide a common way to characterise the influences on the conduct of KM.

The Four Pillars of the framework represent the four fundamental elements of KM namely, *Leadership, Organisation, Technology* and *Learning*. Firstly, *Leadership* deals with decision-making and strategic alignment of KM initiatives with business objectives. Secondly, *Organisation* emphasises the strategic redesigning and alignment of operational processes and procedures to facilitate the proliferation and success of the KM initiative throughout the organisation. Thirdly, *Technology* establishes the importance of the enabling technological infrastructure which supports KM within the organisation and without which the application of KM in any organisation would be near impossible. Finally, *Learning*, in this context, is described as the acquisition of knowledge or a skill through study, experience or instruction and emphasises the fact that the organisation must address KM facilitating approaches such as increasing internal communications, promoting cross-functional teams and creating a learning community.

The G.W. Four Pillar Framework later served as the basis for the research of Calabrese and Orlando (2006) who analysed and synthesised various academic and practitioner approaches for the implementation of KM and derived an inclusive 12-step approach for the implementation of KM.

A robust new framework has been proposed in Table 4.5 which has been derived from the KM literature discussed in this study, namely:

- Critical success factors as indicated by Baloh and Desouza (2009);
- Critical success factors as indicated by Skyrme (1997);
- The Socio-Technical KMS (Sajeva and Jucevicius, 2010);

- Derived 12-Step process (Calabrese and Orlando, 2006); and
- George Washington University Four Pillars of Knowledge Management (Stankosky, 2005).

This chapter has addressed the research question (RQ_3), "*How can a Knowledge Management Framework be developed for the automotive industry?*" and has presented a 12-step framework for the application of Knowledge Management (Table 4.2). No specific KM framework for the application of KM at the level of 1st tier component suppliers of automotive OEMs in the Eastern Cape Province could be established from the literature. In this chapter the author has proposed a derived framework, based on the literature, to serve as a point of departure for the empirical study which will follow in Chapter 6. The relevance and applicability of the proposed KM framework will be empirically evaluated in 1st tier component suppliers of automotive OEMs in the Eastern Cape.

CHAPTER 5: RESEARCH METHODOLOGY

5.1 INTRODUCTION

Research Methodology, indicates the overall pattern of the specific methods which were applied or the approach to the process of the research (Collis and Hussey, 2009). The aim of this Chapter is to present an overview of the specific methods which were applied to achieve the empirical results of this study. Collis and Hussey (2009:73) express a *method* as "*a technique for collecting and/or analysing data*" and a *methodology* as "*an approach to the process of the research, encompassing a body of methods*". The methodology followed in this research study will be outlined by discussing the specific methods which were applied to achieve the results of the empirical study.

Section 5.2 presents the literature review and expresses the methods used to collect information for the literature review and the strengths and weaknesses of literature analysis methods. Section 5.3 describes the formulation of the hypotheses, expressing the null hypotheses and presenting an illustration of the hypothesised model. Section 5.4 illustrates the design of the questionnaires for the OEM survey and the Component Supplier survey. Section 5.5 describes the survey respondents of the OEM survey and the Component Supplier Survey and Section 5.6 expresses the data collection methods used for the OEM survey and the Component Supplier survey, strengths and weaknesses of the data collection methods and number of responses and response rate. Section 5.7, explains the data analysis, is followed by Section 5.8 which outlines the limitations of the research methodology, Section 5.9 discusses the reliability and validity of the methodology used and is followed by Section 5.10 which concludes the chapter with a summary.

5.2 LITERATURE REVIEW

The literature is all the sources of published data on a particular topic. A literature review is a systematic process with a view to identifying the existing body of knowledge on a particular topic (Collis and Hussey, 2009). Knowledge is disseminated through various types of publication, which can be in hard copy or digital form, and the data can be qualitative (such

as text or illustrations) or quantitative (such as tables or statistics). The author's purpose with the literature review in this study, was to collect and read as many relevant items of literature as possible, in the process of learning more about the subject and the methodologies used in previous research on the subject.

Methods used to collect information for literature review

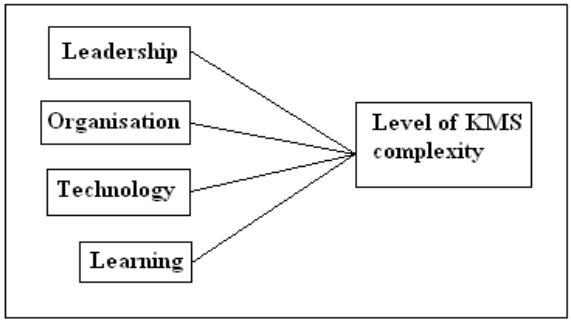
The author explored two major sources of literature on the subject, which included the:

- Internet: various forms of electronic documents were accessed via the Internet including electronic articles and publications, websites and various other documents.
- NMMU library: the expertise services of experienced librarians were employed to search various periodicals and databases for articles on the subject. The author also accessed various books on the research subject from the library.

The scope of the study was defined and a list of key words was established for the purpose of searching the literature. A list of electronic and printed sources (journal databases, library books and other sources) was then established by consulting the NMMU Business School librarian. The NMMU library's on-line search facility was utilised to obtain the relevant literature. A record of progress and full details of relevant publications was kept, in order to read them later and record the references of relevant publications in the research study. The most recent publications were reviewed first and then the earlier ones were searched, using the references at the end of relevant publications to lead the author to previous studies. The synthesised literature was then discussed with the research supervisor of this research project for approval and input.

The following conceptual model was formulated based on the literature study conducted:

Figure 5.1- Conceptual Framework



Strengths and weaknesses of literature analysis methods

Strengths of the analysis methods stem from the fact that firstly, the information sources (i.e. Internet, NMMU library and on-line databases such as Ebscohost) to which the author had access, provided extensive information on the research subject. Secondly, both the author and the research supervisor had prior exposure and experience in the environments being studied (i.e. Automotive OEMs and their 1st tier component suppliers) which provided valuable insight to the study.

Weaknesses of the analysis methods stem from fact that the sources of information (i.e. Internet, NMMU library and online databases) which were used, created the situation of an information overload considering the time constraints of the project. These sources, though extensive, were limited to a finite selection of information, as restricted sources and databases exist which could not be accessed. The assessment of the literature was governed by the "human factor" namely the knowledge, experience and bias of the author and the research supervisor and was therefore limited to their frames of reference, opinions and perspectives.

5.3 FORMULATION OF HYPOTHESES

A literature review was conducted as stated above and a conceptual framework for this research study was established which was based on the literature review. The conceptual framework was used to establish relationships between the Dependent variable, "*Level of KMS complexity"* and the Independent variables, *Leadership, Organisation, Technology* and *Learning* (outlined in Section 4.3) which constitute the conceptual framework. Statements were developed for measuring the variables and assimilated into a questionnaire for collecting data. The hypotheses developed in this research study were formulated, to be judged true or false by means of statistical analysis through empirical evaluation and to verify the proposed relationships indicated in the conceptual model (Figure 5.1). Research questions were developed through analysis of the literature and served as a guide for the discussions in Chapters 2 to 4.

Hypotheses

The following Null hypotheses have been formulated in order to test the relationship between the Dependent Variable, *"Level KMS complexity"* and the four Independent Variables, *Leadership*, *Organisation*, *Technology* and *Learning*:

$H0_1$ = "*There is no relationship between Leadership and the level of complexity of the knowledge management system".*

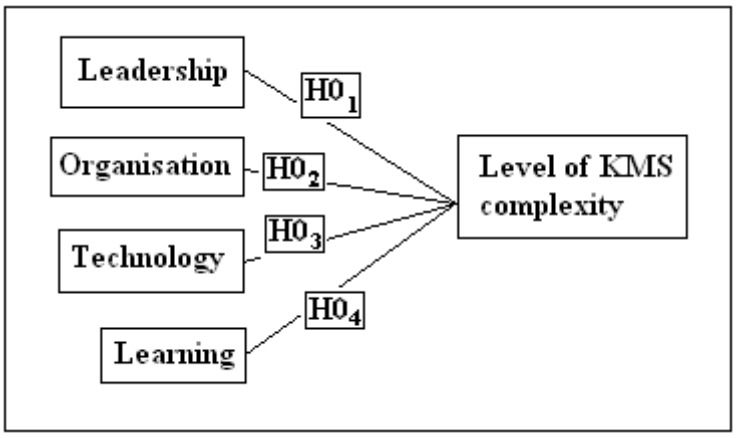
$H0_2$ = "*There is no relationship between Organisation and the level of complexity of the knowledge management system".*

HO_3 = "*There is no relationship between Technology and the level of complexity of the knowledge management system".*

$H0_4$ = "*There is no relationship between Learning and the level of complexity of the knowledge management system".*

Figure 5.2 illustrates the theoretical framework on which the quantitative data collection and analysis were based and equivalently the relationships between the Dependent Variable "*Level of complexity of KMS*" and the Independent variables."*Leadership*", "*Organisation*", "*Technology*" and "*Learning*".

Figure 5.2 - Hypothesised Model:



5.4 QUESTIONNAIRE DESIGN

Leedy (1997:196-197) states that there are key issues pertaining to questionnaire design. These guidelines were used in the design of the questionnaires used in this study and are as follows:

- Use simple and concise language;
- Do not make unrealistic demands of those who fill in the questionnaire;
- Each question should ask about only one topic;
- Each question should have no escape route, for example “don't know”, “no comment”;
- Each question should be polite;
- Be straight forward and guard against double meanings;
- Get the question order right;
- Make the layout easy to follow;
- Give clear instructions;
- Test the questionnaire first.

Two questionnaires were used in the empirical study (Appendix B and D) in order to conduct an OEM Survey and a Component Supplier Survey, respectively. The OEM Survey utilised open ended questions which were developed for the structured interviews conducted at two automotive OEMs in the Eastern Cape Province. The Component Supplier Survey was developed for the 1st tier component suppliers of the automotive OEMs in the Eastern Cape Province. The Component Supplier Survey consisted predominantly of closed questions, for statistical analysis, but also including open ended questions. A similar methodology was employed in the design of the questionnaires for the OEM Survey and the Component Supplier Survey, in that both questionnaires were developed, based on the conceptual framework which was developed from the literature study. This methodology was followed in order to provide answers to the main research problem and the hypotheses.

Design of the OEM Questionnaire

The introduction to the OEM Questionnaire (Appendix B) was designed to prepare the interviewee for answering the questionnaire by providing a confidentiality statement, benefits

of participating in the study and instructions for answering the questions. The questionnaire was divided into five sections with Section A providing Biographical information on the interviewee. Section B was designed to probe the nature of the organisation's Enterprise Resource Planning system. Sections C through E were formulated to probe the three possible orientations of knowledge management practised within the industry, i.e.:

- Section C: Knowledge management not practised by the company;
- Section D: Knowledge management practised within the company only; and
- Section E: Knowledge management shared between the company and its 1st tier suppliers.

The investigative questions of Sections C through E were formulated using the statements developed to measure the variables of the conceptual framework.

Design of the Component Supplier Questionnaire

The measurement and investigative questions of the Component Supplier Questionnaire (Appendix D) were formulated based on the measurement statements established for the variables of the conceptual framework. Existing questions from questionnaires of previous research on the subject were also consulted and modified and assimilated into this questionnaire.

The Introduction section to this questionnaire was very similar to that of the questionnaire for the OEM Survey, in that it prepared the respondent for answering the questionnaire by providing a confidentiality statement, establishing some of the benefits of participating in the study, providing clear instructions for the process of completing the questionnaire and providing a brief list of definitions and explanation of abbreviations with which the respondent might not be familiar.

The body of the questionnaire was divided into seven sections as follows:

- Section A probed the background of the respondents and their organisation and categorised the respondent's organisation according to the orientation of KM at their organisation.
- The remainder of the questionnaire was designed to probe the variables of the conceptual framework with Section B probing, *Leadership;* Section C probing,

Organisation; Section D probing, *Technology;* Section E probing, Learning; and Section F probing *Successful application of KM* by investigating the challenges which organisations face in applying KM. The Conclusion section then provided the respondent with an opportunity to request a copy of the outcome of the study.

The questionnaires were presented to and discussed with three senior academics at the NMMU, namely the research supervisor of this research study, the Head the Research Department of the Business School and the statistician of the NMMU Statistical Unit, in order to ensure the validity and reliability of the questionnaires. Following these discussions, both questionnaires were refined and updated in accordance with the input received from the aforementioned academics.

5.5 SURVEY RESPONDENTS

Two independent surveys were conducted for this research study. Firstly an OEM Survey was conducted to establish the situation of KM at the level of the OEMs within the automotive supply chain. Secondly, a Component Supplier Survey was conducted in order to establish the situation of KM at the level of 1st tier component suppliers within the automotive supply chain.

OEM Survey

On approaching the three major OEMs in the Eastern Cape, the author could successfully acquire the participation of respondents at two of the three OEMs. The parameters of interest for this survey were typically individuals who were actively using the company's KMS and liaised with suppliers via the company's information system. A one on one interview was respectively conducted at these two OEMs with the Manager of Support Services and BIO Administration and the Manager of the Information Technology Division.

Component Supplier Survey

Parameters of interest for this survey were individuals who were actively using the company's KMS. The author therefore acquired the input of the Sales Managers, Commercial Managers and other personnel of 1st tier automotive component supplying companies who

were actively using the companies KMS.

The author firstly analysed the population of component suppliers in the Eastern Cape Province by procuring a list of automotive component suppliers for the Eastern Cape Province from the National Association of Automotive Component and Allied Manufacturers (NAACAM). The listing received from NAACAM included 50 component suppliers located throughout the Eastern Cape Province. The author then proceeded to establish a listing of approved 1st tier component suppliers from the three major automotive OEMs in the Eastern Cape Province. The lists of approved 1st tier suppliers were combined and the duplicates removed from the listing. This list provided the names of 120 1st tier component suppliers in the Eastern Cape Province. This indicated that at least 70 of these suppliers had not been registered with NAACAM.

The list of 120 component suppliers was captured in a spreadsheet, along with organisational details i.e. name of company, contact numbers and addresses. This list constituted the population for this study. The listed companies were all contacted individually by telephone or cellular phone to request their participation in the study and establish the contact person at the company to whom the questionnaire should be sent. A total of 72 potential respondents agreed to participate in the study. The questionnaire (Appendix D) was sent to the 72 potential respondents and they were reminded to respond on three occasions after which a total of 38 respondents returned the completed questionnaires.

5.6 DATA COLLECTION

Qualitative data are normally understood only within context and are associated with an interpretive methodology that usually results in findings with a high degree of validity. It contrasts with quantitative data, which are normally precise, can be captured at various points in time and in different contexts and are associated with a positivist methodology that usually results in findings with a high degree of reliability (Collis and Hussey, 2009). A combination of qualitative and quantitative techniques was employed to gather data for this study.

Data collection method of the OEM Survey

The qualitative component of the data collection process relied primarily on structured interviews at two automotive OEMs in the Eastern Cape Province. Contact persons who were actively using the organisation's KMS and who had first hand contact and interaction with 1st tier component suppliers were established at the two OEMs. Structured interviews were arranged with the contact persons in which the aforementioned OEM questionnaire was used. Permission was obtained to do audio recordings of the interviews and responses were also captured, during the interview, in the form of notes.

Data collection method of the Component Supplier Survey

The Component Supplier Survey relied on the feedback of respondents from 1st tier component suppliers of automotive OEMs of the Eastern Cape Province. A cover letter (Appendix C) was compiled to:

- introduce the researcher and explain the purpose of the study;
- mention the approximate time it would take to complete the questionnaire;
- explain what the information would be used for;
- provide a link to the website where the questionnaire could be completed online;
- mention the deadline for responses;
- provide the respondents with the contact details of the researcher, in case of any queries.

The organisations on the aforementioned sample listing spreadsheet were contacted individually by telephone in order to establish names, e-mail addresses and contact numbers for the respondents at the various organisations. This was done for the purpose of getting the approval of respondents before sending them the questionnaire and also to increase the response rate. A week after the questionnaire had been sent to respondents, the author followed up, via e-mail, on all respondents who had not yet responded. Two weeks after the questionnaire had been sent to respondents, the author again followed up via email to request the feedback of all who had not yet responded. A third request for a response was sent to respondents, via e-mail, three weeks after the questionnaire had been sent.

Strengths and weaknesses of data collection methods

The strengths of the structured interviews conducted for the OEM Survey, stem from the fact that they could be conducted on a one on one basis, which allowed for clarifying any unexpected misunderstanding and maintain the context of the questions. Interviewing also allowed the researcher the opportunity to probe aspects not adequately anticipated in the questionnaire design or not adequately covered by the questions. Weaknesses of this method arise, as only a limited number of candidates could be interviewed due to the scattered geographic location of OEMs, time constraints, availability and willingness of interviewees to be interviewed.

The strengths of the data collection method used in the Component Supplier Survey, stem from the fact that most of the collection was done electronically, which allowed for relatively quick feedback to be retrieved from a sample which was geographically scattered throughout the Eastern Cape Province. The weakness of this method arose from a lack of control over the answers given by respondents, i.e. some respondents could choose to answer only certain questions in the questionnaire. Reasons for answers remained unknown or responses could be out of context.

Number of responses and response rate

The OEM Survey will not be considered in this section as both of the interviews arranged with the OEMs in the Port Elizabeth and Uitenhage areas were conducted. The Component Supplier Survey yielded a total of 38 responses from the 72 potential respondents. This equates to a response rate of 52%. Considering the reduced size of the sample, the statistician who was consulted, deemed this to be an acceptable response rate for conducting the statistical analysis.

5.7 DATA ANALYSIS

The analysis of the data from the OEM Survey was conducted using informal methods to outline general practises employed by the OEMs and establish the status of KM within these organisations. Lindlof (1995:216) notes that this approach allows the researcher to examine such things as repetitive or patterned behaviour.

The data from the Component Supplier Survey was of a quantitative nature and was analysed by a statistician of the NMMU Statistical Unit. The quantitative data retrieved from the empirical study was analysed using descriptive statistics (i.e. mean, SD, minimum and maximum values) to establish the nature of the responses, Cronbach alphas were calculated to establish the reliability of the instruments and an Analysis of Variance (ANOVA) analysis was conducted to establish p-values for testing and verifying the hypotheses.

5.8 LIMITATIONS OF THE RESEARCH METHODOLOGY

A limitation describes a weakness or deficiency in the research (Collis and Hussey, 2009). Limitations in this study are considered to be the following:

- The scope of the study was limited to the Eastern Cape Province due to geographically dispersed location of automotive OEMs and their component suppliers. This reduced the level of feedback and size of the population and sample of the study;
- A limitation of Positivism and quantitative research stems from the inability to extract further detail in new areas of interest which may be revealed by the responses of respondents.
- Sending questionnaires to respondents via e-mail limits the control which the researcher has over the response process and the number of questions must be reduced, to maintain the respondent's willingness and motivation to answer the questions;
- The researcher is limited in controlling the response rate. The researcher may be required to repeat the request and remind respondents on multiple occasions to accurately complete and return the questionnaires.

5.9 RELIABILITY AND VALIDITY

Leedy (1997:32) notes that reliability and validity are terms used in connection with measuring instruments. The integrity of the research is based on the validity and reliability of

that piece of work and, as such, it is important that the work should conform to the requirements of validity and reliability. Reliability refers to the absence of differences in the results if the research were repeated, i.e. a repeat study should produce the same results (Collis and Hussey, 2009:64). Reliability is a matter of whether a particular technique, applied repeatedly to the same object would yield the same results each time (Mouton and Babbie, 2001:119). Easterby-Smith, Thorpe and Lowe (1991) argue that reliability is a matter of stability, where concern is raised that if an instrument is administered to the same individual on two different occasions, it will yield the same result. Reliability is concerned with the findings of the research and is one aspect of the credibility of the findings; the other is validity.

Research errors, such as faulty research procedures, poor samples and inaccurate or misleading measurement, can undermine validity of an instrument. The validity of the measurement instrument is the extent to which the instrument measures what it is supposed to measure (Leedy and Ormrod, 2005:28). An effect or test is valid only if it demonstrates or measures what the researcher thinks or claims it does (Coolican, 1992). Validity is the extent to which the research findings accurately reflect the phenomena under study (Collis and Hussey, 2009:65).

Easterby-Smith *et al.*, (1991: 121) list the following three ways of estimating validity:

- face validity: which looks at whether the instrument or items are plausible;
- convergent validity: confirmation by comparing the instrument with other independent measurement procedures;
- validation by known groups: comparing groups otherwise known to be different on the factor in question.

In order to ensure reliability and validity of the results of this study, the author approached various academic experts (i.e. the Research Supervisor, Head of the Research Division at the NMMU Business School and the Statistician from the NMMU Statistical Unit) in the compilation and refinement of the questionnaires for the OEM Survey and the Component Supplier Survey.

5.10 LINKING THE QUESTIONNAIRES AND PROPOSED KM FRAMEWORK

Linking the questionnaire of the OEM Survey to the Proposed KM Framework was accomplished by considering the KM aspect with regard to the pillar (*Leadership, Organisation, Technology* and *Learning*) of the *GW Four Pillar Framework* and allocating a tick to the cells in the Proposed KM Framework (to indicate conformance with the KM aspect), or leaving a blank (to indicate non-conformance with the KM aspect).

Linking the questionnaire of the Component Supplier Survey to the Proposed KM Framework was accomplished in three dimensions by:

- considering the KM aspect of the Proposed KM Framework;
- considering the four pillars *Leadership, Organisation, Technology* and *Learning;*
- linking the identified questions of the questionnaire to the relationship being measured by the specific cells of the Proposed KM Framework.

The result is displayed in Table 5.1, to below:

Table 5.1 – Linking the questionnaire questions to the cells of the Proposed KM Framework

KM aspect	GW Four Pillar Framework			
	Leadership	Organisation	Technology	Learning
Strategic Leadership	7d,l	9d	13f	21a,i
Alignment of KM strategy to business goals	7d	7k	9c	
Organisational learning	7e,f,g	7m		7e,g,j,n, 21
Value proposition	7k	27		
Organisational KM context		7f,g, 9a,e,f,g,h,i,j	13d	
Top management support	7a			
Employee empowerment	7a,b	7b,m, 9d,f,g,h,i 13d, 21m	13d	7c,j, 9d, 21f,i,m
Organisational infrastructure		9d	9c, 13f	
Technological Infrastructure	9c	13d	13f	21f
KM governance structure and process		7h,n	13a	

5.11 SUMMARY

Collis and Hussey (2009) define a research methodology as a strategy and overall pattern of the specified methods which were applied or the approach to the process of the research. This chapter has addressed the research question (RQ_4) stating, "*How can a detailed description be provided in order to understand and reproduce this research study in future*?".

In this chapter, the author has developed and explained the research methodology in detail to convey understanding to the reader, pertaining to this research project and allow it to be reproduced in future. Equivalently, this chapter serves to outline the alignment and relationship between the Research Design (Section 1.4) and the Research Methodology and to indicate the appropriateness of the methodology followed. The following chapter will present the results of the empirical study which employed the research design and methodology which have been outlined.

CHAPTER 6: RESULTS AND ANALYSIS OF THE EMPIRICAL STUDY ON THE PROPOSED KM FRAMEWORK

6.1 INTRODUCTION

In Chapter 2 the significance of the South African automotive industry and in particular the significance of the automotive industry within the Eastern Cape and the need for improved productivity and service from automotive 1st tier component suppliers was presented. Chapter 3 has established Knowledge Management (KM) as a formidable tool to improve productivity and profitability of automotive component suppliers, where KM is practised to a far lesser extent when compared with the Original Equipment Manufacturers (OEMs) whom they supply. Chapter 4 presented KM frameworks from the literature and produced a proposed framework for the application of KM in the automotive industry at the level of 1st tier automotive component suppliers within the Eastern Cape Province and in Chapter 5 the research methodology used in this study was described.

KM in the automotive industry within the Eastern Cape Province was investigated by means of two related studies. Firstly an OEM assessment, by means of structured interviews, was conducted at two of the major automotive OEMs in the Eastern Cape Province. Secondly, a Component Supplier assessment of KM at the level of 1st tier automotive component suppliers was conducted in order to evaluate the relationships between the dependent variable *Level of complexity of the KMS* and the four independent variables, *Leadership*, *Organisation*, *Technology* and *Learning*, by testing the proposed hypotheses regarding the relationship between these variables. This chapter further evaluates the new proposed KM application framework, proposed by the author in Chapter 4, by means of an investigation of KM in the 1st tier automotive component supply industry.

This chapter will address the research question RQ_5 stating, "*How can the Proposed KM Framework be validated by empirical evaluation in the automotive industry of the Eastern Cape?"* The objective of this chapter is to conduct an empirical evaluation of the Proposed KM Framework in the automotive industry within the Eastern Cape.

Section 6.2 presents the results from the automotive OEM interviews. Section 6.2 will consist of a discussion of the common responses from OEM1 and OEM2 in Section 6.2.1; the responses specific to OEM1 and OEM2 will be discussed respectively in Section 6.2.2 and Section 6.2.3; a summary of the results from the automotive OEM interviews will then be presented in Section 6.2.4, followed by a section conclusion in Section 6.2.5. Section 6.3 will then present the results of the component supplier survey. Section 6.3 assesses the G.W. Four Pillar Framework, presented in Chapter 4 and will constitute Section 6.3.1, the presentation of the respondent background and organisational context; Section 6.3.2 , an assessment of the pillar of *Leadership*; Section 6.3.3, an assessment of the pillar of *Organisation*; Section 6.3.4, an assessment of the pillar of *Technology*; Section 6.3.5, an assessment of the pillar of *Learning*; Section 6.3.6, the evaluation of the *Proposed KM Framework*, and Section 6.3.7, a summary of the results of the component supplier survey. The Chapter will then conclude with Section 6.4, discussing derived conclusions.

6.2 RESULTS FROM THE AUTOMOTIVE OEM INTERVIEWS

Three automotive OEMs are located within the Eastern Cape Province namely, Volkswagen, located in Uitenhage, General Motors, located in Port Elizabeth and Mercedes-Benz, located in East London. These organisations were approached in order to acquire candidates for interview who could provide the input required by this research study. The criteria for selection were that interview candidates were required to:

- be in a senior management position;
- have in excess of 10 years working experience with the organisation or in the Automotive industry;
- have intricate knowledge of the ERP system;
- their job function should involve production and liaising with 1st tier suppliers;
- have at least a basic understanding of knowledge management in their organisation.

6.2.1 Common responses from *OEM1* and *OEM2*

Suitable candidates from senior management were identified at two of the aforementioned OEMs and personal interviews were conducted in order to probe KM practises at these companies. The two interviewees from the OEMs have been employed in their respective positions for less than five years but have been employed by their respective organisations and in the automotive industry for more than 10 years and were therefore able to provide valuable insight to the questions. For the sake of confidentiality, these two companies will be referred to as *OEM1* and *OEM2*. The information gathered from the structured interviews (Appendix B) have been summarised and are discussed in this sub-section.

Background Information

OEMs generally only interact with their 1st tier suppliers and do not become involved with lower level suppliers. Two-way communication between OEMs and their suppliers allows for efficiency and flexibility in planning and delivery of products. Communication with 1st tier suppliers is primarily conducted electronically via e-mail, telephone or on-line systems. An agreement exists within the South African automotive industry that all OEMs send information (i.e. orders, specifications, drawings etc.) via a central portal/hub. A third party (mediating company) named Collaborative Exchange is responsible for the conversion of information of automotive OEMs into a usable format, for their suppliers and vice versa. 1st Tier suppliers are granted limited access to the organisation's information system through Collaborative Exchange.

Enterprise Resource Planning (ERP) system

SAP R/3 is the ERP platform used by both *OEM1* and *OEM2*. SAP R/3 is a standard ERP package consisting of various modules including, finance, materials resource planning, sales and distribution, costing, etc. However, not all modules within the package are always used, as the use of specific modules depends on the organisational requirements of the package and may be used in conjunction with company-specific ERP systems (SAP, 2011). Though a newer version of the platform SAP ERP has KM capabilities, SAP R/3, at *OEM1* and *OEM2* is not used for the purpose of KM but primarily to control production. KM is practised within OEM1 and OEM2 using a group-specific knowledge management system (KMS) specifically designed for company use.

Knowledge management

During the structured OEM interviews, which employed the automotive OEM questionnaire (Appendix B), it was indicated that *OEM1* practised "KM internally only" and that *OEM2* practised KM internally but also shared knowledge with its 1st tier suppliers. The interviewees indicated that at their organisations, KMS is used essentially for avoiding repetition of mistakes, problem solving, sharing information and knowledge and locating subject matter experts (SMEs) within the international group. The KMSs of neither *OEM1* nor *OEM2* are controlled by a Central or Chief Knowledge Officer but the function is rather decentralised and KM is controlled by prescriptive policies and procedures, enforced globally within the respective organisational groups. The Intranet, in conjunction with the organisational ERP system, provides employees at both companies *OEM1* and *OEM2* access to organisational document repositories and contact with SMEs via information-sharing platforms.

Limitations of the organisational computerised systems exist in that KMS at *OEM1* and *OEM2* might not be interactive or operating live and in real time, therefore delays may occur in finding information or contacting SMEs. ERP systems tend to be more useful with simple problems of an explicit nature. More complex problems may require that SMEs physically visit the location to experience the problem first hand.

As illustrated by Juceviciene and Burksiene (2009), *Learning* occurs at three levels:

Individual

- Individuals are encouraged to use training materials available on the organisational Intranet;
- learning may occur by means of on-the-job training;
- individuals may attend on- and off-site workshops and seminars;
- job rotation and spending time abroad at sister companies help individuals, being groomed for management, to understand the functioning of the group as a whole.

Departmental

- Team members attending seminars give feedback to their departments on lessons learned from these seminars.

Organisation

- Job rotation and spending time abroad at sister companies help individuals, being groomed for management, to understand the functioning of the group as a whole and allow for proliferation of tacit knowledge, and common values and culture throughout the international group.

Formal organisational structures exist to allow flows of knowledge within the individual business units by means of cross-functional project teams who meet regularly for the purpose of decision-making. Knowledge flows through the various business units of the groups globally through the interaction of like-departments, i.e. purchasing department at one business unit (e.g. Port Elizabeth, South Africa) liaising with purchasing department at another business unit (e.g. Detroit, USA) within the group. Formal electronic platforms allow for electronic networks which permit knowledge sharing in real time. Job rotation and spending time abroad at sister companies help to transfer tacit knowledge within groups. Informal networks are formed by e-mail contacts or by contact with fellow employees in other departments who are consulted for knowledge on a specific aspect of a problem. Members of cross-functional teams or *Communities Of Practice* may contribute part of an informal network. Peers at different plants who meet at conferences and seminars may then become contacts as part of an informal network.

It was noted that senior management at *OEM1* and *OEM2* displays an active interest in the promotion and support of KM. The knowledge of experienced personnel is retained and reused by the company for future decision making by means of process mapping, process or work instructions and formal project reviews conducted at the end of all projects.

Comments on KM in 1st tier suppliers

In this study it was found that a better sharing of knowledge between component suppliers will lead to better practises in the local industry and improve the competitiveness of the local market. More competitive suppliers allow for reduced prices on components leading to an increased local content of vehicle components which helps to boost the local economy. 1st Tier component suppliers could share knowledge via the National Association of Automotive Component and Allied Manufacturers (NAACAM, 2011) as a central body and benchmarking could be used to drive the achievement of an industry standard.

6.2.2 Response specific to OEM1

Knowledge management

Employees are able to access training information through the Intranet and specialised training software allows for on-line training (documents, presentations, videos, etc.) to be conducted at your workstation. Additional KM initiatives included conducting project reviews at board level, with the focus on financial implications and lessons learned.

***Learning* at the various levels**

Individual

The learning methods for the individual level were the same as mentioned at OEM 2.

Departmental

Surveys are conducted to establish the perspective that staff have of management and where improvements could be made in management practises.

Organisation

The organisation may conduct comparisons across various plants (Benchmarking) to compare relative productivity and profitability. Senior management shows an active interest in KM initiatives, for example, all major projects are closed by a review at the board of management level to establish the financial implications of the project and ensure that lessons learned from the project are recorded for future decision-making. Monetary incentives and rewards are provided for the best ideas and monetary saving suggestions submitted by employees. Contribution of knowledge to the KMS is managed through an ideas management system whereby all employees are expected to submit at least 1 idea per annum.

Comments on KM in 1st tier suppliers

KM helps to improve supplier efficiency, productivity and profitability, leading to better service to its customers in terms of reliability, trust and relationship and promotes a good reputation in the industry.

Evaluation of OEM1 response on Proposed KM Framework

Table 6.1 presents the Proposed KM Framework, established in Chapter 4 and outlines the KM practice at OEM1. Table 6.1 indicates that OEM1 is lacking under the pillar of Leadership with regard to the KM aspect of Strategic Leadership. This results from the fact that the organisational KM practises are decentralised and not managed by a Chief Knowledge Officer. OEM1 is also lacking under the pillar of Organisation with regard to Organisational infrastructure, due to the fact that the organisation lacks a flexible organisational structure.

Table 6.1 - KM Practice at OEM1

Table Legend:

Symbol	**Description**
X	Non-conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
✓	Conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
Blank cell	No relationship exists between KM aspect and pillar of *G..W. Four Pillar Framework*

KMS complexity	**KM Aspect**	**Leadership**	**Organisation**	**Technology**	**Learning**
OEM1	Strategic Leadership	X	✓	✓	✓
	Alignment of KM strategy to business goals	✓	✓	✓	
	Organisational learning	✓	✓		✓
	Value proposition	✓	✓		
	Organisational KM context		✓	✓	
	Top management support	✓			
	Employee empowerment	✓	✓	✓	✓
	Organisational infrastructure		X	✓	
	Technological Infrastructure	✓	✓	✓	✓
	KM governance structure and process		✓	✓	
Gap analysis: (X-count)		1	1	0	0

6.2.3 Response specific to OEM2

Enterprise Resource Planning (ERP) system

The Business Warehouse module within SAP R/3, was noted as being a very useful facility as it interfaces with other in-house systems and provides historical information for event analysis. Data mining in the Business Warehousing facility within SAP also allows for location of specific explicit knowledge on a project.

Knowledge management

It was noted that the KMS was also used for sharing best practises of top-performing managers within the group. Some of the KM initiatives currently being pursued by *OEM2* is the evolution of their KMS to become live and interactive and also to establish Centres Of Excellence. KM goals are generally achieved through top-down management by formalising KM goals throughout the organisation.

At *OEM2* the organisational ERP system allows for instant messaging, posting queries on electronic notice boards and finding SMEs in a specific field. Sharing information is possible through an on-line platform (SharePoint) for posting documents. A Skype-type platform will soon be implemented at OEM2 which allows for video calls and conferencing.

Learning at the various levels:

Individual

The learning methods for the Individual level were the same as mentioned at OEM 1.

Departmental

The learning methods for the Departmental level were the same as mentioned at OEM 1.

Organisation

Organisation conducts open forum meetings with suppliers in which open two-way communication occurs, i.e. briefing of industry updates, company events, new products, improvements required from the (OEM) organisation and like-wise, improvements required from the suppliers.

Comments on KM in 1st tier suppliers

Suppliers practicing KM will be able to provide valuable input on manufacturing and design of components, leading to cost reductions. Knowledge sharing with 1st tier suppliers may become problematic if confidentiality is breached through the compromise of sensitive information. Knowledge sharing between component suppliers could also become disadvantageous to OEMs if oligopoly markets were to develop, for example in the glass industry or tyre industry.

Table 6.2 presents the KM practice at OEM2. Table 6.2 indicates that OEM2 is lacking under the pillar of Leadership with regard to Strategic Leadership concerning KM. This results from the fact that the organisational KM practices are decentralised and not managed by a Chief Knowledge Officer.

Table 6.2 - KM Practice at OEM2

Table Legend:

Symbol	**Description**
X	Non-conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
✓	Conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
Blank cell	No relationship exists between KM aspect and pillar of *G..W. Four Pillar Framework*

KMS complexity	**KM Aspect**	**Leadership**	**Organisation**	**Technology**	**Learning**
OEM2	Strategic Leadership	X	✓	✓	✓
	Alignment of KM strategy to business goals	✓	✓	✓	
	Organisational learning	✓	✓		✓
	Value proposition	✓	✓		
	Organisational KM context		✓	✓	
	Top management support	✓			
	Employee empowerment	✓	✓	✓	✓
	Organisational infrastructure		✓	✓	
	Technological Infrastructure	✓	✓	✓	✓
	KM governance structure and process		✓	✓	
Gap analysis: (X – count)		1	0	0	0

6.2.4 Summary of results from the automotive OEM interviews

Table 6.3 presents the Proposed KM Framework, compares KM practice at OEM1 (Table 6.1), OEM2 (Table 6.2) and gives an averaged indication of KM practised in the Eastern Cape Province, derived from the results obtained. The results indicate that on average, the Eastern Cape Province, at the level of the OEMs is conducting KM at a high level. Table 6.1 indicates that OEM1 and OEM2 is lacking under the pillar of Leadership with regard to KM aspect of Strategic Leadership. This results from the fact that the organisational KM practises are decentralised and not managed by a Chief Knowledge Officer.

Table 6.3 - OEM KM Practice In The Eastern Cape Province

Table Legend:

Symbol	**Description**
X	Non-conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
✓	Conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
Blank cell	No relationship exists between KM aspect and pillar of *G..W. Four Pillar Framework*

KMS complexity	**KM Aspect**	**Leadership**	**Organisation**	**Technology**	**Learning**
Average for Eastern Cape	Strategic Leadership	X	✓	✓	✓
	Alignment of KM strategy to business goals	✓	✓	✓	
	Organisational learning	✓	✓		✓
	Value proposition	✓	✓		
	Organisational KM context		✓	✓	
	Top management support	✓			
	Employee empowerment	✓	✓	✓	✓
	Organisational infrastructure		✓	✓	
	Technological Infrastructure	✓	✓	✓	✓
	KM governance structure and process		✓	✓	
Gap analysis: (X – count)		1	0	0	0

The results of the assessment at OEM1 and OEM2 reveal that they are, to a large extent conducting KM as outlined in the literature. However, improvements are required where the two organisations are lacking. Organisations OEM1 and OEM2 both reflect a lack of Strategic Leadership. However, when OEM1 is considered, the conclusion is made that the lack of Strategic Leadership, i.e. absence of a knowledge leader or champion or Chief Knowledge Officer is leading to a lack of clear and compelling KM vision and strategy, which has a secondary effect on the organisational infrastructure, that it lacks the required structural flexibility to respond and adapt rapidly to sudden market changes.

The interviewees at OEM1 and OEM2 both noted that not just their organisations but the entire value chain would benefit if their 1st tier suppliers were to practise KM among themselves. Sharing KM among 1st tier component suppliers could be driven by NAACAM as a central body and benchmarking could be used to promote the achievement of an industry standard.

6.3 RESULTS OF THE COMPONENT SUPPLIER SURVEY (1st Tier suppliers)

A population for the study was established by requesting a listing of all automotive component suppliers from the National Association of Automotive Component and Allied Manufacturers (NAACAM). The listing received from NAACAM included 50 component suppliers located throughout the Eastern Cape Province. A listing of approved 1st tier component suppliers was acquired from the three major automotive OEMs in the Eastern Cape Province. The lists of approved 1st tier suppliers were combined and the duplicates removed from the listing. This list provided the names of one hundred and twenty 1st tier component suppliers in the Eastern Cape Province, indicating that at least seventy of these suppliers were not registered with NAACAM (NAACAM, 2011).

The list of 120 (population, n=120) component suppliers was captured in a spreadsheet, along with organisational details i.e. name of company, contact numbers and addresses. This list constituted the population for this study. The listed companies were all contacted individually by telephone, cellular phone and e-mail to request their participation in the study and establish the contact person at the company to whom the questionnaire should be sent. The

listing of 120 companies yielded 72 responses agreeing to participate in the study. Respondents were reminded to respond on 3 occasions after which a total sample of 38 (n=38) respondents had returned the completed questionnaires.

The questionnaire for the Component Supplier Survey contained both open-ended and closed-ended questions. The response to the closed-ended questions of the questionnaire (Appendix D), for which descriptive statistics and inferential statistics could be established are summarised and discussed in this sub-section.

6.3.1 Background Information

The respondents required for this survey were essentially Sales managers, Commercial managers and other personnel at 1st tier component suppliers whose job function was customer orientated and who was actively involved in using the company's information system or knowledge management system (KMS).

Figure 6.1 to follow indicates the response to question 3 in Appendix D and shows that 19 responses (50%) from the total of 38 respondents appear in the category of 0-4 years. This represents a turnover rate for these positions of less than five years and indicates that valuable knowledge is being lost if the persons who were previously in these positions were not retained and either rotated to other positions or promoted by the organisation. The second highest response rate comes form those in the 10-14 years category. This category indicates eight responses (21%) from the sample which reflects a longer tenure and retention of knowledge over an extended period which corresponds with the other categories of tenure.

Figure 6.1 – Tenure in current position

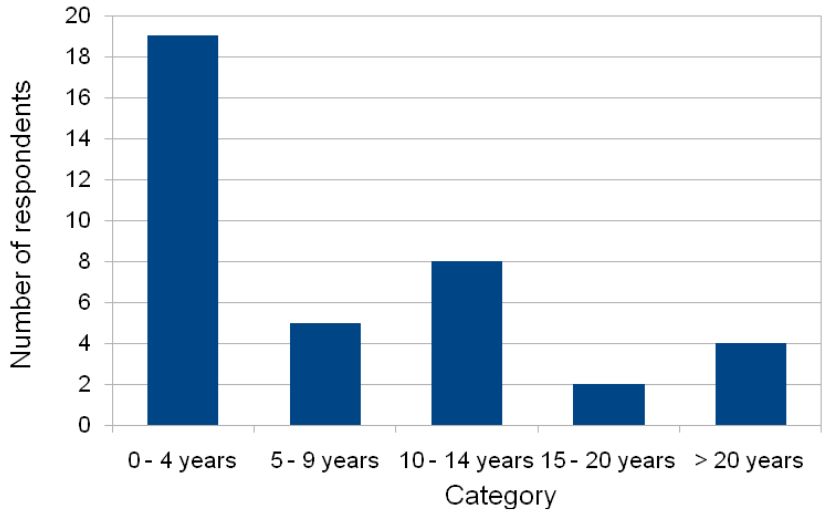


Figure 6.2 depicts the response to question 4 in Appendix D and indicates that 10 respondents (26%) have not been employed by their organisation for more than 5 years which indicates a relatively high turnover rate. However, the remaining 74% of respondents (n=28) are located in the categories ranging from 5-9 years to more than 20 years, showing extended tenure with the current organisation and therefore retention of tacit knowledge by these organisations.

Figure 6.2 – Length of employment with company

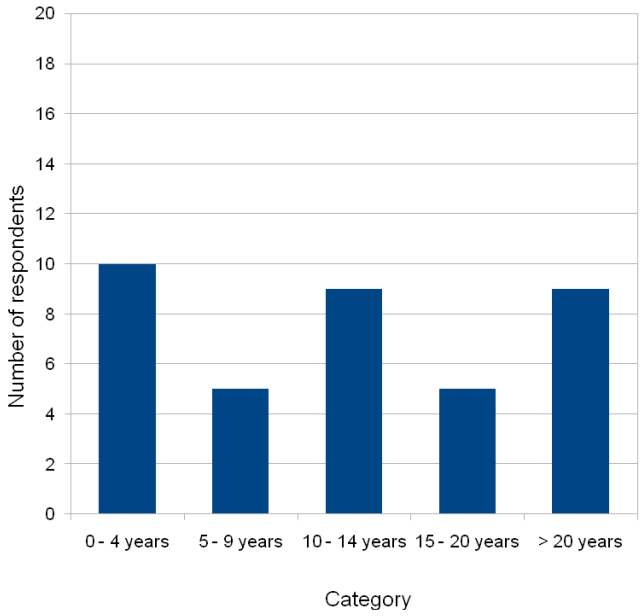


Figure 6.3 depicts the response to question 5 in Appendix D and indicates the size of 14 companies (36%) to have between 49 – 250 employees, nine respondents (24%) are from organisations in the category of 1-49 employees and nine respondents (24%) are from organisations in the category of 250-499 employees. These three categories reflect the nature of the majority (84%; n=32) of organisations in the industry, i.e. small/medium sized organisations (Kruger and Johnson, 2008; Section 3.3.5). The remaining 6 responses (16%) are from Large organisations with more than 500 employees.

Figure 6.3 – Company size

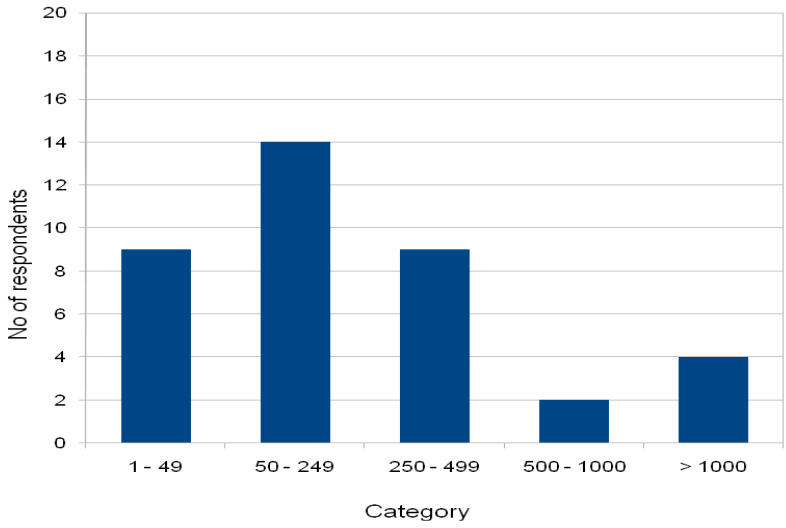


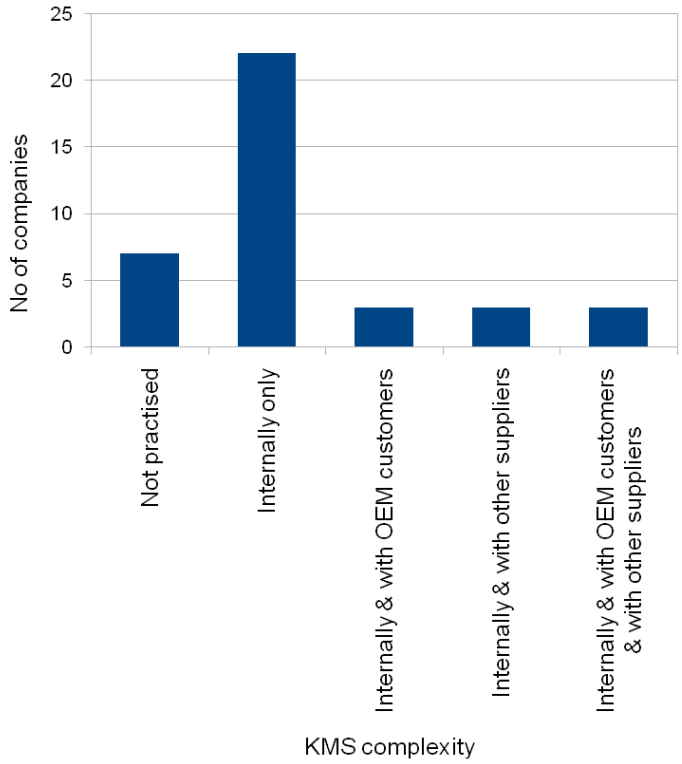
Figure 6.4 depicts the response to question 6 in Appendix D and is representative of the evolution and complexity of knowledge management systems. Figure 6.4 displays the various levels of Knowledge management system complexity. Taken in increasing order of complexity, these are:

- KM not practised (*Not practised*);
- KM practised internally only (*Internally only*);
- KM practised internally and with OEM customers;
- KM practised internally and with other suppliers;
- KM practised internally, with OEM customers and with other component suppliers.

(For statistical reasons, the last three levels have been collapsed into one level, namely KM practised internally and with other business partners in the value chain, i.e. "*Internally and with others*").

Figure 6.4 further illustrates that seven respondents (18%) have the perception that their organisation is not practising KM, 22 respondents (58%) practise KM internally only. and that the remaining nine respondents (24%) find value in sharing knowledge with strategic partners in their value chain. These trends indicate the need for a KM application framework which helps Small/Medium component suppliers to overcome challenges of applying KM and sharing KM with business partners in their supply chain.

Figure 6.4 – KMS level of complexity



6.3.2 Leadership

Section B of the questionnaire (Appendix D) was formulated to measure the independent variable "*Leadership*" in the organisations surveyed and was accomplished by means of a 5-point Likert Scale, ranging from "Strongly disagree" to "Strongly agree". Fourteen questions (7a – 7n) were designed (Appendix D - Component Supplier Questionnaire) in order to evaluate the perception of respondents on how important *Leadership* is to KM at their organisation. Due to weak correlation with the other questions, questions 7m and 7n have been omitted. The Cronbach's alpha for this construct was established as 0.91, indicating high reliability for this construct.

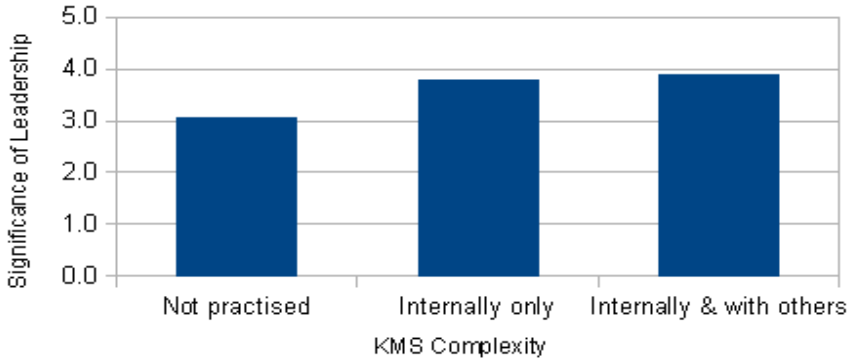
Figure 6.5 illustrates the mean values of the responses to question 7 in Appendix D, established from the descriptive statistics and shows a definite trend discernible in the perceived importance of *Leadership* across the various evolutionary levels of knowledge management system complexity. The figure indicates that as KMS complexity increases, so too does the level of significance/importance of *Leadership*, as indicated by the respective mean values:

- *Not practised*: mean score = 3.1
- *Internally only*: mean score = 3.8
- *Internally and with others*: mean score = 3.9

Considering the Null Hypothesis H_{O1}, the p-value, from the ANOVA test, for *Leadership* was calculated at p = 0.01, indicating that *Leadership* is "significant" (i.e. $p < 0.05$) and that we must reject the Null Hypothesis (H_{O1}) and accept the Alternative Hypothesis (H_{1alt}) which states that, "*There is a relationship between Leadership and the level of complexity of the knowledge management system*."

The Analysis of Variance (ANOVA) Test further revealed that a significant difference in mean values exists between the various levels of KMS complexity. The post hoc test (Tukey test) then indicated that there were significant differences between the group "*Not practised*" and the other two groups, "*Internally only*" and "*Internally and with others*". Between the two groups, "*Internally only*" and "*Internally and with others*" however, no significant difference was evident. This finding supports the fact that higher levels of *Leadership* is needed where KM is practised.

Figure 6.5 – Significance of Leadership



In small samples, such as investigated in this study, a statistically non-significant result may prove to be of practical importance. This may suggest that there is a real effect, but the sample was too small to detect it. Since analysing the means of more than two groups on a single quantitative variable is done by Analysis of Variance (ANOVA), certain statistics that usually form part of the output of such analysis are used in the calculation of an effect size index (η^2) known as eta-squared. The index is directly proportional to the size of the differences among the group means and therefore the importance of the difference or relationship. Consequently a large index will lead to concluding that the effect is "practically significant".

Steyn, (2000) proposes the following guidelines for interpretation of (η^2) values:

$\eta^2 \leq 0.035$: Small effect size, practical significance, or importance;

$0.035 < \eta^2 \leq 0.100$: Medium effect size, practical significance, or importance;

$\eta^2 > 0.100$: Large effect size, practical significance, or importance.

Calculating eta-squared (η^2) for *Leadership* yielded a value of 0.229, indicating that this variable has Large practical significance (in this case the correlation between the p-value, i.e. p = 0.01, indicating statistical significance and eta-squared value of 0.229 indicating *Large practical significance* is quite evident. However, this is not always the case).

6.3.3 Organisation

Section C was designed to measure the independent variable "*Organisation"* at the companies surveyed and was formulated to consist of a 5-point Likert scale, consisting of 10 questions (9a - 9j). Due to weak correlation with the other questions, questions 9a and 9b have been omitted. Statistical analysis of the data for this variable (*Organisation*) required that the variable be divided into 3 subcomponents, namely:

- Social networks extending outside of the organisation, i.e. "*Soc Netw (Ext)",* derived from questions 9g, 9h, 9i and 9j*;*

– Organisational infrastructure, i.e. *"Infrastructure",* derived from questions 9c and 9d; and
– Social networks existing within the organisation, i.e. "*Soc Netw (Int)*", derived from questions 9e and 9f.

Questions 9a and 9b have been omitted from the statistical analysis due to weak correlations with the other questions. Cronbach's alpha was established for "*Soc Netw (Ext)*", "*Infrastructure*", and "*Soc Netw (Int)*" respectively as 0.77, 0.77 and 0.74. These values are all above the minimum acceptable cut-off value of 0.7 and indicate that the constructs are highly reliable.

The descriptive statistics clearly indicate a trend when one considers the relative importance of the respective sub-variables, "*Soc Netw (Ext)*", "*Infrastructure*" and "*Social Netw (Int)*" in relation to the 3 evolutionary levels of KMS complexity, i.e. "*Not practised*", "*Internally only*" and "*Internally and with others*", as indicated by Figure 6.6, Figure 6.7 and Figure 6.8.

The trendlines in Figure 6.6, Figure 6.7 and Figure 6.8 indicates that the importance of the respective variables (*Soc Netw (Ext)*, *Infrastructure* and *Social Netw (Int)*) is perceived to increase as the KMS evolves from the state of *Not practised*, through *Internally only* to *Internally and with others*.

Figure 6.6 – Importance of Soc Netw (Ext)

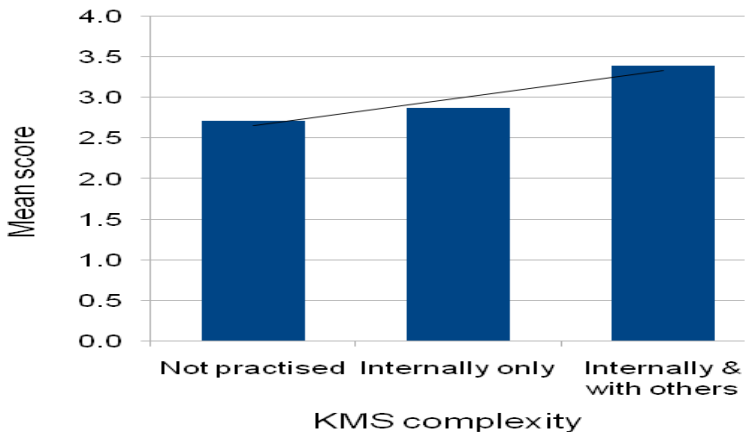


Figure 6.7 – Importance of Infrastructure

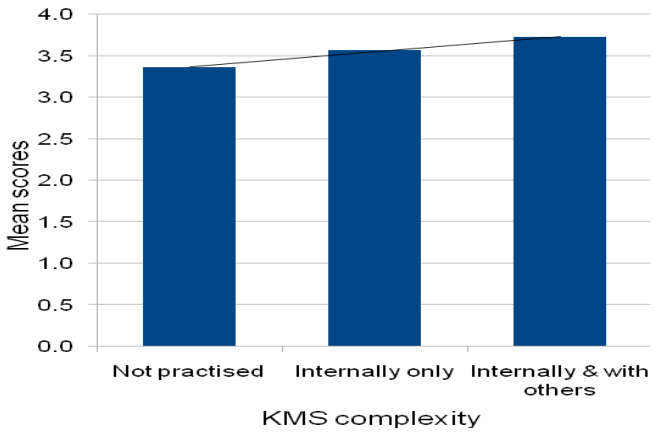
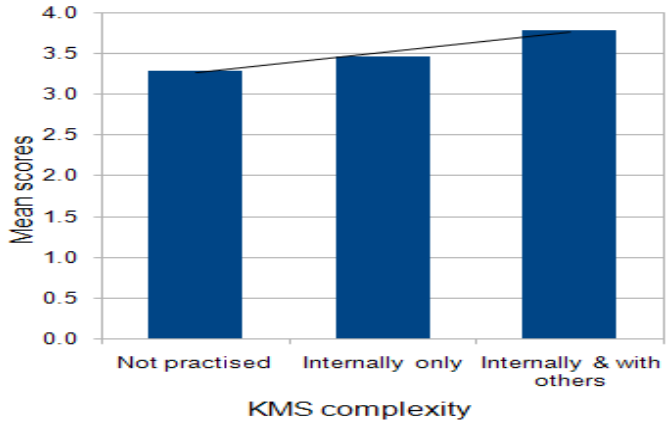


Figure 6.8 – Importance of Soc Netw (Int)



Figures 6.6, Figure 6.7 and Figure 6.8 indicate that the mean scores are positively related to the KMS level of complexity, with the mean scores increasing as KMS complexity level increases.

An ANOVA test was used to analyse the differences between the means of the three sub-variables. The p-values from the ANOVAs for the sub-variables, "*Soc Netw (Ext)*" ($p = 0.11$), "*Infrastructure*" ($p = 0.69$), and "*Soc Netw (Int)*" ($p = 0.31$) have all been established as being above the 0.05 (95%) cut-off value, indicating that these values are not significant and that we have failed to reject the Null Hypothesis (H_{02}), which states that, "There is no relationship between *Organisation* and the level of complexity of the knowledge management system."

Calculating eta-squared (η^2) for the sub-variables "*Soc Netw (Ext)*", "*Infrastructure*", and "*Soc Netw (Int)*", yielded the following results:

Soc Netw (Ext)	$\eta^2 = 0.120$	i.e. Large practical significance/importance;
Infrastructure	$\eta^2 = 0.021$	i.e. Small practical significance/importance; and
Soc Netw (Int)	$\eta^2 = 0.064$	i.e. Medium practical significance/importance.

The eta-squared values above indicate that though we have failed to reject the Null Hypothesis (H_{O2}), which states that, "*There is no relationship between Organisation and the level of complexity of the knowledge management system*", the relationship between *Soc Netw (Int)* and *Soc Netw (Ext)* with the evolutionary level of complexity of the KMS, as measured by the differences in mean scores, are still indicated as having some practical meaning.

6.3.4 Technology

Section D of the questionnaire was designed to probe the importance and use of "*Technology*" at the organisations which were surveyed. This section yielded valuable results in two questions, namely questions 11 and 13.

Question 11 was formulated to probe the type of technology used at the organisation. Table 6.4 (Most common Technologies) summarises the ranking of technologies as indicated by the responses and indicates that at lower levels of KMS complexity, technology needs of the organisation differ from those at higher levels of KMS complexity. The Internet remains the most important technological tool throughout KMS evolution and complexity. At the lowest level of KMS complexity, i.e. "*Not practised*", the Internet is followed by the organisation's Intranet, then Data management systems which is followed by E-commerce, Data warehousing, KM software, Extranet, Decision Support System and Automated Manufacturing, which are all attributed the same level of importance.

Table 6.4 below, at the KMS level of complexity, "*Internally only*", the Internet, Intranet and data management systems retain their ranking, however, the rating of the technologies which follow are then rearranged as the organisation's demands from the system evolve.

Table 6.4 further illustrates that at the final level of evolution of the KMS complexity, i.e. "*Internally and with others*", the Internet is followed, in order of ranking, by Data Management Systems, Intranet, Data Warehousing, KM Software, E-commerce, Extranet, Decision Support System and Automated Manufacturing.

Table 6.4 – Most common Technologies

Technologies listed in order of most common to least common Rating scale: % Of the group using the technology in decreasing order of industry use.					
Not Practised		**Internally Only**		**Internally And With Others**	
Rating	**Description**	**Rating**	**Description**	**Rating**	**Description**
85%	Internet	100%	Internet	100%	Internet
71%	Intranet	59%	Intranet	77%	Data Management System
42%	Data Management System	54%	Data Management System	55%	Intranet
28%	E-Commerce	31%	Data Warehousing	44%	Data Warehousing
14%	Data Warehousing	31%	Automated Manufacturing	33%	KM Software
14%	KM Software	22%	E-Commerce	22%	E-Commerce
14%	Extranet	18%	KM Software	11%	Extranet
14%	Decision Support System	9%	Decision Support System	11%	Decision Support System
14%	Automated Manufacturing	9%	Groupware	11%	Automated Manufacturing

Table 6.5 illustrates the mean scores for question 13, which were derived from the descriptive statistics for the variable, *Technology*. The mean scores for *Technology* reveals that information systems of most automotive component suppliers are not linked to those of either their automotive OEM customers nor to other automotive component suppliers and this indicates low levels of collaboration and networking among these companies. Another point of interest gleaned from the descriptive statistics is that the information systems of most companies are not accessible to all employees and indicates that knowledge, specifically tacit knowledge, is not being captured throughout these organisations and that valuable lessons learned may be lost, leading to repeated mistakes or "reinventing the wheel".

Table 6.5 – Mean scores for *Technology*

Rating statements:	**Mean Score**
a) Information which is stored in the company information system is managed to ensure validity, reliability and that information is up to date.	3.8
b) Our organisation's information technology system is linked to that of our automotive Original Equipment Manufacturer (OEM) customers.	3.1
c) Our organisation's information technology system is linked to that of other Automotive Component Suppliers.	2.5
d) The organisational information system is accessible throughout the company to all employees.	2.9
e) Our organisation's information technology system provides reports on its usage and performance to management staff.	3.5
f) Our organisation's information and communications technology system has flexibility to meet future changes in requirements.	3.5
g) Security features in our organisational information system ensure that critical information is not compromised and leaked to external sources.	4.0

It is of interest to note that no Cronbach's alpha could be established for *Technology* as the measuring statements were varied, measuring various aspects of *Technology* within the organisation and did not correlate well with each other. However, the statements in question 13 were positively related to the importance of *Technology* to KM at the organisation, i.e. low mean scores (below 3) would indicate low importance of *Technology* and high mean scores (above 3) would indicate high importance of *Technology* to KM at the organisation. The descriptive statistics for question 13 yielded relatively high mean scores, indicating a significantly high level of importance for *Technology* to KM at the organisation. Analysing the mean scores for *Technology* across the various evolutionary levels of KMS complexity, however, produced no trend of increase in mean score with an increase in KMS complexity as established with the previous two variables *Leadership* and *Organisation*.

Table 6.6 below illustrates the significance of the variable, *Technology* to the evolutionary level of KMS complexity. The p-values (refer to Table 6.6) obtained from the ANOVA test for question 13 were all above the cut-off of 0.05 (95%) and is an indication of non significance for *Technology* in relation to the evolutionary level of complexity of the KMS. We therefore fail to reject the Null Hypothesis (H_{O3}) stating that, "*There is no relationship between Technology and the level of complexity of the knowledge management system*".

Table 6.6 – Significance of *Technology*

Significance of *Technology*				
Question 13	**p-Value**	**Statistical Significance**	**eta-squared**	**Practical Significance**
a) Information which is stored in the company information system is managed to ensure validity, reliability and that information is up to date.	0.54	Non-significant	0.034	Small
b) Our organisation's information technology system is linked to that of our automotive Original Equipment Manufacturer (OEM) customers.	0.68	Non-significant	0.022	Small
c) Our organisation's information technology system is linked to that of other Automotive Component Suppliers.	0.49	Non-significant	0.040	Medium
d) The organisational information system is accessible throughout the company to all employees.	0.75	Non-significant	0.017	Small
e) Our organisation's information technology system provides reports on its usage and performance to management staff.	0.96	Non-significant	0.002	Small
f) Our organisation's information and communications technology system has flexibility to meet future changes in requirements.	0.53	Non-significant	0.036	Medium
g) Security features in our organisational information system ensure that critical information is not compromised and leaked to external sources.	0.41	Non-significant	0.050	Medium

The eta-squared values in Table 6.6 indicate that though we have failed to reject the Null Hypothesis, the relationship between *Technology* and the evolutionary level of complexity of the KMS, as measured by the differences in mean scores from the ANOVA test, is still indicated as being of medium practical significance or importance in three cases (13c, 13f and 13g: Appendix D)".

6.3.5 Learning

Section E was designed to evaluate the significance of the independent variable *Learning* to KM at the organisations surveyed. Section E consisted of open ended questions and closed questions. The results of the closed question, question 21, have allowed for statistical evaluation which has been summarised and is discussed in this Subsection. The Cronbach's

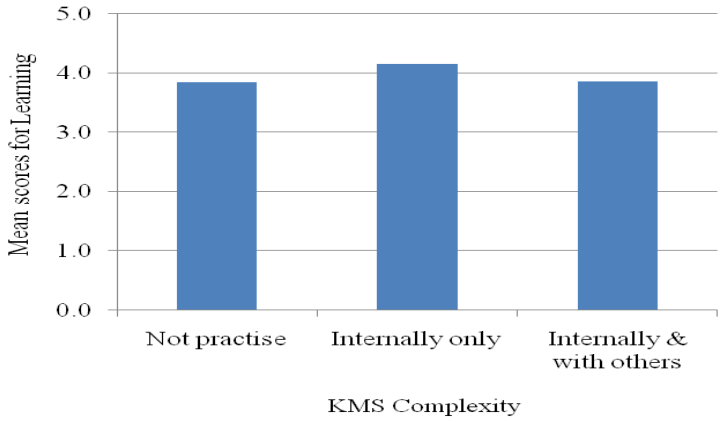
alpha for this construct has been established at 0.94 which is above the cut-off value of 0.7 and indicates that this construct is highly reliable. Table 6.7 (Mean scores for Learning) reveals relatively high mean values throughout, indicating that Learning is perceived by respondents as being of high importance to practising KM in their organisation.

Table 6.7 – Mean scores for *Learning*

Rating statements:	**Mean scores**
a) Improving the company's competitive advantage.	4.4
b) Improving customer satisfaction.	4.4
c) Introducing innovations.	4
d) Inventory reductions.	3.6
e) Reduction of waste.	3.9
f) Employee training and development.	4.1
g) Cost reduction.	4.1
h) Revenue growth.	4.2
i) Better decision-making.	3.9
j) Faster response to key business issues.	4
k) Improving quality.	4.3
l) Reducing throughput and delivery time.	4
m) Improving worker efficiency or productivity.	4
n) Prevented duplicate research and development.	3.7
o) Develop new measures and metrics for processes.	3.7

Figure 6.9 (Importance of Learning) presents the mean scores for the perceived importance of *Learning* in the various evolutionary levels of KMS complexity at the organisations surveyed. No incrementally increasing trend is present across the KMS complexity levels in Figure 6.9, indicating that the importance of *Learning* does not increase with an increase in the evolutionary complexity of the KMS.

Figure 6.9 – Importance of *Learning*



An ANOVA was performed to test whether the *Learning* means for the three groups differ significantly. A p-value of 0.39 was obtained, indicating that we fail to reject the Null hypothesis (H_{04}) which states: "*The three Learning means are equal*". Equivalently, this hypothesis states that "*There is no relationship between Learning and the level of complexity of the knowledge management system*". Calculating the effect size measure, eta-squared for this variable, a value of 0.052 was obtained, indicating that although the relationship is not statistically significant, it can be seen as having some practical importance since an eta-squared value of 0.052 can be interpreted as "medium".

6.3.6 Evaluation of Proposed KM framework

The Proposed KM Framework (Table 4.5 - Alignment of KM aspects with Four Pillars), established in Chapter 4 will now be used to compare the conformance of the 1st tier automotive component suppliers to the application of the KM aspects as outlined by the literature and listed in the proposed framework. A "Gap analysis" is conducted by calculating the mean score for the KM aspects in the framework using the Component Supplier Questionnaire statements (Appendix D) as per Table 5.1. Mean scores above 3 indicate that respondents' organisations are practising the KM aspect being measured (indicated by "✓"). A value of 3 or less than 3 indicates that respondents are either unsure if the KM aspect is being practised or are not practising the KM aspect at their organisation (indicated by "X", i.e. a gap for improvement exists). The Gap analysis is concluded by adding the X-values, firstly vertically, to establish the number of gaps in each pillar of the G.W. Four Pillar

Framework and secondly horizontally to establish the number of gaps in each KM aspect of the KM practice of the organisation. Table 6.8 (Table layout of comparison of KMS complexity) outlines the KM aspects as indicated by literature and the scoring if all KM aspects were being practised.

Table 6.8 – Table layout for comparison of KMS complexity

Table Legend:

Symbol	**Description**
X	Non-conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
✓	Conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
Blank cell	No relationship exists between KM aspect and pillar of *G..W. Four Pillar Framework*

KMS complexity	**KM Aspect**	**Leadership**	**Organisation**	**Technology**	**Learning**	**Gap analysis: (X – count)**
Baloh and Desouza (2009); Skyrme (1997); and Sajeva and Jucevicius (2010);	Strategic Leadership	✓	✓	✓	✓	**0**
	Alignment of KM strategy to business goals	✓	✓	✓		**0**
	Organisational learning	✓	✓		✓	**0**
	Value proposition	✓	✓			**0**
	Organisational KM context		✓	✓		**0**
	Top management support	✓				**0**
	Employee empowerment	✓	✓	✓	✓	**0**
	Organisational infrastructure		✓	✓		**0**
	Technological Infrastructure	✓	✓	✓	✓	**0**
	KM governance structure and process		✓	✓		**0**
Gap analysis: (X – count)		**0**	**0**	**0**	**0**	**0**

Table 6.9 (Not Practised), Table 6.10 (Internally only) and Table 6.11 (Internally and with others) present the results of the KM aspects with regard to the four pillars as practised by 1st tier automotive component suppliers of the Eastern Cape. These three tables indicate the progressive improvement in the state of the organisational KMS and likewise, the improvements in the KM aspects and pillars of the G.W. Four Pillar Framework as KM at the organisation evolves from *Not Practised* through *Internally only* to *Internally and with others*. The results and Gap analysis in Table 6.9, Table 6.10 and Table 6.11 indicate that lower levels of KMS complexity (i.e. Not practised and Internally only) exhibit many gaps, compared to the level of *Internally and with others*, indicating low conformance with KM as

prescribed by literature and that there is a great need for improvement in their KM practises

Table 6.9 – Not Practiced

Table Legend:

Symbol	**Description**
X	Non-conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
✓	Conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
Blank cell	No relationship exists between KM aspect and pillar of *G..W. Four Pillar Framework*

KM Aspect	Leadership	Organisation	Technology	Learning	Gap analysis:
Strategic Leadership	X	✓	X	✓	**2**
Alignment of KM strategy to business goals	X	X	X		**3**
Organisational learning	X	X		X	**3**
Value proposition	X	X			**2**
Organisational KM context		X	X		**2**
Top management support	X				**1**
Employee empowerment	X	X	X	✓	**3**
Organisational infrastructure		✓	X		**1**
Technological Infrastructure	X	X	X	✓	**3**
KM governance structure and process		X	✓		**1**
Gap analysis: (X – count)	**7**	**7**	**6**	**1**	**21**

Table 6.10 – Internally only

Table Legend:

Symbol	**Description**
X	Non-conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
✓	Conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
Blank cell	No relationship exists between KM aspect and pillar of *G..W. Four Pillar Framework*

KM Aspect	Leadership	Organisation	Technology	Learning	Gap analysis:
Strategic Leadership	✓	✓	X	✓	**1**
Alignment of KM strategy to business goals	X	✓	X		**2**
Organisational learning	✓	X		✓	**1**
Value proposition	✓	X			**1**
Organisational KM context		X	X		**2**
Top management support	✓				**0**
Employee empowerment	✓	X	X	✓	**2**
Organisational infrastructure		✓	X		**1**
Technological Infrastructure	X	X	X	✓	**3**
KM governance structure and process		✓	✓		**0**
Gap analysis: (X – count)	**2**	**5**	**6**	**0**	**13**

Table 6.11 – Internally and with others

KM Aspect	Leadership	Organisation	Technology	Learning	Gap analysis:
Strategic Leadership	✓	✓	✓	✓	**0**
Alignment of KM strategy to business goals	✓	✓	X		**1**
Organisational learning	✓	✓		✓	**0**
Value proposition	✓	X			**1**
Organisational KM context		✓	X		**1**
Top management support	✓				**0**
Employee empowerment	✓	✓	X	✓	**1**
Organisational infrastructure		✓	✓		**0**
Technological Infrastructure	X	X	✓	✓	**2**
KM governance structure and process		✓	✓		**0**
Gap analysis: (X – count)	**1**	**2**	**3**	**0**	**6**

Considering the four pillars Leadership, Organisation, Technology and Learning

It is of interest to note that the largest number of gaps (X=7) at the KMS level of complexity of *Not practised* (Table 6.9) are located in the pillars of *Leadership* and *Organisation.* This is typical of a trend reflecting that the lack of Strategic Leadership, which results in a lack of vision, KM strategy and planning, is leading to inadequate organisational infrastructure. Inadequate organisational infrastructure, in turn, results from a lack of physical assets and resources and equivalently a lack of human resources to manage those physical resources, which is typical of Small/Medium organisations as stated in the literature (Pontz *et al.*, 2010). This is also reflected by the large gaps (X=6) in the pillar of *Technology,* at this level of KMS complexity.

Another point of interest is that the pillar of *Learning* reflects a low number of gaps at the KMS level of complexity of *Not practised* (Table 6.9). The KMS aspects correlating with *Learning,* (i.e. *Strategic Leadership, Employee Empowerment* and *Technological Infrastructure*) reflect no gaps, even at this low level of KMS complexity. However, the KMS aspect of *Organisational learning* indicates a gap where improvement is required. Low levels of *Learning* at *Organisational learning* here reflect the need to improve the state of the organisational KMS.

The second level of KMS complexity, *Internally only* (Table 6.10) indicates reduced gaps as the level of organisational KM practice improves. Significant levels of improvement at this level are indicated in the pillar of *Leadership,* an improvement from X=7 to X=2. Noted changes in the Gap analysis are reflected in most of the KM aspects correlating with *Leadership,* however, *Alignment of KM strategy to business goals* and *Technological infrastructure* continue to reflect gaps and room for improvement in KM.

The pillar of *Organisation* at the level of *Internally only* (Table 6.10) reflect improvements in the areas of *Alignment of KM strategy to business goals* and *KM governance structure and process*, indicating logical improvements in KM as the KMS evolves from *Not practised* to *Internally only*. No improvement is noted in the pillar of *Technology* at this stage. This is indicative of a strategy of leveraging the present technology within the organisation while assessing system requirements before upgrading the ERP and other technological systems to improve efficiency and effectiveness. A change is noted at this point in the pillar of *Learning*

with regards to the KM aspect of *Organisational learning*, as organisations realise the benefit of leveraging their human and intellectual capital.

At the KMS level of complexity of *Internally and with others,* (Table 6.11) Leadership is noted to have an improvement in *Alignment of KM strategy to business goals,* however, a gap remains in the *Technological infrastructure.* The pillar of *Organisation* displays a large improvement from X=5 to X=2. These improvements are reflected in the KM aspects of *Organisational learning, Organisational KM context* and *Employee empowerment*. These improvements reflect improvements in organisational culture, i.e. acquisition of a knowledge sharing culture, vital for effective and efficient KM in the organisation (Figure 3.4, Stankosky, 2005:5).

A great improvement is evident in the pillar of *Technology* at this stage as the Gap analysis for Technology improves from X=6 to X=3. KM aspects showing improvement are *Strategic leadership, Organisational infrastructure* and *Technological infrastructure*. These improvements are evident of an established KM vision, goals and strategy resulting from the improvement in *Strategic leadership* with regard to *Technology* and improvements and investment in the *Organisational infrastructure* and *Technological infrastructure* of the organisation.

Considering the KM aspects

At the KMS level of complexity of *Not practised* (Table 6.9), the Gap analysis reflects many areas for improvement across all KM aspects. Evolving from *Not practised* (Table 6.9) to *Internally only* (Table 6.10), a large improvement occurs in *Organisational learning*, evident in transformations in organisational ability to conduct KM processes i.e. Identification, Acquisition, Creation, Storage, Dissemination and Application of knowledge (Sajeva and Jucevicius, 2010). Other improvements are noted in the KM aspects of *Strategic leadership* (i.e. improved KM vision, goals, strategy and planning), *Value proposition* (linking KM to business bottom-line/profit), *Top management support* (i.e. Top management visibly supporting KM initiatives to promote buy-in by lower levelled staff), *Employee empowerment* (i.e. empowering employees to become self-driven in achieving KM goals), *KM governance structure and process* (i.e. standardised structures and processes for conducting KM).

At the KMS level of complexity of *Internally and with others* (Table 6.11) major improvements are evident in the *Alignment of KM strategy to business goals*. At this level of KMS evolution, it is evident that top management have been convinced of the benefits of KM and the value proposition of achieving improved bottom-line (profit) through the use of KM. KM goals are therefore aligned with business goals to enhance organisational performance.

Recommended action for correcting gaps:

Note: In order to illustrate the procedure for establishing the recommended actions to correct the gaps in KM practice at an organisation, Table 6.11 will be used as a working example. (see also Section 7.4)

Example:

Steps:

1. Assess Table 6.11 and establish the positions of "X" in the Table.
2. Overlay the positions of X to Table 7.3 (Guide to Recommended Actions) to establish the numbers to be used. The positions of "X" in Table 11 correlate with those of numbers 7, 14, 19, 27, 29 and 30 in Table 7.3.
3. Look up the numbers in the *List of recommended actions,* as indicated in Section 7.4.
4. The recommended actions for Table 6.11 are as follows:

Number 7

– Ensure flexibility of the technological infrastructure to enable quick changes and ensure the success of various projects or initiatives.

Number 14

– Reward knowledge sharing.

Number 19

– Grant restricted access to the organisational information system to all employees throughout the company.

Number 27

– Ensure that the organisational information system is accessible throughout the company to all employees.

Number 33

– Ensure flexibility of the technological infrastructure to enable quick changes and

ensure the success of various projects or initiatives.

Number 34

- Ensure that the organisational information system is accessible throughout the company to all employees.

6.3.7 Validity of the proposed Framework

The applicability and validity of the Proposed KM Framework used, in conjunction with the Component Supplier Questionnaire (Appendix D), and the List of recommended actions (Section 7.4) have been proven by the results obtained from the investigation of KM aspects in relation to the four pillars of the G.W. Four Pillar Framework, as practised by 1st tier automotive component suppliers. The framework has accurately indicated the variation in KM aspects, as they relate to the G.W. Four Pillar Framework, practised at the various evolutionary levels of KMS complexity. It accurately displays gaps in the organisational KM practice, directing leadership or management where to apply their focus in order to improve their KMS and avoid wasted efforts, by providing recommended actions (List of recommended actions – Section 7.4). This framework exhibits trends which outline the progressive improvements in the Four Pillars of KM, and related KM aspects, across the levels of KMS.

6.3.8 Significance of the Proposed KM Framework

The Proposed KM Framework has proven to have the potential of becoming a valuable instrument if deployed in the automotive industry of the Eastern Cape. The framework enables the practitioner to identify gaps accurately in the organisational KM practice and provides recommended actions to focus efforts to eliminate gaps in the KM practice and ultimately improve the organisation's bottom-line.

6.3.9 Summary of the results of the component supplier survey

The results of the 1st tier automotive component supplier survey have highlighted a high turnover in the positions of Sales and customer related management (as indicated by the positions held by respondents), indicating a loss of valuable tacit knowledge. The majority of 1st tier automotive component suppliers are Small to Medium in size, which in most instances indicates a lack of financial, physical and human resources (Pontz *et al.*, 2010). These organisations tend to lack the resources required for the application of an efficient and effective KMS.

The survey has shown that the 1st tier automotive components supply industry can be divided into 3 distinct areas of knowledge management complexity, namely KM not practised by the organisation (Not practised), KM practised internally only (Internally only) and KM practised internally and shared with strategic partners in their value chain (Internally and with others).

The pillars of the G.W. Four Pillar Framework, *Leadership*, *Organisation*, *Technology* and *Learning*, have been empirically evaluated and the hypotheses tested. The assessment of *Leadership* revealed a high correlation between *Leadership* and the level of complexity of the knowledge management system (KMS) at the organisations surveyed. *Leadership* exhibited low significance at low levels of KMS complexity (i.e. Not practised) and high levels of significance at higher levels of KMS complexity (i.e. Internally and with others). Assessing the hypothesis for the variable, *Leadership*, led to the Null hypothesis being rejected, indicating that a relationship existed between the variable, *Leadership* and the *level of KMS complexity*.

Assessing the other three variables *Organisation*, *Technology* and *Learning*, led to a failure to reject the Null hypotheses of these variables, indicating that there was no relationship between the variables *Organisation*, *Technology* and *Learning* and the level of complexity of the KMS. The fact that 1st tier component suppliers did not practise the variables of *Organisation*, *Technology* and *Learning* may have caused this result, equivalently, the result may be caused by lack of insight of managers, at the organisations surveyed, into the importance of these variables to KM productivity and profitability in their organisations.

The assessment of Technology further revealed a positive relationship between the evolution of the technological needs of the organisation and the evolution of the complexity of the KMS. The assessment revealed that *Learning* is considered as highly significant to KM in the organisation, as indicated by the mean values in the descriptive statistics, however no trend or correlation could be established between *Learning* and the level of complexity of the KMS, indicating that *Learning* is important to KM regardless of the *level of KMS complexity*.

The applicability and validity of the proposed KM framework has been verified by comparing the KM aspects practised by organisations, across the three levels of KMS complexity. The evaluation revealed definite trends, as gaps were reduced with an evolutionary improvement in the *level of KMS complexity,* indicative of transformations within the organisation to align their KM strategy to business goals and leverage KM to deliver an improved bottom-line. The proposed framework is a new contribution to the literature and body of knowledge of management and may serve as a valuable instrument for assessing the knowledge management status of organisations in the automotive industry.

Table 6.12 (Summary of results) presents a summary of Tables 6.9, 6.10 and 6.11, displaying the Gap analysis conducted on the four pillars and on the KM aspects. A point of interest in Table 6.12 is the two-dimensional trend (four pillars; KM aspects) in the reduction of gaps as progress is made from *Not practised* through *Internally only* to *Internally and with others.* Table 6.12 displays a definite reduction in gaps and an improvement in organisational KM practice as organisations progress through the levels of KMS complexity.

Table 6.12 - Summary of results

Table Legend:

Symbol	**Description**
X	Non-conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
✓	Conformance with KM aspect and pillar of *G..W. Four Pillar Framework*
Blank cell	No relationship exists between KM aspect and pillar of *G..W. Four Pillar Framework*

	KM Aspect	Leadership	Organisation	Technology	Learning	Gap analysis:
Not practised	Strategic Leadership	X	✓	X	✓	**2**
	Alignment of KM strategy to business goals	X	X	X		**3**
	Organisational learning	X	X		X	**3**
	Value proposition	X	X			**2**
	Organisational KM context		X	X		**2**
	Top management support	X				**1**
	Employee empowerment	X	X	X	✓	**3**
	Organisational infrastructure		✓	X		**1**
	Technological Infrastructure	X	X	X	✓	**3**
	KM governance structure and process		X	✓		**1**
Gap analysis: (X – count)		7	7	6	1	**21**
Internally only	Strategic Leadership	✓	✓	X	✓	**1**
	Alignment of KM strategy to business goals	X	✓	X		**3**
	Organisational learning	✓	X		✓	**1**
	Value proposition	✓	X			**1**
	Organisational KM context		X	X		**2**
	Top management support	✓				**0**
	Employee empowerment	✓	X	X	✓	**2**
	Organisational infrastructure		✓	X		**1**
	Technological Infrastructure	X	X	X	✓	**3**
	KM governance structure and process		✓	✓		**0**
Gap analysis: (X – count)		2	5	6	0	**13**
Internally and with others	Strategic Leadership	✓	✓	✓	✓	**0**
	Alignment of KM strategy to business goals	✓	✓	X		**1**
	Organisational learning	✓	✓		✓	**0**
	Value proposition	✓	X			**1**
	Organisational KM context		✓	X		**1**
	Top management support	✓				**0**
	Employee empowerment	✓	✓	X	✓	**1**
	Organisational infrastructure		✓	✓		**0**
	Technological Infrastructure	X	X	✓	✓	**2**
	KM governance structure and process		✓	✓		**0**
Gap analysis: (X – count)		1	2	3	0	**6**

6.4 CONCLUSIONS

This chapter has presented the analysis of the results for the empirical evaluation of KM at the level of 1st tier component suppliers of automotive OEMs within the Eastern Cape. The analysis of the two OEM interviews revealed that OEMs interact primarily with 1st tier component suppliers and do not interact with lower levels of suppliers in the supply chain. Their communication with these component suppliers is essentially in electronic format via e-mail, by telephone or via the electronic file interchange of *Collaborative Exchange*. The inventory control software SAP R/3, which is widely used in the industry is primarily used as an ERP tool for production control and is not used for KM. SAP R/3 is supplied as an ERP package with various modules which are used as the requirements of the organisation dictate. OEM1 and OEM2 have indicated that the Business warehousing module within SAP R/3 is very useful with regard to accessing historical information and conducting event analysis.

KM at the two OEM companies is essentially used for sharing information and knowledge within the business unit and also with the international group. Software provides the platform for the KMS, however delays may occur where networks are not live and operating in real time. Training software is simplified and can be accessed by employees at their leisure. Learning practises at these organisations concurred with literature (Juceviciene and Burksiene, 2009; Grundstein and Rosenthal-Sabroux, 2007) in that learning occurs essentially at three levels; individual, group and organisational. Organisational learning at OEM1 and OEM2 leads to an increase in individual knowledge via training and development to reinforce competencies. Individual competencies are converted to a collective knowledge through interactions, dialogue, discussion, exchange of experiences and observations (tacit knowledge). Knowledge of experienced personnel is captured explicitly by means of artefacts such as process maps, process instructions and training videos and project reviews, for the purpose of future decision making.

Formal and informal networks at OEM1 and OEM2 further promote the flow of knowledge throughout the organisation. However, senior management must lead by example and display an active interest in the promotion of KM through top-down management in order for KM initiatives to be a success. Benefits arise and are passed along the value chain when 1st tier suppliers implement KM within their organisations and between themselves, however,

problems may arise if access to knowledge is misused and confidentiality breached. A finding from the interviews with the OEMs was that the 1st Tier component suppliers could share knowledge via the NAACAM as a central body and benchmarking could be used to drive the achievement of an industry standard.

The analysis of the quantitative data obtained from the empirical study revealed that respondents have a high turnover rate of less than 5 years in their position, indicating a low level of retention of tacit knowledge in these management positions, if managers, previously in these positions, were not rotated or promoted by the organisation. The majority of respondents (74%; n=28) indicated extended tenure in their respective organisations. This translated into a high retention of tacit knowledge within these organisations and might be an indication that employees are in fact rotated or promoted and are not lost by these organisations. The nature of most (84%; n=32) organisations, as indicated by respondents, is "Small" to "Medium" in size. This reflects the ability of these organisations in terms of their technological resources and human resources available to manage these resources (Pontz, Grauer, Metz and Karadgi, 2010; Section 3.3.2). The data reflects that 58% (n=22) of respondents are practising KM internally only, 18% (n=7) are not practising KM and 24% (n=9) are practising KM internally and with others in the value chain. This indicates that KM has proliferated throughout the industry within the Eastern Cape but that it is not yet operating at advanced levels of efficacy.

ANOVAs were conducted on the data for the four variables *Leadership*, *Organisation*, *Technology* and *Learning* in order to test the hypotheses which were formulated for these variables. The ANOVAs revealed that, of the four variables, only *Leadership* proved to be significant and has a relationship with the dependent variable level of KMS complexity. This finding revealed that the significance of the variables *Organisation*, *Technology* and *Learning* do not vary as the KMS evolves through the levels of *Not practised*, *Internally only* and *Internally and with others*. However, the eta-squared (η^2) tests on these variables revealed that they tend to retain their *Practical significance* with regard to KM of the organisation.

The results of the empirical evaluation indicate that *Technology* needs (i.e. Internet, Intranet, Extranet, etc.) of the organisation evolves with the level of complexity of the KMS. The mean values from the descriptive statistics for question 11 indicated that information systems

of most automotive component suppliers are not linked to those of their OEM customers, nor those of other suppliers (indicative of low levels of collaboration and networking among these companies, a necessary factor for competitive advantage). The information systems of most component suppliers are not accessible to all employees (Their ability to capture tacit knowledge and lessons learned is reduced and this may lead to repeated mistakes).

Conducting a secondary comparison on the results of the OEM comparison (Table 6.3) and the 1st tier component supplier comparison (Table 6.11), using the Proposed KM Framework led to the following findings and conclusions:

- The strong variation of gaps in KM practice between the 1st tier groups, *Not practised*, *Internally only* and *Internally and with others*, firstly, emphasises the need for a central body, such as NAACAM, which can drive an industry standard for KM throughout the Eastern Cape through the process of benchmarking. Secondly, this finding also emphasises the need for a file interchange such as Collaborative Exchange, to bridge the gap between the two contexts of KM occurring at the OEM and at the 1st tier component suppliers. These tend to lack Technological infrastructure, to a certain degree, at all levels of KMS complexity.
- The difference in the gap analysis between Table 6.3 (KM Practice In The Eastern Cape Province) and Table 6.11 (Internally and with others) reveals a number of gaps and misalignment between the OEMs, who are practising KM at a very high level, compared to that of the 1st tier component suppliers of these OEMs. This becomes evident when the nature of the KM gaps at these two levels within the automotive supply chain is evaluated. Analysis of the nature of the OEM and 1st tier problems, reveals that the OEM problems are of a higher level and involve leadership issues. The instrument for recommending corrective actions (List of recommended actions – Section 7.4) indicates that leadership is required to establish a strategic vision and goals for KM and identify and protect strategic knowledge (i.e. intellectual property) present within the company. The gaps in KM practice of 1st tier suppliers are of a lower level, indicating that KM gaps are related to organisational and technological infrastructure. The instrument for recommending corrective actions (List of recommended actions – Section 7.4) indicates that 1st tier suppliers should ensure flexibility of the technological infrastructure, provide rewards and incentives for knowledge-sharing, provide access to the organisational information system

throughout the organisation and grant employees restricted access to it.

This chapter has evaluated the relationships between the dependent variable "Level of complexity of the KMS" and the four independent variables, "Leadership", "Organisation", "Technology" and "Learning", by testing the proposed hypotheses regarding the relationships between these variables. The proposed KM framework established in Chapter 4 has been evaluated and its applicability and validity proven. In the following chapter the major findings of this study will be outlined. A final proposed model will be presented and recommendations for application of KM at the level of 1st tier automotive component suppliers will be made.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

The South African automotive industry is presently a minor contributor to the global automotive output but a giant locally, viewed widely as being second only to the mining industry. The Eastern Cape plays a vital role in the South African economy as it is considered the "Detroit of South Africa". Promoted by its Industrial Development Zones (IDZs), the Eastern Cape is a favourable location for investment by automotive manufacturers.

The need for productivity in the automotive industry has generated a growing interest in the concept of Knowledge Management (KM). KM is the development of tools, processes, systems, structures and cultures explicitly to improve the creation, sharing and use of knowledge critical for decision making. The effective use of KM helps organisations to improve the quality of their decision making and correspondingly reduce costs and increase efficiency (Kinicki & Kreitner, 2008). Various KM frameworks are presented in the literature and they are generally descriptive or prescriptive in nature (Holsapple and Joshi, 1999). Most automotive Original Equipment Manufacturers (OEMs) have made some attempt at KM initiatives, and these attempts have been well-documented. However, among the automotive component suppliers, little evidence exists of attempts at KM (Piderit, 2007).

The main objective of this research study was to develop a Framework for Knowledge Management in automotive component manufacturers within the Eastern Cape. This was accomplished sequentially by establishing the importance of conducting the KM research in the automotive industry of the Eastern Cape; reviewing the literature to outline the application of knowledge and KM; developing a KM framework for the automotive industry; and empirically evaluating the framework to establish its validity and applicability.

Section 7.2 presents a summary of the main findings established by answering the secondary research questions and meeting the secondary research objectives. Section 7.3 conveys the conclusions drawn from the main findings of this study. Section 7.4 provides a summary of the significant contributions of this research study. Section 7.5 presents the recommendations

derived from the findings, conclusions and insights derived form the study. Section 7.6 presents possible avenues for future research studies. Section 7.7 outlines the limitations of the study followed by a chapter summary in Section 7.8.

7.2 SUMMARY OF THE MAIN FINDINGS

Chapter 1 of this research report served to provide the reader with a background, context and outline to this study. The *Main research problem* was identified and stated that, *"No Knowledge Management Framework is available to industry practitioners for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape."*. This *Main research problem* led to the formulation of the *Main research objective*, which stated, *"Develop a Knowledge Management Framework for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape."*. However in order to meet the main objective of this study secondary research objectives were established as milestones and secondary research questions were formulated in order to address the secondary research objectives. The secondary research objectives, secondary research questions and the corresponding findings are outlined below.

The secondary research objective RO_1: "*Establish the importance of conducting the research study on KM in the automotive industry within the Eastern Cape*" was addressed by the secondary research question RQ_1: *"What is the significance of the automotive industry within the Eastern Cape?"*. In addressing this research question, the following significant findings were made from the literature:

- Researchers (Black, 1998) established that the automotive industry had reached a maturity stage and that it was likely that significant growth and employment opportunities would not occur in the OEMs but rather in the component and services sector;
- South Africa is considered to be the gateway to Africa and with the Eastern Cape considered to be the "Detroit of South Africa", along with its Industrial Development Zones (IDZs), provides a favourable location of investment for manufacturers;
- The various provincial opportunities that exist in terms of the automotive and component sector includes, in particular, business opportunities in the automotive

component cluster which involve co-operation with established first and second tier suppliers for storage solutions, Just In Time (JIT) distribution, research and development and training initiatives.

The secondary research objective RO_2: *"Review the literature in order to establish the application of knowledge management."* was addressed by the secondary research question RQ_2: *"How can Knowledge Management be employed functionally in the automotive industry?".* Addressing RQ_2 by means of a literature study, yielded the following findings:

- KM is practised to a large extent in automotive Original Equipment Manufacturers (OEMs) and to a lesser extent in Small and Medium sized companies of the engineering domain, typically the component suppliers of these OEMs;
- It was established that KM should be developed not only within organisations but also between them (Mello, 2006) and could be achieved by formal and informal knowledge networks established within and between organisations;
- KM is shared formally through linked or networked electronic systems and informally, via e-mail, online social networks, through "weak ties" and other contacts in social networks;
- Suppliers producing components with higher assembly interface complexity, faster technical change rate, greater influence on consumers and on a larger scale, are likely to exchange more knowledge with the manufacturer. They can obtain a higher degree of tacit knowledge and systematically embedded ability and can effectively enhance their own learning, knowledge creation and level of innovation by obtaining the manufacturer's knowledge (Lin and Chen, 2010).

The secondary research objective RO_3:, *"Develop a Proposed KM Framework for applying Knowledge Management in the automotive industry."* was addressed by RQ_3: *"Can a Knowledge Management Framework be developed for the automotive industry?".* A literature study addressing this research question resulted in the following findings:

- Correlations were established between the critical success factors of KM as indicated by various authors (Baloh and Desouza, 2009; Skyrme, 1997; McGarrity, 2000) and the four domains *Leadership*, *Organisation*, *Technology* and *Learning*, the four domains which are associated with successful knowledge sharing and collaborative cultures;

- In developing the KM framework for the automotive industry, it was discovered that a very limited body of literature existed for KM in the automotive component supply industry.

The secondary research objective RO_5: *"Conduct an empirical evaluation of the Proposed KM Framework in the automotive industry within the Eastern Cape Province."*, was addressed by RQ_5: *"What results are obtained from the empirical evaluation of the Proposed Knowledge Management Framework?"*, by means of an empirical study. The empirical evaluation yielded the following findings:

- Interviewees at OEM1 and OEM2 indicated that tenure in their present position was less than five years, however, they had been employed by the organisation for more than 10 years each.
- The knowledge management systems (KMSs) at OEM1 and OEM2 were company specific.
- 1stTier component suppliers are granted limited access to the organisational information system.
- Electronic file transfer between OEMs and their 1st tier suppliers is achieved through Collaborative Exchange, a mediating company, ensuring that OEM files are converted into a usable format for suppliers and vice versa.
- Learning within the OEMs occurs actively at three levels, individual, group and organisational learning. Individual learning ensures individual competency, while group learning occurs through interaction with colleagues, leading to organisational learning by means of knowledge flow through formal and informal social networks and systems.
- A major finding from the OEM interviews indicated that KM would not only benefit 1st tier suppliers by sharing knowledge between themselves and with their OEM customers but would also allow benefits to be passed to various other members of the value chain.
- The results of the empirical study on 1st tier component suppliers indicated a high turnover rate (58%; n=22) of less than 5 years in their positions but similarly a large number (74%; n=28) indicated tenure with their respective companies of between five and 20 years.
- The results indicate that the majority (84%; n=32) of organisations are Small to

Medium in size.

- The statistical testing on the variable of *Leadership*, indicates a high level of correlation with the level of KMS complexity. However, the other three variables, *Organisation*, *Technology* and *Learning* show no correlation with the level of KMS complexity but indicate relatively high mean values for these values.
- The empirical evaluation of the Proposed KM Framework accurately indicated gaps in the KM practice of companies, trends in the improvement of the KM practice as companies evolve across the 3 levels of KMS complexity and the instrument is also capable of recommending corrective actions to be taken to eliminate gaps.

7.3 CONCLUSIONS FROM RESEARCH FINDINGS

The maturity of the OEM market, viability of the component supply industry within the Eastern Cape and the existence of various provincial business opportunities in the automotive component cluster indicates that opportunities exist in the Eastern Cape for collaboration between the IDZs of Coega and East London, with the National Association of Automotive Component and Allied Manufacturers (NAACAM) to exploit opportunities within the region.

Automotive component suppliers generally have lower levels of resources at their disposal as compared to that of Large and Extra Large OEM organisations. This reflects the low level of knowledge sharing between organisations encountered in this survey. The status of KM at the level of 1st tier automotive component suppliers reveals that there is a great need for improved KM in this market. Component suppliers who realise the benefits of KM and react proactively to establish KM at their companies through developing organisational and technological infrastructure will place themselves in a favourable position to collaborate with others, at their level, in the supply chain and with their customers. These actions improve their learning capability and create a competitive advantage over rivals in their market and afford them the ability to exploit more opportunities in the market as compared to rivals with lesser KM capability. It would be of great benefit to the automotive industry if the National Association of Automotive Component and Allied Manufacturers (NAACAM), acting as a central body, could drive and coordinate the creation of an industry standard of KM, at the level of 1st tier suppliers, by means of benchmarking.

The mean values for the four pillars, obtained from the survey, indicate that these variables are considered important to KM regardless of the level of KMS complexity. The four pillars of the G.W. Four Pillar Framework cover a wide range of aspects which the KM practitioner must consider when establishing a functional knowledge management system (KMS). The ability to establish correlations between critical success factors and the four pillars is essential to address the management dilemma and to identify the areas where attention should be focused when the organisation's KM issues are addressed.

Reduced tenure in current positions, coupled with extended employment within the company as indicated by OEMs, suggests that these organisations may be using career planning and job rotation to groom candidates for management positions. These employee retention strategies tend to retain tacit knowledge within the organisation, and reinforce culture, norms and values. This trend has also been noted in the 1st tier suppliers.

Learning within the organisation, as indicated by the OEMs, correlates with the literature (Juceviciene and Burksiene, 2009), which states that learning at three levels, Individual, Group and Organisational level is essential. The need for a mediating company such as Collaborative Exchange is essential in an OEM-supplier relationship where the information systems of OEMs are more advanced than their suppliers and the suppliers are all using information systems from various vendors.

7.4 SUMMARY OF CONTRIBUTIONS

This research project has delivered the following contributions to the existing body of literature on the subject of knowledge management:

- An analysis of the KM practice in 1st tier automotive component suppliers within the Eastern Cape with regard to the four pillars of the G.W. Four Pillar Framework has been presented;
- A new Proposed KM Framework, based on the KM literature for the application of KM at the level of 1st tier automotive component suppliers has been presented;
- Recommendations for corrective actions to the "Gap analysis" are provided;

- The results of an empirical evaluation of 1st tier automotive component suppliers within the Eastern Cape, by means of the Proposed KM Framework, has been presented.
- Conclusions and recommendations drawn from the findings based on personal perspectives and new insights have been presented.

The Proposed KM Framework's Instrument which consists of the constructs developed by this research study is essentially composed of the three sections:

- **Table 7.1 - Proposed KM Framework for Automotive Component Suppliers:** This component provides the KM practitioner with a table to be filled in, in order to conduct the Gap analysis;
- **Table 7.2 – Linking the questionnaire questions to the cells of the Proposed KM Framework:** This component identifies the combination of statements from the Component Supplier Questionnaire (Appendix D) which must be addressed in order to conduct the Gap analysis;
- **Recommended actions for remedying KM Gaps which have been established:** This component recommends activities to be conducted in order to bridge and eliminate the gaps which have been identified by the gap analysis.

The components of the Framework's instrument are applied in sequence and is illustrated as follows.

Table 7.1 - Proposed KM Framework for Automotive Component Suppliers

KM Aspect	Leadership	Organisation	Technology	Learning	Gap analysis
Strategic Leadership					
Alignment of KM strategy to business goals					
Organisational learning					
Value proposition					
Organisational KM context					
Top management support					
Employee empowerment					
Organisational infrastructure					
Technological Infrastructure					
KM governance structure and process					
Gap analysis: (X – count)					

Table 7.2 – Linking the questionnaire questions to the cells of the Proposed KM Framework

KM aspect	GW Four Pillar Framework			
	Leadership	Organisation	Technology	Learning
Strategic Leadership	7d,l	9d	13f	21a,i
Alignment of KM strategy to business goals	7d	7k	9c	
Organisational learning	7e,f,g	7m		7e,g,j,n, 21
Value proposition	7k	27		
Organisational KM context		7f,g, 9a,e,f,g,h,i,j	13d	
Top management support	7a			
Employee empowerment	7a,b	7b,m, 9d,f,g,h,i 13d, 21m	13d	7c,j, 9d, 21f,i,m
Organisational infrastructure		9d	9c, 13f	
Technological Infrastructure	9c	13d	13f	21f
KM governance structure and process		7h,n	13a	

Recommended actions for remedying KM Gaps which have been established:

Table 7.3 – Guide to Recommended Actions

KMS complexity	KM Aspect	Leadership	Organisation	Technology	Learning
KM aspects as measured by Component Supplier Questionnaire (Questions indicated by the numbers in the grid)	Strategic Leadership	1	2	3	4
	Alignment of KM strategy to business goals	5	6	7	8
	Organisational learning	9	10	11	12
	Value proposition	13	14	15	16
	Organisational KM context	17	18	19	20
	Top management support	21	22	23	24
	Employee empowerment	25	26	27	28
	Organisational infrastructure	29	30	31	32
	Technological Infrastructure	33	34	35	36
	KM governance structure and process	37	38	39	40

Gap identified and recommended actions:

Description of layout:

X. KM aspect – Pillar of G.W. Four Pillar Framework

- *"Recommended actions"*

List of recommended actions:

1. Strategic Leadership - Leadership

- Senior management to establish a strategic vision and goals for knowledge management;
- Identify and protect strategic knowledge present within the company.

2. Strategic Leadership - Organisation

- Improve organisational flexibility to enable quick adaptation and meet sudden changes in market demand.

3. Strategic Leadership - Technology

- Ensure that the organisation's information and communications technology system has flexibility to meet future changes in requirements.

4. Strategic Leadership - Learning

- Improve the company's competitive advantage;
- Improve decision-making.

5. Alignment of KM strategy to business goals - Leadership

- Senior management to establish a strategic vision and goals for knowledge management.

6. Alignment of KM strategy to business goals - Organisation

- Use knowledge management to increase efficiency and improve general productivity.

7. Alignment of KM strategy to business goals - Technology

- Ensure flexibility of the technological infrastructure to enable quick changes and ensure the success of various projects or initiatives.

8. Alignment of KM strategy to business goals - Learning

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework

9. Organisational learning - Leadership

- Promote the importance of practising knowledge management;
- Ensure that basic values and purpose emphasise the sharing of knowledge;
- Create an open, encouraging and supportive culture.

10. Organisational learning - Organisation

- Improve the transferring and sharing of knowledge with clients or customers.

11. Organisational learning - Technology

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

12. Organisational learning - Learning

- Promote the importance of practising knowledge management;
- Create an open, encouraging and supportive culture;
- Improve efficiency in the capture and use of knowledge;
- Ensure that capturing of critical know-how (e.g. project information etc.) forms part of the daily routine;
- Improve the company's competitive advantage;
- Improve customer satisfaction;
- Introduce innovations;
- Reduce inventory;
- Reduce waste;
- Improve employee training and development;
- Reduce cost;
- Increase revenue growth;
- Improve decision-making;
- Ensure faster response to key business issues;
- Improve quality;
- Reduce throughput and delivery time;
- Improve worker efficiency or productivity;
- Prevent duplicate research and development;
- Develop new measures and metrics for processes.

13. Value proposition - Leadership

- Use knowledge management to increase efficiency and improve general productivity.

14. Value proposition - Organisation

- Reward knowledge sharing

15. Value proposition - Technology

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

16. Value proposition - Learning

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

17. Organisational KM context - Leadership

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

18. Organisational KM context - Organisation

- Ensure that basic values and purpose emphasise the sharing of knowledge.
- Create an open, encouraging and supportive culture.
- Decentralise the organisational management structure.
- Ensure that the organisational structure and interaction of various departments create formal social networks through which knowledge can flow in the organisation.
- Promote informal organisational relationships between employees to create informal social networks through which knowledge can flow in the organisation.
- Ensure that formal interaction with the company's automotive Original Equipment Manufacturer (OEM) customers create formal social networks which facilitate knowledge-sharing between the company and its automotive OEM customers.
- Promote informal inter-organisational relationships between employees (via email, chat rooms etc.) which create informal social networks and facilitate knowledge-sharing between the organisation its automotive OEM customers.
- Ensure formal interaction with other Automotive Component Suppliers (ACS) create formal social networks which facilitate knowledge-sharing between the organisation and other ACS.
- Promote informal inter-organisational relationships between employees (via email, chat rooms etc.) which create informal social networks and facilitate knowledge-sharing between the organisation and other ACS.

19. Organisational KM context - Technology

- Grant restricted access to the organisational information system to all employees throughout the company.

20. Organisational KM context - Learning

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

21. Top management support - Leadership

- Senior management to provide sufficient resources as required for the implementation of various projects or initiatives.

22. Top management support - Organisation

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

23. Top management support - Technology

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

24. Top management support - Learning

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

25. Employee empowerment - Leadership

- Senior management to provide sufficient resources as required for the implementation of various projects or initiatives;
- Management to involve line staff to acknowledge their needs and get their buy-in when implementing projects or initiatives.

26. Employee empowerment - Organisation

- Management to involve line staff to acknowledge their needs and get their buy-in when implementing projects or initiatives;

- Improve the transferring and sharing of knowledge with clients or customers;
- Improve organisational flexibility to enable quick adaptation to meet sudden changes in market demand;
- Promote informal organisational relationships between employees to create informal social networks through which knowledge can flow in the organisation;
- Ensure that formal interaction with the company's automotive Original Equipment Manufacturer (OEM) customers creates formal social networks which facilitate knowledge-sharing between the company and its automotive OEM customers;
- Promote informal inter-organisational relationships between employees (via email, chat rooms etc.) which create informal social networks and facilitate knowledge-sharing between the organisation its automotive OEM customers;
- Ensure that formal interaction with other Automotive Component Suppliers (ACS) creates formal social networks which facilitate knowledge-sharing between the organisation and other ACS;
- Promote informal inter-organisational relationships between employees (via email, chat rooms etc.) which create informal social networks and facilitate knowledge-sharing between the organisation and other ACS;
- Improve worker efficiency and productivity.

27. Employee empowerment - Technology

- Ensure that the organisational information system is accessible throughout the company to all employees.

28. Employee empowerment - Learning

- Senior and experienced personnel to be valued for their knowledge and expertise;
- Improve efficiency in the capture and use of knowledge;
- Improve organisational flexibility to enable quick adaptation to meet sudden changes in market demand;
- Improve employee training and development;
- Improve decision-making;
- Improve worker efficiency and productivity.

29. Organisational infrastructure - Leadership

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

30. Organisational infrastructure - Organisation

- Improve organisational flexibility to enable quick adaptation to meet sudden changes in market demand.

31. Organisational infrastructure - Technology

- Ensure flexibility of the technological infrastructure to enable quick changes to ensure the success of various projects or initiatives;
- Ensure that the organisation's information and communications technology system has flexibility to meet future changes in requirements.

32. Organisational infrastructure - Learning

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

33. Technological Infrastructure - Leadership

- Ensure flexibility of the technological infrastructure to enable quick changes to ensure the success of various projects or initiatives.

34. Technological Infrastructure - Organisation

- Ensure that the organisational information system is accessible throughout the company to all employees.

35. Technological Infrastructure - Technology

- Ensure that the organisation's information and communications technology system has flexibility to meet future changes in requirements.

36. Technological Infrastructure - Learning

- Improve employee training and development.

37. KM governance structure and process - Leadership

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

38. KM governance structure and process - Organisation

- Establish policies and programmes intended to improve worker retention;
- Ensure that capturing of critical know-how (e.g. project information etc.) forms part of the daily routine.

39. KM governance structure and process - Technology

- Ensure that information which is stored in the company information system is managed to ensure validity, reliability and that information is up to date.

40. KM governance structure and process - Learning

- No relationship found between KM aspect and Four pillars of G.W. Four Pillar Framework.

7.5 RECOMMENDATIONS

In view of the aforementioned findings and conclusions, recommended actions are proposed. In Sub-section 7.3.1 Recommendations to OEMs will be proposed. Sub-section 7.3.2 will outline recommendations to 1st tier component suppliers, followed by Sub-section 7.3.3 which will present recommendations for future research.

7.5.1 Recommendations to OEMs

- The gap analysis which was conducted indicated that OEM1 and OEM2 required improvements in *Strategic Leadership* with regard to *Leadership.* This requires that senior management establish a strategic vision and goals for knowledge management and identify and protect strategic knowledge present within the company.
- OEM1 and OEM2 presently do not have central control of the knowledge

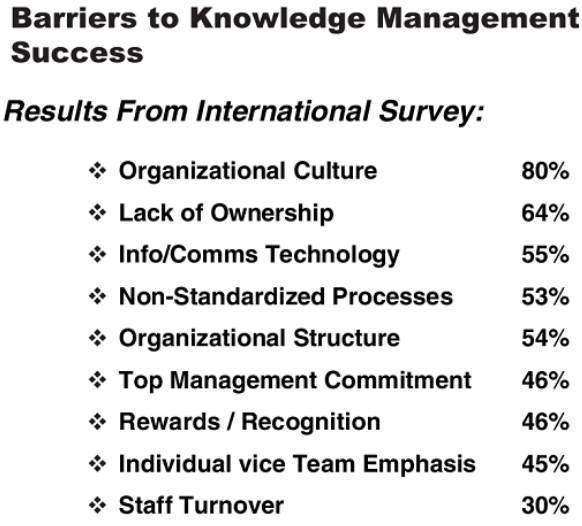
management system. The recommended corrective action for this item is that a Chief Knowledge Officer be appointed to administer and coordinate the organisational KM strategy and ensure alignment with the business goals and objectives.

– The gap analysis also reveals that OEM1 is indicating a gap in *Organisational infrastructure* with regard to *Organisation*. This indicates that a need for organisational flexibility exists, in order to meet rapid changes in market demand. An analysis of the organisational and technological infrastructure must be conducted in order to establish areas where change in infrastructure and resources is required. Goals must be established and prioritised. A programme for the changes to be implemented must be established and change metrics are to be measured, monitored and reported.

7.5.2 Recommendations to 1st tier component suppliers

Organisations at the level of 1st tier component suppliers must firstly overcome the barriers to successful knowledge management as illustrated in Figure 7.1 (introduced in Chapter 3). This figure serves as a point of departure to ensure that the company has established an environment or a context in the organisation in which KM can flourish. Ignoring these factors will lead to failure in applying KM at the company.

Figure 7.1 – Knowledge management barriers to success



Source: Stankosky (2005: 5)

- Hahn and Subramani (2000) advocate a low-tech, bottom up approach for the development of a KMS, by building on existing organisational or technological infrastructure. This is of particular interest to Small/Medium companies where available resources are limited.

- Once an environment has been established which is conducive to KM the KM aspects as illustrated in the Proposed KM Framework (Figure 7.1) must be established and may periodically be evaluated using the Proposed KM Framework to establish the gaps in the company's KM practice and implement the recommended corrective actions as stated in the List of recommended actions in Section 7.4.

The following recommendations are proposed to address the four pillars of the G.W. Four Pillar Framework:

Leadership:

- Develop a strategic vision, goals and KM strategy which is aligned with business goals and objectives;
- Pursue employee buy-in and staff empowerment to reduce dependency and promote initiative by providing training and development and ensuring availability of the necessary resources;
- Promote an open, encouraging and supportive culture.

Organisation:

- Ensure flexibility of the organisational and technological infrastructure to meet changes in market demand;
- Establish formal and informal networks along which knowledge can flow.

Technology:

- Ensure that the system is managed to ensure the validity and reliability of information and that information is up to date;
- Ensure restricted accessibility to the organisational information system throughout the organisation.

Learning:

- Promote employee training and development;
- Promote Communities of Practice and cross-functional teams.

7.6 RECOMMENDATIONS FOR FUTURE RESEARCH

- This research study has presented a Proposed KM Framework for the application of KM at the level of 1st tier component suppliers. This Framework has been evaluated within the automotive industry of the Eastern Cape to verify the structure of the framework but does not present the practitioner with a methodology how specific companies should implement and manage KM at their particular company. This has been beyond the scope of this study but presents the opportunity for future study.

- It is recommended that this study be repeated on a national level across South Africa in order to provide a larger sample and an indication of KM practice within the entire South African Automotive Industry.

7.7 LIMITATIONS OF THIS RESEARCH

A limitation describes a weakness or deficiency in the research (Collis and Hussey, 2009). Limitations in this study are considered to be the following:

- The scope of the study was limited to the Eastern Cape Province due to geographically dispersed location of automotive OEMs and their component suppliers. This has reduced the level of feedback and size of the population and sample of the study.
- A limitation of Positivism and quantitative research stems from the inability to extract further detail in new areas of interest which may be revealed by the responses of respondents.
- Sending questionnaires to respondents via e-mail limits the control which the researcher has over the response process and the number of questions must be reduced to maintain the respondent's willingness and motivation to answer the questions.

- The researcher is limited in controlling the response rate. The researcher may be required to repeat the request and remind respondents on multiple occasions to accurately complete and return the questionnaires.
- Limitations of access to literature in secured databases limited the literature study to that which could be reviewed in available sources. The nature of the structured interviews with managers at the two OEM organisations established limits to the time that could be spent conducting the interviews. The context of the interview environment, the knowledge and experience of both the interviewer and interviewee has biased the presentation of questions and their responses.
- A limitation of this study lies in the fact that the test for OEM1 and OEM2 was conducted by the author, based on qualitative research and may have been biased by personal subjective aspects, which could lead to a different set of gaps if the analysis were conducted by someone else. A limitation has therefore been detected in that no qualitative response was available from OEMs to conduct a gap analysis based on quantitative data.

7.8 SUMMARY

This study has successfully addressed the main research problem *"No Knowledge Management Framework is available to industry practitioners for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape",* answered the Main research question "*Can a framework for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape be develope*d*?*" and met the Main research objective *"Develop a Knowledge Management Framework for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape"*.

A new KM Framework was proposed and has been empirically evaluated in the automotive industry of the Eastern Cape. This research project has made the following unique contributions to the existing body of literature on the subject of knowledge management:

- A unique analysis of KM practises was conducted in 1st tier automotive component

suppliers within the Eastern Cape with regard to the four pillars of the G.W. Four Pillar Framework and has been presented;

- A new Proposed KM Framework, based on the KM literature for the application of KM at the level of 1st tier automotive component suppliers has been presented;
- Recommendations for corrective actions to the "Gap Analysis" are provided;
- The results of the empirical evaluation of 1st tier automotive component suppliers within the Eastern Cape, by means of the Proposed KM Framework, has been presented;
- Conclusions and recommendations, drawn from the findings based on personal perspectives and new insights, have been presented.

LIST OF REFERENCES

Alavi, M. and Leidner, D.E. (1999). Knowledge management systems: Issues, challenges and benefits. *Communications of the AIS*, 1(7): 1-37.

Baloh, P. and Desouza K.C. (2009). *Towards knowledge needs-technology fit model for knowledge management systems*. [online] Available at: <http://desrist2009.ist.psu.edu/Papers/desrist2009_submission_17.pdf> (Accessed 18 May 2011).

Barnes, J. and Meadows, B. (2008). *HSRC Research Report: On the brink? Skills demand and supply issues in the South African automotive components industry.* [online] Available at: <http://www.labour.gov.za/downloads/documents/research-documents/Automotive_DoL_Report.pdf> (Accessed on 22 April 2011).

Barnes, J., Moodley, S. and Morris, M. (2001). Unlocking Value in the "New Economy": The Implications of B2B E-commerce for South African Apparel and Automotive Component Firms. In *Proceedings of the Trade and Industry Policy Secretariate (TIPS) Conference on New Directions in the South African Economy.* Johannesburg, 10 – 12 September 2001.

Bartholomew, D. (2008). *Building on Knowledge. Developing Expertise, Creativity and Intellectual Capital in the Construction Professions.* United Kingdom: Blackwell Publishing Ltd.

Bixler, C.H. (2002). Applying the Four Pilars of Knowledge Management. *KMWorld*, January 2002. 11 (1). [online] Available at: <http://www.providersedge.com/docs/km_articles/Applying_the_Four_Pillars_of_KM.pdf.> (Accessed 10 July 2011).

Black, A. (1998). The Impact of Trade Liberalization on the South African Automotive Industry. *Paper presented to the TIPS Policy Forum*. Johannesburg, September 1998.

Boland, R.J. and Tenkasi, R.V. (1995). Perspective making and perspective taking in communities of knowing. *Organization Science*, 6(4): 350-372.

Brewster, C., Carey, L., Grobler, P., Holland, P. and Wärnich, S. (2008). *Contemporary Issues in Human Resource Management: Gaining a competitive advantage.* 3rd edition. Southern Africa: Oxford.

Brown, J.S. and Duguid, P. (1991). Organizational learning and communities of practice: Toward a unified view of working learning and innovation. *Organization Science.* 2(1): 40-57.

Brown, J.S. and Duguid, P. (1998). Organizing knowledge. *California Management Review,* 40(3): 90-111.

Bryman, A. and Bell, E. (2007). *Business research methods*. 2nd edition. Oxford: Oxford University Press.

Burger, F. (2011). Urbanization: Mobility for millions. *Automotive Now*. (January, 2011) [online] Available at: <http://www.kpmg.com/Global/en/IssuesAndInsights/Articles Publications/AutomotiveNow/Documents/automotive-now-spring-2011v2.pdf> (Accessed 27 July 2011).

Calabrese, F.A. and Orlando, C.Y. (2006). Knowledge Organisations in the Twenty-First Century: Deriving a 12-step Process to Create and Implement a Comprehensive Knowledge Management System. *Journal of information and knowledge management systems,* 36(3): 238-254.

Calitz, A.P. and Calitz, M.B. (2002). The Design and Implementation of a Cost-effective Knowledge Management System – A South African Case Study. *Paper presented at the 14th Annual Conference of the South African Institute of Management Scientists (SAIMS)*, Johannesburg, September 2002.

Chen, Z. (2010). A Study on Construction of Knowledge Management System Based on Enhancing Core Competence of Industrial Clusters. *International Journal of Business and Management,* 5(3):217-222.

Cleveland, J. (2007). The *Toyota Product Development System's Implementation Challenges*. [online] Available at: <http://www.autofieldguide.com/columns/0506insight.htm> (Accessed 25 May 2011).

Collis, J. and Hussey, R. (2003). *Business research: A practical guide for Undergraduate & Postgraduate students*. 2nd edition. London: Palgrave Macmillan.

Collis, J. and Hussey, R. (2009). *Business research: A practical guide for Undergraduate & Postgraduate students*. 3rd edition. London: Palgrave Macmillan.

Constant, D., Sproull, L. and Kiesler, S. (1996). The kindness of strangers: The usefulness of electronic weak ties for technical advice. *Organization Science*, 7(2): 119-135.

Cook, S.D. and Brown, J.S. (1999). Bringing epistemologies: The generative dance between organizational knowledge and organizational knowing. *Organization Science*. 10(4): 381-400.

Coolican, H. (1992). *Research Methods and Statistics in Psychology.* London: Hodder and Stoughton.

Cooper, D.R. and Schindler, P.S. (2006). *Business research methods*. 9th edition. New York: McGraw Hill.

Coughlan, P. and Rukstad, M.G. (2001). *DaimlerChrysler knowledge management strategy.* In Piderit, R. (2007). Knowledge management in multinational automotive suppliers: An investigation into the use of information systems. [online] Available at: http://ufh.netd.ac.za/jspui/bitstream/10353/94/1/Piderit%20thesis.pdf. (Accessed on 23 May 2011).

Davenport, T.H. and Glaser, J. (2002). Just-in-time delivery comes to knowledge management. *Harvard Business Review*, 80(7): 5-9.

Davenport, T.H. and Prusak, L. (1998). *Working knowledge: how organisations manage what they know*. Paperback 2000 edition. Boston: Harvard Business School Press.

DeLisi, P.S. (1990). Lessons from the steel axe: Culture technology and organisation change. *Sloan management review*, 32(1): 83-93.

Densford, L.E. (1996). Knowledge management: an underutilized tool that enables companies to know what they know. *Corporate University Review*.

Desouza, K.C. and Awazu, Y. (2005). *Engaged knowledge management: Engagement with new realities*., Bazingstoke: Palgrave Macmillan.

Desouza, K.C., Awazu, Y. and Tiwana, A. (2006). Four Dynamics for bringing use back into software reuse. *Communications of the ACM*, 49(1): 97–100.

Donaldson, L. (1995). *American anti-management theories of organisation*. Cambridge: Cambridge University Press.

DTI. (2005). *Current Developments in the Automotive Industry.* Pretoria: Department of Trade and Industry.

Easterby-Smith, M., Thorpe, R. and Lowe, A. (1991). *Management Research: An Introduction*. London: Sage Publications.

Eastern Cape Development Corporation Investment Promotion Unit. (2005). Automotive *Industry: An Overview of the Eastern Cape Automotive Industry and its Opportunities in the South Africa Context*. [online] Available at: <http://www.ecdc.co.za/from above/files/pdfs/ECDC_Automotive.pdf> (Accessed 12 November 2011).

ECDC. (2011). *Automotives and Components*. [online] Available at: <http://www.ecdc. co.za/opportunities/manufacturing> (Accessed 12 November 2011).

Economist Intelligence Unit. (2006). *CEO Briefing: Corporate priorities for 2006 and beyond*. [online] Available at: <http://graphics.eiu.com/files/ad_pdfs/ceo_Briefing_ UKTI_wp.pdf> (Accessed 27 November 2011).

Ellis, S. (2006). An overview of the global and South African automotive industry. In *Proceedings of the Programme for Industrial Manufacturing Excellence* (PRIME) student training. Hillcrest, 18 March 2006.

Feng, C., Zhang, Y., Li, J. and Li, T. (2010). Evolution of knowledge sharing model in the development of supply chain management. In *Proceedings of the 2010 International conference on optoelectronics and image processing.* IEEE Computer Society. 522-525.

Fingar, C. (2002). "Car Wars". *fDi Magazine*. 2 December [online] Available at: <http://www.fdimagazine.com/news/fullstory.php/aid/191/Car_wars.html> (Accessed 3 July 2011).

Ford Motor Company. (2005). Challenges facing the automotive industry. *Ford Sustainability Report*. [online] Available at: <http://corporate.ford.com/doc/2004-05_sustainability_report.pdf> (Accessed 27 November 2011).

Franse, R. (2006). *The Response of an Original Equipment Manufacturer to the Motor Industry Development Programme: A Case Study*. Master of Business Administration. Unpublished MBA dissertation, Rhodes University, Grahamstown.

Grundstein, M. and Rosenthal-Sabroux, C. (2007). A sociotechnical approach of knowledge management within the enterprise: The MGKME model. In *Proceedings of the 11th World Multi-Conference on Systemics, Cybernetics and Informatics*, 3: 284-289. [online] Available at: <http://www.lamsade.dauphine.fr/scripts/FILES/publi816.pdf> (Accessed 27 November 2011).

Hahn, J. and Subramani, M.R. (2000). *A framework of knowledge management systems: Issues and challenges for theory and practice*. [online] Available at: <http://citeseerx.ist.psu.edu> (Accessed 16 May 2011).

Hansen, M.T. (1997). *The search-transfer problem: The role of weak ties in sharing knowledge across organisation subunits*. [online] Available at: <http://www.case.wvu.edu/~xinl/library/papers/social/Hansen1999.pdf> (Accessed 27 November 2011).

Ho, C. T. (2009). The relationship between knowledge management enablers and performance. *Industrial management and Data systems*, 109(1): 98-117.

Holsapple, C.W. and Joshi, K.D. (1999). Description and Analysis of Existing Knowledge Management Frameworks. In *Proeedings of the 32nd Hawaii International Conference on System Sciences*, Hawaii.

ICMR. (2005). *Knowledge Management Practices at Toyota Motors*. [online] Available at: <http://www.icmrindia.org/casestudies/Catalogue/IT%20and%20Systems/ITSY048.htm> (Accessed 25 May 2011).

Juceviciene, P. and Burksiene, V. (2009). A model of organisational learning for solution of problems of sustainable development: Changes in social and business environments. In *Proceedings of the 3rd international conference*, November 4-5: 167-174.

Kappe, F. (2001). Knowledge management: A practical example at BMW. In Tochtermann, K. and Maurer H. In *Proceedings of I-Know 2001: International Conference on Knowledge Management*, Graz, Austria, 12 July,. Know-Centre Gaz and Springer Pub. Co.: 93-95.

Kinicki, A. and Kreitner, R. (2008). *Organizational behavior: Key concepts, skills & best practices*. 3rd edition. Taipei: McGraw-Hill Irwin.

Kruger, C.J. and Johnson, R.D. (2008). Assessment of Knowledge Management's Growth in South Africa. *GlobDev 2008*. Paper 12. [online] Available at: <http://aisel.aisnet.org/globdev2008/12> (Accessed 23 May 2011).

Lee, H. and Choi, B. (2003). Knowledge management enablers, processes, and organisational performance: An integragive view and empirical examination. *Journal of management information systems*, 20(1): 179-228.

Leedy, P.D. (1997). *Practical Research – Planning and Design*. 6th edition. New Jersey: Prentice Hall.

Leedy, P.D. and Ormrod, J.E. (2005). *Practical research: planning and design*. 8th edition. New Jersey: Prentice Hall.

Levitt, B. and March, J.G. (1988). Organisational learning. *Annual Review of Sociology*. 14(1): 319-340.

Liebowitz, J. (1999). The new star in organisations: The chief knowledge officer and the knowledge audit function. In *Proceeding of the 1999 ACM SIGCPR conference on Computer personnel research*, New York.

Liker, J.K. (2004). *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*. New York: McGraw-Hill.

Lindlof, T.R. (1995). *Qualitative Communication Research Methods*. Thousand Oaks, CA: Sage.

Lin, Y. and Chen, Y. (2010). Effect of the supplier heterogeneity on knowledge transfer between the upstream and the downstream partners in the auto manufacturing industry. In *Proceedings of the 3rd International conference on information management, innovation management and industrial engineering*. IEEE Computer Society.

Lorentzen, J. (2006). *Multinationals on the periphery: DaimlerChrysler South Africa, Human Capital Upgrading and Regional Economic Development*. Cape Town: Human Sciences Research Council Press.

Lönnqvist, A., Kemppilä, S., Mettänen, P., Pirtimäki, V. and Uusi-Rauva, E. (2003). *Developing intangible assets to improve productivity and profitability. Frontiers of e-business research*. [online] Available at: <http://www.ebrc.fi/kuvat/204-214.pdf> (Accessed 27 November 2011).

McGarrity, J. (2000). Implementing a Knowledge Management Solution: From Scattered, Individual Tools to a Shared, Fully-Stocked Workshop. In *Proceedings of the 29th annual ACM SIGUCCS conference on user services*, Portland, Oregon.

McNabb, D.E. (2007). *Knowledge Management in the Public Sector: A Blueprint for Innovation in Government*. NY: M.E. Sharpe, Inc.: 345.

Mello, J.A. (2006). *Strategic human resources management*. 2nd edition. Mason, Ohio: Thomson South-Western.

Merali, Y. and Davies, J. (2001). Knowledge capture and utilization in virtual communities. *Journal of Management Information Systems*, 18(1): 57-93.

Miles, R.E. and Snow, C.C. (1986). Organisations: New concepts for new forms. *California Management Review,* 28(3): 62-73.

Morgan, G. and Smircich, L. (1980). The case of qualitative research. *Academy of Management Review,* 1(5): 491-500.

Mouton, J. and Babbie, E. (2001). *The Practice of Social Research: South African edition*. Cape Town: Oxford University Press.

NAACAM. (2011). *National Association of Automotive Component and Allied Manufacturers (NAACAM)*. [online] Available at: <http://www.naacam.co.za/site/default.asp> (Accessed 11 November 2011).

NAAMSA. and TISA. (2006). *Key information on the South African Automotive Industry*. Pretoria: Department of Trade and Industry.

Nachmias, C.F. and Nachmias, D. (2008). *Research methods in the social sciences*. 7th edition. New York: Worth.

Nonaka, I. (1991). *The knowledge creating company*. [online] Available at: <http://home.base.be/vt6195217/The%20knowledge%20creating%20company.pdf> (Accessed 27 November).

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*. 5(1): 14-37.

OICA, n.d. *A growth industry*. [online] Available at: http://oica.net/category/economic-contributions/. (Accessed on 27 July 2011).

Oxford Compact Dictionary and Thesaurus. (1997). Oxford: Oxford University Press.

Pan, S.L. and Scarbrough, H. (1998). A Socio-Technical View of Knowledge-Sharing at Buckman Laboratories. *Journal of Knowledge Management*, 2(1): 55-66.

Piderit, R. (2007). *Knowledge management in multinational automotive suppliers: An investigation into the use of information systems*. [online] Available at: http://ufh.netd.ac.za/jspui/bitstream/10353/94/1/Piderit%20thesis.pdf. (Accessed on 23 May 2011).

Polanyi, M. (1967). *The tacit dimension*. New York: Doubleday Anchor.

Pontz, T., Grauer, M., Metz, D. and Karadgi, S. (2010). Service-Orientated Knowledge Exchange in a Virtual Value Creation Chain for SMEs. In *Proceedings of the 3rd International Conference on Information Management, Innovation Management and Industrial Engineering*. Kunming, 26-28 November.

Rethink IT. (2004). The car industry drives forward with knowledge management – Masterclass. *Rethink IT*. March 2004. [online] Available at: <http://findarticles.com/p/articles/mi_m0PAT/is_2004_March/ai_114699548> (Accessed on 25 May 2011).

Sajeva, S. and Jucevicius, R. (2010). Determination of Essential Knowledge Management System Components and their Parameters. *Social Sciences/ Socialiniai Mokslai,*. 1(67): 80-90.

SAP. (2011). *ERP SOFTWARE FROM SAP: A Foundation To Execute Your Business Strategy*. [online]. Available at: <http://www.sap.com/solutions/business-suite/erp/index.epx> (Accessed 9 November 2011).

Saunders, M., Lewis, P. and Thornhill, A. (2007). *Research methods for business students*. 4th edition. London: Prentice Hall.

Sharkie, R. (2003). Knowledge creation and its place in the development of sustainable competitive advantage. *Journal of Knowledge Management*, 7(1): 20-31.

Sink, D. (1983). Much ado about productivity: Where do we go from here. *Industrial Engineering*, October: 36-48.

Skyrme, D.J. (1997). *From information management to knowledge management: Are you prepared?* [online]. Available at: <http://www.skyrme.com/pubs/on97full.htm> (Accessed on 18 May 2011).

Smuts, H., Van der Merwe, A., Loock, M. and Kotzé, P. (2009). *A framework and methodology for knowledge management system implementation*. [online] Available at: http://researchspace.csir.co.za/dspace/bitstream/10204/3793/1/Smuts_2009.pdf. (Accessed 18 May 2011).

South Africa's Automotive Industry. (2008). *South Africa.info: Gateway to the Nation*. [online] Available at: <http://www.southafrica.info/business/economy/sectors/automotive-overview.htm> (Accessed 28 July 2011).

Sproull, L. and Kiesler, S. (1991). *Connections: New ways of working in networked organisation*. Cambridge, MA: The MIT Press.

Stankosky, M.A. (2005). *Advances in knowledge management: University research toward an academic descipline*. [online] Available at: <http://www.v5.books.elsevier.com/bookscat/samples/9780750678780/9780750678780.pdf> (Accessed on 8 July 2011).

Stankosky, M.F., Calabrese, F. and Baldanza, C. (2003). *A systems approach to engineering a knowledge management system*. Washington, DC: Management Concepts Press.

Steyn, H.S. (2000). Practical significance of the difference in means. S.A. *Tydskrif vir Bedryfsielkunde*. 26(3): 1-3.

Sturgeon, T.J. and Van Biesebroeck, J. (2010). *Effects of the crisis on the automotive industry in developing countries: A global value chain perspective.* [online] Available at:

<http://unstats.un.org/unsd/trade/s_geneva2011/refdocs/RDs/Automotive%20Industry%20and%20Crisis%20(Sturgeon%20-%20Jun%202010).pdf> (Accessed 27 July 2011).

Sunassee, N. and Sewry, D.A. (2003). *An investigation of knowledge management implementation strategies*. [online] Available at: <http://idisk.free.fr/.iFolder/.NET/.M17.ORG.UK/PDF/Paper-Knowledge-Strategies.pdf> (Accessed 27 November 2011).

Sveiby, K. (2000). *What is knowledge management?* [online] Available at: <http://www.sveiby.com/articles/KnowledgeManagement.html> (Accessed on 18 May 2011).

Tait, P. and Vessey, I. (1988). The effect of user involvement on system success: A contingency approach. *MIS Quaterly*, 12(1): 91-108.

Takeuchi, H. (1998). Beyond knowledge management: Lessons from Japan. *Monash Mt. Eliza Business Journal*, 1(1): 216-225.

Turban, E. and Volonino, L. (2010). *Information technology for management: Transforming organisations in the digital economy.* 7th ed. New Jersey: John Wiley and Sons, Inc.: 395.

Uusi-Rauva, E. and Hannula, M. (1996). Measurement – A tool for productivity improvement. In *Proceedings of the 9th International Working Seminar on production economics*, Innsbruck: 13-29.

Vogt, W.P. (1993). Dictionary *of statistics and methodology*. Newbury Park, CA: Sage.

Volkswagen. (2007). *Knowledge Management: Knowledge at Volkswagen*. In Piderit, R. 2007. Knowledge management in multinational automotive suppliers: An investigation into the use of information systems. [online] Available at: http://ufh.netd.ac.za/jspui/bitstream/10353/94/1/Piderit%20thesis.pdf> (Accessed on 23 May 2011).

Webster's Online Dictionary. (2011). [online] Available at: <http://www.websters-online-dictionary.org> (Accessed 12 May 2011).

Wiig, K. (1993). *Knowledge management foundations – Thinking about thinking .– How people and organisations create, represent and use knowledge*. Arlington, TX: Schema Press.

Wing, L. and Chua, A. (2005). Knowledge management project abandonment: An exploratory examination of root causes. *Communications of AIS*, 16: 723-743.

APPENDICES

APPENDIX A – CONSISTENCY MATRIX

Title: A Knowledge Management Framework for Automotive Component Manufacturers in the Eastern Cape				
Main Research Problem: No standard Knowledge Management Framework is available to industry practitioners for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape.				
Thesis statement: A Knowledge Management Framework for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape can be developed.				
Research objective: Develop a framework for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape				
Main Research Question (RQ_M): Can a framework for the application of Knowledge Management in automotive component manufacturers within the Eastern Cape be developed?				
Secondary research questions		**Research objective**	**Chapter**	**Deliverable**
RQ_1	What is the significance of the automotive industry within the Eastern Cape?	Establish the importance of conducting the research study on KM in the automotive industry within the Eastern Cape.	Chapter 2: THE AUTOMOTIVE INDUSTRY (Literature Study)	Importance of the Automotive Industry of the Eastern Cape along with the need to conduct the KM research study has been established.
RQ_2	How can Knowledge Management be employed functionally in the automotive industry?	Review the literature in order to establish the application of knowledge and knowledge management.	Chapter 3: KNOWLEDGE AND KNOWLEDGE MANAGEMENT (Literature Study)	KM is applied by means of a KMS in larger multinational companies and almost non-existent in the smaller component suppliers.

RQ_3	Can a Knowledge Management Framework be developed for the automotive industry?	Develop a Proposed KM Framework for applying Knowledge Management in the automotive industry	Chapter 4: A FRAMEWORK FOR APPLYING KM (Literature Study)	A Knowledge Management framework which can be tested in the automotive component supply industry.
RQ_4	How can a detailed research methodology be provided in order to understand and reproduce this research study in future?	Explain the research methodology used for this research study in detail, to allow it to be reproduced in future	Chapter 5: RESEARCH DESIGN AND METHODOLOGY (Literature Study)	A detailed description of the research methodology used to conduct this specific research project so it may be repeated in future.
RQ_5	What results are obtained from the empirical evaluation of the Proposed Knowledge Management Framework?	Conduct an empirical evaluation of the Proposed KM Framework in the automotive industry within the Eastern Cape.	Chapter 6: RESULTS AND ANALYSIS OF THE EMPIRICAL STUDY (Empirical Study)	Validation findings from the empirical evaluation of the Proposed KM Framework in the automotive industry of the Eastern Cape.
RQ_M	RQ_M	RO_M	Chapter 7: FINDINGS RECOMMENDATIONS AND CONCLUSIONS	KM Framework for Automotive Industry in the Eastern Cape.

APPENDIX B – ORIGINAL EQUIPMENT MANUFACTURER (OEM) QUESTIONNAIRE

Knowledge Management in the Automotive Industry

Automotive Original Equipment Manufacturer (OEM) Questionnaire

Confidential

This research is being conducted in fulfilment of the NMMU MBA treatise. Your valuable time and cooperation is sincerely appreciated. Thank you for your participation.

INTRODUCTION

The information obtained from this questionnaire will be treated with strict confidentiality, will not be used for any other purpose other than in writing the research dissertation for academic purposes only and will be presented in anonymous or aggregated fashion. Your cooperation to participate in this interview is greatly appreciated.

Benefits from participating:

- You can indicate at the end of the questionnaire if you want a summary of the results. This provides you with an overview of the status of knowledge management in the Eastern Cape Province.
- When answering, you will automatically review the problems involved intensively, perhaps even receive new stimuli.

I would like to clarify what is meant by the term Knowledge Management (KM). This term refers to the creation, sharing and use of knowledge to realise a competitive advantage for the organisation. KM initiative, therefore, is any practise or policy that aims to encourage the creation, sharing and use of knowledge to realise a competitive advantage for the organisation.

QUESTIONNAIRE INSTRUCTIONS:

- Not all sections will be applicable. Answer only compulsory Sections A and B, then select the most applicable section from Sections C, D and E.

Section A
Company name: .....

Name of interviewee: .....

Position held: .....

Period in current position:.....

Describe the company's relationship and interaction with it's 1st tier suppliers.

…….
.....

Give a description of the supply side (upstream) of the value chain process.

…….
.....

Please explain how information is communicated between the company and its suppliers.

…….
.....

Is the IT system freely accessible and utilised by employees? Please explain how this system is managed (i.e. in-house or outsourced)?

…….
.....

Section B

1. Explain how SAP/R3 fits into the supply chain process?

   …….
   .....

2. Can suppliers access the SAP/R3 system with compatible software? How is this achieved?

   …….
   .....

3. What are the most useful functions of the SAP/R3 system with regard to production planning?

   …….
   .....

4. What are the most useful functions of the SAP/R3 system with regard to inventory management?

   …….
   .....

5. Please explain your understanding of the term "Knowledge Management".

   ……. .....
   .....

6. **Please select one of the following:**

   [ ] Knowledge management is ***not*** practised by our company
   [ ] Knowledge management is practised within our company only
   [ ] Knowledge management is shared between our company and its 1st tier suppliers

   – If you selected a) then please continue with Section C on page 4;
   – If you selected b) then please continue with Section D on page 5;
   – If you selected c) then please continue with Section E on page 7.

Section C Knowledge management NOT practised

1. Please identify and explain some of the barriers or challenges your company experiences in trying to implement knowledge management?
…….....
.....

2. How would one describe your company's organisational culture? (e.g. based on trust, innovation, learning knowledge-sharing etc.) Please explain.
…….....
.....

3. Has senior management displayed an active interest in the promotion and support of KM initiatives in the past? Please explain?
…….....
.....

4. Please explain how learning at the company is achieved on the levels of the individual, the group and the organisation?
…….....
.....

5. Please describe how the know-how of experienced personnel is retained and reused by the company for future decision making.
…….....
.....

6. Is the current organisational information system widely distributed throughout the organisation and used in most departments? Please explain?
…….....
.....

7. Could knowledge management benefit your company? Please explain?
…….....
.....

8. Could knowledge management benefit the company's 1st tier suppliers? Please explain.
…….....
.....

9. Could your organisation benefit from practising knowledge-sharing with 1st tier suppliers? Please explain?
…….....
.....

10. Could knowledge-sharing between 1st tier suppliers benefit your company? Please explain?
…….....
.....

11. How could 1st tier suppliers work together to share knowledge?
…….....
.....

12. What disadvantages would knowledge-sharing of 1st tier suppliers hold for the company? Please explain.
…….....
.....

13. How could senior management be persuaded to implement knowledge management? Please explain?
…….....
.....

14. Are there any additional comments which you would like to add?
…….....
.....

Thank-you for your participation. Your time and cooperation are sincerely appreciated.

Section D KM practised within company only

1. What is knowledge management used for within your company? Please explain.
…….....
.....

2. What are the perceived benefits or advantages which your company derives from using a SAP/R3 based knowledge management system?
…….....
.....

3. What are the limitations of SAP/R3 with regard to knowledge management? Please explain?
…….....
.....

4. What knowledge management initiatives are currently being pursued by your company?
…….....
.....

5. How are the goals for KM initiatives achieved?
…….....
.....

6. Does your organisation make use of an incentive and motivation system to improve knowledge contribution to the knowledge management system? Please explain how this is accomplished?
…….....
.....

7. Please describe how the know-how of experienced personnel is retained and reused by the company for future decision-making.
…….....
.....

8. Please explain the use of enterprise knowledge portals by employees?
…….....
.....

9. How is knowledge in the knowledge management system (KMS) controlled to ensure reliability, validity and that knowledge is up to date?
…….....
.....

10. Does senior management display an active interest in the promotion and support of KM initiatives? If so, how is this achieved?
…….....
.....

11. Please describe the formal organisational structures which facilitate the flow of knowledge throughout the organisation.
…….....
.....

12. Please describe the informal organisational structures which facilitate the flow of knowledge throughout the organisation.
…….....
.....

13. How would one describe the company's organisational culture? (e.g. based on trust, innovation, learning knowledge-sharing etc.) Please discuss.
…….....
.....

14. Please explain how learning at the company is achieved on the levels of the individual, the group and the organisation?
…….....
.....

15. Could knowledge management within the company's 1st tier suppliers be of benefit to them? Please explain.
…….....
.....

16. Could your organisation benefit from practising knowledge-sharing with 1st tier suppliers? Please explain?
…….....
.....

17. Could knowledge-sharing between 1st tier suppliers benefit your company? Please explain?
…….....
.....

18. How could 1st tier suppliers work together to share knowledge between themselves?
…….....
.....

19. What disadvantages would knowledge-sharing of 1st tier suppliers hold for your company? Please explain.
…….....
.....

20. Are there any additional comments which you would like to add?
…….....
.....

Thank-you for your participation. Your time and cooperation are sincerely appreciated.

Section E KM shared with 1st tier suppliers

1. How is knowledge in the knowledge management system controlled to ensure reliability, validity and that knowledge is up to date?
   ……
   ……

2. Does senior management display an active interest in the promotion and support of knowledge management initiatives? If so, how is this achieved?
   ……
   ……

3. Please describe the formal organisational structures which facilitate the flow of knowledge throughout the organisation.
   ……
   ……

4. Please describe the informal organisational structures which facilitate the flow of knowledge throughout the organisation.
   ……
   ……

5. How would one describe the company's organisational culture? (e.g. based on trust, innovation, learning knowledge-sharing etc.) Please discuss.
   ……
   ……

6. Please explain how learning at the company is achieved on the levels of the individual, the group and the organisation?
   ……
   ……

7. Please describe how the know-how of experienced personnel is retained and reused by the company for future decision-making.
   ……
   ……

8. What KM initiatives are currently being pursued to enhance knowledge-sharing with 1st tier suppliers?
   ……
   ……

9. How are the goals of knowledge management initiatives achieved?
   ……
   ……

10. How is the information systems of 1st tier suppliers integrated into that of the company to facilitate knowledge-sharing?
    ……
    ……

11. If enterprise knowledge portals are used by employees and suppliers, please provide a description of their use.
    ……
    ……

12. What are the perceived benefits or advantages which your company derives from using a SAP/R3 based knowledge management system?
    ……
    ……

13. What are the limitations of SAP/R3 with regard to knowledge management? Please explain?
…….
.....

14. Could knowledge management benefit the company's 1st tier suppliers? Please explain.
…….
.....

15. What are the perceived benefits or advantages which your company derives from knowledge-sharing with 1st tier suppliers?
……. .....
.....

16. Are there any perceived disadvantages of knowledge-sharing with 1st tier suppliers?
……. .....
.....

17. What benefits could the company derive if its 1st tier suppliers practised knowledge-sharing between themselves?
…….
.....

18. In your expert opinion, how could knowledge sharing between 1st tier suppliers be achieved?
……. .....
.....

19. What disadvantages would knowledge-sharing of 1st tier suppliers hold for your company? Please explain.
……. .....
.....

20. Are there any additional comments which you would like to add?
……. .....
.....

Thank-you for your participation. Your time and cooperation are sincerely appreciated.

APPENDIX C – SURVEY COVER LETTER

Subject: Request for input on knowledge management

Dear Mr/Mrs (Surname)

My name is Nathan Lingham and I am an MBA student at the Nelson Mandela Metropolitan University (NMMU) in Port Elizabeth currently in my final year of study. For my research treatise I am investigating knowledge management in the automotive component supply industry within the Eastern Cape Province. The purpose of this study is to gain insight into how companies like yours can retain the knowledge of experienced professionals after they have resigned or left the company for whatever reason. Your input is of paramount importance to finding a solution to this problem and you are therefore requested to contribute your valuable experience and knowledge toward this study.

I am well aware of the value of your time, therefore only about 15 minutes are being requested to complete a questionnaire to give your view on the situation at your organisation. The information obtained from this questionnaire will be treated with strict confidentiality, will not be used for any other purpose other than in writing the research treatise for academic purposes only and will be presented in anonymous or aggregated form.

Please feel free to contact myself or my research supervisor on the contact details given below about any queries you may have regarding this study. You have the options of downloading the questionnaire attachment in MS Word format, to be completed and returned to me via e-mail or alternatively, click on the web link below to complete the questionnaire online:

https://www.surveymonkey.com/s/TQ7PWKG

You may request a copy of the study, in aggregated form, by indicating so in the concluding section of the questionnaire. It would be greatly appreciated if you could respond by the end of this week (Friday, 19 August 2011).

I thank you in advance for your participation. Your cooperation to participate in this study is greatly appreciated.

Sincerely,

Nathan Lingham (Research Student)
Cell: 083 504 5850
E-mail: nathan_lingham@yahoo.com

Prof Andre Calitz (Research Supervisor)
Office: 041 504 2639
E-mail:andre.calitz@nmmu.ac.za

APPENDIX D – COMPONENT SUPPLIER QUESTIONNAIRE

Nelson Mandela Metropolitan University
Business School
Leaders for tomorrow

Nelson Mandela Metropolitan University
for tomorrow

Knowledge Management in the Automotive Industry

Component Supplier Questionnaire

Note: This is a confidential questionnaire. Your identity will not be revealed.
Your willingness to participate is most appreciated.

Confidential

Nathan Lingham (MBA Candidate)

This research is being conducted in fulfilment of the NMMU MBA treatise. Your valuable time and cooperation is sincerely appreciated. Thank-you for your participation.

INTRODUCTION

The information obtained from this questionnaire will be treated with strict confidentiality, will not be used for any other purpose other than in writing the research dissertation for academic purposes only and will be presented in anonymous or aggregated fashion. Your co-operation to participate in this interview is greatly appreciated.

Benefits from participating:

- You can indicate at the end of the questionnaire if you want a summary of the results. This provides you with an exclusive overview of the status of knowledge management in the Eastern Cape Province.
- When answering, you will automatically review the problems involved intensively, perhaps even receive new stimuli.

QUESTIONNAIRE INSTRUCTIONS:

- Please indicate your answer by making an "x" or a tick in the appropriate box or by writing your answer in the space provided;
- Please answer the questions as honestly as possible;
- Please answer **ALL** the questions in this questionnaire.

DEFINITIONS:

Knowledge Management: Is the precise process of creating, collecting, storing and sharing organisational knowledge for use by employees within the organisation to improve productivity and efficiency.

Knowledge Management Initiative: Any practise or policy that aims to encourage the creation, sharing and use of knowledge to realise an advantage for the organisation.

Formal social networks: Formally established lines of reporting and formal communication within the company.

ABBREVIATIONS:

OEM: Original Equipment Manufacturer

KM: Knowledge Management

ACS: Automotive Component Supplier

SECTION A – BACKGROUND INFO

- Name of your organisation: _____
- What is your current position / job title? _____

Please mark your choice with an "X" in the appropriate box:

- How long have you been in this position?

  0-5 years [ ] 6-10 years [ ] 11-15 years [ ] 16-20 years [ ] > 20years [ ]

- How long have you been employed by your company?

  0-4 years [ ] 5-9 years [ ] 10-14 years [ ] 15-20 years [ ] > 20years [ ]

5. Please indicate the approximate number of employees of the organisation where you are employed at present:

   1-50 [ ] 51-250 [ ] 251-500 [ ] 501-1000 [ ] > 1000 [ ]

6. ***Please select <u>one</u> of the following:***

- [ ] Our organisation does **not** practise knowledge management;
- [ ] Our organisation practises knowledge management internally only;
- [ ] Our organisation practises knowledge management internally as well as with Original Equipment Manufacturer (OEM) customers;
- [ ] Our organisation practises knowledge management internally as well as with other Automotive Component Suppliers.

e) [ ] Our organisation practises knowledge management internally, with OEM customers and with other Automotive Suppliers

SECTION B – LEADERSHIP

7. Please rate the statements below by using the following scale:
1 - Strongly Disagree
2 - Disagree
3 - Neither Agree Nor Disagree
4 - Agree
5 - Strongly Agree
(indicate your selection by marking the appropriate box)

		1	2	3	4	5
a)	Senior management is usually able to provide sufficient resources as required for the implementation of various projects or initiatives.					
b)	Management usually involves line staff to establish their needs and get their buy-in when implementing projects or initiatives.					
c)	Senior or experienced personnel are valued for their knowledge and expertise.					
d)	A strategic vision and goals for knowledge management has been established by senior management.					
e)	Knowledge management is seen as an important practise at our company.					
f)	Our basic values and purpose emphasise the sharing of knowledge.					
g)	We have an open, encouraging & supportive culture.					

h)	Our company has policies and programmes intended to improve worker retention.					
i)	Our company uses strategic partnerships to acquire knowledge.					
j)	Our company is good at the capture and use of knowledge.					
k)	Management increases efficiency by using knowledge to improve general productivity.					
l)	Management identifies and protects strategic knowledge present within the company.					
m)	Our organisation is good at transferring and sharing of knowledge with clients or customers.					
n)	Capturing of critical know-how (e.g. project information etc.) forms part of our daily routine.					

8. Please add your comments on management and leadership, with regard to knowledge management at your company:

_____

SECTION C - ORGANISATION

9. Please rate the statements below by using the following scale:
1 - Strongly Disagree
2 - Disagree
3 - Neither Agree Nor Disagree
4 - Agree
5 - Strongly Agree
(indicate your selection by marking the appropriate box)

		1	2	3	4	5
a)	Our organisational management structure is decentralised.					
b)	Our organisational management hierarchy has many levels of management.					
c)	Senior management is always able to implement changes in the technological infrastructure quickly to ensure the success of various projects or initiatives.					
d)	Our organisation is flexible and can adapt quickly to meet changes in demand from the market.					
e)	The organisational structure and interaction of various departments create formal social networks through which knowledge flows in our organisation.					
f)	Informal organisational relationships between employees create informal social networks through which knowledge flows in our organisation.					
g)	Formal interaction with our company's automotive Original Equipment Manufacturer (OEM) customers create formal social networks which facilitate knowledge-sharing between our company and our automotive OEM customers.					
h)	Informal inter-organisational relationships between employees (via email, chat rooms etc.) create informal social networks which facilitate knowledge-sharing between our organisation and our automotive OEM customers.					
i)	Formal interaction with other Automotive Component Suppliers (ACS) create formal social networks which facilitate knowledge-sharing between our					

	organisation and other ACS.					
j)	Informal inter-organisational relationships between employees (via email, chat rooms etc.) create informal social networks which facilitate knowledge-sharing between our organisation and other ACS.					

10. Please add any other comments on your company's organisational structure with regard to knowledge management:

_____

_____

SECTION D - TECHNOLOGY

11. Which technologies has your company implemented? (Please mark all that apply)

a)	Internet	[ ]	b)	Data warehousing	[ ]
c)	Intranet	[ ]	d)	Knowledge management software	[ ]
e)	Extranet	[ ]	f)	Decision support system	[ ]
g)	Groupware	[ ]	h)	Data management system	[ ]
i)	E-Commerce	[ ]	j)	Automated Manufacturing	[ ]

k) If any other, please specify _____

12. What is the name of the inventory management system currently used by your company?

_____

13. Please rate the statements below by using the following scale:
1 - Strongly Disagree
2 - Disagree
3 - Neither Agree Nor Disagree
4 - Agree
5 - Strongly Agree
(indicate your selection by marking the appropriate box)

		1	2	3	4	5
a)	Information which is stored in the company information system is managed to ensure validity, reliability and that information is up to date.					
b)	Our organisation's information technology system is linked to that of our automotive Original Equipment Manufacturer (OEM) customers.					
c)	Our organisation's information technology system is linked to that of other Automotive Component Suppliers.					
d)	The organisational information system is accessible throughout the company to all employees.					
e)	Our organisation's information technology system provides reports on its usage and performance to management staff.					
f)	Our organisation's information and communications technology system has flexibility to meet future changes in requirements.					
g)	Security features in our organisational information system ensure that critical information is not compromised and leaked to external sources.					

14. What are the problems faced by your company in using IT for Knowledge Management? (Please mark all that apply)

a) Lack of training. [ ]
b) System is too complicated. [ ]
c) Lack of identifying the proper IT tool [ ]
d) Lack of time to learn. [ ]
e) Lack of user uptake due to insufficient communication. [ ]
f) Every day use did not integrate into normal working practise. [ ]
g) Unsuccessful due to technical problems. [ ]

h) If any other, please specify _____

15. Please add any other comments on your company's technological infrastructure with regard to knowledge management:

_____

_____

SECTION E - LEARNING

Please mark your choice with an "X" in the appropriate box (mark more than one box if applicable):

16. At our company, learning on an individual level is achieved by:

a) [ ] On the job training
b) [ ] Formal training workshops
c) [ ] Company knowledge bases
d) [ ] On-line (i.e. through the company's intranet, internet or extranet)
e) [ ] Other

Please specify other: _____

_____

17. Learning in a team or departmental level is achieved by:

a) [ ] On the job training
b) [ ] Formal training workshops
c) [ ] Company knowledge bases
d) [ ] On-line (i.e. through the company's intranet, internet or extranet)
e) [ ] Other

Please specify other:

_____

_____

18. Learning at an organisational level is achieved by:

a) [ ] Recording information in an organisational database
b) [ ] Recording information on the organisation's intranet
c) [ ] Other

Please specify other_____

_____

19. Organisational learning is monitored in our organisation through the use of:

a) [ ] Organisational training register
b) [ ] Other methods

Please specify other methods:_____

20. Does your company actively create and support "Communities of Practice (CoP's)?
(CoP: An informal, self-organising group of people in the organisation, brought together by common interest who share expertise and solve problems together.)

a) Yes [ ] b) No [ ] c) Can't say [ ]

21. Please rate the significance of, <u>retaining *knowledge (i.e. learning) in your organisation*</u>, with regard to the statements below by using the following scale:
1 – No significance
2 – Low significance
3 – Average significance
4 - Above average significance
5 – Extremely high significance
(indicate your selection by marking the appropriate box)

	1	2	3	4	5
a) Improving the company's competitive advantage.					
b) Improving customer satisfaction.					
c) Introducing innovations.					
d) Inventory reductions.					
e) Reduction of waste.					
f) Employee training and development.					
g) Cost reduction.					
h) Revenue growth.					
i) Better decision-making.					
j) Faster response to key business issues.					
k) Improving quality.					
l) Reducing throughput and delivery time.					
m) Improving worker efficiency or productivity.					
n) Preventing duplicate research and development.					
o) Develop new measures and metrics for processes.					

22. Please add any other comments on your company's technological infrastructure with regard to knowledge management:

_____

_____

SECTION F – CHALLENGES IN APPLYING KNOWLEDGE MANAGEMENT

Please mark your choice with an "X" in the appropriate box (mark more than one box if applicable):

23. What are the challenges currently experienced by your company?
    a) [ ] Lack of relevant information.
    b) [ ] Information overload.
    c) [ ] Reinventing the wheel.
    d) [ ] Loss of crucial knowledge as a key employee left the organisation.
    e) [ ] Poor sharing of knowledge in the organisation.
    f) [ ] If any other, please specify _____

24. Please mention some of the benefits which your company could derive from implementing knowledge management.

    _____

    _____

25. Kindly indicate, in your opinion, how senior management can be motivated to introduce Knowledge Management practises.

    _____

    _____

26. Kindly indicate the steps, which an automotive component supplier should take for successfully implementing a Knowledge Management Programme. Also indicate the relative importance of IT in this context.

    _____

    _____

27. Does your company reward knowledge sharing with:

    a) [ ] monetary incentives

    b) [ ] non-monetary incentives

    c) [ ] not applicable

28. Please briefly describe the knowledge management initiatives which are currently being pursued to facilitate knowledge-sharing between your company and your automotive OEM customers?

    _____

    _____

29. Please briefly describe the knowledge management initiatives which are currently being pursued to facilitate knowledge-sharing between your company and other automotive component suppliers?

    _____

    _____

CONCLUSION

30. Please mark one of the boxes below to indicate if you would like to receive a copy of the summarised results of this study:

Yes [ ] no [ ]

31. Do you have any additional comments you would like to add? Your opinion is most valued:

_____

_____

Thank-you for your participation. Your valuable contribution to this study is sincerely appreciated.