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Title

Innovation management in the automotive component manufacturing industry of South Africa

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A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

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ABSTRACT

Innovation management competency and technological capability are fundamental to the development of a competitive SMME sector in the automotive component manufacturing industry. The aim of this research is to investigate innovation strategies in the form of managerial processes and systems that SMME firms in the ACM industry employ in developing technological capability and managing innovation, as well as to identify conditions and factors that influence success or failure of innovation.

A semi-structured interview based on the simplified model of innovation process framework with 10 management representatives of firms in the automotive component manufacturing industry together with observations within the firms and semi-structured interviews with the two industry experts were used to gather data for analysis.

The research highlights the following as the processes and systems that needs to be in place to develop technological capability and manage innovation, Vision and strategy stating the innovation intention, Organisational structure and culture to support innovation objectives, Skills development to build technical and managerial knowledge and skills, Risk management to build sustainability and Information sharing to build trust. The research findings goes further to highlight the following as factors that determine success or failure of innovation, Leadership to champion innovation, External environment scanning for opportunities and threats, Technology for capability and competitiveness and Teamwork for support and drive.

The successful implementation and integration of these processes will assist in defeating the technological late comer effect by helping SMME firms to catch up technologically with competitors in other developed countries, even if is still a long term prospect.

DECLARATION

I, Mokiri Mametja Mangwale, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfillment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Mokiri Mametja Mangwale

Signed at: Johannesburg

On the 17th day of August 2015

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1. INTRODUCTION

1.1. Purpose of study

To investigate innovation strategies in the form of managerial process and systems that SMME firms in the ACM industry employ in developing technological capability and managing innovation, as well as to identify the conditions and factors that influence success or failure of innovation, using the simplified model of the innovation process Framework as developed by Tidd (2009) and analysed through the technological capability building process in latecomer firms framework as developed by Dutrénit (2004)

1.2. Context of the study

With South Africa emphasizing its economic development path on industrialisation and development of a strong Small Micro Medium Enterprises (SMME) sector, innovation management competency and technological capability amongst these businesses will be necessary for their survival. As Maladzhi (2012) says, the failure of leadership to create an innovation culture within an organisation has led to the failures of the majority of SMMEs. The success of this approach especially in industrialising, is centered on encouraging SMME's to go into the manufacturing industry to create firms that can offer products and services that can compete with existing players in the industry.

SMME's are seen as the engine for economic growth and development across the world, while in case of South Africa also linked to economic empowerment and job creation amongst poor communities. (Urban & Naidoo, 2012). Urban and Naidoo (2012) further notes that more tax revenue is generated from small and medium enterprises in the developed countries than tax from big business. According to Kleynhans (2009), SMMEs in South Africa accounts for 35% of the GDP, contribute 43% of total value of salaries and wages and about 54% of private sector employment. 38% of South African SMMEs are located in the Gauteng Province making it the economic hub of South Africa. (Urban & Naidoo, 2012)

SMME's mainly in the manufacturing sector are forced to operate in the same environment as their larger counterparts without the benefit of the resources and capital at the disposal of the larger companies. (Smit & Watkins, 2012). Due to globalisation and the ease with which manufactured goods can reach South Africa, competition amongst manufactured goods and services is intense and requires creative and innovative leadership and organisational processes and systems within the SMME firms to gain competitive advantage. (Urban & Naidoo, 2012)

Innovation is not only the production of new creative ideas, but also the successful commercialisation of those ideas to yield financial benefits for the firm. According to Smith (2010), the success of many creative ideas relies on the quality of the management and processes followed to ensure success in the market. Ideas are generated daily and in large numbers, but the majority of them never make it to market or end up failing when they get to the market. This is not only because they are bad ideas or bad technology or bad products, which they may well be, but also because of the processes followed in managing their development, industrialisation, commercialisation and diffusion. As Smith (2010), says for every successful innovation there are probably ten times as many unsuccessful ones.

1.2.1. Background of Automotive Industry in South Africa

South Africa boasts a vibrant and highly competitive automotive manufacturing sector, with the main players being the well known international original equipment manufacturers (OEM's), Ford, Nissan and BMW with production facilities located in Gauteng Province, Toyota (SA) with production facilities located in the KwaZulu-Natal Province and Volkswagen, General Motors and Mercedes Benz (SA) with production facilities located in the Eastern Cape. All these OEM's are producing vehicles for both the local and international market from their production facilities in South Africa. (Naude, 2009). These OEM's are organised under an industry body called the National Association of Automobile Manufacturers of South Africa (NAAMSA).

The OEM industry in South Africa like elsewhere in the world is supported by a large Automotive Component Manufacturers (ACM's) industry, which supplies the OEM's with components for the vehicle assembly, while also supplying the aftermarket retail sales (ARS) and export original equipment suppliers (OES) market for spares. (Naude, 2009). These ACM's are organised under an industry body called the National Association of Automotive Component and Allied Manufacturers (NAACAM).

Until the early 1990's the automotive industry in South Africa was excluded from the international market due to sanctions and therefore could only supply the local market. At the dawn of democracy in 1994, all the OEM's that were previously operating in SA returned and bought their investments back to also take advantage of the new Motor Industry development Plan (MIDP) that Government introduced as an incentive to attract investment in the industry.(Lorentzen & Gastrow, 2011)

The MIDP was since replaced by the Automotive Production Development Program (APDP) on the 1st January 2013. APDP is characterised by support driven by volumes and therefore encouraging OEM's to attract big model projects in order to increase their export volumes and benefit from the program.(Ambe & Badenhorst-Wess, 2013) This program was also extended to cover the ACM's, which increased the amount of multinational subsidiaries investing in component manufacturing in SA. (Lorentzen & Gastrow, 2011)

Due to the global recession of 2008, which had a big impact on OEM sales across the world, the same knock on effect was felt in the ACM industry. As indicated by Achterholt (2008) in the KPMG survey of 2009 to 2013, the future of the automotive industry will be tough going forward until major economies are fully out of recession. The target for the SA Automotive Industry was to build 1.2 million vehicles by 2020, which was then revised to 800 000 in 2010 and there is agreement that this will also not be met considering the current growth rates 5 years from 2020. But the industry players are focused on the long term innovation and improvement in technology, like efficient fuel technology.(Achterholt, 2008)

This research will focus on the development of technological capabilities and the management of innovation within an SMME firm, while also identifying the conditions that affect the success or failure of innovation within SMME firms operating in the ACM industry.

1.3. Problem Statement

1.3.1. Main problem

To investigate managerial processes and systems that SMME firms in the ACM industry employ in developing technological capability and managing innovation, and to identify the conditions and factors that influence the success or failure of innovation.

1.3.2. Sub-problem 1

To investigate managerial processes and systems that SMME firms in the ACM industry employ in developing technological capability and managing innovation.

1.3.3. Sub-problem 2

To identify the conditions and factors that influence the success or failure of innovation.

1.4. Significance of the study

This research contributes in enhancing knowledge about developing technological capability and innovation management within SMME firms in the ACM Industry. There is currently no significant research that addresses the systems and processes employed by SMME firms in developing their technological capability, with the aim of improving their innovation management capability especially in the ACM industry. Most published research identifies innovation as an enabler for SMME firms to be competitive and even grow, but very little addresses the way this is done and this study fills that gap.

The two frameworks that was used in this study (The Simplified Model of Innovation Process and the Technological Capability Building Process in Latecomer Firms Framework). The first one was used to characterise the basic stages that the firms go through in order to capture the expected benefits of their innovation strategies, while the second framework was to allow a deeper and more robust analysis of the processes and systems followed in managing innovation in these firms. To my knowledge these models have not been used in the analysis of the ACM Industry and amongst SMME firms before and therefore provide fresh insights into this topic from a South African perspective.

This study also provide guidance to other SMME's in the ACM industry that seek to develop their technological capability and innovation management techniques and don't know how to approach it. This includes those that are also considering entering the industry and would like to adopt innovation management as their growth strategy in the ACM industry or manufacturing in general.

The study also provides valuable information for reference to SMME's, innovation scholars and academics to enhance their respective fields and to pick up areas of further research. The South African government with their strategy on industrialisation and SMME development and the fact that ACM is one of their focus points will find the study valuable to assist in sustaining SMME growth within the ACM industry and manufacturing in general.

1.5. Delimitations of the study

- The study focused its approach on the chosen frameworks only but does not imply that innovation is based on these frameworks alone.
- The study was limited to the Province of Gauteng.
- Two companies in the same sector were chosen and an in-depth analysis done.

1.6. Definition of terms

1.6.1. Innovation

Innovation as a concept has many varied definitions , but there are key words that are common in the majority of the definitions, which include *idea generation*, *new*, *different* and *changes* among others. There are various research papers that explore a universal definition, by considering what is common amongst the existing definitions. Some of the early researchers of the topic like Thompson's (1965, p.2) as cited by Baregheh, Rowley, and Sambrook (2009) state the definition as follows, “Innovation is the generation, acceptance and implementation of new ideas, processes, products or service".

However Freeman and Soete (1997, p. 6) states that innovation is different from invention in the fact that it also needs commercial success and therefore define it as follows, "Innovation is the first commercial application or production of a new process or product"

While definitions are not limited to the ones quoted above, the few above were highlighted to illustrate the diversity of the views on what innovation is and mean to different sectors. The last one by Freeman and Soete (1997, p. 6) captures the essence of commercialisation of the new product or process, which is fundamental to successful innovation. For the sake of this research and to define the scope of the research more accurately, the simple definition by Freeman and Soete (1997, p. 6) was adopted and therefore the focus was on the two elements which are that the idea has to be new to the environment or firm and has been commercialised and therefore successful in the market.

1.6.2. SMME in SA context

Small, Micro and Medium Enterprises (SMME) in South Africa are defined in different forms by different authors and researchers. Some categorise them by number of employees, others by turnover, others by legal standing, others method of production and others by skill of labour.

With these wide areas of definition it was difficult for the South African Government to define an SMME firm and therefore offer relevant services and support. SA government then took an effort to define an SMME firm in the legislation by sector, number of employees, turnover and asset value. The table below explains the categorisation as extracted from the SMME Act and the definition as per the Act is as follows,

Table 1: Classification of SMME in the Manufacturing Industry

SCHEDULE

Sector or sub-sectors in accordance with the Standard Industrial Classification	**Size or class**	**Total full-time equivalent of paid employees** *Less than:*	**Total annual turnover** *Less than:*	**Total gross asset value (fixed property excluded)** *Less than:*
Manufacturing	Medium Small Very small Micro	200 50 20 5	R51.00 m R13.00 m R 5.00 m R 0.10 m	R19.00 m R 5.00 m R 2.00 m R 0.10 m

(Source: Extract from, Act 106 of 1996: National Small Business Act, 1996 and National Small Business Amendment Bill)

As the above is the official classification and definition by the South African Government, it therefore informs the development path, support and policies used when the government deals with SMME's. But due to the difficulty of finding organisations that fit this criteria exactly on all three aspects, this research will therefore adopt a definition that only looks at the number of employees and any organisation that employs 200 or less employees will be classified as fitting the criteria to be an SMME.

1.7. Assumptions

The following assumptions have been made regarding the study:

- The sample shared sufficient information on the innovation process followed by the firms. Insufficient knowledge would have negatively affected the credibility of the study.
- Firms chosen for the study represent the approach that majority of the firms in that sector would follow when faced with similar challenges.
- The respondents chosen were sufficient to gain adequate data.
- Respondents were honest and truthful in their responses, as false information would have negatively affected the results of the study.
- Innovation challenges are similar within different firms in the same sector.

1.

2. LITERATURE REVIEW

2.1. Introduction

This chapter contains the literature review on the key themes of relevance to the research. The first area is on an overview of the concept of innovation with special emphasis on innovation management both technological and organisational within firms. It then goes over the characteristics and features of the SMME firms. This is then followed by the particular innovation dynamics pertaining to SMME firms and an overview of the management of innovation in the automotive industry. It then concludes by synthesizing the literature to identify the key themes relating to innovation in an SMME firm in the automotive industry in SA or in countries at a similar level of technological development.

2.2. Background discussion

2.2.1. Innovation Management

To many people, innovation is seen as the key to getting the economy moving and creating jobs. It is harder to define exactly what innovation is, how it happens and whether it actually translates into economic growth. But innovation has now become one of the key elements within a business. (Rosenbusch, Brinckmann, & Bausch, 2011). Public opinion surveys reveal interesting results in people's views about innovation. A 2009 *Newsweek*-Intel Global Innovation Survey interviewed 4,800 adults in the United States, China, United Kingdom, and Germany. Researchers found that two-thirds of respondents believe innovation will be more important than ever to the economy over the next 30 years. (McGinn, 2009). People understand that innovation has been the key to past prosperity and will be vital moving forward.

Innovation is the ability to turn ideas into useful new products, services and ways of doing things; this is the wellspring of prosperity for any developed country. The companies that invest most in innovation become industry leaders, are more competitive and thus grow faster in profits and turnover than ones that do not; and the countries that invest most in innovation do well. (Rosenbusch et al., 2011). Nor is it a coincidence that many of the nations doing best today in innovation have articulated a clear vision of where they think their future wealth and jobs will come from. Countries as diverse as Korea and Finland, Israel and Singapore have sustained a mood of optimism and possibility through the crisis, and given business a sense of the future gains that make investment today worthwhile. (Wincent, Anokhin, & Boter, 2009).

As competition for customers and resources become more and more intense, the ability of a company to innovate is often more important than any other factor in its sustainability. Innovation therefore needs to transcend all areas of operations - production, finance, planning, human resource management and marketing. The reason being that technological innovation without a proper business model or organisational innovation to support its commercialisation results in failed innovations. (Teece, 2010).

The concept of innovation management concerns itself with combining all the resources of an organisation to sustain an innovation practice. Innovative organisations embrace innovation management practices to create the necessary capabilities to sustain the gains of the technological innovation (Parker & Van Alstyne, 2010). Innovation management is normally divided into technological innovation and organisational innovation. Technological innovation encompasses both the product and process innovation, while organisational innovation is concerned with the non-technological aspects of innovation like business model, structure, culture, leadership, human capital, skills development and strategy. Both innovation efforts seek to provide the business with competitive advantage if developed and managed correctly to become a core capability. (Mothe & Thi, 2010)

According to Dahlman, Ross-Larson, and Westphal (1987) who are some of the earlier writers about technological capability development, contend that invention is not at the centre of technological capability development for successful industrialisation but the ability to acquire the required technologies and to use it efficiently to improve productivity. (Dahlman et al., 1987) further emphasises the importance of combining both local and foreign technologies to create a global mix that improves efficiency and productivity. (Lall, 1992) argues that technological capability is not only about acquiring the technology and transferring it from a developed country of its source to a developing country to use but require an adaptation process that involves learning, skills development, effort and investment in the new technology by the receiving firm, as most technologies have elements of tacit knowledge with underlying principles.

This is supported by Kim (1999) who say that firms that want to be successful in technological capability development should recruit higher caliber human resources to keep improving the existing knowledge, continue to scan the market for new technologies and also to invest in in-house research and development to improve on imported technologies to create internal tacit knowledge and therefore competitiveness.

Building technological capability involves the management of knowledge within the organisation. It is the ability to utilise this knowledge to create new products and processes using new technology or adapting new technology to old technology to create a competitive advantage.(Dutrénit, 2004). As Dutrénit (2004) stated, firms acquire technological capability by going through a learning process over time, this builds knowledge that is difficult to copy or be imitated by competitors as it is tacit knowledge that cannot be easily codified. This is supported by Teece (2007), who goes on to contend that developing technological competency should be a dynamic process in the pursuit of being at the cutting edge of technological capability.

2.2.2. Characteristics of SMME Firms

Small, Medium and Micro Enterprises (SMMEs) are considered worldwide as a mode of sustainable business development. (Urban & Naidoo, 2012) This is shared by Kleynhans (2009), who claim that SMME's are more labour intensive, as there are initial capital constraints and therefore represent a good source of employment at the early stage of a country's development.

This is further supported by Smit and Watkins (2012), who emphasize the importance of SMME's especially to the African continent to promote economic growth, create employment and even mitigate poverty, especially in countries like South Africa where unemployment is as high as 40%. Kleynhans (2009) goes further to suggest that SMME's offer the potential to reduce the inequality problem that South Africa has with their potential to raise income and therefore improve wealth distribution.

Even with the importance of SMME's as described above, there remains a concern on the survival rate of SMME firms, only 1% of SMME's expand from five or fewer employees to ten or more. (Smit & Watkins, 2012). A number of researchers highlight poor managerial skills, poor scanning of the external environment, poor risk management, lack of innovation culture and poor leadership as the factors contributing to the poor sustainability of SMME's. (Kleynhans, 2009; Maladzhi, Yan, & Makinde, 2012; Smit & Watkins, 2012; Urban & Naidoo, 2012).

SMME firms particularly in South Africa where management skills are scarce and therefore highly priced are plagued by lack of skilled human capital. The majority of them are owned and managed by an SMME entrepreneur who then becomes everything in the business and therefore being unable to adequately asses the threats and the internal weaknesses that may surface.(Urban & Naidoo, 2012). The firms are also characterised by poor skills both technical and entrepreneurial, under capitalisation and high risk therefore rendering them incapable of acquiring proper technologies and technological capabilities to attain the competitive advantage required thereby remaining technologically illiterate and susceptible to failures and retarded growth.
(Smit & Watkins, 2012).

Smit and Watkins (2012) also support this notion that an organisation's growth potential and technological innovative capability is dependent on the depth of its human capital. He goes further to say that successful entrepreneurs have educational qualifications beyond primary school, which is based on the notion that entrepreneurs with high level of education are able to analyse and identify risk factors and are therefore able to adapt their business to changing environments.(Smit & Watkins, 2012). But the above notion of formal education or codified knowledge is criticised by Dutrénit (2004), as this type of knowledge is easy to imitate and therefore does not offer competitive advantage when it comes to technological capability. She continues to say that the organisation's competitive advantage is created by continuous development of learning on tacit knowledge. (Dutrénit, 2004).

2.2.3. Innovation dynamics within SMME Firms

SMME firms that adopt innovation as a business practice tend to adapt better and faster to changes and due to their size are more flexible to easily apply new production technologies or expedite supply channels to be first to market. (Kleynhans, 2009). But due to additional challenges of poor resources and lack of finance, especially in technology intensive industries like manufacturing, SMME firms tend to have an even lower survival rate.(Kleynhans, 2009).

The ability to innovate and exploit innovations globally in a rapid and efficient manner is a source of competitive advantage (Teece, 2010). However the management of innovation is made difficult by the complexity, unpredictability and the pace of turbulence in the environment which then limits the time period for strategic planning (Teece, 2010). In Kim (1997:219) as cited by Dutrénit (2004) she maintained that the successful technological learning or development of technological capability is more dependent on the external environment. A country's innovation system has a major impact on organisations capacity to develop technological capability as it supports the firms learning process and therefore its competitiveness.(Dutrénit, 2004).

One of the factors identified as contributing to the cause of the high failure of SMME's in innovation is the poor risk management. This is supported by Smit and Watkins (2012) who contend that Enterprise Risk Management (ERM) is a business competency that managers need to learn and master to take advantage of risk opportunities. Further identified problems of SMME's in raising funds relate to the inability of funders to assess enterprise credit risk due to poor business plans. (Smit & Watkins, 2012).

But Urban and Naidoo (2012) contrast this by supporting a risk taking environment even if it should be a calculated risk and continue by saying that risk taking is a big ingredient to idea generation and therefore supports innovation, He therefore supports a culture of controlled risk taking to support innovation initiatives.

Innovation therefore needs to transcend all areas of operation - production, finance, planning, human resource management and marketing. (Urban & Naidoo, 2012). However in most small businesses many of these functions are carried out by the owner manager and thus often lead to a lack of realisation of the processes needed to implement innovation within the small business. (Maladzhi et al., 2012).

2.2.4. Innovation Management in the automotive industry

The automotive industry is one of the biggest industries in the world based on its product variety and spread. Is also one of the most competitive industries globally due to the complex needs of the customer base and therefore requires quick innovative ways to respond to customer needs. The industry also invests highly on product and technological development and is therefore highly advanced on both manufacturing processes and products. (Ambe & Badenhorst-Wess, 2013).

The eight biggest car markets in the world, which are EU(European Union), USA (United states of America), Japan, Russia, China, Brazil, South Korea and India boast a combined vehicle total of 530 million vehicles and is expected to double by 2030 and triple to 2 billion vehicles by 2050. (Cames & Helmers, 2013) These figures indicate an industry that is growing and therefore has become an important industry in all vehicle producing countries. In 2008, 80 million motor vehicles were produced worldwide and of these 60 million were cars. This number increased to 65 million cars in 2010 and is expected to increase to 93 million by 2020 and 114 million by 2030 indicating an annual 3% increase in production until 2030.(Cames & Helmers, 2013)

But the industry is also facing challenges of reducing manufacturing costs, enhancing quality, improving styling, improving organisational efficiencies and drive innovative features in their products to remain competitive and enter new markets.
(Ambe & Badenhorst-Wess, 2013). This pressure is therefore felt throughout the supply chain including ACM's. Due to the pressure of managing Quality, cost and time for each development model which was inefficient, a majority of the OEM's moved to a platform system, where components and subsystems can be shared amongst different products in a global sourcing system. (Beaume, Maniak, & Midler, 2009).

Therefore, to the majority of the firms in the automotive industry, innovation management is no longer about the introduction of new radical products and processes, but applying new innovative features incrementally to a stream of existing products and formation of platforms. This implies the management of the interplay between aging innovative features and a stream of new development projects. As Beaume et al. (2009) say, this method allows the OEM's to build core competencies based on existing tacit knowledge thereby building an innovation capability based on a learning organisation.

2.2.5. The Simplified Model of Innovation Process Framework



Figure 1: The Simplified Model of Innovation Process Framework. (Tidd, 2009)

The simplified model of the innovation process in an organisation structures an innovation approach that is centered on key questions that an organisation has to ask to establish its position in relation to innovation. The six questions that form the crux of this model encompass all aspects of the organization and also embrace the wide scope of innovation. This approach allows an organisation to enter into practical processes of answering questions, which when answered adequately suggests that a process of innovation has been entered into. The six questions of the model are explained independently underneath:

1. ***Do we have a clear innovation strategy?*** This question seeks to understand whether an organisation has put together deliberate measures to harness the power of innovation for its benefit. It explores whether there is an understanding across the organisation of how innovation can assist the organisation's growth and a clear process that each individual in each section of the business can follow to contribute to the growth of the organisation through innovation.

2. ***Do we have an innovative organisation?*** This question explores the extent to which innovation management form part of the day to day operation of the organisation. It seeks to understand the extent to which innovation management and creativity is embedded in its leadership structure to ensure that innovation is nurtured at all levels. It also further addresses the level of support given to the innovation process to ensure that it remains dynamic and aligns to the increasing needs of organisations and therefore sustaining an organised innovation system.

3. ***Search, How can we find opportunities for innovation?*** This question forms the first element in the simplified innovation process model. It seeks to answer the question of where do you start, how and when. By getting answers to this question the model creates a fertile environment where innovation can thrive. This process of gathering ideas is not categorised or focused on any element in the organisation but looks at the organisation as whole, meaning it looks at ideas which are new, incremental and ideas that involves external stakeholders that can be of value to the organisation.

4. ***Select, What are we going to do and why?*** This question explores the selection criteria used to decide, which of the generated ideas will be pursued and why? This element in the process is critical as new radical or disruptive ideas may be lost if selection techniques and processes are poor and fail to recognise the potential of the idea. The selection is also crucial as this is the area where generation of ideas could be discouraged if the selection is flawed and feedback detailing the reasons for successful and unsuccessful selection is not provided. This question will also look into the protection of the selected ideas to ensure that the organisation benefits from the intellectual property.

5. ***Implement, How are we going to make it happen?*** This question explores bringing the idea into life. At this stage an organisation looks into its resources and structures required to put the idea into practice. This stage requires the selection of a team that will ensure the successful implementation of the idea using proper project management tools and techniques. This stage also requires clear oversight from the organisation's leadership over and above the project leadership, as failure at this stage does not only rob the organisation of the benefits of the idea but also waste countless effort and finances.

6. ***Capture, How are we going to get the benefits from it?*** This question explores the element of getting value from the efforts of innovation. At this stage the effort put throughout the process now yields the promised fruits. Organisations engage in innovation processes to derive benefits and to sustain the innovation process. This stage is critical to justify the means. The benefits of the innovation process are a perfect motivator for continuous innovation and have to be communicated when realised.

2.2.6. The technological capability building process in latecomer firms Framework

The technological capability building process in latecomer firm's framework identifies three stages of building technological capability based on the level of accumulation and use of innovative technological capabilities. These stages involve basic, transition and advanced technological capability, which distinguishes firms competitively.

These stages are clearly illustrated in Figure 2 below. Stage one consists of building the minimum basic knowledge necessary to survive in the market, which is in the lower area of figure 2. The next stage consists of building, nurturing and renewing strategic capabilities thereby operating at an advanced level of technological capability, which is displayed in the top section of figure 2.

Then there is another stage which represent the transition between the above two stages, this stage consist of a firm that has build the minimum basic knowledge but has not yet arrived at the minimum requirement for strategic capability stage. This transition stage is said to be at the Embryonic strategic capability stage and is displayed in mid section in Figure 2. (Dutrénit, 2004). These stages are also detailed in Table 2 below,

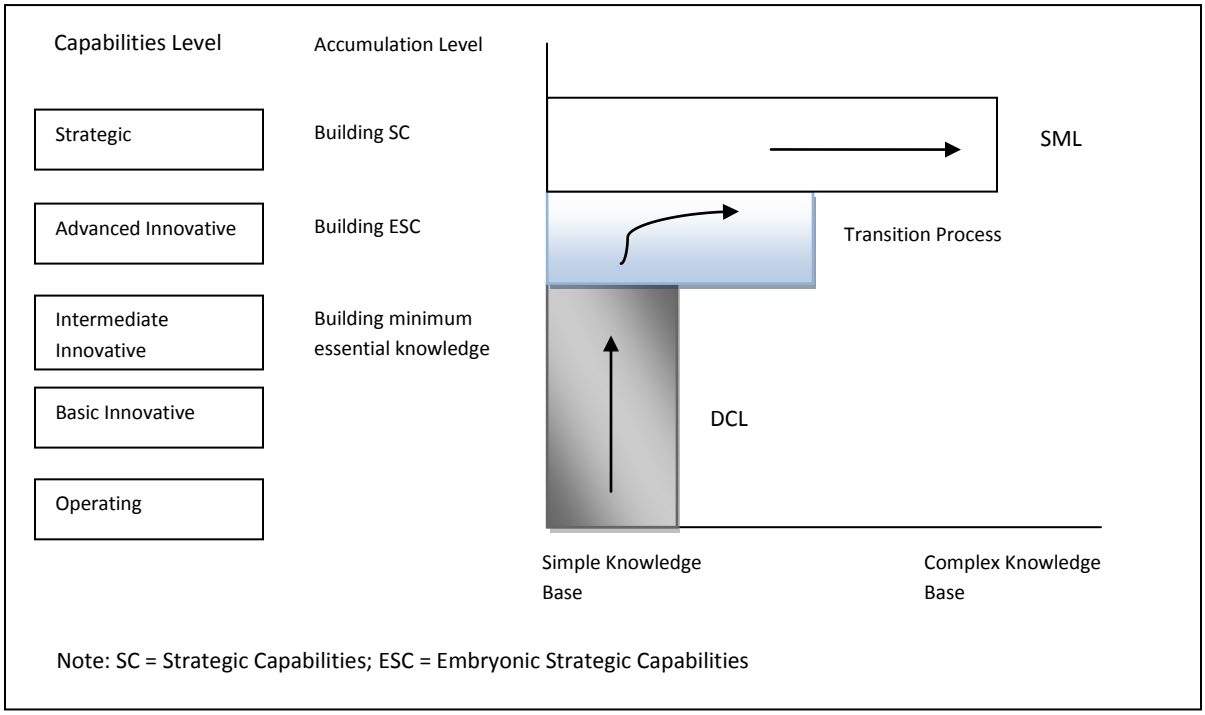


Figure 2: The technological capability building process in latecomer firms Framework (Dutrénit, 2004)

Table 2: Stages of building technological capability (Dutrénit, 2004)

Stages	*Building the minimum essential knowledge base*	*Transition process*	*Building strategic capabilities*
Definition	Stage of accumulation where firm has built technological capabilities to reduce costs, improve quality and upgrade equipment to achieve parity with competitors	Stage of accumulation from building the minimum essential knowledge base to building strategic capabilities to distinguish the firm competitively	Stage of accumulation where the firm has already built strategic capabilities which distinguish the firm competitively, and continually looks at maintaining, maturing and renewing them
Characteristics	Accumulation of: • Routine production capabilities • basic to intermediate innovative technological capabilities • simple knowledge base	(I) Accumulation of: • Routine production capabilities • Intermediate innovative technological capabilities in certain technical functions and advanced in others • Simple knowledge base (ii) Emergence of embryonic strategic capabilities in some technical functions, technical areas or knowledge fields	(I) Accumulation of: • Routine production capabilities • Advanced innovative technological capabilities in all technical functions • Complex knowledge base (ii) Emergence of strategic capabilities in some technical functions, technical areas or knowledge fields
Literature	DCL mostly refer to this stage		SML refers to this stage

(Source Article: Building Technological Capability in Latecomer firms)

2.3. Conclusion of literature review

The literature review highlights the importance of innovation within an SMME firm, but not specific to an industry or sector. It also highlights the extent of the need for innovation management within SMME firms to reduce the failure rate currently being recorded. It also details some of the factors contributing to SMME failure but falls short of explaining the environment that needs to exist to ensure success. Technological capability as an element of innovation management requires the availability of capital and skills development which is normally what is in short supply amongst SMME's. In synthesizing the literature the following five key themes emerge,

- Leadership,
- External Environment,
- Vision and Strategy,
- Organisational Structure and Culture
- Skills Development.

These are summarised underneath;

For innovation to succeed in any firm, leadership is an important factor to champion the creation of an innovation culture within an organisation.(Maladzhi et al., 2012) Innovation culture in organisation ensures that everyone in the firm engage in the process of improving the organisation in their respective functions. According to Sloan (2006), as cited by (Maladzhi et al., 2012) innovative leadership is a catalyst for getting the people excited about change and source their commitment and participation in order to innovate successfully. For most businesses innovation and the quest for innovation, must be a continuous process of improvement and change.

According to Sandada (2014) every business has to conduct an environmental assessment. The business environment consist of three different environments, namely the micro, market and macro environments. Micro is concerned with the business and its internal operations; Market is the environment surrounding the business, which consists of suppliers, competitors, customers, labour unions etc. Macro consist of the environment surrounding the business but the business has no control over but it controls how the business operates, this consist of politics, economics, social etc. These factors are an essential element of managing a business and continuous impact and risk assessment has to be done to ensure that business strategies are not threatened.

Innovation management is not an event but an intentional strategic process through which organisations renew themselves and keep them relevant to ever changing markets and other external conditions(Teece, 2010). Having an Innovation strategy allows the business to therefore formalise the processes that needs to be followed to trigger creative idea generation that will result in innovative products, services, technologies or processes. (Lorentzen, 2009) It allows SMME firms to scan their environments accurately and respond creatively to reduce threats and improve weaknesses.(Smit & Watkins, 2012)

The individual innovation also assists in growing organisations, as this brings out the entrepreneurship element to the innovation space (Jordaan, 2013) As Jordaan (2013) says the organisational structure should be an enabler that support a thriving innovation culture. This is also shared by Maladzhi et al. (2012) when he says that innovative leadership guards and police jealously every sign that seeks to threaten innovation culture within an organisation and supports every effort that strengthens it.

SMME's high failure to innovate has been attributed to the inability to attract good human capital.(Maladzhi, 2008) An SMME environment does not offer job security especially at startup and therefore fails to attract experienced managers thereby resulting in a chronic lack of technical, operational and management skills. (Urban & Naidoo, 2012) He continues to emphasize that the entrepreneur's technical and operations skills are a great asset to the business that needs to be developed and enhanced through training. (Urban & Naidoo, 2012)

But SMME's remain an important element in every country including South Africa due to its potential to create jobs, distribute wealth and neutralise dominance of some monopoly firms. It is therefore essential to create innovation capability within these firms to ensure their sustainability. The question that always arise when a need is identified is how can it be satisfied, what do we do and how do we do it? The process to be followed, systems required and conditions necessary to develop innovation management capability in SMME firms has not been explored in the literature reviewed and therefore justifies the proposed study.

2.4. RESEARCH QUESTIONS

2.4.1. Research question 1

What processes and systems do SMME firms in the ACM Industry employ to develop technological capability and manage innovation successfully?

2.4.2. Proposition 1

Processes exist mainly on an adhoc basis to support problem solving that result in continuous improvement and therefore building unique capabilities but not systematic.

2.4.3. Research question 2

What are the factors and conditions both internal and external that could facilitate or impede the SMME firm in the ACM industry to attain its intended innovation outcomes?

2.4.4. Proposition 2

Both internal and external environment contributes to the success or failure of innovation but the external would have more impact due to reliance on OEM's, Government incentives and industry association support.

3. RESEARCH METHODOLOGY

This part of the report details the methodology used in conducting the research. The discussion on the choice of the methodology is then followed by the review of the literature on research design, sampling and research instrument. Then data collection methods and analysis is discussed followed by validity and reliability of the study.

3.1. Research methodology

This research uses qualitative research methodology to collect and analyse data in order to answer the research questions. Hennink, Hutter, and Bailey (2010, p. 8) defines qualitative research as an approach that allows the researcher to examine people's experiences in detail by using a specific set of methods like in-depth interviews, focus group discussions, observations, content analysis, visual methods and life history. According to Tracy (2010) practitioners of excellent qualitative research seek to answer the following questions, Are these findings sufficiently authentic? Can I trust them to act on their implications? Would I feel sufficiently secure about the findings to construct policy or legislation based on them? She continues to characterise qualitative research into criteria of quality which are, a worthy topic, rich rigor, sincerity, credibility, resonance, significant contribution, ethics and meaningful coherence. (Tracy, 2010).

Due to the nature of the topic and the structure of the research question that wanted to establish reliable findings that both the researcher and the targeted impact group would feel sufficiently secure to apply in building more knowledge or growing SMME firm's innovation capability. This research required that the respondents be able to describe the details of the activities they undertake through questions, which then triggered other detailed questions to get an in-depth understanding. Visual interactions with the environment and observations of proceedings were also used to aid in the data collection and assist in the analyses and therefore the findings. Qualitative research was therefore the most suitable for this study.

The assumption of this methodology is that the respondents have enough knowledge about the topic and the environment they operate in both internal and external. It is also assumed that they were honest and credible in answering posed questions.

3.2. Research design

The research design was based on a case study method and chosen because of its characteristics. Case studies can be applied to a detailed analysis of a limited number of events and conditions. Case studies have also frequently been used to evaluate, document and analyse projects and implementation processes and systems.(Yin, 2011) It is suitable as it involves in-depth analysis using limited number of respondents. It was used together with semi-structured interviews to provide a face to face discussion with the respondents to allow for in-depth understanding of processes and systems. Other sources of data included expert commentators from NAACAM and AIDC, as well as automotive industry publications.

The advantages were that respondents were studied within their normal settings and therefore removing the discomfort of an interview. The disadvantage was the inability to obtain all the desired respondents due to the difficulty in securing appointments because of their busy schedule.

3.3. Population and sample

3.3.1. Population / Case Site

The population was two companies operating in the ACM industry. The companies are listed in table 3 underneath,

Table 3: Companies selected for the study

COMPANY	INDUSTRY	PRODUCT RANGE
Quantum Automotive	Automotive Component Manufacturing	Poly-v pulleys, Crankshaft, Power-steering pumps and water pumps.
Shatterprufe	Automotive Component Manufacturing	Automotive glass (Laminated windscreens, toughened side glasses and toughened rear glasses).

Quantum Automotive,

This company formerly known as Baisch Engineering was established in 1967 by Mr. H.P. Baisch. Over the years it was purchased by different owners until 2010 when it was purchased by Bentral (Pty) Ltd trading as Quantum Automotive who are the current owners. The company relocated its manufacturing facilities from Spartan in Kempton Park to Ga-Rankuwa in Pretoria and eventually to the Automotive Supplier Park (ASP) in Rosslyn to be closer to the OEM's in Rosslyn Pretoria. The company supplies various types of Poly-v pulleys, crankshafts, power-steering pumps and water pumps to the OEM's and to the export market. Current customers are Ford, BMW, Audi, Volvo and Renault. The company also holds an ISO9001:2008 and TS16949 quality standards certifications.

Shatterprufe Ga-Rankuwa

Shatterprufe Ga-Rankuwa is owned by PG Group. The company has its manufacturing facility located in Ga-Rankuwa Pretoria and produces automotive glass both laminated windscreens and toughened side and rear glasses for all major OEM's in SA. Current customers are Ford, Nissan, BMW, General Motors, Toyota, Mercedes Benz and Volkswagen in the automotive industry. The company also holds an ISO9000, ISO14000 and TS16949 certification.

3.3.2. Sample and sampling method

Five internal people were selected from each of the organisations, then one from National association of automotive component and allied manufacturers (NAACAM) and one from the automotive industry development centre (AIDC). Due to the nature of the research questions where majority of the issues are management related, five individuals were therefore selected from the Management team within each of the SMME firms.

One individual from senior management a Managing Director, second one from technical management, third one from Human resources Management, Fourth one from production Management and fifth one from Supply Chain management. This was followed by one from the regulatory environment, automotive industry development centre (AIDC) and another from National association of automotive component and allied manufacturers (NAACAM). All respondents were selected based on their knowledge of the processes and operations of the studied firms and industry.

A request for an alternate respondent in the case of absence of one of the respondents with suitable knowledge was made to ensure the smooth running of the data collection process.

Table 4: List of respondents

COMPANY	LOCATION	NUMBER SAMPLED	RESPONDENTS
Quantum Automotive	Automotive Supplier Park, Rosslyn (Pretoria)	5	Managing Director - Mr. Brendon Lowe and 4 others.
Shatterprufe Ga-Rankuwa	Ga-Rankuwa (Pretoria)	5	Managing Director - Mr. Johan Steenkamp and 4 others.
National association of automotive component and allied manufacturers (NAACAM)	Isandovale (Isando)	1	Executive Director: Mr. Robert Houdet
Automotive Industry Development Centre (AIDC)	Automotive Supplier Park, Rosslyn (Pretoria)	1	Dept. Manager: Government Incentive Schemes - Prof. Jasper Steyn.
TOTAL		12	

3.4. The research instrument

The research instrument was a semi structured interview combined with observation. Interviews are a personal one to one interaction between the researcher and the person being interviewed to gather the necessary information for the said topic. (Harrell & Bradley, 2009). The authors cited above also agree that observations are a perfect way to support and validate the answers provided through the interview and combined can provide valuable insight into the topic at hand. (Harrell & Bradley, 2009).

The chosen instruments were suitable for the research question, as they allowed for follow up questions arising from the interview questions. This method provides depth when supported by observations and has delivered a comprehensive view of both the operations and the environment.

The research instrument is found on Appendix B and explores the following key questions;

- How do you search for innovation opportunities or ideas?
- How do you implement innovative ideas?
- What is the skill level of the workforce?
- What is the current production capability?
- What improvements have they recorded lately?
- What external support do they get?
- How is their technology sourced, funded and from where?
- Do they have an innovative organisation?

The advantage of both semi structured interview and observation was the ability to provide depth, as ambiguous questions and misunderstandings were clarified and clear reliable insight provided. The disadvantages were access to the people required due to their busy schedules.

3.5. Procedure for data collection

The people that were interviewed were contacted to pre arrange the interviews during business hours. Where schedules were tight and the required person cannot be available during the stipulated time an alternative was requested. All interviews were conducted at their premises or offices within the Gauteng Province of the Republic of South Africa. This, over and above the convenience, provided an opportunity to observe the operations and working environment. As (Harrell & Bradley, 2009) say location of the interview also on its own provide valuable insight into the research. Observations of things like staff interactions, guest reception, office organisation and layout and housekeeping indicate the nature of the working environment.

The conducted interviews with all respondents were audio recorded to ensure that pertinent aspects of the discussion can be revisited and to act as evidence where required that the actual interview took place. Hand written notes were also made but limited to an extent that it does not disturb the attention of the interviewee and therefore disrupt the smooth running of the interview.

3.6. Data analysis and interpretation

The data analysis was done using the technological capability building process in latecomer firms framework as developed by Dutrénit (2004) and the simplified model of innovation process framework as developed by Tidd (2009). The simplified model of innovation process framework was used to characterise the firms' innovation capability based on organisational and processes followed, and subsequently, the TCB framework used for in-depth analysis of their innovation management and capability building strategies. The technological capability building process in latecomer firms framework can also be used to analyse firms that are considered to be in the technological capability building transition process, this means that the firms have built a minimum essential knowledge base and some may even be close to the technological frontier.

In analysing the data collected, the five key themes identified in the literature review which are Leadership, External environment, Vision and Strategy, Organisational structure and culture and skills development obtained from Tidd (2009)'s framework will be used to structure the presentation and discussion of the results. Data was reduced into summaries which involved going through all transcripts and recordings collected during interviews including other documentation that were provided. In grouping the data, specific criteria from the technological capability framework was identified and matched against all the data gathered. This allowed the discovery of inconsistencies and contradictions that arose. All the data was analysed through the frameworks provided and conclusion were drawn from the study.

3.7. Limitations of the study

- The study was limited to the province of Gauteng.
- The study was also reliant on the availability of the respondents and recognised the distant possibility of cancellations of interviews but all effort necessary to ensure that they honoured the interviews were made.

3.8. Validity and reliability

3.8.1. External validity

Unlike in quantitative research where external validity is concerned with generalisability, in qualitative research external validity is concerned with the transferability of the research findings to other groupings, circumstances and events other than the population chosen(Lewis, 2009). The manner in which questions were structured ensured that both firm and industry specific data is gathered to ensure that findings can also be transferable within the industry. But the risk of interviewee's lack of industry knowledge existed due to the study focusing on SMME firms. But all endeavors were taken to compare industry data with firm specific data to increase chances of transferability and therefore external validity.

3.8.2. Internal validity

Internal validity concerns itself with credibility, the truthfulness of what the researcher reports. It is said to be the duty of the researcher to report truthfully what was observed and then explain the reasons why the observations would happen naturally. (Lewis, 2009) In this research credibility was insured by the consistency of the semi structured interview questions. All respondents were asked similar questions, the differences only surfacing on follow up questions resulting from responses. A process of triangulation was also applied where additional sources of data like publications and expert commentators were gathered to support the findings and provide credibility.

(Guion, Diehl, & McDonald, 2011).

3.8.3. Reliability

Reliability refers to the extent to which results can be consistent and repeatable if the instrument is applied to the same subject repeatedly. (Lewis, 2009) He goes on to say that scholars of social sciences find the repeatability in the reliability test to be a poor standard, as the environment is always changing and therefore the practicability of having similar conditions to be unrealistic. The belief is that the standard should be dependability especially in qualitative research.(Lewis, 2009) In this research dependability was assured by the use of a thoroughly trial and tested instrument that is accurate and offer questions that seek to get in-depth data from all interviewed.

4. PRESENTATION OF RESULTS

4.1. Introduction

The results are presented in relation to the following format: Results for the five (5) people interviewed in Firm 1 (Quantum Automotive) were consolidated and presented under the heading results pertaining to Firm1 then followed by consolidated results for the five (5) people interviewed in Firm 2 (Shatterprufe, Ga-Rankuwa) presented under the heading results for Firm 2 and then followed by consolidated results by the two (2) industry experts (AIDC and NAACAM) interviewed and presented under the heading results pertaining to Industry Experts and then finally a summary of all the results and relating them to the research questions and propositions. The results are presented under the five themes identified in the literature review and additional four that are not from the literature review but surfaced following the interview process.

4.2. Results pertaining to Firm 1 (Quantum Automotive)

4.2.1. Leadership

Quantum automotive is lead by Managing Director who is also a shareholder together with the Financial Director. They are the only shareholders in the business that they bought while it was struggling and brought it back to sustainable operation. They are both directly involved in the business on a day to day basis. The Managing director is involved in almost everything from project management, product development, costing, production management and technical management.

He believes leadership to be characterised by hard work and being exemplary. He has in-depth knowledge of the business processes and therefore becomes hands-on to ensure successful execution of certain operations. He believes strongly in being accessible to both management and shop floor employees and therefore has an open door policy where he interacts positively with everyone that comes through on a daily basis. He believes this to be strength more than a weakness as he says "more progressive ideas are shared in this manner".

4.2.2. Organisational Structure and culture

The structure of the business is flat with the managing director on top followed by Financial director, Operations Manager, Technical Manager, Tool room Manager, Maintenance Manager and Human resources Manager all reporting to the MD. There is a culture of hard work and perseverance. Majority of the managers work long hours and are very dedicated to their work. They also do more than one function in their duties as they cannot afford to hire more managers. As a small business they believe it to be easier to share roles and multi task.

The Financial Director looks after financial management issues and cost accounting. Then there is the operations manager looking after production and Quality, The Technical Manager is responsible for process management and new product development using a structured process called APQP, then the Tool room Manager responsible for manufacturing new tools and refurbishing and maintaining old once, he also get involved in product development especially on press machines due to his extensive knowledge.

Maintenance Manager is responsible for routine management of maintenance and repairs as and when they occur and finally the Human resources manager who looks after Human resources, people development, training management and management of the union. There is a culture of openness and willingness to learn and grow amongst the workforce. This was indicative by the time when training could only be done on Sundays and people were willing to come to work on Sundays to receive the training without pay. They MD says "this culture is created by the will to learn this unique skill as after qualification you are guaranteed of job security as you will be in demand within the firm".

4.2.3. Vision and Strategy

There is no vision statement and strategy written or displayed anywhere within the firm. The firm's website states purpose as follows, Our Purpose,

- To create a stable and sustainable business.
- To exceed our customer's expectations in delivery and quality
- To enhance leadership and technical capability in this field.
- To create an environment in which our employees can develop to their full potential.

The vision to grow the business was articulated in the interview and displayed in the new product developments currently being undertaken to increase the product range with new components that will provide an increased market share. There are plans to move into the manufacturing of inertia rings, which are new things in modern cars to replace some pulleys. These inertia rings are currently under development and if successful they will be cheaper and faster on the production lines thereby giving them increased market share. Therefore, the vision articulated is for firm growth and does not encompass any element of innovation or innovation management and has not been communicated thoroughly within the business. The other managers were not very clear of the vision but were aware that there are growth opportunities that the MD is pursuing.

There is no structured process or strategy followed to gather ideas for improvement. Ideas are shared in meetings and during interaction with challenges on the shop floor and if feasible implemented. Majority of the suggestions are for small improvements where according to them, there is no need to put a formal process in place, and decisions are made there and there based on potential benefits. If feasible is implemented through a project management process.

Employees are given an opportunity to share ideas in feedback meetings happening every Friday and also in meetings between union representatives and management where ideas can be forwarded to a union representative for articulation in the meeting if one in not comfortable to bring the idea forward themselves. There is also belief that due to the open door policy maintained within the firm, ideas can be brought forward and listened to anytime whenever one is comfortable.

4.2.4. External Environment

The firm has created very good relations with their customer and is very well aware of what is expected of them. The firm has also complied with the necessary quality and system regulations like ISO9001:2008 and TS16949, which allows them to trade in the industry. The methodology used to manufacture products is different from what is used by competitors in Germany but have accepted that the methodology they use is appropriate for the volumes produced.

The firm is also aware of incentives and grants offered by government like Automotive Investment Scheme (AIS) and Automotive production development program (APDP), which assist in the sustainability of the industry and make use of them to their advantage. QA is an affiliated member of NAACAM in good standing and participates in NAACAM meetings to ensure that they contribute towards the mandate given to NAACAM on how to represent the industry and to ensure that the voice and interests of smaller firms within the industry is heard.

The firm depends on the customer for feedback on performance against competitors, as there is no other access to competitor information besides customer feedback. On the last feedback, the firm was said to still be competitive on both quality and price. This firm is also getting support from the customer, who sends through a technician and manager for a period of two years from Germany to SA to assist the firm to setup properly in order to meet customer requirements.

4.2.5. Skills development

The current skills level in QA is based more on experiential knowledge than educational knowledge. Majority of the work force have just artisan qualification with the exception of the MD who is a qualified mechanical engineer, the FD who is a qualified accountant, an Industrial Engineer who is also the projects leader and the operations manager who has a business management degree.

The firm is mostly reliant on experiential skills, especially on Polly-v machines to keep the firm running. The employees that have experience in Polly-v skills acquired them through long service to the firm and majority has an average of 15 years service in the firm. This technology is no longer used anywhere else, which make these skills scarce and very essential for QA to keep operating.

Due to the firm being the only one in SA the Polly-v skills locally can only be acquired internally and cannot be traded anywhere else in SA. These skills have allowed the firm to keep on maintaining machines that some are close to 20 years in age and are still in productive working condition producing quality automotive components.

The firm values these skills and rewards them accordingly; the MD describes it as "a unique specialised skill, which cannot be found anywhere else in SA". Due to rarity of this skill the firm has undertook to pursue internal training of the workforce and therefore promote from internal. A training program in tooling manufacturing, machine maintenance and Polly-v setting is also underway within the business. The selection of the trainees was based on average knowledge of CNC and therefore trained to be upgraded into specialised Polly-v skills for sustainability.

4.2.6. Technology

The technology including its machinery used by the firm to manufacture components is old and was brought to SA 20 years ago when the firm was started. The machinery has been kept in good working condition, with continuous refurbishment and good maintenance to continue to produce components to this day. The firm has invested in new machines on the CNC side but has kept the 20 year old Polly-v machines, which are fundamental to the production process.

The Polly-v technology came from Germany 20 years ago and companies in Germany no longer use this technology. They have moved to high tech press technology that is much faster and suitable for high volumes they produce. The Polly-v technology is only suitable for volumes of up to 400 000 per annum, which is the range that QA operate in on volumes. Anything above 400 000 per annum the Polly-v technology becomes inefficient, as the machine cycle times can only reach so much and going further than that will start compromising quality.

CNC technology, skills and operators are easily available in the market and therefore pose no threat to the continuous running of the firm. Are the Polly-v skills that can only be acquired internally and can only be developed internally through on the job training. The firm has 8 Polly-v machines and only utilise 6 at a time, leaving extra capacity for increased volumes and major breakdowns. This old technology has put the firm under pressure on some of the new products that customers want that require tolerances of up to 60 to 80 microns, which is difficult to attain with the current technology.

As a result the firm had to forego some product ranges due to being incapable of manufacturing the components. Due to lack of capital and high technical skills the firm has compensated the situation by manufacturing some of the items internally like tools and measuring gauges. The tools for all the components in production are manufactured internally by a well equipped tool room thereby recouping all the money that the client pays for the tools.

The tools for Polly-v machines can only be manufactured internally, as the technology is well understood internally. Especially the machines they have that have been modified several times to improve weaknesses on the initial design. These machines are now a competency of QA as they rarely resemble the once initially bought. The MD says "there is a high mark-up on the tools and they can manufacture them internally at a less cost".

The firm also builds their own measurement gauges to inspect products. These gauges are used for 100% quality control on the various production lines and vary per product. These gauges measure the product and display the reading on the screen for the operator to see. These gauges are used on critical dimensions where traditional venires will not suffice, like where you need to check a component to a tolerance of 80 microns. These are other ways of generating revenue and saving money where they posses skills to manufacture internally they do it internally.

4.2.7. Risk Management

There is no formal risk management strategy evident from QA but the information from the interview highlight the following as eminent risks,

- They currently supply one customer in Germany with various products.
- The technology used might not carry them far with tightening customer specifications.
- The skills pool for the Polly-v machine setters is way too low.
- Sourcing of capital to fund new technology if additional customers are to be signed on and the products cannot be manufactured on existing technology.
- Will they still be competitive and survive if all the external incentive support is removed due to the schemes no longer being affordable to government?
- Will they still be competitive and survive if the rand become stronger and the exchange rate yields deficits instead of current surpluses?

The above identified risks are derived from the interview conducted and are eminent risks when the interview results are assessed and would need management intervention in the absence of a risk management strategy.

4.2.8. Team Work

Teamwork is of essence to the day to day running of the firm at QA. Everyone get together to ensure the smooth running of the firm including the MD. All mangers including the MD are hands-on and participate in new product development meetings, production meetings and technical meetings. Also due to varying skills they rely on each other to ensure the successful achievement of production targets. This is also evident in the way the employees with stronger skills in certain areas are paired with other employees that are weaker in that skill but stronger in another skill that the other is weaker in. This allows them to learn from each other and turn their individual weaknesses to strengths through other team members.

4.2.9. Information Sharing

QA has information sharing sessions with the whole workforce every Friday to discuss the business progress, challenges encountered, share ideas and discuss any other issue that might be of concern to the workforce. These meetings are also information sharing sessions about the market trends, the forecast of the business going forward and the planned new models that are potentials for the business to manufacture. In this sessions all employees are invited including service departments to ensure that everyone is aware of what is happening within the firm and if there is initiatives that are announced everyone can participate.

4.3. Results pertaining to Firm 2 (Shatterprufe, Ga-Rankuwa)

4.3.1. Leadership

Shatterprufe Ga-Rankuwa is lead by a General Manager (GM) who is not a shareholder but was hired to run the operations on a full time basis. The GM has a mechanical engineering background supported by many years experience in manufacturing. He is passionate about change and change management and implements a management style that involves everyone that wants to contribute within the firm. The GM gets involved in the day to day operational issues and offers his expertise to the process where necessary. He is also a supporter of continuous improvement and implemented a suggestion scheme where ideas for improvements can be put forward and implemented to continuously improve.

4.3.2. Organisational Structure and culture

The structure is flat at the top with managers in each area of the firm. Reporting to the GM is the Logistics Manager looking after Planning, warehousing, buying, transport and customer and supplier care, Financial manager looking after finance and costing, Human Resources Manager responsible for human resources management, skills development and training.

Two production managers one responsible for the Laminating section of the factory manufacturing windscreens and the other responsible for the Toughening section of the factory, manufacturing side and rear vehicle glasses, Quality Manager responsible for quality documentation, control and assurance, Maintenance manager responsible for machine repairs and maintenance and Technical manager responsible for process engineering and new product development.

These managers have their own engineers, technicians, operators, supervisors and junior managers reporting to them for the day to day running of the factory. The firm has a culture of hard work and quest for technical competence. This is as a result of high value being put on technical competence and hard work thereby rewarding those competent in those attributes. This has created a healthy culture of learning from involvement and from others.

This firm has created a culture of healthy competition characterised by work teams competing with each other for best performance thereby finding ways to improve their processes. Team members are vigilant for opportunities for improvement and suggestions are provided where opportunities are identified. Teams get rewarded for the number of suggestions as well, to ensure that they keep suggesting. The GM says "there is no stupid suggestion but a feasible and not feasible suggestion". At Shatterprufe Ga-Rankuwa they believe in incremental continuous improvement and not in radical improvement.

4.3.3. Vision and Strategy

Shatterprufe's vision is to remain a recognised premium supplier of automotive glass to selected national and international markets, and this they plan to achieve by,

- A commitment to their customers
- An investment in new technology
- An investment in and retention of good people
- A world class manufacturing philosophy
- A culture of creativity, flexibility and rapid response

Shatterprufe Ga-Rankuwa has put a strategy in place to support their quest for world class manufacturing and is called Mission Directed Work teams (MDW). MDW involves dividing the factory into sections that constitute work teams. These work teams meet daily before commencement of work for 15 minutes to share ideas and discuss the challenges encountered the day before and the way forward, these meetings are also information sessions used to inform workers of anything that might affect the firm, their employment or their livelihood.

This MDW system is supported by a suggestion scheme where suggestion boxes are placed everywhere around the premises with suggestion forms to allow all employees to suggest areas of improvements and share ideas of improvements when they encounter an opportunity. These boxes are found everywhere around the premises and there are easily accessible, the suggestion form is simplified to allow for ease and speed of completion.

4.3.4. External Environment

Shatterprufe Ga-Rankuwa has a wide customer base. Supplying all the Original Equipment Manufacturers (OEM's) currently in SA even if is only selected models of vehicles. Supplying also the aftermarket industry for the models they manufacture and are the biggest in the aftermarket industry in SA. The firm also supply the export market in selected countries in the USA and Europe and have also complied with the necessary quality and system regulations like ISO9001:2008, ISO14000 and TS16949, which allows them to trade in the industry as responsible manufacturers.

The firm also does continuous competitor assessment based on performance and on acquisition of new models. All Shatterprufe competitors are overseas in China, Japan and other European countries. The industry has common suppliers of certain materials and therefore is able to communicate performances of others. Customers also do benchmark studies on their suppliers to compare performances and they are able to access those benchmark studies.

The licensing agreement with companies from Europe and Japan are with automotive glass manufacturers and therefore open sharing of information is available even if the GM says "the information cannot be trusted", but is there. The firm gets support from NAACAM in facilitating industry negotiations and getting industry performance statistics. They are also aware of training support offered through the AIDC to support the automotive industry in general especially on life skills and sustainability.

The firm is also aware of incentives and grants offered by government like Automotive Investment Scheme (AIS) and Automotive production development program (APDP), which assist in the sustainability of the industry and continue to make use of them for their benefit. The firm has gone to an extent of aligning its internal new equipment justification process to the requirements of the incentive scheme, to ensure that by the time claim is submitted for the incentive, all the documentation and compliance procedures were followed from the beginning of the process. While having no control over it, the impact of exchange rate on their export components was also mentioned and is fortunately currently yielding surpluses and assisting in recouping funds to cover for some low margin glasses that they supply.

4.3.5. Skills development

Shatterprufe possess highly skilled employees on both technical and educational experience. The process and technical work teams comprises of Artisans, Mechanical and Industrial engineers. All managers have some sort of management or technical educational qualification or are working towards it. The decision to improve the skills and professionalise the firm was taken a while ago to ensure that managers understand their roles and the bigger firm imperative.

Shop floor employees are mostly uneducated but with high levels of experience. The employee retention strategy has yielded results, as the level of retention is very high with employees having an average of 10 years of stay in the firm. This allows the firm to build on the experience gained by others along the way. There is belief that experiential knowledge of shop floor employees is strength, as introduction of new complex glasses require that you have shop floor employees that understand the problem as much as the management do and therefore contribute in finding solutions. The firm has undertaken assessments to map career paths and improve skills of the management including first line management.

On the job training is a continuous process that is undertaken by the technical staff. Long changeovers and long planned shutdowns are used as an opportunity for training. When new technology is introduced, Technicians and Engineers are sent overseas to the manufacturer of the technology for training. According to the GM this forms part of the investment cost to ensure that while upgrading the equipment, knowledge and skills of the workforce is upgraded to be able to work with the technology. These training costs are also claimable as a grant from Government through the skills fund.

4.3.6. Technology

Major equipments, which are furnaces were installed over 20 years ago and still use the sag bending technology. The GM says, "Sag bending technology is the heating of the glass on a mould until it sags under its own weight to take the shape of the mould is sitting on. This technology is old but still works. This method of bending is difficult as controlling the type and accuracy of the bend is subject to too many factors, but is suitable for very thin glasses ranging from 1.8mm thickness".

"Modern automotive glass manufacturing factories use press bending technology. With this technology glass is placed on a mould heated and then pressed against the mould to take the shape of the mould. This method is more accurate and repeatable and has far less parameters to control during production. But the technology is very highly priced and does not work well with very thin glass". The furnaces are refurbished every five years and involves breaking and rebuilding the inside walls of the furnaces. There is belief that there is nothing wrong with the furnaces, as long as the refurbishments are precisely timed and maintenance happens on a continuous basis.

The loading and offloading of material from the production lines was automated, by installing robots at the raw material loading section to the cutting lines and the offloading of the completed product to the pallets ready for shipping. This project was aimed at reducing the handling scratches happening throughout the process. The automation involved the introduction of fully automatic robots that pick the glass from the pallet and place it at the right position on the cutting line and the other robots on the offloading side pick the completed glass off the conveyer belt into a pallet ready for storage and transport.

It is said that the introduction of this automation has managed to reduce handling scratches from about 4% to just less than 1%. This technology upgrade was also as a result of coordinated problem solving between Shatterprufe and technical partners in Japan and Europe. The financial manager says "New technology is funded through a combination of recapitalisation, loans and grants or incentives. This model of funding is found to be sustainable and affordable to reduce chances of over indebtedness". Projects are also selected for funding on the basis of an internal rate of return (IRR) calculation, which tell the rate of return on the investment made.

4.3.7. Risk Management

There is also no formal risk management strategy evident from Shatterprufe but the information from the interview also highlights the following as eminent risks,

- They currently supply most local OEM's with various products but their OEM volumes have been declining year on year due to the loss of new models with the majority not supplying the whole vehicle glasses.
- The technology used might not carry them far with tightening customer specifications.
- Raising of capital to fund new technology to improve capability.
- Will they still be competitive and survive if all the external incentive support is removed due to the schemes no longer being affordable to government?
- Will they still be competitive and survive if the rand become stronger and the exchange rate yields deficits instead of current surpluses?

These risks are similarly derived from the answers of the interview conducted and are eminent risks when the interview results are assessed and would need management intervention in the absence of a risk management strategy.

4.3.8. Team Work

Shatterprufe's strategy also embodies teamwork. The business itself has been structured in a way that work teams can be formed and work together to achieve daily functions. The MDW system that they introduced has extended teamwork from informal support on the shop floor to formal discussion in meeting rooms about the progress of the team and the section they operate in. This has not only promoted teamwork but has managed to find a home for each of the employees to belong to. This has encouraged contribution of team members to their respective teams and they have also found support during challenging times within their team members.

The team structure has been extended to service departments as well, including the GM who belongs to a team that meets daily to discuss that team's challenges and objectives and minutes are taken in meetings and followed on. These teams are also allowed to cross share information that they believe can be beneficial to the other teams. In these team meetings while there is a team leader the chairing of meetings circulates amongst team members to allow for everyone to participate. This has also assisted in identify especially leadership skills in others that would otherwise have not been known.

4.3.9. Information Sharing

Information sharing sessions are held every week in sections. The Toughening section of the firm will bring all its teams together for an information session and so will the laminating section. The administration and service departments meet together for their weekly information sessions. The information ranges from the business performance, the vision and mission is always emphasised in this meetings, any changes or alerts that might require the attention of team members, challenges encountered and other information that has direct impact on the employees in general.

Then a monthly meeting with all the employees chaired by the GM is also available to share information and clarify any questions that might be available needing his direct response. Other information is placed on notice boards in green areas and along the isles to keep the workforce informed of developments.

4.4. Results pertaining to Industry Experts (AIDC and NAACAM)

These interviews were performed as part of data triangulation, since the expert commentators do not reside within the confines of the firms being studied. Despite using the same protocol only five themes emerged from the interviews as being critical to them. They are as follows,

- Vision and Strategy
- Skills Development
- External Environment
- State of the Industry
- Technology

4.4.1. Vision and Strategy

The vision of the industry is to increase the number of component manufacturers in South Africa by working with OEM's through NAAMSA to improve localisation. The current local content in locally manufactured vehicles is less than 40% and the target is to improve it to 45% by 2020. This target was reduced from 60% set in 2007 due to the recession of 2008, which the industry is still trying to recover from till to date.

The SA automotive industry had targeted to manufacture 1.2 million vehicles by 2020 and due to the same recession of 2008, they will not achieve it and have revised the target to 800 000, which also looks doubtful. This is due to the industry volume growth slowing down from around 17% in 2011 to just over 3% in 2013. The locally manufactured vehicle figures divided into diesel and petrol models since 2010 are detailed in table 5 below:

Table: 5: 2013, locally manufactured vehicles divided into Petrol and Diesel models

	2010	2011	2012	2013
Diesel cars and light commercials	115 062	133 240	156 512	182 981
Petrol cars and light commercials	355 077	418 389	445 499	436 295
Total cars and light commercials	**470 139**	**551 629**	**602 011**	**619 276**
Diesel Vehicles as a % of Total	24.5%	24.2%	26.0%	29.5%

Source: NAAMSA/Light stone Auto

The vision for the component manufacturing industry is to still target the manufacturing of 1.2 million vehicles components equivalent through looking for additional export opportunities for the components.

The strategy is to grow the industry through recruitment and attraction of multinational component manufacturers to setup operations in SA, which was always the task of the OEMs, secondly by the attraction of new component manufacturers to enter the industry and to grow volumes in existing component manufacturers through lobbying for increased investment incentive grants and capacity building through training and competitive improvement programs.

4.4.2. Skills Development

According to Professor, "vehicle manufacturing is classified as advanced manufacturing and there is a general shortage of high level skills in the industry but not only in SA but globally, especially management skills that can adapt to the fast changing nature of the industry. This industry is an ideal environment for management because you get stretched to operate at a global level proficiency due to the requirement for global level quality".

The AIDC as a government agency was developed primarily to support the automotive component industry through competitive improvement interventions run by Industrial Engineers employed by the AIDC. AIDC also works on the introduction of best practices in the industry and skills development amongst people working in the industry both on technical and life skills through learnerships and have developed a Gauteng automotive learning centre in collaboration with Nissan and University of Pretoria.

The AIDC has also introduced two incubation centers, one at Ford premises and the other at an offsite location in Pretoria. At the moment seven (7) mini factories run by entrepreneurs taught by the AIDC and under the mentorship of the IE's of the AIDC are located at Ford to supply components online. There are more incubation centers being planned including one at Nissan, which will be up and running soon.

Most companies in the component manufacturing industry also over and above the national initiatives offer their own internal job training to improve the factory specific skills which are essential for their success. The industry is also focusing on improving the educational skills level of the industry employees by working in partnership with merSETA and university of Pretoria to ensure that they also tap into new creative methods that integrates new technology that comes with educationally trained minds. This is with the aim of improving productivity, as seen with the competitors in India and China where the educational level of a worker in the component industry is higher and productivity levels are higher.

4.4.3. External Environment

The industry collaborates continuously with external parties or environment in several initiatives to support the competitiveness and the sustainability of the industry. The first one was on the APDP where the stakeholders (NAACAM, NAAMSA, DTI, AIDC) came together to assist the industry to become competitive.

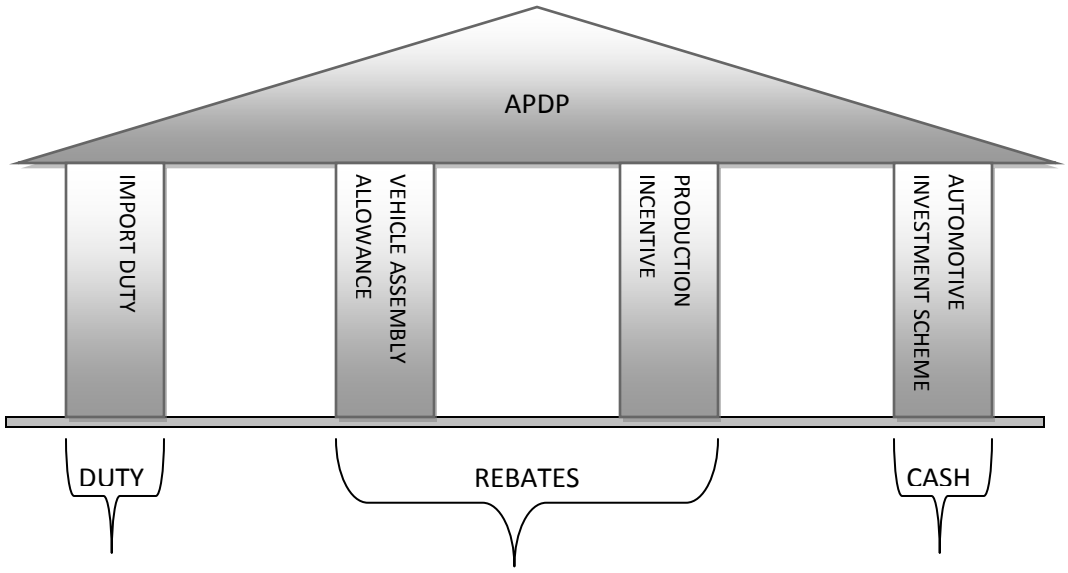


Figure 3: Automotive production development program, Source: NAACAM Directory 2014

The APDP constitutes of 4 pillars of support, Import duty, Vehicle assembly allowance (VAA), Production Incentive (PI) and Automotive investment scheme (AIS). Import duty support involves the freezing of import duties on vehicles and components at 2012 levels (25% on light vehicles and 20% on components) through to 2020. VAA support comes in the form of duty-free import credits issued to vehicle assemblers based on 20% of ex-factory prices in 2013, reducing by 1% in 2014 and in 2015 to 18% of the value of light motor vehicles produced domestically.

PI support is also in the form of duty-free import credits and starts at 55% reducing by 1% annually to 50% of value added. Certain products identified under PI as vulnerable products will attract a PI of 80% in 2013 and 2014, reducing thereafter annually by 5% to 50% in 2020. AIS support comes in the form of a non-taxable cash grant of 20% of the value of qualifying investment in productive assets by light vehicle manufacturers and 25% of the value of qualifying investment in productive assets by component manufacturers and tooling companies. This can be extended by an additional 5 to 10% if the project meets certain additional strategic requirements.

Component manufacturers benefit in the scheme by collecting rebate certificates and selling them to OEMs at 80% of the value. The APDP is actually the biggest government support program that government provide in value terms compared to any other industry in SA. The investment incentive is only 10% of the APDP program, 90% is the production or operational support incentive.

The other initiative together with the same stakeholders was the introduction of the Supply Chain Competitive Initiative (ASCCI) with the aim of looking at opportunities to broaden the supply chain. ASCCI is a nonprofit organisation funded by both the DTI and industry to drive initiatives aimed at improving the supply chain competitiveness. Consultants are send into struggling companies to assist, funded by ASCCI. The AIDC then follows in providing Total productivity maintenance (TPM) courses to these companies.

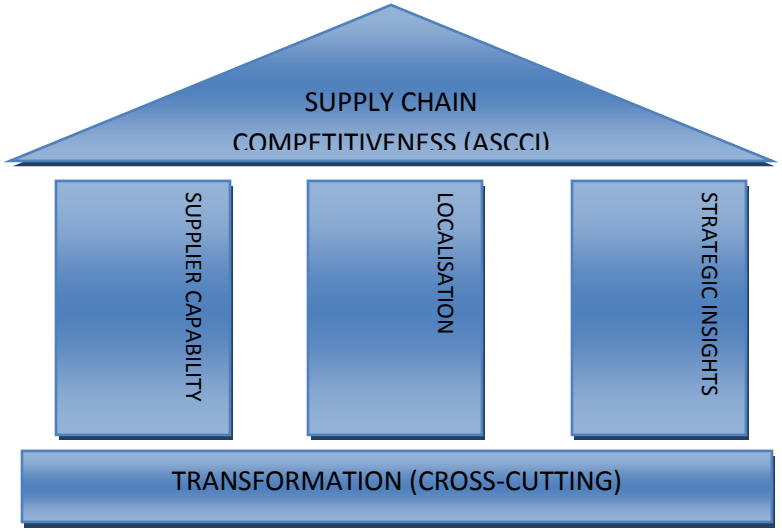


Figure 4: Automotive supply chain competitive initiative Source: NAACAM newsletter, issue 35, May 2014

The Automotive Supply Chain Competitiveness Initiative (ASCCI) was established in December 2013 with the objective of increasing supplier manufacturing value add (MVA). ASCCI scoped its strategic focus to meet the following objectives, supplier capability, localisation and strategic insight. Supplier capability is directed at improving operational performance of suppliers, with emphasis on supplier performance improvement activities. Localisation is directed at localising supply, spanning from competitive local material inputs to investment in new suppliers and supply technologies. Strategic insight is directed at industry-level policy and strategy to accelerate transformation in the industry.

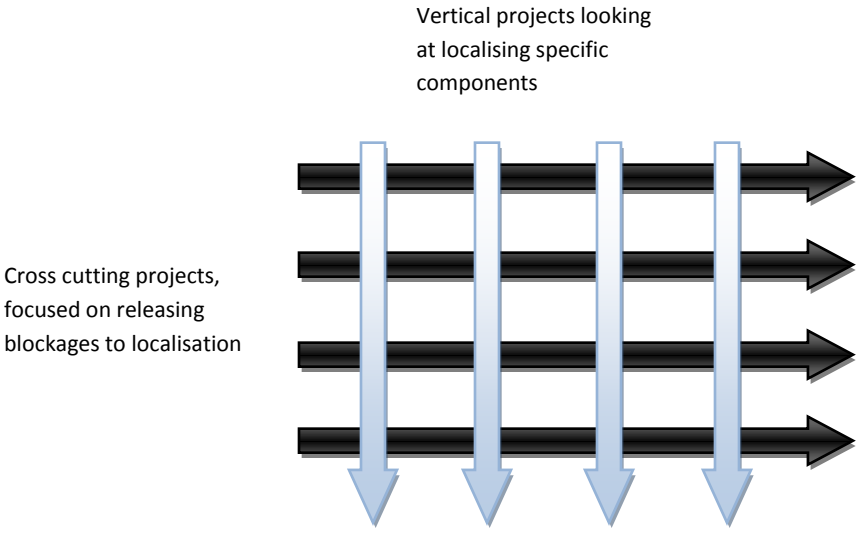


Figure 5: ASCCI project priority chart, Source: NAACAM newsletter, issue 38, November 2014

ASCCI has started by focusing on projects that fit the two types criteria over the multitude of projects they plan to undertake, first, projects that are called cross cutting projects focused on releasing the blockages to localisation and second, projects that are called vertical projects focusing on specific components. Under the Cross cutting projects ASCCI will identify value chains that contribute a large portion of the total cost of an average motor vehicle and value chains that are less cost competitive compared to leading cost countries and introduce World Class Manufacturing (WCM) practices and interventions to drive maximum competitiveness upgrading.

On the vertical projects ASCCI worked on the premise that the starting point for localisation activity is to broaden localisation through existing capability. This meant identifying product that are currently sourced locally by some OEMs and may offer an opportunity for localisation by other OEMs.

Further, there is a benchmarking club currently operating in KZN Province which is also in the process of being established in other provinces, where they collaborate and compare quality and cost effectiveness in the component industry.

The AIDC as well plays a specialist role to support the industry and the DTI on investment incentive part of the APDP formerly MIDP. The AIDC is mandated by the DTI to evaluate the applications submitted to the DTI and make recommendations on whether the applicant qualify and to what extent according to the guidelines provided.

4.4.4. State of the industry

The vehicle component manufacturing industry is growing, but is not growing according to the targets that were set. The target was to build 1.2 million vehicles by 2020, which due to the economic recession of 2008 was then revised to 800 000 and there is agreement that this will also not be met considering the current growth rates 5 years from 2020. This target was based on increasing the number of OEM's to over 10 from the current 7 thereby getting the ripple benefits that come with it in the component industry.

The Professor says "he believes this argument was flawed from the beginning, as we don't need more OEM's but more component manufacturers. Majority of OEMs are automated and employ very little workforce. It has always unfortunately been the responsibility of OEM's to attract and recruit component manufacturers to setup factories in SA. This has been the only proven successful method of recruiting components manufacturers into SA and other countries. Governments and individuals have tried and failed in other countries as this does not work without the support of the OEMs".

OEMs in SA are also reluctant to take on or recruit new component manufacturers as they have to justify it to their headquarters overseas and while tiring it is also very risky, as you will be fired if the component manufacturer you recommend does not perform, which makes them reluctant to go that route. In the absence of OEMs in the recruitment of component manufacturers governments are also tide down by the World Trade Organisation (WTO) regulations that only allows supply side incentive and not demand side. Meaning you can only incentivise the supply side and cannot attract the demand with incentives. NAACAM has set itself an objective of championing the growth of the industry and therefore will assume the recruitment role.

4.4.5. Technology

According to Professor "the component industry in SA is a follower, but considering the education levels, is a very capable follower based on exponential skills capability. If you compare the extent of international knowledge exchange, SA is much lower than other countries we benchmark against, India and China. They benefit from their own employees level of education and therefore technological capability, which SA does not have those linkages. SA companies via multinationals have to source technology from other countries either by license or through a subsidiary of a multinational setting up in SA".

OEM's in SA as well don't do any technological development in SA so they can be advanced, but there are few component manufacturers that do development work but very few. SA companies have accepted themselves as manufacturers and not innovators of new products. There is a study that was done that looked at the definition of innovation broadly as, New products and services, New processes, New logistics and New ways of international management of relations.

The findings were that SA companies perform better away from new products and services, a little on new processes as most processes are tied to the products and perform well on logistics because of challenges in distance from suppliers and customers in international markets and are also performing well in the management of international relations due to sources of knowledge and technology being international and they are dependant.

According to NAACAM Executive Director "OEM's have tried to invest in new products locally before but the return on investment and effort was disappointing. Probably caused by cultural issues and level of education contribute to the successful execution of new product research". The technology used by SA companies is not the same as the once used in similar industry in developed countries but work just as well. This view is due to SA industry also supplying international markets and competing fairly well in quality standards.

4.5. Summary of the results

These results indicate the day to day processes that management and leadership in the firm follow in the planning, execution and monitoring of their operations and duties. These processes will be evaluated in the discussion chapter for their strength and weaknesses and how they impact on the firm's performance or in the firm's ability to grow or develop technological capability and manage innovation.

The external environment and the independent experts provide an interesting narrative on the state of the industry and the external factors impacting the industry and therefore impacting on the firm's ability to be innovative and competitive and also indicate the view that firms themselves have about the environment they operate in. The technology in the sector is fundamental to the growth of the firms and the industry in general and this results shows a trend of old technology that continue to be used in the industry supported by the experiential technical skills base that firms have created overtime.

5. DISCUSSION OF THE RESULTS

5.1. Introduction

This chapter discusses the results of the study in relation to the themes that came out of the literature review. It will then compare what has been previously written about the themes selected with the findings of this study and note similarities and differences and seek to explain both the similarities and the difference. It will also explore the possible causes of differences based on the findings of this study. A conclusion will then be drawn from the comparison and reasoning thereby contributing to knowledge.

The analysis also considered the propositions made, which were based on the literature reviewed and stated underneath,

Proposition 1

Processes exist mainly on an adhoc basis to support problem solving that result in continuous improvement and therefore building unique capabilities but not systematic.

Proposition 1 was based on that South Africa is a developing country therefore operating within a latecomer economy when it comes to technology. Most firms locally do not invest in research and development and therefore have no immediate intention to be at the cutting edge of technology.

Proposition 2

Both internal and external environment contributes to the success or failure of innovation but the external would have more impact due to reliance on OEM's, Government incentives and industry association support.

Proposition 2 was based on the general lack of managerial skills in developing economies that is highlighted in most literature, which is an internal aspect that will impact successful innovation. But the majority of the impact would be from the external environment both on Macro and Market level due to the ACM industry being reliant on a healthy OEM sector, exchange rates, Government incentives for investments and the support of the industry association NAACAM to influence policy direction that support industry growth

5.2. Discussion of results

5.2.1. Leadership

The literature review highlight leadership as one of the fundamental necessities for a business to succeed in the market and even to implement and manage innovation initiatives within itself. It has also identified that in the nature of SMME businesses, entrepreneurs tend to want to micro manage everything within the business in order to ensure that everything goes well. This is supported by (Urban & Naidoo, 2012) where he says that majority of SMME firms are owned and managed by the entrepreneur who then becomes everything in the firm.

Literature also highlight the attributes of innovative leadership, characterised by the need for involvement of everyone in the business in the generation of ideas for continuous improvement as highlighted by Sloan (2006), as cited by (Maladzhi et al., 2012), saying innovative leadership is a catalyst for getting people excited about change and source their commitment and participation in order to innovate.

Both this attributes are found in the research findings and therefore the findings support the literature in that owner managers tend to manage the business as a personal asset that needs personal attention in every corner. Thereby limiting the growth potential of the business, as everything is limited to the abilities of the entrepreneur. In the other case the business hired a competent manager based on his knowledge, skills and education with performance measurement criteria that needs to be met.

These managers organise the firm better and resource it accordingly for it to achieve their goals. These kind of managers value ideas and initiatives for continuous improvement and will put formalised processes in place to take advantage of possible ideas that may arise and make adequate provision for the proper implementation of these ideas if they arrive.

In the analyses of the leadership aspect one can argue that in both cases above businesses are successfully meeting their customers' needs and continue to operate within the confines of their weaknesses. There is no evidence of one being better than the other in observation of their individual performances. One therefore questions whether the leadership aspect can be reduced to whether you are an owner manager or a hired manager. Evidence from this research shows the contrary. It shows ownership to be irrelevant when it comes to leadership and relevant the possession of management skills, strategic competence and educational and experiential knowledge to lead an organisation in a way that creates an innovation culture that inspires everyone within the business to embrace innovation.

Summary

Leadership is key in building innovation capability in any business especially SMME businesses. Emphasis has to be put on the leader having the right attributes to lead the firm. Attributes like skills, knowledge, education and strategic competence to lead the business to success through building innovation capability and not solely because of ownership.

5.2.2. Organisational Structure and culture

Automotive industry is classified as advanced manufacturing and therefore has a chronic shortage of skilled managers, not only in SA but globally. As stated by
Smit and Watkins (2012) who says that due to the shortage of skilled managers SMME's become the least favoured due to problems with job security, under capitalisation and poor remuneration. This led to majority of entrepreneurs hiring sub-standard managers and fewer of them and then taking it upon themselves to do what they are incapable of doing.

This build dependency on the entrepreneur, which makes them too busy, destroys reporting lines and makes a mockery of the stated organisational structure as no one is empowered to make any decisions. Other managers with the same industry challenges keep their firms functional under the same flat structure but hire or train competent managers and empower them to run their areas of responsibility without interference but within the parameters of a non-negotiable organisational culture that support innovation initiatives.

This is also supported by literature from Maladzhi et al. (2012) that says that innovative leadership guards and police jealously every sign that seeks to threaten innovation culture within an organisation and supports every effort that strengthens it. On this theme findings are that both attributes are present in the industry and agree with the literature that an organisational structure and culture created within an organisation determines the extent of innovation possible within an organisation. This is also supported by existing literature from Jordaan (2013) that says that an organisational structure should be an enabler that support a thriving innovation culture.

Managers whether owners or not tend to structure their organisational structure and therefore create a culture to support whatever objectives they seek to achieve. Innovative managers will structure an organisational structure and create a culture that supports their innovation strategy and vision. Then systems will be put in place to support the structure and maintain a culture of innovation.

Therefore the absence of an innovation strategy or vision will in most cases lead to poor implementation of innovation within the business, as that is superseded by other stated objectives and that is visible in the two cases observed. Shatterprufe with its stated innovation objective and systems turn to prioritise innovation and have high participation rates amongst employees and as a result gather more ideas and generally get more incremental improvements compared to QA.

Summary

The organisational structure and culture created, supported and nourished to support an innovation strategy determines the extent of innovation possible within an organisation. Innovation and innovation management are conscious efforts put together by management to enhance their firms and keep them competitive. Some SMME's as in the findings realise the importance of innovation and innovation initiatives and have taken effort to enhance this as a culture within their firms.

5.2.3. Vision and Strategy

Literature review states that that small firms are more focused on surviving and things like vision and strategies are not seen as important as long as day to day operations continue and there is enough technical competency to solve challenges that may hamper the smooth running of the day to day operations.(Kleynhans, 2009). Lorentzen (2009) goes on to say having an innovation strategy allows the business to formalise its processes to trigger idea generation which will result in innovative products, services, processes or technologies.

Evidence from this research supports the findings of prior studies in that where a vision and strategy exist to support innovation and innovation initiatives like in the case of Shatterprufe. Various formal systems were put in place to support an innovation strategy and vision and those systems are supported and used by both management and the workforce to improve the business. This formalisation of innovation processes and systems have increased participation in idea generation and therefore increased innovation initiatives. The contrary is also observed in the case of QA, which clearly proves the findings.

Summary

Stating the innovation management intention in the vision and formulating innovation strategies of the firm, attach importance to the innovation initiatives and therefore force management of the organisation to put systems in place to realise what is stated in the vision and strategies.

5.2.4. External Environment

Literature review emphasise the importance of the external environment as the determining factor for successful learning and development of technological capability. (Dutrénit, 2004), this is shared by Teece (2010) saying that the ability to innovate and exploit innovation globally in a rapid and efficient manner is a source of competitive advantage but the management of innovation is made difficult by the complexity, unpredictability and the pace of turbulence in the environment, which then limits time for strategic planning.

But a number of researchers agree on a notion that SMME firms are generally poor in scanning their external environment thereby failing to take advantage of what the environment offers or avert the risks threatening the firm. (Kleynhans, 2009; Maladzhi et al., 2012; Smit & Watkins, 2012; Urban & Naidoo, 2012). These research findings contradict the existing literature in that firms are found to be scanning the external environment very well and taking advantage of the opportunities presented to benefit the firm. Both firms are well aware of their Micro, Market and Macro environments.

Grants, incentives, support, policy influence, skills training and facilitation of new markets can be accessed for the benefit of the firm through external stake holders at minimal or no cost to the firm as long as the firm is aware of the services and can position itself to comply with regulations that govern those services. All these services are meant to sustain the industry under challenging global business conditions, which otherwise would have been non-existent and harmonise relations with government while maintaining employment in SA.

Findings reveal scanning the environment to be the strong common phenomenon of small firms in the component automotive industry. The reason for the difference is that the external environment in the automotive component and automotive industry in general is fundamental not only to the firm's competitiveness but to their survival as well.

Summary

Small firms in the automotive component industry are aware of the importance of their micro, market and macro environment and continuously make effort to scan the external environment for beneficial opportunities and participate in industry associations to influence industry policy direction. The component industry all over the world sustain its competitiveness through innovation and innovation management and cannot survive without active indicators' of factors that are outside the firm and can affect or impact the health and sustainability of the firm.

5.2.5. Skills development

Due to the automotive industry being classified as advanced manufacturing and thereby requiring high level managerial skills that are in short supply not only in SA but globally, the component industry in SA also find itself plagued by the same skills challenges. Literature review highlight the skills problem to be worse in SMME firms than other bigger firms due to the environment not offering job security and as a result failure to attract experienced managers. (Urban & Naidoo, 2012)

The findings reveal that in component manufacturing firms and corroborated by the industry experts, skills in specialised industries like component manufacturing are majority experiential technical skills that were developed by long hours of on the job training due to generally poor education levels amongst majority of employees. This was also exacerbated by the poor investment in new technology that made current educational levels acceptable as the technical understanding of existing technology was sufficient.

New technology would have required new knowledge that would need a minimum educational level to understand and would have emphasised a need to invest in educational skills. In realising that both educational skills and experiential skills are necessary for the running of the day to day operation these firms have put through skills retention strategies to retain good and technically competent people to keep their firms operating, while augmenting it with hiring new staff with educational qualification or encouraging the existing once to study.

These agree with the literature review on the lack of managerial skills but differ on the issue of technical skills. These firms have over the year's emphasised technical competence and have had on the job training programs to improve on the technical skills. The technical skills are sufficient for the technologies currently used but does not set them up for good knowledge gain and therefore slow technological growth. .

Summary

There is increased emphasis on skills both within firms and in the industry in general triggered by the growth targets that the industry set for itself and the aging workforce that currently plaque the industry. The objective is to increase the pool of both managerial and technical skills in the country from within which firms can recruit and build their technological capability. Government is investing large sums in developing learning centers to create this skills pool to feed the industry and also assists firms to become learning centers themselves to also develop skills that will assist them in creating technological advancement and growth.

5.2.6. Technology

Firms in the industry continue to use machinery and technology that they had for 15 to 20 years and instead of replacement prefer to refurbish and maintain in good working condition. Literature review highlight the building of technological capability as the management of knowledge within the firm, it is the ability to utilise this knowledge to adapt old technology with new to create a competitive advantage. (Dutrénit, 2004) The findings reveal that the technology used while old suits the facilities, volumes and skills they possess.

While gaps and challenges are starting to be experienced where some new model components cannot be manufactured due to tight tolerances and high quality standards that cannot be met by the current technology and machinery they continue to have some components that their current technology and machinery can make. This does not set them well for new growth opportunities but they are sustainable in the current environment.

The poor capital investment in this industry is in line with what has been written about in existing literature (Smit & Watkins, 2012) but the reasons according to the findings is not the lack of funds as depicted in existing literature. The reasoning that comes through is the lack of requisite skills and volumes necessary for them to make such investments at the moment. Demand show that the industry has not recovered from the 2008 recession yet and therefore competition is rife and supply is definitely way more than demand.

Summary

This is corroborated by the information supplied in the NAACAM 2014 directory showing a decline and steady growth in some components compared year to year. The analysis, of the other information gathered during the interviews also support this notion as incentives especially the AIS has been increased to go up to 35% of qualifying assets in the latest review of the APDP and new proposals of lifting it up to 75% are being looked at especially on tooling to encourage investment in the industry.

These incentives grants would have encouraged the firms in the industry to fast track capital investment with the aim of accessing the grants and therefore increasing the rate of return on investment while benefiting from new technology and improved capability.

When analysed using the technological capability building process in late comer firm's framework, technological capability is defined according to three stages of accumulation. The findings for SA ACM firms are as per table 6 below:

Table 6: Stages of SA ACM technological capability

STAGES OF BUILDING TECHNOLOGICAL CAPABILITY	**CHARACTERISTICS OF TECHNOLOGICAL CAPABILITY FOR SA ACMs**					
	Routine Production Capabilities	**Basic to intermediate innovative technological capabilities**	**Intermediate innovative technological capabilities in certain technical functions and advanced in others**	**Advanced innovative technological capabilities in all technical functions**	**Simple Knowledge base**	**Complex Knowledge base**
Building the minimum essential knowledge base	X	X	Y	Z	X	Z
Transition process	X	X	Y	Z	X	Z
Building strategic capabilities	X	X	Y	Z	X	Z

X	Capabilities currently present
Y	Capabilities under development
Z	Capabilities currently absent

Firms studied in this research operate differently and have accumulated knowledge and technology to different stages. But when analysed using the technological capability building process in latecomer firms framework, it is found that they both indicate a characteristic of accumulating technology for routine production capability, basic to intermediate innovative technological capabilities and characterised by simple knowledge base with the objective of reducing costs, improving quality and upgrade of equipment to achieve parity with competitors. This puts both of them within the building of minimum essential knowledge base.

5.2.7. Risk Management

Risk management remains an integral part of business strategy and the need to put systems and process in place to identify, asses and manage the eminent risks is one of the challenges facing small businesses. The results of this research highlights eminent risks associated with survival of the firm and if realised will have an impact in the achievement of innovation outcomes. Literature reviewed has not raised this as an eminent concern, especially in the automotive industry as generally enterprise risk management across the board has received little research attention (Paape & Speklè, 2012).

Summary

The identification, assessment and management of risk within an organisation are an important management function especially in the current global competitive era. Risk management has to be a competence of every manager if the intended innovative outcomes are to be achieved. Observing the risks raised in the findings, risk management strategies can also serve as perfect triggers of innovative initiatives if the process is structured correctly.

5.2.8. Team Work

Literature review has also not raised teamwork as an essential element to achieve innovation and technological capability. The findings of this research raise it quite sharply, as it seen on both cases that teamwork is fundamental to motivating for idea generation and for execution of continuous improvement initiatives. Teamwork is also seen to be the best facilitator of learning within the firm as teams turn to assist each other in areas of weakness and learn from others in their areas of strength. The concepts of each one teach one works excellently within a team environment and can make an impact in growing the skills base and improve knowledge.

Summary

Firms have explored teamwork to benefit their innovation initiatives and have placed fundamental to achieving their innovative outcomes. The belief is that if an idea is generated within a team and supported for implementation it turns to get better support and buy-in and therefore turns to be more successful. Members within a team also turn to support each other in areas that would have otherwise been difficult for management to identify due to their close proximity to each other thereby benefiting the firm.

5.2.9. Information Sharing

Information sharing sessions are also fundamental to the support of an innovative culture. Innovation initiatives turn to get impetus and momentum when communicated adequately and information is shared sufficiently to allow team members to understand the direction the business is taking and why. Information sharing meetings and sessions to some are the only areas of interaction with management where questions can be asked and answers sought thereby creating an element of trust that is fundamental to a thriving culture of innovation. Literature review has also not raised the issue of information sharing in the context of innovation or innovation management but findings have clearly indicated it as a fundamental factor that can lead to success or failure of innovation initiatives.

Summary

Information sharing is a fundamental factor to a successful innovation management system and supports an innovative culture by creating trust especially when openness is maintained. Information sharing sessions are critical spaces of interaction that allows robust engagement that benefits dialog and set an agenda for interaction within the firm.

6. CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

In this chapter, a summary of the findings is provided and conclusions drawn based on the findings. Then recommendations to the stakeholders identified in the beginning that can benefit from this research and finally make suggestions for future research on questions that arose during the research but did not form part of the research scope.

6.2. Conclusion of the study

The objective of this study was to investigate innovation strategies in the form of managerial processes and systems that SMME firms in the Automotive Component Manufacturing (ACM) industry employ in developing technological capability and management of innovation, as well as to identify conditions and factors that influence success or failure of innovation.

This investigation was conducted within the context of the SA ACM industry with the aim of supporting government initiatives to broaden and successfully implement their industrialisation policy amongst SMME firms in this industry.

In reviewing the existing literature on the topic two sets of research questions and propositions arose,

Research question 1

- What processes and systems do SMME firms in the ACM industry employ to develop technological capability and manage innovation successfully?

Research proposition 1

- Processes exist mainly on an adhoc basis to support problem solving that result in continuous improvement and therefore building unique capabilities but not systematic.

Findings of the research identifies the following as the processes and systems that SMME firms can employ to ensure successful innovation management and technological capability, this list is by no means exhaustive or complete but highlights what was found within the context of the area where the research was conducted.

- Vision and strategy - Stating the innovation management intention in the vision of the firm attach importance to the innovation initiatives and therefore force management of the firm to put strategies in place to realise what is stated in the vision.

- Organisational structure and culture - The organisational structure and culture created, supported and nourished within an organisation determines the extent of innovation possible within an organisation. Innovation and innovation management are conscious efforts put together by management to enhance their firms and keep them competitive.

- Skills Development - To create technological capability an organisation has to start by becoming a learning organisation that is able to develop unique skills that can distinguish the firm from its competitors. Awareness of the importance of skills development should be at every level within the business and firms should become learning centers to develop skills that will build capacity and create technological advancement.

- Risk Management - The identification, assessment and management of risk within an organisation is an important management function especially in the current global competitive era. Risk management has to be a competence of every manager if the intended innovative outcomes are to be achieved. Observing the risks raised in the findings, risk management strategies can also serve as perfect triggers of innovative initiatives if the process is structured correctly.

- Information Sharing - Information sharing is a fundamental factor to a successful innovation management system and supports an innovative culture by creating trust especially when openness is maintained. Information sharing sessions are critical spaces of interaction that allows robust engagement that benefits dialog and set an agenda for interaction within the firm.

Research question 2

- What are the factors and conditions both internal and external that could facilitate or impede the SMME firm in the ACM industry to attain its intended innovation outcomes?

Research proposition 2

- Both internal and external environments contributes to the success or failure of innovation, but the external would have more impact due to reliance on OEM's, Government incentives and industry association support.

Findings of the research identifies the following as the factors and conditions that can facilitate or impede the attainment of innovation outcomes, this list is by no means exhaustive or complete but highlights what was found within the context of the area where the research was conducted.

- Leadership - Leadership is essential in building and championing innovation capability in any business, especially SMME businesses. Emphasis has to be put on the leader having the right attributes to lead the firm. Attributes like skills, knowledge, education and strategic competence to lead the business to success through building innovation capability and not solely because of ownership.

- External Environment - Being aware of the importance of the external environment is fundamental to success. Understanding the micro, market and macro environment and continuously making an effort to scan the external environment for beneficial opportunities and participating in industry associations to influence industry policy direction are measures necessary for the survival of firms in the global competitive environment. The component industry all over the world sustain its competitiveness through innovation and innovation management and cannot survive without active indicators' of factors that are outside the firm and can affect the health and sustainability of the firm.

- Technology - Investment in unique knowledge and knowledge management practices that would differentiate the firm from competitors is a necessary activity. This includes investment in new equipment with new technologies, investment in technical and managerial skills that will set the firm apart both competitively and sustainably.

- Teamwork - Firms have explored teamwork to benefit their innovation initiatives and have placed it fundamental to achieving their innovative outcomes. The belief is that if an idea is generated within a team and is implemented, it turns to get better support and buy-in and therefore turns to be more successful.

6.3. Recommendations

- Other SMME's - Innovation management and technological capability are fundamental to the establishment, growth and sustainability of small business especially in the automotive industry where competition is global and competitiveness is a necessity. This research outlines practical things that can be done to achieve the level of innovation management and technological capability that is sufficient to keep the business competitive and to grow in a sustainable manner. I would therefore recommend that these initiatives be incorporated in the strategies of small businesses and implemented to improve their competitiveness. They will also assist in defeating the technological late comer effect by helping SMME firms to catch up technologically with competitors in other developed countries even if is still a long term prospect.

- Innovation Scholars - The findings of this research opens room for detailed research on the impact of each of the identified factors and processes in the development of SMME firms and to enrich knowledge in the field of innovation. It also opens areas of further research into SMME's in the automotive industry and the nature of technology and investment prevailing and whether that will grow the industry as envisaged by government. It can further open areas of research on the adaptations required by SMME's to successfully transfer technology from other countries.

- SA Government - The findings of this research highlight important factors that can determine the success or failure of innovation within SMME's in the automotive industry. These factors can be used to structure assistance that is aimed at growing the automotive component manufacturing industry if not the manufacturing industry in general in a sustainable manner. They can also be used to indicate the areas of support and areas were additional funding can be provided and have maximum impact. They can further be used to inform policy direction on industrialisation with emphasis on building technological capability to ensure sustainability.

6.4. Suggestions for further research

This report addresses only the processes, systems and factors that need to be implemented to improve innovation management and technological capability, it does not in any way explore the extent of each factor or the priority required to get maximum impact. I would therefore recommend the following for further research,

- Research on the impact of each of the factors identified and the extent to which each need to be taken to have maximum impact.
- The direct impact of successful innovation on the firm's turnover and what methods can be put in place to easily measure its impact.
- The impact of successful innovation on firm's productivity, as productivity has not been explored as part of this research.
- The extent of the use of government incentives and their impact on competitiveness and the impact if they were removed due to affordability.

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APPENDIX A

Consistency matrix

Table 7: Consistency Matrix

Research Problem: To investigate managerial processes and systems that an SMME firm in the ACM industry employ in developing technological capability and managing innovation, also to identify the conditions and factors that influence the success or failure of innovation.					
Sub-problem	**Literature review**	**Research question**	**Source of data**	**Type of data**	**Analysis**
Investigate managerial processes and systems that SMME firms in the ACM industry employ in developing technological capability and managing innovation.	(Ambe & Badenhorst-Wess, 2013; Beaume et al., 2009; Dutrénit, 2004; Gauthier & Wooldridge, 2012; Lorentzen & Gastrow, 2011)	What processes and systems does an SMME firm in the ACM Industry employ to develop technological capability and manage innovation successfully?	Respondents in semi structured interviews Observations Company documents (annual reports, brochures and press articles)	Qualitative data	Data summaries, application of technological capability building process in latecomer firms framework, (Dutrénit, 2004) conclusion
Identify the conditions and factors that influence the success or failure of innovation.	(Kleynhans, 2009; Maladzhi et al., 2012; Rosenbusch et al., 2011; Sandada, Pooe, & Dhurup, 2014; Smit & Watkins, 2012; Teece, 2007; Urban & Naidoo, 2012)	What are the factors and conditions both internal and external that could facilitate or impede the SMME firm in the ACM industry to attain its intended innovation outcomes.	Respondents in semi structured interviews Observations Company documents (annual reports, brochures and press articles)	Qualitative data	Data summaries, application of simplified model of innovation process framework,(Tidd, 2009) conclusion

APPENDIX B

Actual research instrument

RESEARCH INTERVIEW GUIDE FIRMS			
ARCHIVE NO. SITE: INTERVIEWER: INTERVIEWEE: DATE: START TIME: END TIME: Do you consent freely to participate in this tape-recorded interview? Tell us briefly about the business and what your role is in the business?			
Theme from Framework	***Questions***	***Field Notes***	***Observation***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?		
Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?		
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?		
Technological Capability	How would you describe your production capability? Please elaborate.		
	What is the level of skill within your workforce? (both education and experience)		

	What have you done lately to improve quality and reduce costs? what training is offered? when ongoing or at start?		
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)		
	How do you fund new technology? External support, reinvestment etc. How do you intend to get off the funding source?		
	What external support does the business get? and from who?		
	How much revenue is attributed to in-house development and training?		
	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up?		

APPENDIX C

Actual interview notes

RESEARCH INTERVIEW GUIDE FIRMS			
ARCHIVE NO. 001 SITE: Automotive Supplier Park (ASN), Rosslyn INTERVIEWER: Mokiri Mangwale INTERVIEWEE: Brendon Lowe DATE: 16/02/2015 START TIME: 16:30 pm END TIME: 17:45 pm Do you consent freely to participate in this tape-recorded interview? Yes Tell us briefly about the business and what your role is in the business? Manufacture of 70% of the components pulleys for TVD (vibration dampers for smoothing the engine) for diesel engines. It absorbs vibration from the crankshaft and not passes it to the belt. I am the Managing /director and Shareholder and I hold a mechanical engineering qualification. We bought this business when it was battling and turned it around. We relocated from Ga-Rankuwa to Automotive supplier park (ASP) in December 2014.			
Theme from Framework	***Questions***	***Field Notes***	***Field Notes Cont.***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	Products developed by customer and internal process developed to manufacture it. Model component on Cartier software. Process from receiving component from customer, start by 1. Designer develops process layout by modeling 3D software on Cartier. 2. Determines volumes and process steps. Six steps, Blanking, Forming, ironing, machining, Polly-v and final machining to remove shavings. Process flow designed and analysed to see if the existing	Process followed to develop called APQP (Advanced Product Quality Planning). PPAP runs (Iterations on each machine to trial part through the production lines). People involved in product development: Designer (contracted), in-house development team, technician on tooling, forming, and technician on CNC processing.

		equipment can do those operations. If it can, feasibility is done and prototype tooling developed internally to manufacture trial part.	
Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?	No formal process but as a small business we are all accessible and spend time on the shopfloor and therefore ideas are shared in the normal running of operations and if feasible is taken and if not ignored.	
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	All projects are implemented through the APQP process headed by myself.	
Technological Capability	How would you describe your production capability? Please elaborate.	Polly V machines are like pottery from flat sheet of steel. No machining, all parts are formed and pressed. Cold form rolling grooves. Technology is unique but originally brought to SA 20 years ago from Germany. But have improved on it and we are the only manufacturer of this components in the Southern Hemisphere. Only competition in Germany but German company prefers SA components. Cycle time is around 2 min per part and more cost effective.	7000 pieces are produced per day, on a 3 shift system and 5 days per week. 5 to 6 containers per month shipped to Europe. (Germany and Czech republic). Reject rate abnormally high +-5% in automotive standard too high should be +-2 to 1.5% and are due to high tolerances and single step processes. Majority of rejects are normally during setup. As you fold material cracking sometimes happen, which is so small you will not see unless you put under a microscope. This is checked during setup as start up procedure to produce first off.
	What is the level of skill within your workforce? (both education and experience)	Majority have artisan qualification. One Industrial Engineer who is also the Project Leader, the rest is artisans, Fitters, toolmakers and CNC machinists. With the experience averaging 15years and they have developed specialist	While artisan and experience skills are sufficient but you also need a person like me with higher qualifications and experience with high competence to analyse especially during iterations in the development process. This turns to shorten the

		skills through experience. They are currently the best in the market.	process as each challenge can be analysed and rectified at the relevant process upstream.
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	We use sheet metal pulley instead of steel bullet. Due to increase in quantities a method was developed to cater for increased quantities, which changed the method from machining bullet to sheet forming. This is highly specialised technology developed in Germany. Machine Setters are encouraged to share knowledge and are therefore rotated to work together and learn from each other strength. A program of 10 steps was introduced to improve skills and all employees were rated on where the skill level is to determine the training requirement and people at higher rating are incentivised to teach others. Tolerances are getting tighter, features more difficult and quality standards increased thereby triggering process improvements to meet them.	We have successfully managed to meet tolerances to achieve the new stop start pulley technology for BMW's. Training provided is both external and internal. External training is for general purposes like general setting, lathe, machining but all general. Internal training is for Polly-v setting and forming, which cannot be trained anywhere, as the skill is only available internally. It takes about two years to become competent in most of the processes and continuous training is done to feed the process with additional people. The skill is also important which is gained through experience and difficult to document but a lot of guys have a feeling of how to adjust it to get it right and is very difficult to document and therefore also reliant on passing of knowledge.
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	Purpose made Gauges to measure part compliance are designed, developed and build in-house. tolerances of 60 to 80 microns cannot be measured with traditional venires. Every component checked 100% on the gauges for compliance. Gauge will check critical dimensions and displayed on screen for operator to see.	Part turn at 6000 rpm and machine should be extremely balanced to produce. Technology initially supplied by equipment manufacturers from Germany and they helped in setting up the process and trained the operators. Challenge in automating, which is how is done in Germany by doing a series of steps with a single stroke.
	How do you fund new technology? External support, reinvestment etc. How do you intend to get	AIS investment program where you claim from DTI for a certain amount for the new investment.	The normal process is to ask for an all time run out quantity, which is manufactured and

	off the funding source?	Customers are quoted on the tooling for new components, a big mark-up is included in the tooling and is sufficient to fund training and other improvements. But the tooling on our machines belongs to the customer and there is profit because the tools are build internally and therefore used to reinvest in the business. Components themselves have very tight margins and therefore real profit comes from tooling. At the end of the life of the tool the tool is kept for 15 years in case a customer requires a consignment at a later stage.	shipped to customer and tools disposed at scrap value. The process of claiming is easy as long as the documentation is done correctly from the beginning, which is normally the justification and employment figures. Inspections and audits are done and payments done. Time lines and specifications if met the others are quite easy. As shareholders we continuously invest into the business even if are not high amounts. Secondly we use bank loans and overdrafts where necessary but we claim whatever can be claimed from government.
	What external support does the business get? and from who?	Claim of APDP export incentive and covering shipping costs and generate funding. sometimes exchange rates give excesses which are sometimes in our favour even if it might go either way.	Two different schemes assisting in procuring equipment and pay back a certain percentage over a period. We are also members of NAACAM and therefore benefit from industry statistics and representation to influence policy direction.
	How much revenue is attributed to in-house development and training.	Currently running at 60% of capacity on volume and if required to increase it should not be a problem.	We can attribute 90% of revenue to internal development and training.
	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up.	Difficult as we don't understand our competitor and not even know them and even if we did you'll never have access to them. We rely on the customer feedback to understand where you are. Rand euro exchange makes it competitive. Edge over everyone on low to medium volumes from 40k to 400k as our production is cheaper	Customer compares supplier on price, quality and normally historical supply but price counts more than 50% of final decision. Plans to grow into inertia ring which is a new thing in cars instead of a pulley and is less complex than the pulley and are currently made from castings which are more expensive and grooves cut. We are developing a

		due to cheaper tooling but in excess of that you require automation which makes the initial investment high even if it can be offset on economies of scale. I would therefore say competitive due to single step process. Competitive on pricing depending on volume.	forming process for it and if successful it can be cheaper and faster, which will give us huge market share. The process of development takes between 4 to 5 months on standard similar parts but if completely different it will take about 6 months.

RESEARCH INTERVIEW GUIDE FIRMS

ARCHIVE NO. 002

SITE: Automotive Supplier Park (ASN), Rosslyn

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Andre Jacobs

DATE: 24/02/2015

START TIME: 11:55 am

END TIME: 13: 00 pm

Do you consent freely to participate in this tape-recorded interview? Yes

Tell us briefly about the business and what your role is in the business:

We are in the business of manufacturing pulleys. I have 15 years experience. Started as a fitter and turner was moved to machine setting and currently a Technical Manager. I am in charge of all technical matters, training and new product development.

Theme from Framework	***Questions***	***Field Notes***	***Field notes cont.***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	We propose changes to products on a continuous basis to customers especially on non critical dimensions that will make manufacturing easy and not compromise the customer's product. The people involved in product development are the technical manager, tool room manager, the designer, the MD and the finance team for costing.	We have established a good relationship with our customers to a point that we can pick up a phone and discuss the changes, no need for appointments that take long thereby reducing the time to approve.
Search: How do you	How do you gather and	We sit as technical	At the time of prototype

find opportunities for innovation?	select ideas for change or improvement? Who participates?	people and share ideas to see how best to get the best out of every new product or how to best get maximum tool life out of every tool. We have had suggestions to combine the supervisor and setter to form one team leader and also to move machines around in a way that one operator can operate more than one machine.	manufacture the people involved are the toolroom team, production team and technical team and they are there to give input on what can be done to improve the setup of the part and are also involved during the iterations.
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	When we receive a new part for development we start by setting up a meeting, amongst the technical team and the MD to look at feasibility and capability to manufacture. Rudi toolroom manager looks at blanking and forming and I look at the rest of the process to ensure we can manufacture the part. If we find challenges we then note the issues and sit in another meeting to highlight the issues and see if changes can be made to the drawing to solve the problem. The proposed changes are then taken to the customer and discussed through a conference call. Majority of the time proposed changes improve both our processes and therefore are normally accepted.	Parallel to this the costing process continues to ensure that we are also capable of meeting our cost structure. First look at blanking and model it on software to see what volumes can be achieved. The process is like doing pottery with metal. Then in process parts are produced on a trial error bases called development and when those parts meet the said standard they are then send to the customer for their own fitment trials. There are proposed changes that we made that were accepted by the customer and they influenced their future design of products. When the prototypes are made QC gets involved to measure out the parts and ensure that there are 300 parts that have been verified and are therefore send to the customer as a fitment trial run.
Technological Capability	How would you describe your production capability? Please elaborate.	There are parts that we rejected from customers in the past because our machines were not capable of meeting the tolerances required. Some we had to modify certain product dimensions, which are then discussed with the customer and if	Sometimes is not only about whether the product tolerances can be met but it also involves whether volumes could be met at an acceptable reject rate and tool life can be maximised. We also check of there is a machine that can best be utilised for this part. I

		acceptable then we go ahead, if not we leave them. Thereafter I sit with the machine setter on the first production run with the setting paper that I developed for training and as we continue they pick up other better ways and the setting sheet will be amended to accommodate the new method. A first off will then be made and approved by QC before a mass production run.	personally work on the machines during prototyping to ensure that I can get consistency up until I have achieved the standard required. Electronic gauges are also then developed and manufactured internally to check critical dimensions. It takes between 4 to 5 months to do a complete product development from drawing to submitting trial parts.
	What is the level of skill within your workforce? (both education and experience)	This skill can only be acquired from internal training as is the only company in SA that produces these parts.	Out of experience I can outright tell you the part we can make and the one we can't. In the last 4 years 3 to 4 we rejected due to capability and 45 were done. 2 parts development per year.
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	Training of operators and machine setters happen on a continuous basis especially on the job training to ensure that there is better understanding. Secondly, on new product development we do full training on the new part before going into mass production. Changeovers for the whole cell machines take between 6 to 8 hours. Training is done continuously to ensure that improvements on changeovers and setup specifically.	Tooling is manufactured internally and materials are bought and cut internally until the tool is complete and then is taken for hardening. Operators are on a point system where incentive is paid on the amount of points you have, which is determined by the amount of skills you have acquired on the required skills.
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	Tool spares are ordered after the final product has been accepted. All our equipments are the same and old but the tools are new for every product.	
	How do you fund new technology? External support, reinvestment etc.	On development the customer pays for the tools and they give the	

	How do you intend to get off the funding source?	money over in portions and tool spares are build in the part price.	
	What external support does the business get? and from who?	Not sure	
	How much revenue is attributed to in-house development and training.	Not sure, I think all.	
	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up.	The technology is behind if I compare but the technical knowledge has improved due to having to do with what you have.	Poor technology is compensated by high skill level. Compared to other peers in our industry we are much more multi-skilled and therefore able to cut on labour cost.

RESEARCH INTERVIEW GUIDE FIRMS

ARCHIVE NO. 003

SITE: Automotive Supplier Park (ASN), Rosslyn

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Jane Garner

DATE: 24/02/2015

START TIME: 13:25 pm

END TIME:14:12 pm

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the business and what your role is in the business?
Pulley manufacturing for vehicles. All products are exported. I am a Quality and Operations Manager and have a business qualification. We lost General Motors and Mercedes business due to poor operations and quality before new ownership. However Mercedes have invited us back for quoting recognising the success we are having at the moment.

Theme from Framework	***Questions***	***Field Notes***	***Field Notes Cont.***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	Production was running at 7 pulleys per man-hour and has improved to 11 pulleys per man hour. Achieved through monitoring and proper people management.	Changes are triggered by new product development and challenges of increase in reject rate, besides that we don't fix what is not broken. The structure was the driver

		Attention to challenges through people involvement. Setup a green area that is filled daily and discussed with all team members available. Maintenance got involved	of the improvement but mainly the constant need to improve.
Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?	Ideas are gathered through discussion of challenges in the green area. Not formalised but openness and accessible encourage involvement. Feedback sessions every Friday where everyone has an opportunity to talk. Involves challenges, quality, production, safety and any other issues. Transparency.	An incentive was provided to improve production. Based on improving pulleys per man-hour and meeting a certain reject rate determined by the part under production. Not formal suggestion process idea gathering.
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	Implementation starts by driving values throughout the shopfloor. Accepted ideas are implemented and sometimes depending on the impact an incentive is given to the person that suggested.	The ideas that were not selected are discarded and the feedback is given. But not formal at all.
Technological Capability	How would you describe your production capability? Please elaborate.	Customer is one of the biggest vibration damper manufacturers. We are preferred because of long standing relationship, find us secure and reliable based on historical supply.	Customer moved in the plant for two years to assist in getting the operations right after the change of ownership.
	What is the level of skill within your workforce? (both education and experience)	Background of skills is from leather manufacturing before coming to QA. have business degree from Wales. The shopfloor was also reorganised to put the skilled guys as team leaders to ensure that they also have management skills and will also have the obligation to transfer skills. The team leaders were then teamed with	The skill required is unique due to it being the only one in the southern hemisphere. We have 5 guys with Polly-v skills, which is scarce knowledge. They don't have degrees but have specialised skills acquired over time. Started a program to improve a skill pool over a year ago. 2 additional guys were brought in and are trained internally to acquire these

		people that are weaker in the area of his expertise to ensure that they can learn. Training was done only on Sundays and therefore all guys that required training had to sacrifice their Sundays in order to learn.	skills as there is nowhere else they can get these skills. People on training were selected due to their CNC knowledge and are now trained on the Polly-v specialised skill.
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	Shopfloor skills not that good. CNC skills could be learned from outside. All other skills are internal. There is training that was attended offered by AIDC, which is incentivised by government called the lay-off training, which firms can use if they are shutting completely or even when they have a short stoppage like when we were moving the plant over December.	Training with operators and machine setters is conducted by process engineers and happens on a continuous base. At the moment due to our improvements we only work Monday to Friday and have weekends for training if need be.
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	No upgrades, challenge is that our machines are very old. We have 8 Polly-v, we use 6 at any given time, thereby giving capacity and flexibility.	
	How do you fund new technology? External support, reinvestment etc. How do you intend to get off the funding source?	Don't get involved but think the shareholders contribute a lot.	
	What external support does the business get? and from who?	AIDC training.	
	How much revenue is attributed to in-house development and training.	All revenue as there is no alternative training anywhere else.	
	How do you think you fair in technological advancement compared to	There is only one competitor. We supply 90% of the products to	Normal certification of new products is done one a year.

	your industry peers? why How do you plan to catch up.	our customer and are constantly told by the customer that we are good at what we do. After the relocation we recertified 11 products in a month while were scheduled for 9 with the customer onsite monitoring and commented that they have never seen such a well planned move.	

RESEARCH INTERVIEW GUIDE FIRMS

ARCHIVE NO. 004

SITE: Automotive Supplier Park (ASN), Rosslyn

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Marius Putter

DATE: 16/02/2015

START TIME: 15:15 pm

END TIME: 16:15 pm

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the business and what your role is in the business?
Manufacture pulleys for the automotive industry. I am a maintenance manager looking after the routine maintenance and repair of machines. I have only been with company for 4 years but come from 22 years of workshop and machine maintenance.

Theme from Framework	***Questions***	***Field Notes***	***Field Notes Cont.***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	Not that I'm aware of on products but continuously make changes on machines to improve functionality. The changes are normally driven by challenges in production and we involve technical to ensure that the changes we make will not impact on the process and not need customer approval.	

Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?	Ideas are gathered through analysis of breakdowns, availability of spares, cost of repair, and production challenges. We discuss every suggestion before we implement to ensure that it is logical and functional.	
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	We arrange for down time with production especially on weekends as we don't work weekends to ensure that there are no disruptions. After the implementation the machine gets tested to ensure that it still functional and couple of parts run to ensure that it still in tolerance before the production team arrives on Monday. If the changes affect the settings technical is involved to ensure that production personnel are trained on the changes when they start up.	
Technological Capability	How would you describe your production capability? Please elaborate.	Our machines are capable of producing the parts that we have. Because they are old there is a higher amount of breakdowns but are being managed. What also assist us is that there is always two machines in each cell that are idling, which allows for immediate swop in cases of breakdowns.	We are sometimes running at high reject levels on some parts but there is nothing you can do on the machine itself to improve it. We therefore inform the costing people and they build a higher scrap level into the part price as long as is still within the customer's affordability.
	What is the level of skill within your workforce? (both education and experience)	The technical capability is very strong. I am personally a fitter and turner and have been in the maintenance industry of manufacturing equipment for well over 20 years and within my team experience of over 20 years as well. Majority of my team are fitters and turners, electricians, electronics	The educational qualifications are honestly quite low but because of their experience they are the best people for the job.

		technicians and hydraulic technicians.	
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	We from our side done a risk assessment on all the machines to see which spares need to be kept and which once we can get off the shelf to reduce on stock holding. These also allow for anticipating breakdowns and therefore replace certain parts before they break. It also facilitates quick repairs.	The maintenance team is trained continuously sometimes outside especially on new materials and methods that can be used to improve our processes
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	No, we just refurbish where we encounter challenges. All machines are on a routine maintenance program that we follow religiously to avoid breakdowns where possible. We keep in contact with the suppliers of machines to ask where we can improve and what new spares are available that are improvements to what we normally use.	If we experience a problem that we can't solve and the manuals cannot help, we would ask the machine supplier to send their technician at our cost to fly to SA to come and assist. This relationship has developed over time as we buy spares from them.
	How do you fund new technology? External support, reinvestment etc. How do you intend to get off the funding source?	I think a lot of it is reinvestment. We have not had any new technology since I've been here but I think they have to be reinvesting or loans.	
	What external support does the business get? and from who?	We get support from machine suppliers on challenges on machinery. The other guys also got training from AIDC during the relocation even if we were busy with the moving of machines. I therefore think they get assistance from government.	
	How much revenue is attributed to in-house development and training.	I think all of it. All the skills learned in production can only be learned in-house, as these are the only machines in SA to do what we do.	

	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up.	I think we are far behind. But I think is because we don't produce too much and therefore no need to invest too much. The machine suppliers continuously ask us if we are not going to be upgrading but I always tell them that I'm the wrong person to ask.	I suspect we are going to have to upgrade soon as some spares are not going to be available soon as we will be the only people still using this type of machines and therefore either have to buy them specially made which will be expensive or we will not have spares.

RESEARCH INTERVIEW GUIDE FIRMS

ARCHIVE NO. 005

SITE: Automotive Supplier Park (ASN), Rosslyn

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Rulie van Heymenes

DATE: 24/02/2015

START TIME: 14:35 pm

END TIME: 15:30 pm

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the business and what your role is in the business?
Manufacture pulleys for vibration dampers of vehicles. I am the Toolroom Manager responsible for the design, manufacture and management of tools. I also get involved in new product developments due to my experience on presses for forming and blanking.

Theme from Framework	***Questions***	***Field Notes***	***Field Notes Cont.***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	All changes we have are driven by the new products that customers want. We rarely make changes on the product, as that is beyond our control, we change our tools and setting processes to ensure that we can manufacture the part.	During development process the people involved are myself from toolroom, technical, MD and the designer with accountant for costing.
Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?	Within the toolroom we discuss the challenges of the new and existing parts, we always look at how we can extend the	We also participate in meetings in production to hear what problems the production team has with the tools and therefore

		tool life as that saves money. We gather ideas by assessing every tool when it comes back from the shopfloor to see if there is anything we can do to polish or sharpen it to give it longer life.	work on their challenges to improve on the tools.
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	We always do trials before putting the tool back in production. When we do changes we then do a mini development trial to ensure that the product produced remains within tolerances. If is a process change we work with production to ensure that they set the tool on the machine in a way that the changes will solve their problems.	Most changes on tools are limited to tool life based on hardening improvements and ensuring that some parts are replaceable without having to destroy the whole tool, in that way we can hold spares instead of making a complete new tool.
Technological Capability	How would you describe your production capability? Please elaborate.	At the moment we do meet customer tolerances with our machinery even if our machinery is old. We have a lot of experience on this machines that we can find ways to ensure that we meet the tolerances. During development we assess the challenges and see where we can compensate to meet the tolerances.	More trial and error until we can come up with a first off that meets all critical dimensions and then record all the settings to use them as a setup sheet. Some components run at higher rejects rate than we anticipated but we continuously work on improving it.
	What is the level of skill within your workforce? (both education and experience)	Majority of the guys are qualified artisans but with experience in tooling, fitting and turning. experience is the main thing as there is no school where you can go to learn what we do. Its only this business that produce this parts in SA and therefore the skills can only be learned here.	We are also trying to get in qualified engineers to train in our processes both in production and toolroom to ensure that we can build future technicians.
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	We have managed to improve majority of our tools from an average tool life of 2500 components to an average of 3500 components. This was	We also involved our team in production to train the machine setters on critical settings that will affect tool life if not setup correctly. We also created awareness on the

		done through increasing guides on the tool to avoid any element of skewness during setting, which eats into the tool during use.	importance of tool life for the business and the effect of poor machine setting on the tool. The training is ongoing.
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	No. Our machines are the same old machines but we keep refurbishing depending on the part we want to manufacture. All the machinery came from Germany 20 years ago and we keep spares to maintain them.	The supplier came with the machine to help us in setting up the operations and running the components.
	How do you fund new technology? External support, reinvestment etc. How do you intend to get off the funding source?	Tools are paid for by the customers for development and thereafter we build them into the components price. I also think that the shareholders put their money in to keep the business running.	
	What external support does the business get? and from who?	I think they also get support from Government, as they provided training during the relocation through the AIDC. I also think there is a benefit that you get when you export parts but I don't know how it works.	
	How much revenue is attributed to in-house development and training.	Not sure but I think all, as everybody is trained internally as the skills are only found internally.	
	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up.	I think we fair well. We just use old machines while in Germany they use automatic machines but we are able to make the components. So as I said we compensate for poor technology with high technical experience.	

RESEARCH INTERVIEW GUIDE FIRMS

ARCHIVE NO. 006

SITE: Ga-Rankuwa

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Tebogo Masoga

DATE: 21/01/2015

START TIME: 11:30am

END TIME: 12:32 pm

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the business and what your role is in the business?
The business is the biggest manufacturer of automotive glass in SA. I am in charge of Logistics and planning. The department includes planning, purchasing, warehousing and distribution.

Theme from Framework	***Questions***	***Field Notes***	***Field Notes Cont.***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	Our core manufacturing process is the same and has not changed in over 20 years. But we continuously improve on accessories and supporting processes to cut costs and deliver the best product. Product changes happen regularly but dependent on customers introducing new models of cars.	On the logistics side we have also introduced improvements to complement the improvements in the factory. We have entered into Just In Time supply with many of our customers to give them value add. All these changes are driven by the need to keep meeting customer expectations.
Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?	We use a suggestion scheme method. The same suggestion scheme used in the factory is also applicable to the services department like ours. We receive on average about 5 to 6 suggestions a week off that I would say we implement an average of 50%.	The scheme allows for the person that has provided a successful idea to be honored with a picture on the major notice boards and receive an incentive. Everyone is allowed to participate in the suggestion scheme and a suggestion can be put in any suggestion box around the premises.
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	All selected ideas are then allocated to implementing agents in various sections to ensure that they are implemented and	In our case they will be given to an Industrial engineer to manage the implementation and monitoring of benefits for reporting purposes.

		reported in weekly meetings.	
Technological Capability	How would you describe your production capability? Please elaborate.	I would say we have a general capability problem and solely basing it on the levels of rejects encountered. Our rejects rate average range between 8 and 10%, which I think is very high and therefore indicative of capability problems.	We do meet our customer commitments at the moment but I believe if we could save the lost production we can work a lot less hours to meet the same target.
	What is the level of skill within your workforce? (both education and experience)	Glass is a delicate product that requires extreme care when handling. All warehouse and logistics personnel are highly experienced in the handling and care of glass. The experiences of the majority of them are over 10 years and have received training internally.	Majority of the personnel are not educated, the education level mostly go up to matric level but have been in the job for long and therefore have perfected the art. This is with the exception of the two industrial engineers that are within the department who have B techs in industrial engineering.
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	We have introduced the Just In Time system with the customer, this system allows us to deliver directly to the customer's production line just in time for the assembly. This has reduced the warehousing and handling costs associated with the bad handling by unqualified glass handlers at the customer warehouse and have allowed us to bargain for higher prices on the basis of the value ad that they get.	The organisation offers all types of training depending on the skills gap identified in the assessment. The organisation also pays for educational studies to high performers with the aim of setting them up for future promotion prospects.
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	We have not upgraded any machinery lately, unless I'm not aware of. According to my knowledge we have a long standing relationship with another glass manufacturer in Europe, who assists with technical challenges telephonically and sometimes even having	I think is under a license agreement or something of that nature as we then get billed for that visit if it does happen.

		to fly out.	
	How do you fund new technology? External support, reinvestment etc. How do you intend to get off the funding source?	Is definitely through reinvestments from the business proceeds and from investor's capital. Majority of all what we buy we try to amortize it within the existing product cost to recoup the investment.	
	What external support does the business get? and from who?	Production incentive (PI) within APDP rebates for exported components, which we use to offset import duties on some of our imported raw materials. Training offered through the skills fund and all other investment incentives available for use.	
	How much revenue is attributed to in-house development and training.	I think all of it. The reason being majority of the workforce has been trained internally.	
	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up.	I think we are way behind. This is due to large capital investment required to stay abreast, which we do not have. The plan to catch up is to receive larger model orders to ensure that the investment can be recouped. But the future lies in new advanced technology and therefore I'm sure soon we will have no choice but to invest in new advanced technology.	

RESEARCH INTERVIEW GUIDE FIRMS

ARCHIVE NO. 007

SITE: Ga-Rankuwa

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Johan Steenkamp

DATE: 26/01/2015

START TIME: 18:00 pm

END TIME: 19:05 pm

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the business and what your role is in the business?
In the business of manufacturing and selling automotive glass. I am the Managing Director of the Shatterprufe Ga-Rankuwa operation. My duty is to ensure that we manage the business in a way that satisfies our customer expectations, meet our employee's wishes and provide a good return on investment for our shareholders. This we do by understanding and managing these diverse expectations in our conduct in the day to day running of the business.

Theme from Framework	***Questions***	***Field Notes***	***Field Notes Cont.***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	We have changed both processes and products in the past year. These changes were first driven by the will to continuously improve our operations to better meet our stakeholder expectations. But also driven by the new products that customers bring into the market that comes with complex shapes and much tighter tolerances and tighter quality standards.	We normally do product development of 3 vehicle models a year meaning a full set of glasses for 3 types of vehicle models planned for introduction by the OEM's each year. Which from that we target to get two vehicles sets if not all, especially if they are replacements of models we are currently manufacturing. To improve our business we have a philosophy of each one teach one, which ensures that everyone participates in the successful implementation of new ideas.
Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?	Our operations are divided into two distinct operations. One section deals with the manufacture of Windscreens only from start to end and the other is the manufacture of tampered side and back glasses. About 10 years ago we introduced a concept called Mission Directed Workteams (MDW), looking at structuring employees into workteams to ensure	This model helped us also to introduce a suggestion scheme that has been very successful in bringing new ideas to the fore especially from sources that have not had the opportunity to bring ideas forward in the past. This has build a culture of responsibility and ownership of processes to ensure that ideas for improvements are brought forward in a structured way and

		that they all participate in how the business is run.	subjected to a fair process aimed at improving our operations.
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	Ideas gathered through the suggestion scheme are subjected to a structured process of evaluating the suggestions and if they have potential for success they are either investigated further and improved upon or direct implementation if the team feels it could be implemented as is. These ideas are normally allocated to a technical person who will then be a champion to ensure the implementation takes place and monitoring is done through the technical meetings to ensure progress.	All ideas have a before and after implementation scenarios including statistics and pictures to ensure that we can reflect on the impact the idea had on the operations. This method of gathering statistics and pictures before and after allows to measure the benefits of each idea fully and therefore know the impact it had on the operations. It also allows for the business to incentivise the individual that came up with the idea to ensure that he also benefits from the proceeds of the idea.
Technological Capability	How would you describe your production capability? Please elaborate.	We are capable to a certain extent even if we are finding the new glasses or glasses from new model cars arriving with more complex bends and shapes that have not been done before and very difficult with the machinery we have. This results in high levels of rejects and if build into the product price makes the part uncompetitive. The machinery that we have is generally old even if we do good routine maintenance on them and refurbishments every 5 years.	The challenges always remain in the bending processes, which are difficult to control on some parts as they tend to be affected by various factors including the weather on the day. But continuous assessment of high loss glasses is made and projects created to improve on them. But we are also aware that soon we will have to upgrade the machinery we use to newer technology if we are going to compete with Chinese imports on both quality and cost.
	What is the level of skill within your workforce? (both education and experience)	We have high technically skilled work force both on education and experience. Our process and technical teams comprises of artisans, mechanical and industrial engineers. All managers have some sort of a management	Shopfloor employees are mostly uneducated but with high level of experience. Our employee retention level at the shopfloor level is very high and thereby allowing us to build on the experience gained by others along the way. I

		educational qualification or are working towards it. This decision to professionalise the business was taken a while ago to ensure that managers understand both their role and the bigger business imperative.	believe this is our strength as introduction of new complex products requires that you have shopfloor employees that understand the problem as much as you do and therefore contribute in finding a solution.
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	We have automated the handling of raw material glass entering the cutting lines. This was a project aimed at reducing losses associated with scratches caused by handling. At the moment the loading section is fully automated with robots and our technical staff receive continuous training on both the use and maintenance of the robots	We also offer continuous on the job training for our shopfloor employees mostly offered by the technicians and engineers. Continuous assessments are also done across the whole business to ensure that we are aware of the knowledge status of our employees.
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	Our major equipments which are the furnaces get refurbished every 5 years, which involves the rebuilding of the inside walls. We believe there is nothing wrong with the furnaces as long as the refurbishments are done and in time, but we also continuously improve on the areas before and after the furnace like loading, offloading and tooling.	We have technical agreements with companies in Europe and Japan to assist with technical challenges and to work with us on improving some processes to achieve better results. We also do involve our technical partners in difficult product developments to harness knowledge from what they do.
	How do you fund new technology? External support, reinvestment etc. How do you intend to get off the funding source?	We fund new technology from recapitalisation and reinvestments. We are not planning to change this model anytime soon as this is a model preferred by current management.	The tooling costs of new and old products are paid for by the customers through us. Customers pay for both the development tool and the final production tool.
	What external support does the business get? and from who?	We get support from NACAAM in facilitating industry negotiations with Government. We also get support through both the APDP incentives for our export glasses and AIS	

		incentives that can be claimed as percentage of investments made in equipment and machinery.	
	How much revenue is attributed to in-house development and training.	I would say over 80%, as the majority of the training happens internally. On the job training is one of our major success factors and has helped us in creating unique skills within our shopfloor personnel and therefore contributes hugely to our success.	
	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up.	We are technologically behind on furnaces but I think compete well on all other areas. The sharing of knowledge acquired through the technical partners that we have will allow us to catch up with industry peers overseas.	Technology is always a fraction of capital and volume and with limited capital and low volumes from OEM's the comparison with overseas players will always be skewed.

RESEARCH INTERVIEW GUIDE FIRMS

ARCHIVE NO. 008

SITE: Ga-Rankuwa

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Pieter Greeff

DATE: 26/01/2015

START TIME: 16:30 pm

END TIME: 17:25 pm

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the business and what your role is in the business?
We are in the business of manufacturing automotive glass components. I have a background in finance and costing and have been in the automotive manufacturing for 13 years. I am currently the financial manager responsible for the management of costing, accounting and financial management)

Theme from	***Questions***	***Field Notes***	***Field Notes Cont.***

Framework			
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	We introduce new products into the factory annually depending on the new models that are released by OEM's. The driver is new models coming into the market on the product side. Processes are continuously reevaluated to ensure that the method used can still best manufacture the products.	All our employees are involved depending on which areas are affected. We normally ensure that everyone necessary participates in the changes to create ownership of the changes.
Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?	We have suggestion scheme that works brilliantly. I believe is still maturing and with more experience of using the scheme it will deliver even better results.	The suggestion scheme is available for everyone to use and accessible with boxes everywhere around the aisles.
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	I know that they get allocated to people to implement depending on which area is involved.	It is a requirement of the suggestion scheme to report the success of the idea and its benefits and therefore the person implementing is required to monitor.
Technological Capability	How would you describe your production capability? Please elaborate.	Our reject rates are higher than normal between 8% and 10% and therefore have a big effect on the product costing. But this is not only due to the technical problems with the machines but runs across. I analyse these reject rates extremely and realise that you have a combination of raw material rejects, in process rejects and post process rejects.	Capability according to me has to do with in process rejects. I would therefore say that we are capable but there is lot that needs to be done to become world class.
	What is the level of skill within your workforce? (both education and experience)	I think the skill base is quite good. Our employee retention is good as we have majority of employees who have been with us for more than 10 years and have over the years acquired valuable experience in glass	We have a good number of engineers and technicians that have educational qualifications to boost the guys with experience in new methods and research.

		manufacturing.	
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	I know that there are continuous improvement projects running including a focus on loss categories to try and reduce them or eliminate where possible. Continuous training to improve care and focus on problem glasses is offered by the technical team and introduction of sensors on sensitive areas to have early alerts.	I know these things because I get involved in the operations to support them on financial and costing information that will assist them in justifying improvements expenses.
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	We spend funds introducing robots in offloading and loading sections in the past financial year to improve on losses, especially handling losses. We source our equipment mostly from Europe and have a licensing agreement, which we evaluate annually to assist in technical challenges.	We also use this licensing agreement to get assistance in assessment of our existing equipment and get recommendations for replacement or upgrades and which equipments are best suited for our environment.
	How do you fund new technology? External support, reinvestment etc. How do you intend to get off the funding source?	We have a reserve fund that we keep, you can also call it recapitalisation fund, which include a combination of withheld funds, loans and grants. This funding model is sustainable it uses a combination of these sources in moderation to avoid over indebtedness.	Projects are also selected on the basis of internal rate of return (IRR) and the higher it is the higher the priority of that project from a funding perspective.
	What external support does the business get? and from who?	We get what we call the Production Incentive (PI) within APDP for exports, which are rebates points that you gather based on the volume of exports, which can be used to net off against import costs incurred on input materials. This allows our products to be competitive internationally. We also get an investment	We have internally aligned our equipment justification process and procedure to align with the incentive scheme. The department suggesting the purchasing of new equipments or assets is required to put together a justification that involves cost benefit documentation that is in line with what the incentive scheme will require and is then

		incentive called AIS that gives back 25% of the qualifying investment in equipments and assets. These incentives are highly accessible if the paperwork is done correctly.	evaluated internally by finance to ensure that when it goes for executive approval it also complies with the incentive requirements for an automatic qualification.
	How much revenue is attributed to in-house development and training.	All revenue generated in this business is attributed to in-house development and training. Shatterprufe is the only automotive glass company in SA and therefore there is nowhere else locally to acquire the skills to do what we do besides internally.	All skilled operators and technicians learned their skills internally.
	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up.	I think we are behind technologically due to the amount of investments put in some of the factories we visited overseas. But we produce some products that they also produce meaning on those we are competitive. There are other things that we do better like, offering additional services to our clients in JIT and value added services done within the premises of some of our customers.	The more we improve our process and skills we will eventually catch up, as this will allow us to attract more glasses from new markets thereby increasing volumes that will justify the new investments.

RESEARCH INTERVIEW GUIDE FIRMS

ARCHIVE NO. 009

SITE: Ga-Rankuwa

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Pieter Redelinghuys

DATE: 26/03/2015

START TIME: 15:15 pm

END TIME: 16:05 pm

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the business and what your role is in the business? We are in the business of manufacturing automotive glasses. I am a trained artisan with 20 years experience in the automotive industry both on maintenance and process. I am a Technical manager responsible for both process and new product development management.

Theme from Framework	***Questions***	***Field Notes***	***Field Notes Cont.***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	We don't have control over product changes or design as that is controlled by our customers. We are responsible for designing the process of manufacture. We only do product development on new model parts designed by the customer. The product development process involves changing some process parameters to achieve the required tolerances and I would therefore say we do purposeful changes even if they are not major.	The changes are always driven by the will to achieve tolerances at a competitive cost so that you can win the job. In product development we have process technicians, production technicians, myself as the project manager, production managers and mechanical technicians. This team is gathered together to ensure that they can contribute towards successful development by contributing their line of expertise.
Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?	We have weekly technical meetings where we share ideas on the day to day production challenges including product development challenges and systematically workout possible solutions. We also make use of the suggestion scheme system that the business adopted to gather more ideas and from a wider employee spectrum. Everyone can be heard through the suggestion scheme and his every idea is treated with the necessary importance and subjected to a fair process of evaluation.	In Weekly technical meeting we have representatives from Process, production, technical, maintenance, logistics and industrial engineering. On the suggestion scheme everyone is involved and they also get involved in the MDW process that we meet in the green areas and discuss production performance and challenges that impacted the previous day or shift.
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	All selected ideas are allocated to individuals for implementation. That person will then report in the weekly meeting on	The monitoring is done by the person allocated to run with the implementation of the idea, for the person to

		the progress of the implementation of the idea including the challenges encountered. All ideas that involve spending money, we do a cost benefit analysis during the selection process to ensure that we are doing the right thing and with the cost benefit analysis it is a requirement that you then do a post audit to check if you achieved what you set out to achieve.	close the project as complete the benefits of the idea have to realised and presented for sign off.
Technological Capability	How would you describe your production capability? Please elaborate.	I would say we are capable basing on the fact that we are still in business supplying some of the complex components in the industry. But I'm also concerned like everyone else that some of those components are manufactured at very high loss rates compared to the market.	We generally have higher loss rates than others and with the customer tightening on price is difficult to build your high loss rate into your price. I believe capability is the ability to do something within set parameters and I therefore think we are doing it even if we don't meet all the parameters.
	What is the level of skill within your workforce? (both education and experience)	We have a wide variety of skills within the business. We have qualified engineers, artisans and technicians. The majority of our workforces even with those with educational qualification just have their first line degrees but what carries them through is experiential knowledge. Due to glass being a delicate product and difficult to manufacture high levels of experience is required in successfully manufacturing products.	We value experience in the automotive industry but more especially in the glass industry, as that sets you above others. Especially when we do product development no amount of education is going to assist you to get the product right, is the experience of knowing which parameters make the hot glass behave in which way, which you can only get through experience.
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	We continuously have projects running, some from our meetings and some from the suggestion scheme with the aim of reducing costs and improving quality.	We offer both internal and external training. For more general skills and more general knowledge we source outside training for support but we also offer internal on

		The major one was the introduction of robots in the loading and offloading area to reduce handling defects.	the job training especially when new methods are introduced or when changes to systems and products are made to ensure that knowledge is enhanced to support production.
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	As mentioned earlier we have upgraded the loading and offloading process from manual to robots, this assisted in reducing handling defects. The major equipments, which are furnaces have not been upgraded but are refurbished every five years to ensure that they can still handle the heat generated inside.	We have enlisted technical support though a licensing agreement with companies in Europe and Japan, also glass manufacturers to assist in setting up more complex glasses but also to assist in complex technical challenges that we battle with. This service is rarely used where a person has to come to SA to assist, majority of the time we discuss telephonically and end up succeeding.
	How do you fund new technology? External support, reinvestment etc. How do you intend to get off the funding source?	For machinery upgrades it will have to be from recapitalisation and loans and for tools and trials the customers are billed and normally pay for them and improvements I believe is from the savings achieved	. There are government incentives to reimburse a certain percentage of the qualifying assets.
	What external support does the business get? and from who?	Government provides incentives for qualifying assets as I said above, they also have an export incentive called APDP replacing the old MIDP to incentivise for export volumes.	We also get training and continuous improvement programs support from the AIDC and get industry statistics from NAACAM and other industry bodies. We also access training funds from the SETA (Sector education training authority) to fund some of the training that we do.
	How much revenue is attributed to in-house development and training.	I would say almost all of it. In-house training is on the job training and there is no outside training that will make you ready for automotive glass manufacture, you need to have gone through proper in-house on the job training to succeed.	

	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up.	I think we are behind, glass factories around the world are high tech and achieve better yields than we do. But with the introduction of the robots on both loading and offloading we are moving in the right direction and think with continuous investment we will get there.	The level of advancement I believe is also linked to volumes produced and I think for the amount of work we currently have the capacity is fine even if achieving complexity will remain a challenge.

RESEARCH INTERVIEW GUIDE FIRMS

ARCHIVE NO. 010

SITE: Ga-Rankuwa

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Ephraim Moagi

DATE: 21/01/2015

START TIME: 13:00 pm

END TIME: 14:05 pm

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the business and what your role is in the business?
We are in the business of manufacturing automotive glasses, ranging from windscreens, side glasses and rear glasses. I am a production manager in charge of the production of tampered glasses, side and rear glasses. In my day to day work I manage the production personnel and equipment to ensure that the targets set for production are achieved at the required quality standard and at the expected cost. Our customers demand high quality standard and I therefore ensure that their expectations are met by our products.

Theme from Framework	***Questions***	***Field Notes***	***Field notes Cont.***
Do you have an innovative organisation?	Have you had any purposeful change in new products, services or processes? Why? What drives it? and who participates?	We have not lately changed any of our processes but continuously introduce new products as OEM's introduce new models. New products are designed and controlled by the customers and we are required to assess feasibility and quote on them.	We also continuously do improvements to our processes with the aim of either improving quality or reducing costs. Processes improvements are triggered by quality or costs challenges associated with certain products. We have a team of highly qualified technicians that monitor

			challenging parts and work on the process to improve them.
Search: How do you find opportunities for innovation?	How do you gather and select ideas for change or improvement? Who participates?	We have two ways of gathering ideas. First is at management level we sit in weekly technical meetings and discuss challenges encountered on the parts manufactured the previous week and share ideas on how they will be tackled the next time they are back in production. If there any preparations required the technical team ensures that those additional preparations are done before the part is run again. The second way is for everyone else including shopfloor employees which use a suggestion scheme.	Suggestion boxes are located at almost every section and along all isles to the toilet, canteen everywhere. They are not hard to find and are very accessible. Suggestion boxes are emptied weekly and a team sit together to evaluate the suggestions. The feasible once are then taken and presented in the weekly technical meeting where then they will be allocated to certain individuals for implementation.
Implement: How are we going to make it happen?	How do you go about implementing selected ideas? How do you monitor, support and measure success?	Accepted suggestions are given to technical personnel for implementation. Any costs incurred are covered by the production budget as the benefits will also accumulate to production. All suggestions are then logged on a project chart and progress reported weekly.	After implementation the changes are monitored to assess their impact. If the changes suggested are major and require capital investment, a cost benefit analysis is done to be able to justify the capital expenditure to the executive.
Technological Capability	How would you describe your production capability? Please elaborate.	I would say we are capable, even if on some components we run high levels of rejects due to inconsistency. The trend of the new auto glasses is increased complexity and tightened quality standards, which is continually becoming a problem for our ageing equipment.	All our furnaces have been with us for over 15 years even if we try and refurbish them every 5 years. The area that I believe we are world class in is the material handling between processes, which in the past couple of years have been automated to reduce human touch as far as possible.
	What is the level of skill within your workforce? (both education and	We employ highly qualified and experienced artisans,	Glass manufacturing skill improves with time and the highly experienced

	experience)	technicians and engineers. We blend them together to get a good mix of educational background and experience. Majority of our core personnel have been with the company for an average of over 10 years and therefore understand glass manufacturing well..	guys irrespective of the educational qualification offer the best workforce Experience therefore plays a major role in the successful setting of machines to achieve quality products. The quality of the product can be affected by many factors and therefore an inexperienced setter or operator will battle.
	What have you done lately to improve quality and reduce costs?, what training is offered? when ongoing or at start?	In the past couple of years we engaged in an exercise to introduce automatic robots at both the loading and offloading section. This was due to the high amount of scratches we were encountering with manual loading, which increased our reject rate. With the introduction of these robots rejects based on scratches at the loading and offloading were reduced to under 1% from just over 4%.	Internal on the job training is done continuously by process technicians to operators and other shop floor personnel. We also offer external training especially for new skills for technician and maintenance personnel. We also fund educational studies to deserving high performing personnel for them to further their studies.
	Have you upgraded your equipment lately and why? Where is it sourced and how e.g. turnkey, licensing, adaptation etc)	All our equipments are old and have not been replaced lately. As I mentioned our furnaces are refurbished every five years to rebuild the bricks inside to continue to resist high temperatures.	We have a technical agreement with a company in Europe to assist in advice on new technologies and assist with challenges especially on new complex parts.
	How do you fund new technology? External support, reinvestment etc. How do you intend to get off the funding source?	The funding is mostly from reinvestments and also we make use of the government grants provided to recoup some of the expenditures.	
	What external support does the business get? and from who?	We get support from government with the reimbursement on some of the qualifying investments and on the APDP rebates for all our export components.	We also sometimes receive money for training from the skills fund for qualifying training courses.
	How much revenue is attributed to in-house development and training.	I would say close to 90%, as the majority of the skills acquired especially experiential	

		skills are acquired internally and those are the once that contribute more to our production success.	
	How do you think you fair in technological advancement compared to your industry peers? why How do you plan to catch up.	I think we are far behind but we are managing with what we have. I say this because we have lost a lot of business from local OEM's due to being unable to meet the cost structure and sometimes even the quality and complexity requirements that they have. But they are successfully importing those glasses and using them locally in their production process.	The only way to catch up is to move to the high tech equipment that they use that can manufacture very high volumes with complex parts and therefore able to mitigate their costs and therefore becoming competitive. But it obviously requires large capital investments, which is not easily available.

RESEARCH INTERVIEW GUIDE INDUSTRY EXPERT

ARCHIVE NO. 0011

SITE: Automotive Supplier Park (ASP), Rosslyn

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Prof. Jasper Steyn

DATE: 05/02/2015

START TIME: 14:30 pm

END TIME: 15:45 pm

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the organisation and what your role is in the organisation?
AIDC is a Government development agency and its main aim is to develop the component industry and the automotive industry in general. With most offering directed at component industry (Offer competitive improvement by industrial engineering intervention and best practices, development of people working in the automotive industry, by way of learnerships) and have developed the Gauteng automotive learning centre in association with Nissan and University of Pretoria. It also introduced incubation centers at Ford for small black owned businesses under the mentorship of IE's of the AIDC to supply online to Ford. Seven (7) mini factories run by entrepreneurs taught by the AIDC (Former Ford employees and a new incubate just been put through that is not from Ford).

My role is a Specialist function of the AIDC that support the DTI on the investment incentive part of the MIDP, productive asset allowance to both OEM's and component manufacturers to the value of 20% of the qualifying assets spread over 5 years with 4% per year. OEM's also qualify but not cash

but duty rebates. Under APDP this has turned into a cash grant instead of duty rebates and can go up to 35% if some additional economic benefit criteria are met. E.g. bringing new component to SA or support for tooling company SA or employment etc. My job is to evaluate applications and claims on investment incentive program and make recommendations to the DTI on whether they qualify and to what extent based on the guidelines. Each claim has its own unique attributes. Process: You reply to the DTI and they will send the report to us for evaluation and recommendation. Components industry benefit by selling their rebate certificates to the OEM's for them to offset their import duties and get paid 80% of what it was worth, especially those OEM's that sell cars locally but not manufacturing locally.			
Theme from Framework	***Questions***	***Field Notes***	***Field Notes Cont.***
Technological Capability	How would you describe the general industry production capability? Please elaborate.	In my view is excellent and good standards are maintained. This is because we are exporting vehicles and components to very difficult fastidious markets like Japan and USA. The Mercedes plant in East London has won the JD power award (they do surveys on consumer acceptance of quality of vehicles build in other countries from the USA) for several years in succession for being the best Mercedes-Benz plant supplying the USA even bettering the plants in Germany and you don't get that unless your industry is very good.	For BMW and Mercedes it is strategic to supply USA from the SA plant due to the AGOA (African growth opportunity act), which SA benefits from and allows duty free or very low duty for products build in Africa. Quality standards are maintained equally by all plants and the JD power award is able to differentiate the quality because of their knowledge but the consumers do not know that and therefore preference of SA build cars is only due to rebates.
	How would you describe the level of skill within the workforce in the industry?	Skill is good and I believe it has to be to deliver the standards required. SA has a major focus on it and that is one of the reasons the AIDC was established to ensure that the skill level in the industry is accelerated and remains one of its most important interventions. Vehicle manufacturing is classified as advanced manufacturing. There is a shortage of high level skill not only in SA but globally, especially management skills due to its fast changing nature	This measured by the number of vehicles per worker. This information would be contained in some of the presentations made at the SA automotive week. The quality of the product is good but they slow down the production line to maintain the quality. More research is required to find the reason for low productivity but I think the level of education in SA component industry worker is found to be much lower than those in India and China. (comparison paper by

		and requires global level quality and therefore ideal environment for management because you get stretched to operate at global level proficiency. That said, the productivity of the SA worker compared to the same worker in other countries we lack behind.	Steyn, Liebenberg and Chan, Picmat). The skill spread in SA based on history is that the older generations have a lot of experience and less education and the younger generation is more educated and sharper but not as experienced.
	What has the industry collaborated on to improve quality and reduce costs?	In KZN there is a benchmarking club, which is now being established in other areas and is run by BM analysts led by Dr. Justin Buns and they collaborate and compare quality and cost effectiveness in the component industry. The other initiatives run by NAACAM and NAAMSA together, which one of them is ASCI (Automotive Supply chain competitive initiative in collaboration with AIDC and the DTI.	Partially funded by the DTI and the industry. With the objective of looking at opportunities to broaden the supply chain.
	How do you think the ACM industry fair in technological advancement compared to their industry peers internationally? why	The industry is a follower relating to the education levels but is a capable follower based on exponential skills capability. If you compare the extent of international knowledge exchange is much higher than other countries we benchmark against China and India. They benefit from their own employees level of education and therefore technological capability and SA does not have those linkages. SA companies via the multinationals have to source technology from other countries either by license or you get a subsidiary of a	The study that I did we looked at a definition of innovation broadly as, New products and services, New processes, New Logistics and New international ways of management and relations. SA companies perform well away from new products and services, a little on new processes as they are tied to the products and well on logistics because of challenges with distance from the suppliers and customers in international markets. Do well in international relations due to sources of knowledge and technology being international and to which they are dependant. There

		multinational that is required to setup in SA. OEM's in SA don't do any technological development here so they can be advanced, there are some component manufacturers that do advanced technology work but are very few.SA companies are manufacturers not innovators of new products.	is an intention in the market to change the business model to new product development but is not preferred by OEM's. They have tried on investing in new products locally but the return on both effort and investment was disappointing. There are different ways of acquiring technology and I suppose is due to the culture and I think based on the way of procurement. the Americans will run a tender system to get a product and judge on the offer, the Japanese build relationships with suppliers and use their engineers to help the suppliers and the Germans are more of who they know based on the trust that you know someone and that why they will trade with a small company or even an individual as long as they know him and trust him. Compared to SA where the trust is nonexistent and mistrust is very high.
	What support do you provide to the industry to ensure their sustainability and why?	The APDP is the biggest government support that government provide compared to any other industry in the country. The budget is the highest of any other industry. The investment incentive is about 10% and the operational support is the real big one. But this comes in the form of production rebate certificates and not cash, which can be used to import components or vehicles duty free.	This indicates that duty is a big thing in this industry. Rebate values: 25% on vehicles and 20% on components. The investment incentive was increased for component manufacturers as part of the AIS revision from 20% to a baseline of 25%, which can increase up to 35% if the additional economic benefits are met.
	What is the state of the ACM Industry in SA?	The industry is growing but is not growing	The governments and individuals tried and were

	Growth, Skill, technology etc.	according to the targets that were set. The target was to build 1.2 million vehicles by 2020 set in 2007 before the economic meltdown and now we are 5 years away from 2020 and the agreement is that it will not be met. This was based on increasing the number of OEM's from the current 7 in the country to over 10. The current belief is that they will only reach 800 000. I believe we are okay we actually do not need more OEM's but more component manufacturers, which will have better benefit for the country and good value for money for the SA tax payer. It is the responsibility of the OEM's to attract new components manufacturers in a country.	unsuccessful both here in SA and Australia. Because of the nature of the industry, SA OEM's have to justify their appointment of local component manufacturers to their headquarters overseas and are aware that if you appoint an incapable supplier for whatever reason your job will be on the line. This causes reluctance in the OEM's to try. But government also have their hands tight as they are the member of the WTO and therefore cannot incentivise exports, your allowed to do supply side incentive not demand side incentive especially not differential demand side and that is why the APDP is not related to exports.

RESEARCH INTERVIEW GUIDE INDUSTRY EXPERT

ARCHIVE NO. 0012

SITE: Kaymac House, Isandovale

INTERVIEWER: Mokiri Mangwale

INTERVIEWEE: Robert Houdet

DATE: 02/02/2015

START TIME: 12:15 am

END TIME: 13:10 am

Do you consent freely to participate in this tape-recorded interview? Yes
Tell us briefly about the organisation and what your role is in the organisation?
Please check Directory no. 7 of 2013 page 03,NAACAM is an association of component manufacturers, it has 60 national member companies with objective of lobbying for our members and protects the interest of the industry in general.

Research and development does not happen in SA, because is very expensive, more than half of our members are subsidiaries of multinationals. They get the technology from the mother companies. The OEMs are the once recruiting international companies to setup in SA to supply them. The majority of the components that are manufactured locally are always logistics unfriendly components, like seats, which are very expensive to ship from overseas and are variable and are last minute fitments. The other half of the membership companies get technology by paying royalties.

Theme from Framework	***Questions***	***Field Notes***	***Field Notes Cont.***
Search: How do you find opportunities for innovation?	Do they ever request your input in their change processes? Why?	They pay for the input, we hold meetings to update them on the industry. The new initiative is the introduction of an automotive ombudsman to resolve friction within the industry. But majority of what they get is representation in government initiatives and information and statistics on the industry.	
Technological Capability	How would you describe the general industry production capability? Please elaborate.	Page 25 of our directory, total production 654000 half of it is export. Half the vehicles manufactured locally are exported and therefore the capability is as good as anybody else. Quality is a given in the automotive industry. Component manufacturers are allowed 15 parts per million (ppm), our products go to Russia at -30 degrees and also cope with +40 degrees in SA this shows the level of quality. 15 ppm looked impossible when it was introduced but now it looks like zero is achievable. This is because the industry does not fight defects is considered too late when a defect happens, the industry work on the risk of a defect not the defect itself, which helps prevent a defect before it happens.	There is a technology that a guy developed in SA, where a counter is installed on your production machines and processes and notifies the supervisors and managers about the underperformance and they can attend to the issue right there and there instead of waiting for the report at the end of the shift. Thereby being proactive by reacting to warning signals, check page 4 Mr. Eric Hudson on process improvement. We are working with NW university on a spark plug (ignition code) that can give a regulated spark, the intensity and duration of the spark can be regulated or fine tuned to get better consumption and get better energy from the spark and less bad gases. through the exhaust.

	How would you describe the level of skill within the workforce in the industry?	The skill is as good as anywhere in the world. The machines, processes and technology are developed overseas and shipped to SA and training happens to get the skills level to a point where the machines and processes can be used productively. AIDC, MERSETA, JAPANESE, UN and ASCI fund training or raise funds on behalf of the industry specifically for training.	The DTI has a very efficient automotive desk that is very good in interacting with the industry to find solutions and support initiatives.
	What has the industry collaborated on to improve quality and reduce costs?	NAACAM has initiatives to assist bad performing companies. A nonprofit company was setup called ASCCI (Automotive supply chain competitiveness initiative). With ASCCI we drive an initiative to improve, get consultants to visit struggling companies to assist and support AIDC to go do TPM (Total preventative maintenance) courses in member companies. APDP is where the stakeholders came together to assist the industry to make it more competitive.	The Australian automotive industry is dying due to government withdrawing its subsidies and the OEMs started leaving and the industry will close down completely in less than a year. The APDP gives rebates certificate to offset import duties on vehicles. The component manufacturer benefit in two ways, one, is to get the rebate certificates from their exports and sell them on the market or two, the components manufacturers allow the OEM to claim the rebates and they negotiate a better price, which make the industry competitive.
	How do you think the ACM industry fair in technological advancement compared to their industry peers internationally? why	The technology is the same, the vehicle manufactured in SA is for international market and they don't expect second had quality. The technology is not the same but just as good. NAACAM is in the process of recruiting overseas component manufacturers to setup in SA for local supply and export in return for a high shareholding and partnership with local	Local content is 40% at the moment but the APDP is there to assist or induce the OEMs to localise even more. The big problem is that due to the small volumes in the SA market it is difficult to amortise the tools and that is why the AIS was introduced to support those efforts. 20 to 30% grant. In the new APDP proposal we are proposing a 75% grant just for tooling so we can

		companies. Currently 18 million cars are made globally and SA only make 600 000, which is very little. When recruiting overseas component manufacturers we are not only interested in the technology but the export markets as well.	make more tools in SA. The tooling association of SA makes 50% of the tools for the automotive industry. 90% of capability has disappeared due to poor investment in training and skills development. TASA is currently highly subsidised to rekindle the tooling sector and recruit young students to enter the industry. But it takes 6 to 10 years of learning to be a very good tool maker and therefore not very attractive to the young generation.
	What support do you provide to the industry to ensure their sustainability and why?	ASCCI provides funding for the consultants that are send in the member companies to assist in improvements. The selection is done through a tender process by ASCCI. ASCCI collects funds from all sources. The OEMs are the once recommending the companies that needs assistance and ask ASCCI to intervene with training and consulting support. When we support the company we follow through until the process is complete and ensure that it has an impact on the shopfloor and the bottom lines	. I believe and encourage companies to consult with their shopfloor employees to get input on improvements based on experience. In India they use a system called clustering and they get other companies within the cluster to audit each other and share knowledge and that is how they improve. This is done on all sections of the business.
	What is the state of the ACM Industry in SA? Growth, Skill, technology etc.	The industry is growing but not at the rate that we envisaged. We were projecting to manufacture 1.2 million cars by 2020, which is a pipe dream.	I think we won't even reach 800 000, but from the component industry we are looking at supplying 1.2 million vehicle components equivalent, this can be done by finding export market.