INTERNAL INNOVATIVE CAPABILITY AND SUSTAINABLE COMPETITIVE ADVANTAGE IN THE SOUTH AFRICAN AUTOMOBILE MANUFACTURING INDUSTRY

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DECLARATION

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I, Kopano Matšaseng, declare that this thesis hereby submitted for the PhD in Business Administration at UFS Business School is an independent work of my own, and the work has not been previously submitted, either as a whole or in part, for a qualification at another university or at another faculty at this university. I also hereby cede the copyright to the University of the Free State.

KMatsaseng

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Kopano Matsaseng *Date*

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DEDICATION

My father who did not get to finish his teaching diploma because of the closure in 1955 of the Modderpoort Teachers College due to the restrictions introduced by the Bantu Education Act of 1953 and the Apartheid government forcing him to self-exile in Lesotho. To my mother who has been a pillar of support to me and my siblings for raising us to be strong, dedicated and fearless in life. She also was a brilliant mathematics student but could not finish her teaching diploma because of life demands and raising a family.

ABSTRACT

The automobile manufacturing industry in South Africa is dominated by multinational original equipment manufacturers (OEMs) that restrict their ability to be innovative in product design and development. Given, the global nature of the industry, the local manufacturers need to stay competitive to be sustainable. The solutions that focus on efficiency and external challenges have not been adequate to assist the industry to stay competitive. Hence, this study is investigating the influence of internal innovative capability on sustainable competitive advantage in the South African vehicle manufacturing industry.

This study has followed an exploratory, descriptive, and explanatory research methods to identify 11 dimensions of innovative capability and 5 dimensions of sustainable competitive advantage. The secondary data analysis has shown that process innovation activities were important in the industry while exploratory factor analysis (EFA) showed that these dimensions are important sources of variation in innovative capability and sustainable competitive advantage. Pearson correlation analysis showed that innovative capability is relatively associated with 3 dependent variables, instead of 5. Regression analysis showed that the majority of estimated coefficients of the independent variables were insignificant, but the F-statistics was significant for 3 out of 5 regression equations and 4 models had an R-squared approximately greater than 50%.

Lastly, the qualitative results revealed four themes that relate to the two main concepts of the study. The results have shown that there are five factors that play a role in the development of innovative capabilities. The implementation of innovative capabilities requires five distinct approaches. On the other hand, the creation of sustainable competitive advantage (i.e., value) through resources is based four factors and lastly, the maintenance of the unique value proposition is possible through five distinct measures.

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LIST OF ABBREVIATIONS AND ACRONYMS

AEU	**Advanced Engineering Units**
AIEC	Automotive Industry Export Council
APDP	Automotive Production Development Programme
BRV	Brandt Radical Vehicles
CRM	Customer relationship management
CMV	Common Method Variance
EEV	Energy efficient vehicles
EI	Environmental innovativeness
GDP	Gross domestic product
GFC	Great financial crisis
HSRC	Human Sciences Research Council
IC	Innovative capability
ICT	Information, communication and technology
IE	Innovative edge
IO	Industrial organisation
IPAP	Industrial development action plan
KBV	Knowledge-based view
KMI	Knowledge management innovativeness
KMO	Kaiser-Meyer-Olkin
KPC	Knowledge Creation Process
MBSA	Mercedes-Benz South Africa
MNC	Multinational corporation
MNE	Multinational enterprise
NAACAM	National Association of Automotive Component and Allied Manufacturers
NAAMSA	National Association of Automobile Manufacturers of South Africa
OECD	Organisation of Economic Corporation and Development
OEMs	Original equipment manufacturers
OES	Original equipment suppliers
PDI	Product development innovativeness

PLS	Partial Least Squares
PrcI	Process innovativeness
RBT	Resource-based theory
RBV	Resource-based view
SA	South Africa
SAAM	South African Automotive Masterplan
SCA	Sustainable competitive advantage
SECI	Socialization, Externalization, Combination, and Internalization
SME	Small and Medium Enterprises
SOP	Standard operating procedures
SPSS	Statistical Package for Social Sciences
SUV	Sport utility vehicles
SWT	Strength of weak ties
TMSA	Toyota Motors South Africa
UFS	University of Free State
VRIO	Value, rare, inimitable and organisational
VW	Volkswagen
VWMSA	Volkswagen Motors South Africa

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The global automobile industry is undergoing a significant shift because of the changes in the environment, technology, consumer needs and other socio-economic factors. The changes in technology are happening in four areas, namely, “diverse mobility, autonomous driving, electrification, and connectivity” (McKinsey 2016:3). On the other side, the requirements for sustainability requires OEMs to produce environmentally friendly products. All these factors have an impact on the industry’s ability to produce relevant products and to stay competitive over the long run in the industry.

New technologies bring about quicker production times and addition of sophisticated features to the vehicles. In addition, this industry is important for skills transfer as it is a technology taker and is globally integrated with an export-oriented strategy (NL, 2019 personal communication, 28 August).

However, in South Africa, the sector fails to compete in the global market. The main reason is because the local content of 35% in the vehicles produced in South Africa is half of what is deemed adequate for the sector to be globally competitive (Naudé & Badenhorst-Weiss, 2011:71). The four main challenges that impede the sector’s competitiveness include access to markets, lack of global competitiveness in the local supply chain, skills and training and lack of competitive supply chains (Meyer, 2015:2). Other factors ranging from currency volatility, electricity and raw materials supply shortages, competition from cheap imports to increasing costs of labour and production in general as well as lack of funding have been suggested as the causes of the decline in the overall manufacturing industry (The Manufacturing Circle, 2015:15). In the meantime, the Department of Trade and Industry (DTI) has developed an Industrial Development Action Plan (IPAP) to assist the broader industry as well the Automotive Production and Development Plan (APDP) to support the motor manufacturing sector. The initiatives are aimed at making the industry more competitive, generate export earnings and create employment (RSA DTI, 2013:80).

Given the challenges brought by the great financial crisis (GFC) of 2008 and a generally weak domestic economy, the sector has faced lower domestic demand and competition from imports. This has led to the development of the South African Automotive Masterplan (SAAM) with the aim of guiding and building capacity within the automotive supply chain and make the industry globally competitive (Barnes, Black, Comrie & Hartogh 2018:6).

In addition, according to the McKinsey Global Institute (2015:8), the sector has the potential to contribute to a renaissance in manufacturing by focusing more on innovation and entrepreneurship. This study aims to investigate the ability of the South Africa motor vehicle manufacturing sector to create value through internal innovation. Innovation is concerned with the creation of new products, entering new markets, adapting new production techniques and discovery of new sources of raw material (Tidd & Bessant 2012:15).

1.2 CONTEXTUAL BACKGROUND

The South African manufacturing industry has evolved over time from being a closed and protected sector to being more open since the new political dispensation began in 1994. While manufacturing activity grew in leaps and bounds in the earlier years thereafter, this did not last. The overall contribution of the industry declined from 19% in 1993 to 13.7% in 2022 (Statistics South Africa [STATSSA] 2022:1).

In addition, the industry was not spared from the aftermath of the 2008-2009 global financial crisis. According to STATSSA (2016:1), the industry declined by 10.6% in 2009 leading to a loss in GDP contributions of approximately R19 billion at 2010 constant prices. The motor manufacturing sector also lost more than 2 500 jobs during the crisis (Ambe 2012:6).

The motor vehicle manufacturing industry has experienced declines in its contribution to overall manufacturing over the years. Figure 1.1 below compares total motor manufacturing production to constituent activities. In 2011, the motor vehicle manufacturing production was the highest at 12.8% but fell slightly in 2012 to 10.1 percent. However, in 2013, the motor vehicle production fell markedly to 0.3% and rose marginal to 3,2% in 2014. Accordingly, the motor manufacturing sector still produces at lower levels than those seen in the previous years.

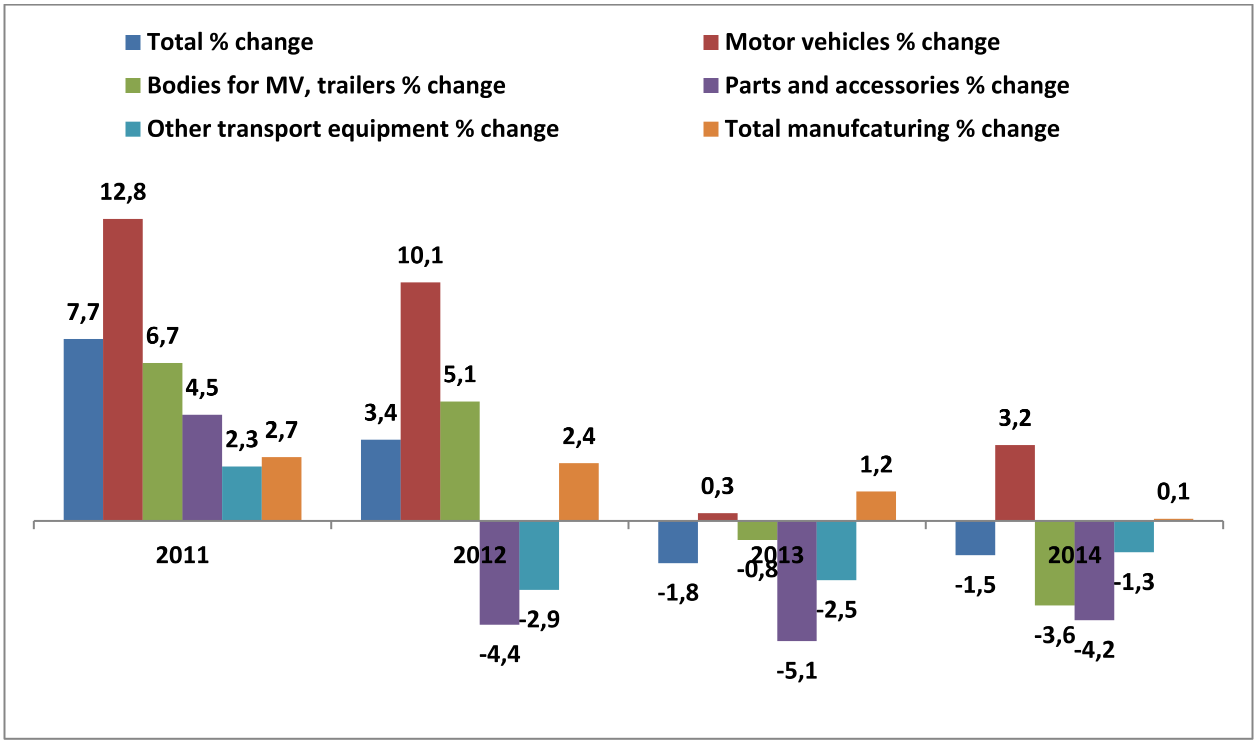

Figure 1.1: Growth rates of physical volume of motor manufacturing production

Source: adapted from Statistics South Africa (2010-2015).

The liberalisation of the South Africa economy has led to a decline in the manufacturing output because of strong competition from cheaper imports from East Asia. Consequently, there is an urgent need for the South African economy to be revived by a renewed strategy that integrates the internal strength and capabilities that have been built over time in order for the sector to become competitive. This study proposes that the motor manufacturing sector would be a good starting point for this revival because the sector’s survival depends on constant reinvention to survive and stay competitive. The need to reinvent is driven by various factors like emissions regulations, safety and performance. Hence an examination of the sectors’ internal capability to innovate is warranted.

The South African OEMs are in the Eastern Cape, Gauteng and KwaZulu Natal provinces of the country. The Eastern Cape province OEMs includes Volkswagen Group South Africa, Mercedes-Benz South Africa, Isuzu Motors Southern Africa and Ford Motor Company of Southern Africa engine plant and contributed 38.1% to total light vehicle production segment in 2021 (Automotive Industry Export Council [AEIC] 2022:30). In Gauteng, the sector is represented by Bavarian Motor Works (BMW) South Africa, Nissan South Africa and Ford Motor Company of Southern Africa and has contributed 33.8% to total light vehicle production segment in 2021 (AEIC 2022:30). Lastly, the KwaZulu Natal province is home to Toyota South Africa Motors which contributed 28.1% to total light vehicle production segment in the same year (AEIC 2022:29). According to the AEIC (2022:6), the motor vehicle production sector contributed 4.3% to Gross Domestic Product (GDP) and represented 17.3% of total manufacturing in 2021.

On the other hand, there are few independent local automobile manufacturing companies found in Free State and Gauteng provinces. The Brandt BRV is located in Bloemfontein in the Free State province and started its production of light commercial vehicles (i.e., bakkies) in 2002 (De Vos 2020:1). The Green Scooter produces electric tricycles use in the delivery of passengers and cargo, respectively and is located in Sandton in the Gauteng province (Akabor 2022:1). Mellow Vans manufactures electric scooters for delivery only and is located in Stellenbosch in the Western Cape province (Venter, 2020b:1). And lastly, Mureza Auto Company is a new manufacturer of affordable passenger vehicles located in Cosmo City in the Gauteng province (De Vos 2021:1). The electric scooters have been considered for the research as they form part of the transport equipment manufacturing category found in the international standard of industrial classification (ISIC) revised version 4 of 2008. They serve a purpose similar to automobiles and are fitted with a motor that propels an engine. ISIC provides a detailed categorisation of economic activities for any given country (United Nations 2008:10).

This means that the sector is the most important contributor to the South African economy.

Based on the above background issues, it is evident that there is a need to identify the dimensions of innovative capability and sustainable competitive advantage (SCA) in the

South African motor manufacturing industry. Harmonisation of SCA with innovative capability is most likely to result in improved performance (i.e., profit) and increased market share in the long run.

1.3 RESEARCH PROBLEM

1.3.1 Problem Statement

Although OEMs in South Africa are multinational corporations and are restricted in terms of product specifications, they holistically need to stay competitive to be sustainable. Opinions on lack of competitiveness focus largely on external challenges rather than internal opportunities in the automotive manufacturing sector. This leads to solutions that argue for efficiency rather than innovation. Previous research has identified a weak exchange rate, high labour costs, external competition, and inaccessible markets as constraints in the competitive development of the sector (Ambe & Badenhorst-Weiss 2011:71). Some of the solutions offered often include various policy incentives, cost containment measures and infrastructure development, to mention a few. However, such initiatives have not yielded the desired results.

OEMs need also to focus on internal strengths that are within the control of the automotive manufacturers as this may offer more insight into issues and factors that are responsible for a company's real competitive advantage. The dynamic capabilities found inside firms' top management and their teams, (i.e., inimitable and built internally over time) also tend to be important factors that can lead to SCA. It is thus important to investigate the internal ability of a firm to improve its position in a rapidly changing business environment to lead the business to an SCA.

1.3.2 Research Questions

The following are the main research questions.

1. What key internal innovative capabilities exist in the automobile manufacturing sector?
2. What key factors of SCA are applicable to the South African automobile manufacturing industry?
3. What key internal innovative capabilities are associated with SCA?

4. Do the internal innovative capabilities in the automobile manufacturing industry lead to SCA?

1.4 RESEARCH OBJECTIVES

The objectives of the study are listed below.

1.4.1 Primary Objective

The primary objective of the study is to investigate how internal innovative capabilities can play a role in fostering SCA in the South African motor vehicle manufacturing sector.

The following secondary objectives are important.

1.4.2 Secondary Objectives

- To examine the role of innovative activities in the motor vehicle manufacturing sector.
- To examine the impact of innovative activities on the South African motor manufacturing sector.
- To identify the key internal capabilities that impact on the innovativeness in the South African motor manufacturing sector.
- To identify the key internal innovative capabilities that impact on the SCA in the South African motor manufacturing sector.
- To investigate the relationship between internal innovative capabilities and SCA in SA motor vehicle manufacturing.
- To recommend the best innovative strategies for OEMs to stay sustainable and competitive.

1.5 PRELIMINARY LITERATURE REVIEW

This section provides a short overview on innovation as part of dynamic capability constructs and its link with SCA found in the literature.

1.5.1 Defining Dynamic Capabilities

Dynamic capabilities (DCs) are those abilities found within an establishment that allow a firm to develop, extend and change its various forms of assets (Douma & Schreuder

2013:215). In addition, DCs enable superior performance against rivals and facilitate the flexibility to embrace changes in technology, consumer tastes and the general business environment (Teece 2010:190; Teece 2014b:328).

This implies that DCs are based on both internal and external contexts directly related to the firm (Douma & Schreuder 2013:219). According to Teece (2014b:339), the internal context is characterised by "co-specialisation, asset orchestration, tacit knowledge, firm specificity and isolating mechanisms". On the other hand, the external context is influenced by technical fitness, sufficient market demand and competitiveness (Douma & Schreuder 2013:282-283).

The internal factors lead to superior firm performance because they are valuable (V), rare (R), inimitable (I) and non-substitutable (N) (i.e., valuable, rare, imperfectly imitable and non-substitutability (VRIN) – framework) while the external factors determine evolutionary fitness of the business' dynamic capabilities (Douma & Schreuder 2013:228; Lin & Wu 2014:408). Evolutionary fitness is defined as the ability to survive and grow in unstable and unfavourable business conditions (Douma & Schreuder 2013:282). Hence, both internal and external factors offer opportunities to develop SCA in the dynamic business environment.

While dynamic capabilities are said to offer SCA, much of the empirical work on the subject has been criticised for not being able to identify standard component factors that are generalisable and offer practical insights to managers in decision-making (Peteraf, Di Stefano & Verona 2013:1389; Pisano 2015:4; Teece 2014b:329). These criticisms imply that the discipline is still in its infancy and further developments in the theory are necessary. Accordingly, Wang and Ahmed (as cited in Adeniran & Johnson 2012:4090) reviewed key studies on dynamic capabilities conducted in the period between 1995 and 2005 to identify three common characteristics that allow firms to convert various contexts into a competitive advantage. The three capabilities are "absorptive capability, adaptive capability and innovative capability". Absorptive capability refers to the firms' capacity to identify, embrace and use new information to add value (Adeniran & Johnson 2012:4090). Adaptive capability involves the ability to adjust quickly to the changing customer needs, competitors' and technological advances (Zhou & Li 2010:225). Innovative capability refers to the ability to develop novel ways of doing things (Adeniran & Johnson 2012:4090). However, Teece (2014b:343) noted that innovation capacity and evolutionary fitness are very similar, while “seizing” is important for operationalisation of resources when opportunities arise.

In addition to the three common factors identified above, other authors have argued that sensing is one of the factors that enable the development of dynamic capabilities (Teece, 2014:332). Other research work has considered the ability to “exploit network relationships” as one of the important factors that enable dynamic capabilities (Michailova & Zhan 2015:579). A high-order competency that combines all of the above elements is called “integrative capability” which involves rearrangement of processes and merging of various forms of knowledge to enhance performance (Michailova & Zhan 2015:579).

Finally, Michailova and Zhan (2015:580) also indicated that the effects of moderating factors such as motivation and head-office support on innovation capability of multinational company subsidiaries should be considered. Given the theoretical background above, Figure 1.2 summarises the DC constructs reviewed so far.

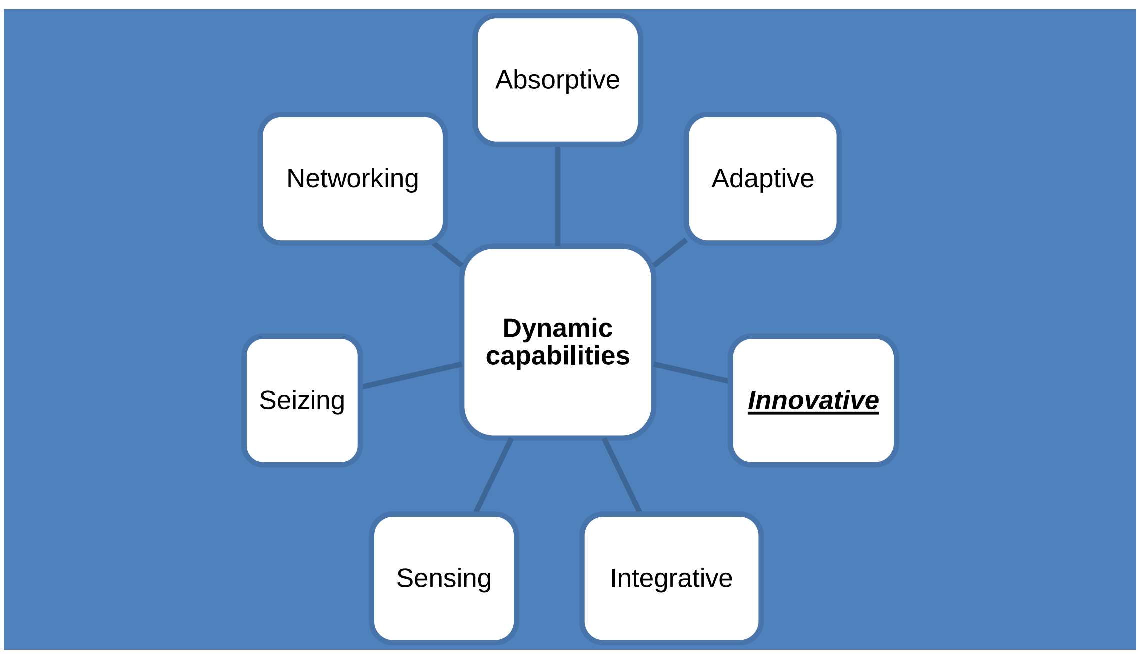

Figure 1.2: Dynamic capabilities concepts

Sources: Adapted from Teece (2014b:332); Michailova and Zhan (2015:576).

Given the above background on DCs, the next section focuses on the theoretical literature on innovation.

1.5.2 Defining Innovation

Innovation has been defined as a means through which firms are able to generate new products, new procedures and new systems as they adjust to changes in the business environment (Bhupendra & Sangle 2015:185). The motor manufacturing sector also must adapt to changes in the market brought by shifting consumer demands, changes in technology and changes in competition from new entrants. Given that various forms of innovation are identified in the literature, Tidd and Bessant (2012:16) concluded that most definitions are similar with regard to the creation and exploitation of new knowledge. However, Garcia and Calantone (2002:110) noted that it is still unclear which definitions are standard, and conceptualised innovation into three different types: radical, really new and incremental innovations.

- *Radical innovation* is associated with a new technology that leads to a new market structure and has the capacity to result in discontinuities at both macro (i.e., worldwide, industry-wide or market-wide) and micro (i.e., firm or consumer) levels (Zapata & Nieuwenhuis 2010:15). The distinguishing characteristics of radical innovations are that they create new demand not recognised before and tend to generate new markets and industries (Zapata & Nieuwenhuis 2010:15). Hence, a test for radical innovation is a simultaneous discontinuity in both technology and marketing strategies.
- *Really new innovations* are moderate in nature as they are associated with discontinuities in either the market structure or technological landscape but not both, at the broader level while full discontinuities take place at the detailed level (Tidd & Bessant 2012:29). Accordingly, this type of innovation lies in the middle ground of both “radical and incremental innovations” even though it is often confused with the former (Rogers 2003, as cited in Zapata & Nieuwenhuis 2010:15).
- *Incremental innovation* happens when a product provides “new features, benefits or improvements to existing technology” in the same market and only occurs at the micro level (Tidd & Bessant 2012:27). Hence, the impact is felt in the technological space and/or market space.

The above concepts imply a descending order of innovation in product development and are summarised in Figure 1.3.

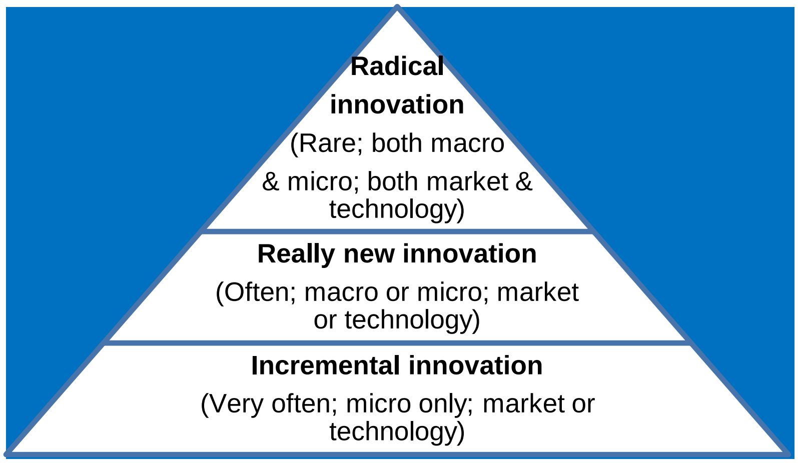

Figure 1.3: The hierarchy of innovation concepts.

Source: Adapted from Tidd and Bessant (2012); Zapata and Nieuwenhuis (2010)

This study focuses on the internal innovation within the motor vehicle manufacturing sector in general. Hence, none of the innovation concepts will be adopted as this will pre-empt the results.

As mentioned above, innovative capabilities are dynamic in nature and as such lead to a firm's competitive advantage. The next section provides a brief discussion on innovative capabilities.

1.5.3 Defining Innovative Capability

Innovative capability is one of the important DC constructs that leads to SCA. Wang and Ahmed (2004, cited in Bhupendra & Sangle 2015:185) defined innovative capabilities in terms of their focus on the formation of new products, entry into new markets, developing new processes, behavioural changes and new strategies. Using this terminology, the following innovative capabilities exist:

- *Product innovativeness* is about the uniqueness, newness and usefulness of new products as they are introduced in the market (Bhupendra & Sangle 2015:186).

Accordingly, the motor manufacturer product innovativeness requires an introduction of products that can prove to be valuable to existing consumers.

- *Market innovativeness* is concerned with the ability to use new methods when conducting market research (including advertising and promotion), entering new markets and exploiting existing markets (Bhupendra & Sangle 2015:186). Accordingly, motor vehicle manufacturing firms need to have a solid marketing plan that can attract a new set of customers.
- *Process innovativeness* refers to the ability to introduce new methods into the production, management and technological activities that lead to better production and management processes (Bhupendra & Sangle 2015:185). The example of the lean production process introduced by Toyota Motor Corporation provides a good illustration of this capability (Teece 2014b:333).
- *Behavioural innovativeness* is observed when all personnel are willing to embrace the new ways of doing things (Bhupendra & Sangle 2015:185). This implies that success in motor manufacturing can be enhanced by improved communication, teamwork and knowledge sharing.
- *Strategic innovativeness* is concerned with top management's vision about the future direction of the business achievable through an integration of existing resources (Bhupendra & Sangle 2015:186). To be successful, motor vehicle manufacturers need to be flexible and should be able to anticipate new challenges that might be imposed by competitors.

Figure 1.4 below shows the five factors responsible for innovative capabilities.

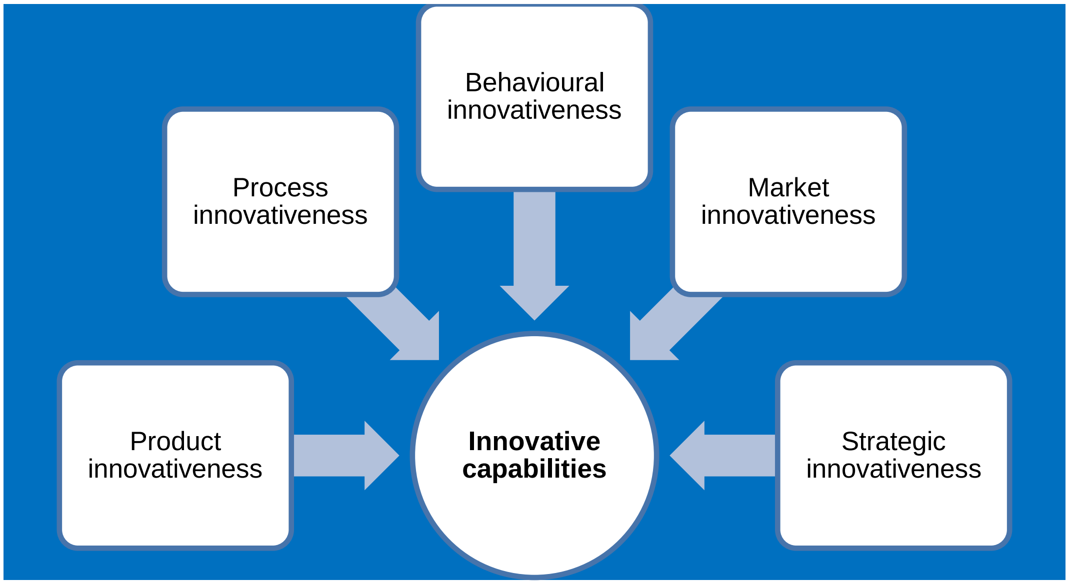

Figure 1.4: Innovative capability concepts

Source: Bhupendra and Sangle (2015:185).

The above paragraphs have presented the theoretical work on dynamic capabilities, innovations and innovative capability. The study is focused on linking innovative capabilities with SCA. Accordingly, the next topic for discussion is the resource-based-view of competitive advantage that is found in the dynamic capabilities' literature.

1.5.4 Defining Strategic Competitive Advantage

The literature on SCA is based on the seminal work of Barney (1986, cited in Maritan & Peteraf 2016:1375) that highlights the importance of VRIN framework for superior firm performance. Lin and Wu (2014:408) stated that a firm has a competitive advantage when it can implement a value-creating strategy which none of its competitors are currently employing. The competitive advantage becomes sustained if both potential and existing competitors are not able to duplicate the strategy. The sustainability aspect implies that dynamic capabilities are an important complement to the resource-based view (RBV) of competitiveness (Enriquez-de-la-o 2015:52). Accordingly, competitive advantage is achievable through "resource heterogeneity, ex-post limits to competition, imperfect resource mobility and ex-ante limits to competition" (Peteraf 1993, cited in Talaja 2012:52). This means that each firm has to meet these requirements in order to enjoy SCA in the market. The four conditions are briefly discussed below.

- *Heterogeneity of resources* refers to the fact that firms differ in the amount (type) of resources in their possession and the types of capabilities they have (Enriquez-de-la-o 2015:55). Firms can enjoy supernormal profits (Ricardian rents) because they have access to limited resources or are spatially located or through product differentiation which may allow them to restrict output. This implies that the motor manufacturing sector needs to examine the types of resources they have or their locations or products to assess if this offers them any competitive advantages.
- *Ex-post limits to competition* imply that the supernormal profits need to be protected in order to maintain the competitive advantage over the long run. This requires the presence of barriers to entry in the form of imperfect imitability and imperfect substitution (Talaja 2012:55). Imperfect imitability is caused by factors that include property rights, information differences and casual ambiguity. Casual ambiguity makes it difficult for potential competitors to know what or how to imitate because they simply do not know how they derive their efficiencies (Teece 2014b:343). Accordingly, to protect their profits in the long run, the motor vehicle manufacturers must devise strategies that will keep potential competitors at bay without violating competition law and regulations.
- *Imperfect mobility* refers to the fact that the resources are not tradable especially when they are specific to the needs of the firm and as such cannot be applied anywhere else (Teece 2014b:333). In addition, resources are immobile when used in conjunction others such that they offer more value to the firm (Teece 2014b:330). In the present study, there is a need for the motor vehicle manufacturers to have specialised and unique resource bundles to reduce competition.
- *Ex-ante limits to competition* require that there be limits to competition before the venture (Teece 2010:182). Such initiative requires perfect foresight about the likelihood of superior returns from the venture before others join in. A manufacturer who is alert to profitable opportunities is likely to remain competitive.

Accordingly, the RBV of sustainable advantage is important for motor manufacturing as it offers managers an opportunity to review, examine and evaluate internal resources and capabilities. Figure 1.5 provides a summary of the concepts.

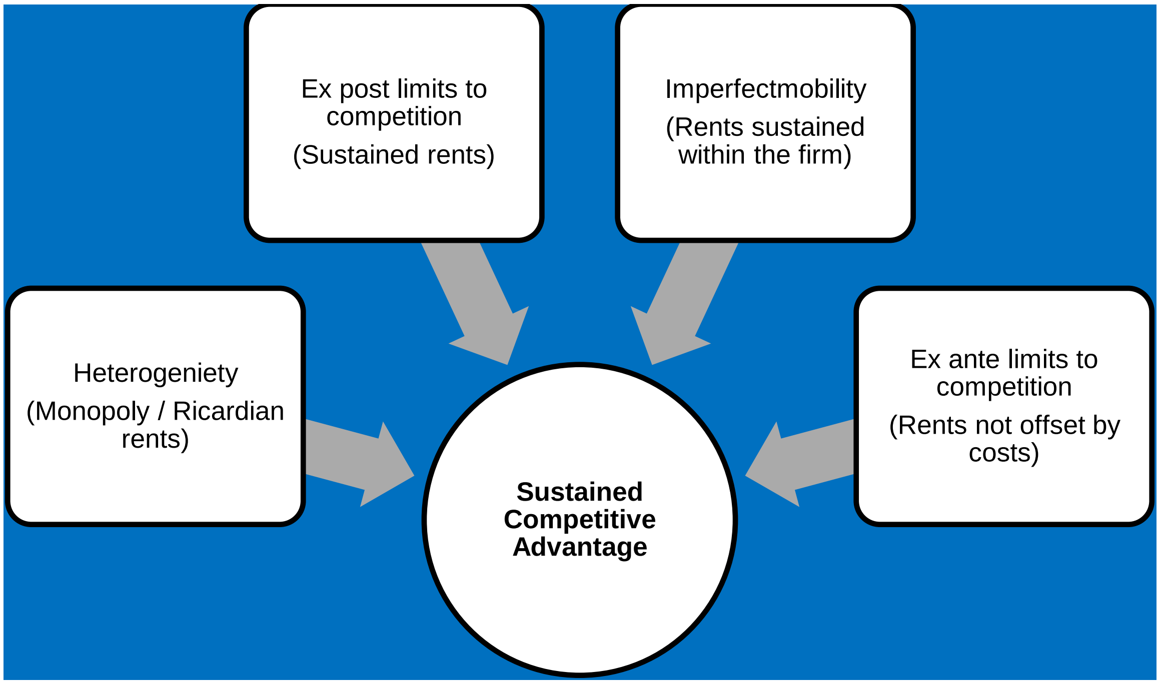

Figure 1.5: The RBV of competitive advantage

Source: Adapted from Enriquez-de-la-o (2015:55); Teece (2010:210; 2014a:179).

Given the above theoretical background, the next subsection presents a discussion of the empirical literature on the topic.

1.5.5 Innovative Capabilities and Sustainable Competitive Advantage

This study explores the presence of innovative capabilities in the motor vehicle manufacturing sector in South Africa and evaluates their link to SCA. In the literature on dynamic capabilities, the concept of innovation has been studied together with other constructs in various industries (Adeniran & Johnson 2012:4089; Sarjana 2015:42; Zhou & Li 2010:224). This study argues that such an approach might conflate the efficacy of innovation capability in the literature. However, given that the dynamic capability perspective is relatively new, there are only a few studies that have examined innovation capability across several industries (Michailova & Zhan, 2015:577).

Based on the categorisation of innovativeness presented above, Zapata and Nieuwenhuis (2010:14) evaluated the link between cleaner technology in the automotive industry and various innovation typologies. The aim was to examine the impact of emissions regulation on the various technological innovations in the motor industry of

Brazilian manufacturers. The authors argued that biofuels innovations (i.e., ethanol and hybrid) are incremental in nature because they both apply existing knowledge of the internal combustion engine (Zapata & Nieuwenhuis 2010:16). On the other hand, the introduction of alternative powertrains such as hydrogen fuel cell forms requires radical innovation because of the need to overhaul the existing manufacturing and distribution infrastructure (Zapata & Nieuwenhuis 2010:17). The implication of the observation is that emissions legislation work should be more directed towards the incremental innovation and less on radical innovation to foster research in this area as well to reduce the associated risks (Zapata & Nieuwenhuis 2010:16). The paper makes a salient point of identifying the types of innovations involved in the cleaner technologies but does not highlight how these capabilities are developed within the firms or lead to superior performance.

Maniak, Midler, Beaume and von Pechmann (2014:118) attempted to isolate the factors that are responsible for the creation of innovative features by major motor vehicle manufacturers across the world. Their aim was to examine how various forms of dynamic capabilities (i.e., exploration, integration and deployment) are created in the production process. The study followed a triangulation approach based on observation of the production processes and interviews with top management. Maniak et al. (2014:120) found that the nine car makers had developed special units called advanced engineering units (AEUs) tasked with innovation feature creation. These units coordinated their work with other functional areas to facilitate integration, routine reconfiguration and streamlining the production processes (Maniak et al. 2014:121). The study shed some light on the actual processes that underpin innovative capability creation. However, the authors did not explore the possibility of competition among these units which might be a source of competitive advantage.

Quadros and Cosoni (2009:54) studied the innovative capabilities of multinational corporations' (MNC) subsidiaries in Brazilian. The focus of the study was on the involvement or non-involvement of MNCs in fostering these capabilities. This is an important aspect as it will highlight whether subsidiaries are independent when new products are developed. Again, the paper did not follow the formal dynamic capabilities approach but concentrated on the extent to which knowledge is transferred, acquired and independently applied by the subsidiary. The study found that long-established motor vehicle assemblers have adopted a more decentralised approach which has assisted them in building product development capabilities and enhanced engineering skills in Brazil (Quadros & Cosoni 2009:72). The other less-established assemblers were still dependent on headquarters for product development and technological advancement. This meant that technological improvements in the Brazilian automobile assembly differ across the various car brands.

A more relevant paper that examined the role of innovation from the dynamic capability's perspective is that of Bhupendra and Sangle (2015:184). The authors examined the role of different types of innovative capabilities in the Indian manufacturing industries in fostering environmentally friendly strategies. Accordingly, innovative capability was represented by process, behavioural, market, product development and strategic innovativeness (Bhupendra & Sangle 2015:185). Data was gathered from management using a questionnaire to collect information about the pollution prevention, cleaner technology and the various innovation capabilities from over 150 manufacturing firms (Bhupendra & Sangle 2015:187).

Using a logistic regression, the authors tested the likelihood that certain firms did implement environmental strategies and as such had innovative capabilities. The second part of the analysis examined the relationship between the independent and dependent variables by using the Spearman rank correlation statistic. Their findings showed that innovative capabilities were associated with the firm's ability to implement the two environmentally friendly strategies (Bhupendra & Sangle 2015:191). These findings highlight the importance of process and behavioural innovativeness as internal competencies which offer firms competitive advantage. On the other hand, product development, marketing and strategic innovativeness are traits that need to be continually transformed as they depend on external influences.

The next subsection introduces the research methodology to be followed in this study.

1.6 OVERVIEW OF RESEARCH DESIGN AND METHODOLOGY

Given the overall aim of this study, the following section outlines the approaches employed to answer the research questions mentioned above.

1.6.1 Research Design

The research design was exploratory, descriptive, and explanatory (causal) in nature. The exploratory approach provided a review of the relevant literature on dynamic capabilities, innovation, innovative capabilities and SCA. The review of the literature assisted in linking dynamic capabilities with innovation and help in identifying innovative capability constructs. The literature reviews also highlighted the various strands on SCA. Lastly, the review of the empirical literature critically evaluated the link between innovative capability and SCA.

The descriptive part of the research included both a preliminary and empirical data analysis. A preliminary analysis of innovation activity was carried out using secondary data from the South African Business Innovation Survey for the periods 2008–2010, 2010–2012 and 2014–2016. The innovation survey is published by the HSRC and provided relevant background information on innovation activity within the manufacturing sector. However, the survey does not provide any specific information on motor vehicle manufacturing to the level of detail required by the study. To augment this part of the analysis a request for a detailed data was made to the HSRC where data at 2-digit standard industrial classification (SIC) was provided to the researcher. This analysis was important in answering the first research question of the presence of innovation in the sector in general.

To facilitate the second part of the descriptive analysis and answer the third research question, a quantitative design approach was followed. An initial strategy to collect data from the senior management of OEMS was cancelled because of lack of access to the companies brought by Covid-19 restrictions. A subsequent strategy to administer the questionnaire to the automobile component manufacturers and suppliers of the passenger car and light commercial motor vehicle assembly plants in South Africa also failed to provide adequate data to conduct any meaningful analysis. Hence, the last strategy involved a reworking of the structured survey questionnaire and administering it to a group of professionals from the researcher's LinkedIn network[1]. The questionnaire assisted in identifying the innovative capabilities and SCA attributes as defined above. The strength of the association between innovativeness and SCA was tested using the Pearson correlation statistic.

However, the quantitative approach did not yield adequate data points necessary for an inferential analysis to examine the cause-effect relationship between innovative capabilities and SCA. Hence, a qualitative approach was considered to augment these results using interview questions administered to owners and employees of local automobile vehicle manufacturers.

1.6.2 Research Strategy

The strategic research approach followed in this study is a survey. A survey is intended to collect "information from or about people in order to describe, compare or explain their knowledge, attitudes and behaviour" (Sekaran & Bougie 2014:102). A survey is important in business research as it provides the researcher with information on many types of research questions to cater for both quantitative and qualitative data.

1.6.3 Population and Sample Size

Population is defined as the whole "group of people, events, or things that the researcher wishes to investigate" (Sekaran & Bougie, 2014:397). For this study, the unit of analysis is an individual in an organisation because innovative capabilities are found inside the firms' top management and their teams (Teece 2014b:332). The initial target population were senior employees of motor vehicle manufacturers who are members of NAAMSA[2]. However, due to inaccessibility brought by Covid-19 restrictions, a new target population

[1] It should be noted an attempt administer the questionnaire to the motoring journalists in South Africa was unsuccessful.
[2] The target population was specialists, middle and senior management who make strategic decisions within these companies.

was identified. Accordingly, the total target population was the senior employees of the direct component manufacturers and suppliers to assembly plants (OEMs). These are called Tier 1 component manufacturers and suppliers and are members of National Association of Automotive Component and Allied Manufacturers (NAACAM). The OEMs (assemblers) were no longer the target population as it was difficult to access them more especially after the start of the Covid-19 pandemic[3]. NAACAM Tier 1 component manufacturers and suppliers' membership is made up of approximately 125 companies (NAACAM.org.za, n.d.). Note that the calculation is made based on the number of search results provided on the members' website. These companies are classified into categories A and B; namely, direct manufacturers and suppliers of components to the seven (7) OEMs' vehicle assembly plants only and those that supply components for OEMs' after-sales (replacement) requirements (NAACAM 2020:12).

The Tier 1 components manufacturers and suppliers constitute approximately 80% of the membership and employ about fifty-one thousand (51 000) people (NAACAM 2020:12)[4]. There were no reliable employment statistics available from public resources. According to AEIC, there are 76 800 employees in the overall component manufacturing sector (Automotive Industry Export Council [AIEC] 2021:6). It should be noted that the NAACAM represents the about 65% of these manufacturers (NAACAM 2020:12).

However, the target population from NAACAM was 160 senior employees from Tier 1 component manufacturers (NAACAM 2020:41-68). Accordingly, the target population of this study was all senior personnel who were assumed to have a good knowledge about the phenomenon of innovation in the motor industry. Therefore, using the target population information as derived from the NAACAM Business Guide, the sample size deemed to be appropriate for the above finite population is approximately 113 individuals (Sekaran & Bougie 2014:268). This is confirmed by the statistical calculation done on the SurveySystem.com (2022) which gives 113 as the appropriate sample size, based on a confidence interval of 5 and a 95% confidence level. Hence, this study's sample size is 113. The researcher applied a judgement sampling technique to collect the relevant

[3] Appendix C provides a brief description of non-response from NAMSA members.
[4] Authors own calculations based on the individual member information published in the Business Guide.

information from individuals based on their expert knowledge. The subjects of the study were senior managers who are owners and directors of NAACAM Tier 1 member companies.

The target population is assumed to represent the OEMs in terms of innovative capability because of the need to keep up to date with new developments in motor manufacturing. Hence, the direct motor vehicle assembly component manufacturing and suppliers will be relevant in answering the research questions that the study is examining[5].

The participants were recruited through an introductory letter describing the study and its purpose. An ID size photo of the researcher was attached to the letter to ensure that the human side of the researcher was revealed. The letter was short, simple and clear about the request. The questionnaire was automated using EvaSys software to ensure that time was not lost during completion. EvaSys is known to be very user-friendly. To ensure rapport with the participants, the researcher acquired advice from an analyst at the offices of NAACAM. The advice was that the questionnaire should be kept short and the research need to contact the members directly using information available in the Business Guide (BD2021, personal email conversation 2 July). The researcher recruited participants as early as possible to give them adequate time to complete the survey. A weekly email reminder was also sent out to encourage participants to complete the survey.

The study followed a probability sampling approach based on the number of individuals with relevant information. Given that the number of senior managers with relevant information is very small, judgement sampling was applied. A purposive judgemental sampling procedure is the only possible technique for this study and could not be generalisable to the entire motor vehicle manufacturing sector because of the small sample size (Sekaran & Bougie 2014:254).

However, as with the original sample, the data collection did not yield the required results. Hence, a non-probability sampling from the total population of the researchers' network of five hundred and sixty (560) individuals was applied. A purposive judgement sampling

[5] The administration of the questionnaire and sampling of the target population was similar for both NAAMSA and NAACAM members.

of professionals in the researchers' network was used because this were conveniently available to the researcher and met the criterion of knowledgeability of the motor vehicle manufacturing sector.

1.6.4 Data Collection Methods

The study used both secondary and primary sources of data. The primary data was collected through questionnaires and the secondary data was sourced through an extensive literature review as well as information from HSRC SA Business Innovation Survey. Online questionnaires have been found to have a higher response rate and are relatively less costly to administer than mail and personally administered questionnaires (Sekaran & Bougie 2014:148). A request for information letter was sent to the administrative department of the targeted Tier 1 component manufacturers to obtain permission to distribute the questionnaire to potential participants. The information of relevant personnel as well as contact details of NAACAM members is available online (www.naacam.co.za). The 2020 NAACAM Business Guide was also utilised to collect information about the participants. In addition to ensuring confidentiality of the responses, a covering letter with clear guidelines and objectives was provided to secure a high response rate during data collection. The literature study used information from books, journal articles, internet sources and conference papers. Information from the HSRC survey cohort periods 2010 to 2012 and 2014 to 2016 was gathered to conduct a preliminary data analysis. The survey used a structured questionnaire based on a six-point Likert scale while the interview contained seventeen (17) open-ended questions to potential candidates. Should there be a part that talks to qualitative here?

1.6.5 Data Analysis

The analysis included both secondary and primary data. The secondary data analysis was based on the HSRC's SA Business Innovation Survey results. An analysis of innovation activities, trends and impact of innovation on automobile performance was determined using graphs and bar charts. On the other hand, primary data analysis was based on both quantitative and qualitative approaches, respectively.

The first of the analysis was on the quantitative approach using data collected from an online questionnaire as described above. Once the data collection was completed, the data was organised and analysed using the Statistical Package for Social Sciences (SPSS). Descriptive analysis of data using frequency distributions, means and standard deviations was presented to identify differences across variables. A two-way cross-tab analysis for pairs of variables was carried out to determine the influence of innovative capability concepts, namely, product innovativeness, market innovativeness, business process innovativeness, behavioural innovativeness and strategic innovativeness on Sustainable Competitive Advantage (SCA) variables using the Pearson correlation coefficient (r).

The Cronbach's alpha coefficient was used to ensure reliability and internal consistency of the questionnaire (Sekaran & Bougie 2014:292). In addition, validity was determined by an evaluation of the questionnaire by a panel of experts and an assessment of different scores from participants using exploratory factor analysis (EFA).

Qualitative data analysis was applied to the results from the interviews. This involved the basic steps of data reduction, data display and drawing conclusions. Various themes were developed based on the responses and this formed part of the analysis to fulfil the objectives of the research. The results of the analysis were presented on graphs. Reliability was determined by ensuring the definitions of various categories were appropriate while validity involved an examination of the results of the research to determine whether the data collected accurately reflected the findings.

1.6.6 The Research Plan

The study has followed the plan as depicted below.

esearch design stage	Research method	Contribution to study	Study time plan
Stage 1: Exploratory	Literature review	Study framework resources	2016 – 18
Stage 2: Descriptive	Questionnaire design and administration	Measurement of innovative capabilities and SCA constructs respectively	2019 - 2022
	Data analysis 1	Identifying the main constructs of innovative capabilities and SCA respectively	2022
Stage 3: Explanatory	Data analysis 2	Evaluation of the link between innovative capabilities and SCA	2022
Stage 4: Draft	Write up	Final submission	2023

1.7 DEMARCATION AND VALUE OF THE STUDY

This study combines the fields of strategic management, industrial organisation, evolutionary economics and entrepreneurship. The viability of the automobile manufacturing sector is of concern for management and policy-makers. The sector needs more than ordinary capabilities in a changing environment – the sector needs to build strong capabilities to be innovative and adapt to the changing landscape.

This study investigates the relationship between internal innovative capability and the SCA of the automotive manufacturers in South Africa: thus, the field of strategic management is relevant to this work. The target population is all employees responsible for technical aspects and strategy execution in the motor manufacturing companies.

The study aims to investigate the issue of performance from the internal as opposed to the external perspective and will thus provide new knowledge in the field. Many studies in South Africa examine external factors that hinder competitive advantage in motor manufacturing, and none has applied a dynamic capabilities perspective to the issue.

In addition, studies of this nature are limited in the emerging economies and the study will contribute to the growing stream of research that examines the role of multinational corporations (MNCs) in fostering technological capabilities in their subsidiaries (Quadros & Cosoni 2009:55; Zhou & Li 2010:224).

From a management perspective, the study offers indications of any persistent capability leadership in the South African motor manufacturing. According to Pisano (2015:33), capability competitive companies tend to remain leaders in the market overtime.

1.8 ETHICAL CONSIDERATIONS RELATED TO THE STUDY

Ethics in business research refers to etiquette when conducting research (Sekaran & Bougie 2014:13). Accordingly, in this study, the following ethical considerations apply.

1.8.1 Objectivity

Given that the sector has been blamed for lack of innovation, the researcher must be objective when collecting and analysing the data. He needed to avoid any bias in data collection and analysis; thus, a statistically validated questionnaire and a scientific statistical programme SPSS were used.

1.8.2 Voluntary Participation

Participation in this research was on a voluntary basis because only personnel who indicated their availability were given an opportunity to take part. The identified personnel were not forced to respond to the questionnaire if they did not want to. Their individual wishes were respected. Approval from top management was acquired and a prepared introduction was available to alleviate concerns about sharing company confidential information with researchers to ensure that participants were not misled or coerced into participation.

1.8.3 Informed Consent

There is a possibility that the targeted personnel might think that top management could be involved in the study. Hence, participants were “fully informed as to the purpose, process, rights and benefits of the research and were required to sign a consent form indicating their understanding and acceptance of the process".

1.8.4 Confidentiality and Respect

The researcher treated the information provided by respondents with strict confidentiality to avoid any possible information leakage to other competing firms and will maintain their anonymity by using numbered questionnaires and coded identifiers e.g., M1 for manager 1; T1 for technical staff member 1.

1.8.5 Data Integrity

A data management system was used to ensure that the participants were protected during and after the data collection phase of the research project.

1.8.6 Permission Obtained

The researcher asked for approval from top management of each company to conduct the research where applicable.

1.9 STRUCTURE OF THE STUDY

This study is made up of five chapters briefly described below.

Chapter 1: Introduction and background.

This chapter provides a background to the study as well as the problem statement. The main and secondary objectives are outlined including a brief description of the research methodology.

Chapter 2: Literature Review.

Chapter 2 provides a literature review in order to identify the factors that are responsible for dynamic capabilities, introduces the concepts of innovation and innovative capability while exploring innovativeness attributes that are responsible for dynamic capabilities.

In addition, Chapter 2 investigates the theoretical aspects of SCA as per resource-based theoretical perspective. The chapter also explores the empirical evidence on innovative capabilities and SCA within the manufacturing industry. To end off, the chapter presents the conceptual framework of the study and proposes the links between innovative capability and SCA.

Chapter 3: Research design and methodology

Chapter 3 provides detailed information on the research design that was followed in the study including the sampling method and the data collection tools that were used. The chapter also outlines the various methods of analysis to be employed.

Chapter 4: Data Analysis and Research Results

The empirical results are presented here in line with the research questions from Chapter 1. The statistical analysis is presented in tables and graphs for clarity of understanding.

Chapter 5: Discussion, conclusions and recommendations.

The last chapter summarises the objectives of the study, offers conclusions about innovative capability in the South African motor vehicle manufacturing sector and provides important practical recommendations based on the results.

1.10 CONCLUSION

The study aims to evaluate the role of internal innovative capability on SCA in the restricted market of SA motor vehicle manufacturing sector. The problem is how motor vehicle manufacturers manage to innovate and remain competitive within a restrictive environment. Innovative capabilities should lead to enhanced performance as well as competitiveness.

The next chapter presents the literature review, the theoretical framework and a conceptual framework.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The first part of this chapter provides a literature review on the concepts of dynamic capabilities, innovation and innovative capabilities. The aim is to identify the important factors within the dynamic capabilities spectrum that are responsible for innovative capabilities[6]. In the second part of the chapter, a theoretical literature on the concepts of competitiveness, competitive advantage and SCA is discussed. The aim is to identify the salient features from SCA applicable to this study. The final part of the study will critically review the existing empirical literature on the links between innovative capability and SCA.

2.2 DYNAMIC AND INNOVATIVE CAPABILITIES

Dynamic capabilities (DCs) have been introduced into the literature on strategic management by various authors to help identify those factors that are responsible for the continued superior performance by firms (Peteraf et al. 2013; Pisano 2015; Teece 2014b). The historical foundations of dynamic capabilities have been traced to the work of Penrose (1952, 1959) on "the theory of the growth of the firm", and Andrews (1971) on the concept of corporate strategy (Peteraf et al. 2013:310; Pisano 2015:2). This body of work refers to dynamic capabilities as those abilities found inside firms that allow it to develop, extend and change their various assets in order to attain superior performance (Douma & Schreuder 2013:215). The other important element of dynamic capabilities is that they allow firms to be flexible in their operations in response to the changing technology, consumer needs and the business environment (Teece 2010:190; Teece 2014b:328).

However, there is some controversy about what dynamic capabilities should actually entail (Peteraf et al. 2013:1390). This has led to diverging theoretical developments that may render the discipline incoherent. According to Di Stefano, Peteraf and Verona

[6] In this study the terms innovativeness and innovative capability are used interchangeably.

(2014:309), seven diverging perspectives on dynamic capabilities have been developed, namely, the behavioural theory, transaction cost economics, evolutionary economics, RBV, knowledge-based view, network theory and the positioning view. On the other hand, Wang and Ahmed (2007:13) identified three basic components of dynamic capabilities, namely, “adaptive, absorptive and innovative capabilities”. Teece (2019:10) also highlights the importance of sensing and transformation as important tenets of dynamic capabilities. These building blocks are briefly discussed below.

2.2.1 Dynamic Capabilities Perspectives

According to Barreto (2010:257), dynamic capabilities seem to offer an answer to the question of how firms can deal with the ever-changing environment in which they operate. Hence, a brief chronological review of the main developments is critical for this study. The seven main developments within the literature are briefly explored below.

2.2.1.1 Behavioural theory

Behavioural theory was the original work of Cyert and March in 1963 (Di Stefano et al. 2014:310) who successfully dealt with the shortcomings of the organisational theorists in providing answers to how decision-making is carried out within a firm. According to Cyert and March (1963, cited in Arndt & Pierce 2018:415), a complete theory of the firm should focus on the firm itself, its decisions regarding pricing, production and allocation of resources as well as an emphasis on the actual steps being followed in decision-making within an organisation. Understanding the functions of a firm requires paying close attention to goals, expectations, choices and control characteristics. The main argument in behavioural theory is that firms follow set rules, procedures and standard operating procedures (SOPs) in dealing with these varying characteristics. The important contribution from Cyert and March is that each firm is unique in the execution of these processes and, as such, firms are heterogeneous in nature (Arndt & Pierce 2018:415). Accordingly, firms will differ in terms of their knowledge, skills and resources.

Teece (2010; 2014b) emphasised that dynamic capabilities allow firms to sense and adapt to the changing environment. In the ever-changing environment, Cyert and March recognised that the SOPs cannot be easily modified because of path dependence (Arndt

& Pierce 2018:416). Path dependence means that these SOPs have been learned and perfected over time such they have become distinctive activities of the firm that cannot be changed quickly. However, from a dynamic capabilities perspective, these unique internal rigidities become important in helping the firm to identify opportunities and adapt to the changes in the environment (Arndt & Pierce 2018:416). For example, given the growing market for electric vehicles in the world, some of the major manufacturers like BMW and Jaguar have adapted their existing assembly lines to accommodate production of both hybrid and electric engines (CBInsights 2019:22). The inherent managerial and organisational processes and search routines will provide the basis for future direction of the firm. In addition, the heterogeneity in processing routines, entrepreneurial capacity and new knowledge integration will determine the firm's dynamic capabilities and success over rivals. Notably, behavioural theory provides the basis for the exploitive nature of dynamic capabilities, while the transaction cost perspective tries to explain the superiority of firms over markets in resource allocation.

2.2.1.2 Transaction cost economics

Transaction cost economics is attributed to the work of Williamson in 1975 (Di Stefano et al. 2014:310) that provides the reasons for the existence of firms as organisations. Transaction cost economics builds on the work of Ronald Coarse (1937 cited in Teece, 2014:9) that showed that firms exist in order to minimise the costs of doing business. However, Williamson (1975 cited in Douma & Schreuder, 2013:167) extended the work by noting that the cost minimisation process is very complex and depends on the relative costs of internal versus that of external coordination. This distinction is critical for empirical testing.

The complexity in transactions is brought about by bounded rationality and opportunism of economic agents. Bounded rationality refers to the limited nature of human beings to solve complex problems when overloaded with information (Arndt & Pierce 2018:415). For example, a motor manufacturer willing to overhaul its robotic system for a new one might not have a clear knowledge about the existing technology and prevailing standards in robotics. Hence, bounded rationality becomes complicated because of uncertainty. On the other hand, human behaviour complicates the transaction process because sometimes people look at the situation to their own advantage alone. From our previous example, it may be difficult to know beforehand if the robotics manufacturer has ever sold defective equipment in the past or the extent of legal bounds of the contract in case one needs to cancel the deal. Accordingly, opportunism can take place ex-ante or ex-post of a sale and can lead to increases in transaction costs especially if there are few players in the market (Douma & Schreuder, 2013:173).

According to the theory of transaction economics, firms can only become a superior arrangement than markets if the conditions of asset specificity, uncertainty and frequency prevail. Asset specificity refers to the fact that robotics machines can only be used in the car assembly production process, not anywhere else in the factory. In addition, uncertainty will lead to increased transaction costs because of bounded rationality as explained above. Finally, the frequency with which the asset specific transactions occur will determine the need for some form of control mechanism. For high frequency transactions, the sunk costs can be easily recovered (Douma & Schreuder, 2013:178).

With the observation of transaction costs associated with contractual relations, various organisational forms have been developed both outside and within firms. While it is irrelevant to discuss these various organisational forms that underpin transaction economics, they are, however, important in explaining how firms of various sizes manage their contractual obligations both within and outside the firms. Within the firms themselves, transaction economics has been criticised for not taking account of the importance of social relations and culture (Douma & Schreuder, 2013:198). Trust is an important element in building strong commercial relationships and cooperation among employees in a firm. Finally, the theory is said to be non-dynamic in nature by assuming that the firm’s survival is indefinite (Douma & Schreuder, 2013:198). However, as per the definition of dynamic capabilities above, the business environment is not static: competition from other organisational forms may ensue rendering the incumbent firm inefficient. Hence, the dynamic nature of the business environment is discussed below.

2.2.1.3 Evolutionary economics

Evolutionary economics is a study of the economy that examines the unending changes in production, distribution and consumption process and their underlying institutional arrangements (Poirot, 2017:1). According to Di Stefano et al. (2014:310), the concept was developed by Nelson and Winter in 1982. Evolutionary economics attempts to resolve the weaknesses found in microeconomic foundations in the neoclassical theory of the firm. The standard concepts of profit maximisation and equilibrium markets seem not to offer a realistic description of firm behaviour in a changing environment. On the other hand, Nelson and Winter emphasised the importance of routines and economic systems (Douma & Schreuder, 2013:270). Routines refer to firms' predictive and regular activities when they produce, advertise, hire or fire people and execute a particular strategy. Accordingly, routines describe the functional part of an organisation that is underpinned by learning-by-doing and tacit knowledge (Douma & Schreuder, 2013:271). Learning-by-doing is a process of becoming more skilful and knowledgeable about an activity from doing it repeatedly (Earl & Wakeley, 2005:203) while tacit knowledge refers to the proficiency developed through experience that is difficult to collect and replicate (Tidd & Bessant, 2012:171). For instance, automobile makers will soon master personalised manufacturing that is brought about by the 3-D printing of car parts in the production lines. However, the take-up of 3-D printing might be hampered by tacit knowledge as car makers adopt and share production procedures with their employees on the shop floor. These organisational routines are automatic in nature and less of a deliberate choice as espoused by the standard microeconomic theory. As shown above, the evolutionary perspective fills the gap in both the behavioural theory and transaction cost economics by explaining the nature of the firm in a dynamic setting. However, the next perspective shows how these routines are rooted in the nature of the resources available to the firm.

2.2.1.4 Resource based view (RBV)

The RBV is based on the original work of Wernerfelt in 1984 (De Stefano et al. 2014:310) and espouses notion that a particular firm has resources which differ from one competing firm to another in terms of originality (Grant 1991, cited in McKelvie & Davidsson 2009:64).

“Resources are defined as assets that are useful in the production process” (Amit & Schoemaker 1993, cited in Barreto 2010:258). The resources are seen as important in driving the performance of firms. However, there is a criticism that the RBV is weak in providing practical solutions that explain the superiority in firm performance (Priem & Butler 2001, cited in Hinterhuber 2013:796; Pisano 2015:8). However, Teece (2014b:341) argued that the RBV can be extended to include the more dynamic perspective by examining the role of management in innovation, co-creation, resources building and deployment approaches. Hence, McKelvie and Davidsson (2009:65) posited that a RBV of dynamic capabilities is innovative in nature and, as such, the resources application within a firm is what separates any two firms in terms of their performance. Accordingly, this paper seeks to examine the role of management in strategy formulation and execution that contributes to innovativeness and competitiveness of motor manufacturers. As such, management and their team acquire and share their knowledge with the rest of the employees for the success of the company as discussed below.

2.2.1.5 The knowledge-based view (KBV)

The KBV was originally developed by Kogut and Zander in 1992 (Di Stefano et al. 2014:310). The premise is that knowledge is an important part of the strategic execution within firms. Knowledge is defined as non-physical resources consisting of a collection of sensible information that is useful for creating strategic capabilities (Davenport and Prusak (2000) and Lengnick-Hall and Griffith (2005), cited in Sarjana 2015:49). As an intangible resource, knowledge is woven into the daily activities and tasks and creates value through its distinctive nature (Barney 1995, cited in Sarjana 2015:49). Many production processes within the motor manufacturing space have become standard processes like the Toyota Production System that has been replicated with relative ease (Teece, 2014:333). However, it is the ability to leverage knowledge from current trends and other complementary production processes that provides competitive advantage. Accordingly, the RBV and the KBV are similar because both focus on the importance of assets (tangible and intangible, respectively) in the development of dynamic capabilities (Di Stefano et al. 2014:311). However, firms do not operate in isolation as shown below.

2.2.1.6 Network theory

Network theory is based on the original work of Granovetter in 1973 (Borgatti & Halgin, 2011:1170) named the 'strength of weak ties' (SWT) proposition. The theory assumes that individuals or companies exist in an environment where there are strong and weak relationships within a group, sector or industry (Byosiere et al. 2010:403). The first type of relationship is characterised by a small group while the latter relationship comprises of a bigger set. In each network, a team has similar characteristics that connect them, while the size and type of relationship determines the level of trust and ease of sharing information among the members of a clique (Byosiere et al. 2010:404). Accordingly, within the motor vehicle manufacturing sector, each OEM has a few selected vehicle components producers whom they trust and rely upon for the production and on-time supply of engine and certain electronic vehicle parts. On the other hand, the number of suppliers for car seats, airbags and non-technical components is higher and OEMs then have a wider choice.

2.2.1.7 The positioning view

The positioning view was originally developed by Richardson in 1972 (Teece, 2019:26) and refers to the firm's capability to apply the knowledge, experiences and skills it possesses to remain more competitive. Di Stefano et al. (2014) saw the positioning view from Porters' perspective, but Teece (2014a) argued that such an approach is not suitable as it deals more with the industry-wide market share rather than firm-level strategic position. In addition, it is not very convincing that Porter's contribution is important as the original work in the development of DC because it has only been cited once – by Porter himself (see Di Stefano et al., 2014:28).

Accordingly, the approach by Richardson is more important in this study as it refers specifically to strategic deployment and coordination of resources. In Richardson's view, the theory of the firm has failed to describe the nature of coordination that happens at both intra-and-inter-firm levels (Teece 2019:19). In particular, the standard production function model left out the presence of the human element in its construction; in other words, X-inefficiency (Leibenstein 1966, cited in Teece 2019:23). The presence of the human element means that a combination of capabilities that are complementary in nature would be important for the continued survival of the firm (Loasby 2010:1310). For example, Austin (2017:03) noted that the success of a product manager in a manufacturing firm is his ability to develop products that can be easily adopted by customers and at the same generate superior revenue and unsettle competitors.

In addition, these production process or firms' complex activities require capabilities in coordination and consolidation at both market and firm level (Katkalo, Pitelis & Teece, 2010:1176). For example, OEMs must coordinate the sourcing of components from constituent suppliers and simultaneously consolidate all activities within the firm by applying a necessary set of capabilities or other arrangements (i.e., outsourcing). Accordingly, this perspective offers a more concrete insight into dynamic capabilities and covers the different views discussed above.

In summary, the above section sought to provide the theoretical background on dynamic capabilities by discussing the seven varying perspectives. The behavioural theory looks at the role of SOPs as important arrangements that determine the success of the firm in responding to the changing environment. On the other hand, the transaction cost economics view argues that firms are superior formations as opposed to markets in resource allocation because costs are better minimised by internal coordination rather than externally. While the transaction cost approach informs the role of firms in resource allocation, it has been criticised as being less dynamic in nature.

The dynamism is explained through the evolutionary view that emphasises the importance of routines in responding to the changing landscape for firms to be competitive. This perspective is augmented by the RBV and the KBV that recognise that the diversity and path-dependence nature of firm's resources lead to superior outcomes. The second last perspective on network theory argues that firms do not exist in isolation and thus require relationships in order to survive. Lastly, the positioning view covers all of the above perspectives by noting the importance of the knowledge, skills and experience in maintaining success in a dynamic setting where the capabilities of coordination and consolidation are important.

Accordingly, the study adopted the following definition:

> dynamic capabilities can be disaggregated into the capacity (a) to sense and shape opportunities and threats, (b) to seize opportunities, and (c) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets (Teece 2007, cited in Barreto 2010:260).

This definition is in line with the focus of the study as it highlights the importance of both intangible and tangible assets found inside the firm as sources of SCA. The seven perspectives are briefly summarised below.

Table 2.1: The theoretical perspectives on dynamic capabilities

Perspective	Main Contribution
Behavioural theory	Heterogeneity of standard operation procedures
Transaction cost economics	Asset specificity, uncertainty and frequency complicates the transaction process
Evolutionary economics	Routines are an automatic process
Resource-based view	Unique resources and innovative resource application
The knowledge-based view	An intangible resource for strategic execution
Network theory	Valuable relationships are found in small groups
The positioning view	Strategic application of knowledge, experiences and skills

Source: Adapted from Di Stefano et al. (2014:310)

The above perspectives provide the theoretical aspects of the concept; however, in the empirical literature, the most common factors have been identified. Wang and Ahmed (2007:40) reviewed 32 research articles to identify adaptation, absorption and innovative capabilities as the main features of dynamic capabilities. These features are briefly described below.

Adaptive capability refers to the firm's awareness to recognise and seize emerging market opportunities (Wang & Ahmed 2007:14). Adaptation means that firms have to be flexible and reconfigure their resources in order to respond to the changing environment. Across the current world motor vehicle manufacturing sector, Nissan Leaf was the first massmarket production electric vehicle to sell 400 000 units in 2008 in response to changing consumer preferences to environmental degradation (CBInsights 2019:26).

Absorption capability refers to the firm's ability to identify, embrace and commercialise the opportunities existing in the external environment using mostly knowledge from past experience (Wang & Ahmed 2007:14). For instance, BMW, Daimler, GM and Volkswagen have embraced the value of car-sharing instead of owning by making vehicles directly available to customers through their new technology subsidiaries (CBInsights 2019:49).

Innovative capability refers to the firm's capacity to develop novel products and markets through strategic positioning underpinned by innovative actions and practices (Wang & Ahmed 2007:16). According to Mosquet, Russo Arora and Wagner (2014:1), 60% of consumers perceive the introduction of new technologies as a mark of innovativeness within the motor vehicle manufacturing sector.

In summary, the three factors are very much related even though they are distinct. The adaptive capability requires the firm to align the internal capabilities with the external environment, while absorptive capability allows the firm to merge the external insight with the internal knowledge to be profitable. On the other hand, innovative capability links the firm's resources and capabilities with its products and market space.

Dynamic capabilities are usually found in firms with inventive and innovative management styles. For such firms to survive in the business environment, certain important attributes of sensing, seizing and transformation are therefore necessary (Katkalo et al. 2010:1178). Sensing refers to the ability to recognise and evaluate threats, opportunities and customer needs, while seizing examines the value capturing provided by mobilising resources as new opportunities arise, and transformation requires continued renewal to stay competitive (Teece, 2019:10). It is through sensing where value is created through activities such as innovativeness while, on the other hand, seizing is important for value capturing via strategic deterrence.

From the above perspectives, this study recognises innovativeness as an important dimension. Innovativeness is in line with the above definition of dynamic capabilities that refers to the importance of resources and their adoption in the changing environment.

Hence, both the RBV and evolutionary approach become very important for this study. Furthermore, innovativeness is a strategic component of competitiveness (Teece 2010:186). Accordingly, in the next section, the study identifies and outlines the various themes encompassing innovative capabilities.

2.2.2 Innovation and Innovative Capability Perspectives

Innovation is a very important concept found in various disciplines and as such has various meanings depending on its usage. Baregheh, Rowley and Sambrook (2009:1325) sought to identify a unifying definition of the concept to overcome the various problems in research and practise. The authors conducted a content analysis of the concept from seven disciplines using key publications from journal articles and business books (Baregheh et al. 2009:1325). The seven disciplines are summarised below together with the number of sources consulted.

Table 2.2: Summary of disciplines on innovation

Discipline	Main view	Number of sources
Economics	New and improved ideas to compete in a market	9
Business and management	New changes that bring sustainability, influence and superiority	18
Innovation and entrepreneurship	New and creative changes that satisfy certain needs	13
Marketing	Technologically new services that deliver superiority	2
Organisation study	New ideas and innovativeness	6
Technology, science and engineering	Addressing new challenges using technology and market for economic success	13

Source: Adapted from Baregheh et al. (2009:1328)

From Table 2.2, business management is the most relevant discipline and has the highest number of sources followed by innovation and entrepreneurship and technology, science and engineering disciplines in the second place. Thus, this study is well suited to examine innovation from the business management perspective as mentioned earlier. In addition, the main view is in line with focus of the study on the internal capabilities that bring about sustainable competitiveness. Based on the above analysis, the following six important features of the definition on innovation were discovered.

Table 2.3: Summary of innovation attributes

Feature / Attribute	Meaning of each feature	Frequency
Type of innovation	The kind output or result	98
Nature of innovation	The form it takes	92
Means of innovation	The necessary resources	69
Social context	Entity, system or group of people involved	60
Stages of innovation	All the steps involved	48
Aim of innovation	The overall result	31

Source: Adapted from Baregheh et al. (2009:1328)

The above features of innovation are important for this study as they highlight the important aspects of the concept needed in order to be competitive in the business environment.

Accordingly, Baregheh et al. (2009:1328) proposed the following definition of innovation: “Innovation is the multi-stage process whereby organisations transform ideas into new or improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace”.

The above definition is in line with the thinking in this study that innovation is an act of renewal, is on-going and internally focused to allow the firm to compete successfully. However, the problem with the unifying definition is that it becomes static and conceals developments in the subject. Other disciplines may develop the concept further as the environment changes. However, this will not be discussed here as these are outside the focus of the study. Note that the different types of innovation that include radical, really new and incremental were discussed in Chapter 1 above.

Given the premise of the study, the next issue is concerned with the ability of the firm to innovate.

Innovative capability is defined by Romijn and Albaladejo (2002, cited in Kim, S. 2013:8) as the ability of the firm to generate new products based on its internal and external strengths. A range of definitions on innovative capability have been presented by various authors from an ability to make key enhancements and adjustments to prevailing technologies, and to producing new technologies (Wonglimpiyarat 2010:247), access to resources, collaboration and existence of methods of solving problems (Laforet 2011:383) combining resources and capabilities to produce new products faster as opportunities arise (Withers, Drnevich & Marino 2011:517) and the ability to develop patents (Ngah & Ibrahim 2011:4). In addition, Akman and Yilmaz (2008:78-79) indicated that the concept of innovative capability has been examined from various perspectives that include knowledge orientation, resources mobilisation, management's competencies and market value creation.

However, for the purposes of this study the relevant capability aspect in innovation is embedded in the dynamic behaviour of resource allocation (i.e., high-order capability) by firms operating in a challenging business environment rather than simply an ability to produce products (Teece 2019:8). A dynamic capability is different from ordinary capability in that it is an ability which cannot be easily replicated, is not readily available in the market and as such requires an appropriate entrepreneurial management team (Teece, Peteraf & Leih 2016:18). The foregoing aspect about management is important as it highlights the internal workings of the firm as per the focus of the study.

Accordingly, Wang and Ahmed (2004, cited in Bhupendra & Sangle 2015:185) defined innovative capabilities (innovativeness) within a dynamic perspective by focusing on the formation of new products, entry into new markets, developing new processes, behavioural changes and new strategies. For purposes of this study, the established dynamic perspective of innovative capability will be discussed together with other perspectives that the extant literature has introduced. This are briefly discussed below.

2.2.2.1 Product innovativeness

Product innovativeness (PI1) has been defined as the uniqueness, newness and utility of the new products that are being introduced in the market (Bhupendra & Sangle 2015:186). In recent times, vehicle connectivity has become the latest development in product innovation within automobile manufacturing which customers appreciate. On the other hand, as vehicle manufacturers move in the direction of electric and hybrid models, vehicle safety has become an issue of concern to customers (McKinsey 2019:49). In addition, McKinsey (2019:51) has shown that Chinese customers prefer voice recognition technology more than any other form of connected digital and online systems on a car. From the South African perspective, one of the motivating factors that attract consumers within the electric vehicle segment is fuel economy (Venter, 2020c:1). Thus, the OEMS that offer new products that are perceived as valuable to consumers are likely to succeed.

2.2.2.2 Innovative edge

Innovative edge (IE) is an extension of product innovativeness as it explores the evolutionary nature of company innovations (Teece 2017:698). Evolutionary fitness has been discussed above and can be linked with innovative capability in the sense it allows firms to response timeously in serving customers, dealing with competition and carrying out internal introspection. Accordingly, in comparison with its competitors and own previous practices, the firm should be able to introduce more innovative products, significantly newer but also different products than before and be more successful with its new offerings (Bhupendra & Sangle 2015:188). Hence, in automobile manufacturing, success requires a well-planned course of action to product development that is aligned with the prevailing and future business environment (Talay, Calantone & Voorhees 2014:75).

2.2.2.3 Market innovativeness

Market innovativeness (MI1) is defined as the use of new ways of exploring new markets and exploiting existing ones while developing new tools in market research, promotion and advertising (Wang & Ahmed 2004, cited in Bhupendra & Sangle 2015:186). The concept follows on the four activities unique to marketing that include product, pricing, communications and distribution (Lin, Chen & Chiu 2010:114). The product marketing capability requires that efforts are made in identifying and satisfying customers' needs as the environment changes (Morgan 2012:106). For instance, the recent demand for compact sport utility vehicles (SUVs) has forced many OEMs to increase the number of models offered in this segment. On the other, a firm must have knowledge about the consumers' value perceptions as well as new and incumbent competitors' pricing strategies in other to position itself favourably in the marketplace (Morgan 2012:106). This requires strategic pricing that appeals to each customer's income and lifestyle. Hence, the ability to identify the factors that influence consumer behaviour is an important component of strong marketing research capability that allows product differentiation and profitability (Merrilees, Rundle-Thiele & Lye 2010:369).

In the end, marketing capability is all about how firms can well serve their customers today and into the future while acquiring new ones in the process without losing their competitive position (Protogerou, Caloghirou & Lioukas 2011:623).

2.2.2.4 Process innovativeness

Process innovativeness (PI2) refers to the application of "new production methods, new management approaches, and new technology" to enhance production as well as management processes (Wang & Ahmed 2004, cited in Bhupendra & Sangle 2015:185). In the case of the vehicle manufacturing, this will include both technological and non-technological efforts to adopt environmentally friendly production methods that are energy efficient and waste reducing. In South Africa, failure to introduce cleaner fuel has meant that local OEMs are not able to adopt the new engine production technologies that would be beneficial to the environment as well as the consumers in terms of cheaper fuel (Venter 2018a:1).

2.2.2.5 Behavioural innovativeness

Behavioural innovativeness (BI) refers to the presence of innovative culture across all levels in an organisation. It refers to the individuals, teams and management's commitment, acceptance of changes and new ways of doing things across all operations within a firm (Wang & Ahmed 2004, cited in Bhupendra & Sangle 2015:185). This requires a total change in the mindset of everyone in an industry or sector or company. For instance, the SAAM advocates for increased focus on investment in production of energy efficient vehicles (EEVs) for the sector to stay relevant and competitive (Barnes et al. 2018:28). Accordingly, the early adopters and pacesetters of the EEV production technology are likely to be more successful.

2.2.2.6 Strategic innovativeness

Strategic innovativeness (SI1) refers to the reconfiguration of the business model that intensively enhances the competitive nature of the organisation (Wang & Ahmed 2004, cited in Bhupendra & Sangle 2015:186). Accordingly, given the competitive nature of the sector, vehicle manufacturers must be willing to form strong partnerships with component suppliers in order to provide suitable range of cars and after-sales support services to their customers. With strong systems innovativeness (SI), firms will be able to forecast future market trends and organise “the trajectory of their technologies, products and services” (Bhupendra & Sangle 2015:185).

On the other hand, a strategic position is affected by the decision on whether top management is promoted from within or hired from outside the firm. Balsmeier and Buchwald (2015:1037) indicated that the firm-specific knowledge of an internal candidate is more important for the innovativeness as opposed to the experiences of an external candidate. Lastly, the characteristics of professional teams are important for driving the innovation strategy within a firm. Hence, innovation-related skills acquired from the industry, self-employment, research and development (R&D) and previous work have been found to be important effects of innovativeness (Arvanitis & Tobias 2012:1074).

2.2.2.7 Systems innovativeness

Systems innovativeness (SI2) refers to the firm’s ability to harness new advances in information, communication and technology (ICT) (Shigeno, Tsuji, Matsuzaki & Shinohara 2017:3) as well as customer-targeted strategies and engineering activities to develop innovations (Lin et al. 2010:113). Within the manufacturing sector, a number of systems have been adopted to enhance innovativeness. Customer Relationship Management (CRM) is widely used to understand the needs of the customers in order to develop new products that meet their aspirations and as such may lead to innovative capabilities (Pedron, Picoto, Colaco & Araujo 2018:12). Computer Aided Design or Manufacturing (CAD/M) is also regarded as important in enhancing innovative capabilities (Parida 2008:68).

2.2.2.8 Product development innovativeness

Product development innovativeness (PDI) refers to the firm’s ability to design, introduce and produce new products from time to time (Yusof, Salleh & Zahari 2020:98). In this study, this concept is linked to the product managers’ capability to develop products that have robust consumer adoption, exceptional revenue raising potential and possibly unsettle the industry (Austin 2017:2). In addition, the literature has recognised the importance of top management involvement in the development of new products (Felekoglu & Moultrie 2014:159) and their cognitive capabilities in inspiring innovations within firms (Helfat & Peteraf 2015:843).

Accordingly, product management literature explores the activities of a product manager who has better knowledge about the product’s technical specifications, experience in business and consumer expectations to deliver innovative products to the market (Mcnaughtan 2013:39). A product manager must be multi-skilled as their role covers several work areas that include strategy, marketing and planning, communication, motivation and foresight (Fernandes 2016:4). The first two core competencies are crucial for innovation capability as they refer to the ability to shape strategic business direction and determine the products’ market fit for the organisation.

At the strategic level, the product manager must outline the strategy for the product and support this strategy with present resources (Fernandes 2016:16). When Volkswagen Motors South Africa (VWMSA) re-introduced the new Tiguan cross-over SUV into the market in 2016, both Toyota Motors South Africa’s (TMSA) RAV4 and Mazda’s CX-5 had already an established market in this segment but the new Tiguan has been recognised as one of the Top 12 buys from 2017 to 2020 (Car Magazine 2021:1). The marketing competency of the product manager requires them to convert product strategy into actions, guarantee alignment throughout product development, recommend revisions when required and obtain internal approval from the organisation’s evaluation committee (Fernandes 2016:17). In planning, a product manager needs to be able to estimate the prospective level of demand for the product, follow its financial impact, and observe its lifecycle from inception to termination (McNaughtan 2013:39).

2.2.2.9 Environmental innovativeness

Environmental innovativeness (EI) refers to the firm's ability to apply the knowledge acquired via external linkages in developing innovative products (Kang & Kang 2009:13; Lin & Wu 2010:583). Given that there are various forms of external knowledge sources impacting on a firm's innovation, it is important for motor vehicle manufacturers to develop and implement "an efficient external knowledge sourcing strategy" (Kang & Kang 2014:177). In this instance, the location of these external sources of knowledge has been shown to be important for innovative capability (Gugler, Keller & Tinguely 2015:327).

2.2.2.10 Product marketing innovativeness

Product marketing innovativeness (PMI) refers to the interaction between the firm's technological ability to produce new products and its ability to market these products more effectively than competitors (Berger 2019:6; Hsiao, Tan & Chiou 2020:494; Leicht, Chtourou & Youssef 2018:9). For instance, interdependence between product technological capability and product marketing capability allows the firm to use its existing knowledge from customer feedback to develop novel products complemented by the existing technology – a combination that cannot be easily copied but is acquired through learning over a long period of time. Accordingly, a firm needs a product marketing manager astute on this conceptualisation.

To be effective in this area requires a solid appreciation of the market and its future trends which is an ability that is developed through learning (Morgan 2012:109). Hence a vigorous and determined information-gathering about car buyers' aspirations, other OEMs' strategies and the general industry's position is necessary.

In addition, while resources are required to drive product development, their acquisition will be determined by the market learning capability of the product marketing manager. This means that the resource configuration of the firm should be guided by market research and the competition (Morgan 2012:109). Within the business, these market learning capabilities are perfected over time and depend on the experience of working with customers and delivering value to them. Hence, the methods within which PMI takes place include learning-by-doing and learning-by-imitation which, according to Morgan (2012:109), are rooted in marketing practice.

2.2.2.11 Knowledge management innovativeness

Knowledge management innovativeness (KMI) refers to the firm's ability to innovate based on its knowledge management capability (Shi 2010, cited in Momeni, Monavarian, Shaabani & Ghasemi 2011:474). The main argument is that knowledge that exists within the firm can be applied effectively in order to develop new knowledge and products. Accordingly, knowledge management capability refers to the application of knowledge systems and procedures in the development of superior performance by the firm (Chen & Fong 2012:13524). This means that an innovative firm, in this case, will ensure that its knowledge management processes are effective. The knowledge management processes that are important for innovation include knowledge sharing, creation, retention, conversion and application (Chen & Fong 2010:13524, Momeni et al. 2011:475). However, within the dynamic capabilities' stance of embedded knowledge, Chen and Fong (2010:13535) theorised that knowledge sharing creates trust and motivates employees, leading to improved in-house business practices that include innovation among others. In addition, Ulah, Hamid, Shahzad and Mahmood (2017:90) argued that training and development is important in enhancing knowledge sharing and, thus, contributes positively to innovative capability. Therefore, the study examines the importance of trust, motivation and training and development in facilitating knowledge sharing that is important for innovative capability.

The above section has presented the concept of innovative capability and its various categories. Thus, the above literature review has identified the key internal innovation activities that are important in answering the first research question as well achieving the third secondary objective of the study. In conclusion, the conceptual framework on innovative capability is summarised in Figure 2.1 below.

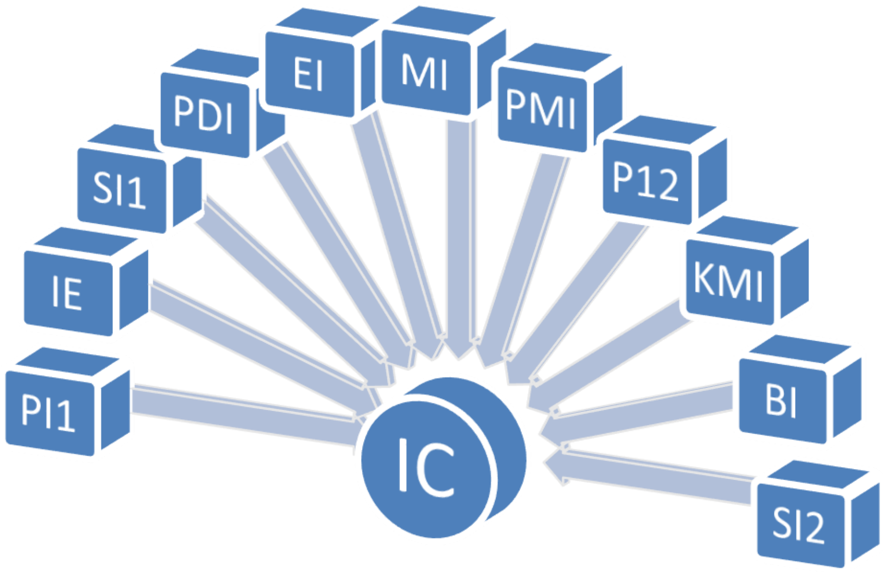

Figure 2.1: A conceptual model of innovative capability

Source: Researcher's own formulation

Accordingly, the above section has identified the main constructs on innovative capability. The next section explores the theoretical literature on the concepts of competitiveness, competitive advantage and SCA. The aim is to identify the salient features of the concepts applicable to this study.

2.3 COMPETITIVENESS, COMPETITIVE ADVANTAGE AND SCA

This subsection introduces the concepts of competitiveness as built to the discuss about SCA as an important concept of the study.

2.3.1 Competitiveness

The aim of this study is to explore measures by which the South African automobile manufacturing industry can improve its position and become competitive at the global level. Accordingly, the issue of competitiveness becomes important. Competitiveness is a term that stems from microeconomics' study on the theory of a firm and has been linked with cost reduction as a strategy for business sustainability in a perfectly competitive environment (Aiginger & Vogel 2015:498). However, the strategy is viewed as a weak and narrow approach to competitiveness. Rather, the alternative from imperfect competition has shown that, competitiveness can be derived from product differentiation, capabilities and innovation (Aiginger & Vogel 2015:498). In addition, the other important driver of competitiveness is productivity (Cetindamar & Kilitcioglu 2013:9). However, cost reduction and productivity are seen as conflating the practical issues of quality and the other salient drivers of competitiveness (Aiginger & Vogel, 2015:499). Hence, a more dynamic and sensible approach would be to examine the competitiveness from the perspective of critical sources the firm possesses and their prospects. The next section attempts to settle the problem by exploring the related concept of competitive advantage.

2.3.2 Competitive Advantage

According to Sigalas, Pekka-Economou and Georgopoulos (2013:321), the first scholars to attempt and define the concept of competitive advantage were Ansoff (1965) and Porter (1985). The definition by Ansoff (1985) was that competitive advantage stems from unique characteristics of a product in the market while Porter's (1985) view is based on a strategic approach of value creation associated with lower prices or greater benefits at higher prices (Sigalas 2015:2005). Both definitions compare the superiority of product offering in the market of competing products and are valuable in explaining the sources of competitive advantage.

However, Sigalas (2015:2006) maintained that the concept lacks a practical and useful meaning for managers as it is usually defined according to context and has been vastly researched in the literature. This means that the concept cannot be generalised to any given setting, thus rendering its application difficult. Furthermore, Sigalas (2015:2011) found that many practising managers unknowingly refer to competitive advantage from the RBV of business strategy as opposed to industrial organisation and market-led theories. While the author argued that such results might have been influenced by the participants' training in business education, one can highlight that this may not mean lack of awareness of the concept but a lack of understanding of the concept from a superior perspective.

It is an indication of what the managers and scholarly research (Struwig & Gaya 2015:863) have found to be practically and evidently valuable in identifying the origins of superior performance (Grant 1991, cited in Brahma and Chakraborty 2011:15). Hence, the concept of SCA has become the focal area of study in management strategy.

2.3.3 Sustainable Competitive Advantage and Its Perspectives

The concept of SCA has been in existence for a while within the discipline of business strategy. According to Vinayan (2012:65), the earliest contributors to the concept are Bain (1956), Kay (1994), and Porter (1980). Bain (1956, cited in Pisano 2015:6) sought to explore the importance of structural features such as entry barriers and firm behaviour in determining the overall performance of the industry while Porter extended this work using the "five forces framework" to identify the possible strategic firm positions given the underlying structural features. On the other hand, Kay (1993, cited in Vinayan 2012:41) argued that competitive advantage is achievable through the application of resources in an industry or when the same resources are brought into the market. These authors assisted in putting the competitive advantage into a superior perspective. However, Day (1994, cited in Piotr 2015:92) asserted that the "sustained" or "sustainable" element of the concept happens through the development and coordination of internal functions of the firm with its external environment such that sustained competitiveness and connections are created.

A more formal definition has since come from Barney (1992) who refers to SCA as the ability of the firm to exclusively develop a value-enhancing strategy which existing and future rivals cannot replicate (cited in Vinayan, Jayashree & Govindan 2012:30). However, the concept of SCA has been examined from various perspectives, namely, the structural approach of industrial organisation (IO) found in "economics (Porter 1980; 1985); the RBV of the firm (Barney 1986, 1991, 2001); traditional IO and game theory (Caves 1984); Schumpeterian economics" of innovation (Foster & Kaplan, 2001; Schumpeter 1950; Schumpeter & Nichol 1934); and dynamic capabilities view (DC) and blue ocean strategy (Kim & Mauborgne, 2004) (all cited in Vinayan et al. 2012:31). The first four are historical in nature while the latter two are more recent developments. Each of these perspectives is briefly discussed below.

2.3.3.1 The structural approach

The structural approach is based on the five forces framework developed by Porter (1985) which focuses on the importance of barriers to entry and mobility with the objective of protecting the firm from rivalry brought by existing and potential competitors in the market of similar products (Brahma & Chakraborty 2011:8).

Accordingly, if the structure of the industry remains the same because of the above barriers, the firm will become profitable and achieve competitive advantage. In addition, sustainability is only achievable if the firm continues to shield and place itself in a better position by applying a low-cost strategy or high price plan augmented by quality products (Sigalas 2015:2005). In the world of motor vehicle manufacturing, this type of rivalry is non-existent because of the incentives offered by national trade policies. In addition, Porter's five forces framework has been criticised for focusing too much on industry rather than on firm-level competitiveness (Clancy et al. 2001, cited in Kharuba & Sharma, 2017:141) and for its inability to clearly explain the existence of the vast differences in the profitability of firms within a given industry (Pisano 2015:7).

2.3.3.2 The resource-based theory (RBT)

The RBT stems from Barney's (1986) work on the importance of organisational culture as "a source of sustained competitive advantage" (Barney, Ketchen & Wright 2011:1301). This development came out of the weakness in Porter's theory of competitiveness that assumed that firms within a particular industry have access to similar resources and that these resources are mobile between firms as facilitated by market activity (Pisano 2015:7). However, researchers such as Wernerfelt (1984), Lippman and Rumelt (1982) and Barney (1986), all cited in Kozlenkova, Samaha and Palmatier (2013:3) observed that firms within a given strategic grouping experience different rates of success and started considering the importance of firms' internal resources and capabilities. Thus, RBT seeks to examine the prospects for the firm to achieve a competitive position over its rivals uniquely based on the type of resources and capabilities it owns (Kabue & Kilika 2016:98).

It should be noted that the line of thinking has since shifted from “a view” perspective to “a theoretical” one given the extensive application of the concept over the past thirty years (see Barney et al. 2011: 1300 and Kozlenkova et al. 2013:3). Accordingly, this study has adopted the RBT stance for the analysis. These resources and capabilities take the form of physical, financial, human and organisational assets that are used to produce, serve and provide goods and services to customers (Brahma & Chakraborty 2011:10). These resources include tangible types like machinery and equipment, land and buildings and intangible types like skilled personnel, client loyalty, firm reputation and superior knowledge (Maritan & Peteraf 2011:1378).

RBT is based on four characteristics of resources, namely, valuable, rarity, imperfect imitability and organisational (Kozlenkova et al. 2013:3). The first two characteristics focus on how resources can become sources of SCA; however, together, their combined effect (i.e., VRIO framework) leads to SCA since no individual resource can be a source of SCA (Brahma & Chakraborty 2011:10). The VRIO framework is a latest adaptation from Barney’s (1991) characterisation of resources into VRIN to gain SCA (Talaja 2012:54). Kozlenkova et al. (2013:3) asserted that non-substitutability has been “subsumed” within the term ‘organisation’ because the firm must organise itself efficiently to remain competitive. While organisation might be accepted as replacing non-substitutability of resources within the framework, it seems to take away the notion of resource characterisation required for practical purposes (i.e., a checklist on value-creating resources). In addition, organisation implies the next step in the implementation of value-enhancing strategies. Each of these assumptions is briefly discussed below.

Resources are valuable if they allow the firm to lower its costs and at the same time help it to raise its turnover beyond the norm (Barney & Arikan 2001, cited in Kozlenkova et al. 2013:3). The implication is that nature of these resources is what allows the firm to implement cost-saving strategies that lead to better profits. In South Africa, there are initiatives to assist OEMs in the motor vehicle manufacturing industry to lower their production costs for them to be competitive. The issue is whether the OEMs can use this support to implement further cost-savings strategies in conjunction with own resources to engender competitiveness.

The rarity of resources implies that the ownership of the resources belongs to a small number of firms within the industry or sector (Cardeal & António 2012:10161). The concept is also tied to the idea that these resources are not readily available in the market and therefore cannot be procured at market prices. For instance, the type of craftsmanship found in Lexus's "*Takumi*" artisans and Bentley's handcrafting is not a skill that any other auto manufacturer has access to or owns. At the Lexus's Miyata production plant, there are only 19 Takumi engineers out 7 700 workers (Witbooi 2020:41). Accordingly, auto vehicle makers also must recruit personnel whose skills and technical knowhow cannot be easily bought or replicated by machines.

Resource immobility examines the inability of the market to distribute these resources to all firms that might need them and thus allows heterogeneity to prevail over time (Kozlenkova et al. 2013:4). Accordingly, if the market for the unique resources is unavailable or the resources are costly, the incumbent firm will continue to enjoy sustained competitive advantage while rivals will struggle to compete. Many of the automobile manufacturers provide internal training and skill development that are unique to their processes and strategies to their employees, such that it may become difficult for the skills to be transferable to rival OEMS (Deloitte 2019:9). A small number of Takumi artisans can make their own hand tools and others are trained to master 10 different stitching techniques before they can work in motor vehicle production (Witbooi 2020:42).

The imperfect imitability of resources refers to the fact that rivals and potential entrants are not able to imitate the incumbent firms in generating or procuring because these unique resources are very expensive (Kozlenkova et al. 2013:4). This feature is brought about by "unique historical conditions, causal ambiguity or social complexity" (Brahma & Chakraborty 2011:11). Historical conditions refer to factors such as property rights and trademarks (Kozlenkova et al. 2013:12). Social complexity looks at the presence of brand loyalty that is built overtime (Kozlenkova et al. 2013:12). For example, the Toyota Hilux has been developed through a solid record of rally racing that its rivals in the light commercial segment have not been able to match (Branquinho 2018:1). In addition, casual ambiguity makes it difficult for potential competitors to know what or how to imitate because they simply cannot ascertain where the incumbents derive their efficiencies from

(Teece 2014b:343). Accordingly, for SA OEMs, the presence of intellectual property rights, brand loyalty that is driven by, for instance, reliability of Toyota vehicles in general or popularity of Volkswagen entry level cars, respectively, will be important for SCA. In addition, the inimitability of resources means that there are no readily available substitutes (Teece 2010:180).

Organisation of resources means that the effective and efficient use of such resources should be well managed and coordinated to achieve SCA (Barney & Hesterly 2012:94). Thus, a firm is important in ensuring that competitiveness is achieved based on how it manages, implements, configures and reconfigures the application of the valuable, rare and imitable resources.

The above assumptions have been shown to work (Peteraf 1993, cited in Talaja 2012:52) if the resources and capabilities of the firm meet the following criteria: "resource heterogeneity, resource immobility, ex-ante and ex-post limits to competition". These criteria allow for an examination of the internal strategies that firms must implement to ensure the VRIO framework (i.e., a checklist approach) becomes useful and brings superior competitiveness. Hence, this study seeks to examine the strategic ability to engender SCA within the South African automobile manufacturing industry. Each of the criteria is discussed below.

Resource heterogeneity refers to the notion that firms in the same industry own and acquire different types (and amounts) of resources and this possession makes some firms more effective than others in applying their unique set of resources (Peteraf & Barney 2003, cited in Kozlenkova et al. 2013:3). Access to limited tangible and intangible resources that competitors do not have leads to varying approaches to the development of resources and capability (Maritan & Peteraf 2011:1381). Accordingly, firms will experience supernormal profits if they have access to limited resources, are suitably located and or have the capabilities to differentiate their product offerings.

Heterogeneity implies that there are superior resources that are finite or available in limited supply, and as such cannot be extracted in any way while, for the most part, these resources are virtually fixed in supply which means it takes a long time to extract them

(Mbarki 2017:32). On the other hand, given the export-oriented nature of auto manufacturing in South Africa, this means that OEMs located within the main ports of shipping will perform better on export sales. For instance, TMSA (Port of Durban), VW and MBSA (Port of Port Elizabeth), are in the major shipping and port harbours and repeatedly featured in the top five rankings of exports of passengers and light commercial exporters for the period 2014 to 2018 (AIEC 2019:20).

Product differentiation refers to the ability of the firm to modify, upgrade or improve its goods and services such that they become more appealing and suitable to consumers than similar products in the markets (Parkin 2012:221). To achieve SCA in these circumstances requires that labour resources to be of superior quality to that of competitors; secondly, that technological knowhow of the firm should be more advanced; and lastly, management that requires the highest standards of excellence (Hayes & Wheelwright, 1984 and Kotha & Orne, 1989, cited in Vinayan et al. 2012:34). In addition to the product's superiority as perceived by customers, they should prove valuable to resellers' market share and profitability (Porter 1980, cited in Vinayan 2012:128).

An ex-post limit to competition refers to the ability of the firm to maintain the superior position offered by the heterogeneity of resources as discussed above. Accordingly, the strategy required is that of limiting competition from the potential entrants and existing rivals through imperfect imitability and imperfect substitution of resources (Talaja 2012:55). Imperfect imitability means that existing and potential rivals are not able to imitate the capabilities or develop resources in the same manner as the firm holding the biggest market share (Mbarki 2017:33). It is difficult to copy and mimic the capabilities and resources where there are property rights in place, information asymmetries and casual ambiguities. The other important sources of imperfect imitability relate to the high-order barriers to entry of social complexity (Rumelt & Lipmann 1982, cited in Barney et al. 2011:1301) and tacit knowledge. Social complexities stem from superior producer learning, high buyer search and switching costs, and brand reputation (Peteraf 1993, cited in Mbarki 2017:33). Tacit knowledge is generally driven by path dependence from previous learning, development, investment and asset accumulation which rivals are unable to detect and reverse engineer (Mbarki 2017:33). The other element of ex-post limits to competition originates from non-substitutability of resources. A resource becomes non-substitutable if it is irreplaceable in the production process such that any similar asset of value is incapable of providing the same results as efficiently and effectively as the original resource (Talaja 2012:54). Hence, it is important for SA OEMs to develop mechanisms that will protect their given superior position through resource inimitability and non-substitutability while abiding by the competition laws of the country and global treaties.

Resource immobility simply refers to the notion that resources are not easily traded between any competing firms, such that heterogeneity of resources persists for a long time (Kozlenkova et al. 2013:5). The underlying argument is that the market for these resources is non-existent or, in some instances, the cost of trade is very high.

Ex-ante limits to competition imply that the firm must be able to protect an established superior position. As such, the firm must have an accurate foreknowledge about the superior benefits of acquiring the unique resources and or be well funded to acquire this resource in the first place (Mbarki 2017:34). The idea is that the costs of acquisition should not outweigh the benefits such that the superior position becomes eroded. Accordingly, the four concepts are interrelated and one, on its own, cannot be a source of SCA as shown in Figure 2.1.

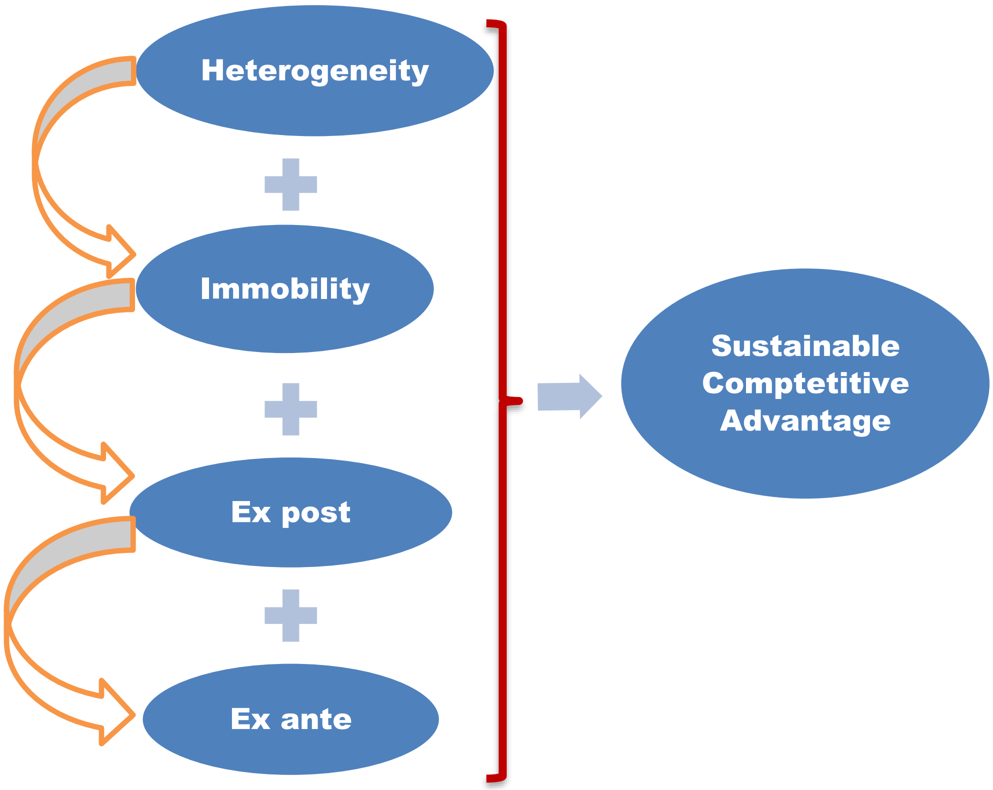

Figure 2.2: The building blocks of RBV within SCA

Source: Adapted from Talaja (2012:55) and Kozlenkova et al. (2013:3)

In summary, these conditions must be met for firms to experience SCA. Resource heterogeneity should assist in producing superior profits. Product differentiation is tied to heterogeneity in the sense that these unique products are produced using well-refined internal resources of labour, capital, technology and in-house developed processes that are imitable. Ex-post limits to competition help by defending these profits from being lost through competition. Imperfect factor mobility guarantees that important resources continue to remain within the firm and strengthens profitability over the long run. Ex-ante limits to competition prevent the costs from reversing the profits. Lastly, the approach towards superior resources implementation and the firm's capability to engender a strategy rooted in these resources should lead to resource efficiency and productivity (Peteraf, 1993, cited in Mbarki 2017:35).

2.3.3.3 Dynamic capabilities

The concept of dynamic capabilities has been explored in detail above as a building block for innovative capabilities. However, the extant literature also highlights the importance of the concept as part of the source of SCA (Makadok, 2004 in Vinayan et al. 2012:31). The argument is that dynamic capabilities of the firm can modify the static resources (i.e., RBV) to account for the constant changes in the business environment. However, Barney and Wright (2011:1304) have shown that not only does RBV lead to diffusion into other areas including dynamic capabilities, but it is also not the only source of competitive advantage. Hence, these developments are part of the broader future research in synthesising and integrating the multiple views on the sources of competitive advantage.

2.3.3.4 Blue Ocean strategy

This strategy was developed by Kim and Mauborgne (2017:130) who compared the “known” market space and the “unknown” one. The known market is considered highly competitive and crowded such that firm survival is very low (i.e., red ocean) while in the unexplored market potential for growth is huge (i.e., blue ocean). A blue ocean strategy is created when an entirely new economic activity is formed or when existing red ocean firms venture into new territories within the industry (Vinayan 2012:72).

In the motor vehicle manufacturing industry, Tesla Motors has revolutionised the electric vehicle market by focusing more on customer mobility needs (i.e., driverless mode) which rivals seem to have been unaware of (CBInsights 2020:76) This has created a high demand for Tesla models with orders outstripping supply in many regions.

The above four perspectives are summarised and synthesised below.

2.3.3.5 An appropriate perspective for the study

The above subsection has reviewed the building blocks of the SCA. The first perspective is based on the structural approach that explores the relevance of competition at an industry level. The approach has been criticised because of its inability to explain the differences in performance among firms within an industry. For the purposes of this study, the structural approach is irrelevant as it mainly focuses on broader industry rather than internal competitiveness at firm level.

The second perspective builds on the weaknesses of the structural approach by focusing on the internal strengths of a firm based on its resources. Accordingly, the resources-based theory identifies four salient features each firm must have in order to compete favourably in the long run. However, the concept has been criticised for ignoring the demand side of the market and treating consumers as homogeneous (Hinterhuber 2013:801). These mean that RBT can only be more meaningful if the resources are able to address the varying needs of customers and the targeted market is large enough. The argument is important, but consumer behaviour is difficult to predict, and markets are always contestable while resources can be controlled to a given extent.

The third perspective has explored the importance of dynamic capabilities on SCA and brings in an evolutionary nature of business environment. As mentioned above, the dynamic capability's view is an extension of RBT and together with other perspectives has become a useful tool in exploring the sources of superior profits. However, there is a lack of research on "the recognition and exploitation of opportunities" provided by the dynamic environment for a given context (Barney and Wright 2011:1309).

Lastly, the blue ocean strategy explores the development of new economic activities which rival or existing firms are unaware of. The strategy is likely to experience obstacles and bottlenecks in production that might negatively affect the company's performance and reputation. For example, the pressure to produce on a large scale to satisfy heightened customer expectations has led Tesla to miss production deadlines and fatal accidents have tarnished its reputation.

Accordingly, the study follows RBT approach to SCA as it in line with the topic of the study that seeks to explore the importance of internal resources in company performance. The next section reviews the literature on the link between innovative capability and SCA.

2.4 THE EMPIRICAL EVIDENCE ON INNOVATIVE CAPABILITY AND SCA

The main objective of this study is to examine the link between innovative capability and SCA in the South African motor vehicle manufacturing industry. To meet this objective, the above sections have provided a background on the theoretical developments on the concepts of innovative capability and SCA, respectively. Accordingly, the following subsections attempt to provide empirical evidence that had sought to address similar research questions.

Few studies have attempted to investigate this relationship from various perspectives. Some studies have examined the role mediating variables on the relationship (Anning-Dorson 2018; Teguh, Hartiwi, Ridho, Bachtiar, Synthia & Noor 2021; Yu, Zhang, Lin & Wu 2017) and other comparable studies directly linked innovative capability with SCA (AlQershi 2019; Brem, Maier & Wimschneider 2016; Mugo & Macharia 2021).

However, the empirical evidence on this topic is very limited and, in some instances, it is conceptually distinct from the focus of this study. These studies do not examine innovative capability and SCA from a dynamic capability or RBT perspective. A critical review of these studies is presented below.

2.4.1 Mediation in the Relationship Between Innovative Capability and SCA

Mediation relates to the influence of other variables on the operation of the independent variable within a given study (Sekaran & Bougie 2014:75). Anning-Dorson (2018:585) argued that organisational leadership by senior management is an important power structure necessary to assist the firm to reap the rewards of innovation. The author argued that this is exactly relevant in the context of emerging markets as power resides within top management who provide instructions unopposed because of cultural norms (Anning-Dorson 2018:587). In the context of the present study, the importance of management or leadership has been raised as part of BI that is expected within the firm regardless of the position held by an individual. Hence, the aspect of a power dynamic has not been assumed but is, instead, a supportive and reflexive approach to innovative culture within an organisation.

Anning-Dorson (2018:588) used a structured questionnaire on a seven-point Likert scale to collect data on the relationships between the three variables, namely, innovation, competitive advantage and organisational leadership. Innovation in service firms was represented by product, process and marketing; competitive advantage was accounted for through the marketing mix approach and organisational leadership was determined through the provision of adequate infrastructure and resources and employee motivation (Anning-Dorson 2018:589). The definition of innovation variables was not based on the dynamic capability's perspective but rather an ordinary capability. On the other hand, the study examined competitive advantage, not the sustainability aspect as highlighted above. Lastly, the notion of organisational leadership was examined from an entrepreneurial, supportive and reflexive approach rather the "top-down" view as rationalised in the study.

All variables were found to be valid and reliable when tested and the independent variables were robust in explaining the dependent variable for both countries (Anning-Dorson 2018:510-511). However, market innovation was found to be more significant than other variables while product innovation was more robust than process innovation in Ghana but vice versa for India (Anning-Dorson 2018:512). The results presented are warranted as within any business operation, the availability, size and breath of the market usually increases the potential for its success.

On the other hand, the mediation test on the role of organisational leadership in the relationship between innovation and competitive advantage was estimated through regression models. The test results showed that organisational leadership was acutely responsible for mediation between product innovation and competitive advantage while moderate in the relationship between process innovation and competitive advantage (Anning-Dorson 2018:514). While the results may be positive for the study, had the application of organisational leadership been applied in the manner akin to cultural dimensions of power distance, the results would have been reliable. Power distance refers to the expectance and acceptance of inequality by lower-ranking members in any setting and could have been measured using the Values Survey Module (VSM) developed by Hofstede in 1980 (Gerlach & Eriksson 2021:2). Accordingly, the effect of organisational leadership on SCA could not be accurately examined.

Other studies have examined the role of innovative capability as a mediator in the relationship between given independent variables and SCA (Teguh, Hartiwi, Ridho, Bachtiar, Synthia & Noor 2021; Yu, Zhang, Lin & Wu 2017). The difference here is that innovative capability is not an independent variable but rather an intervening one. Yu et al. (2017:2) examined the mediating role of the technologically innovative capabilities of product and process innovation on an independent variable called knowledge creation process (KPC). The authors' rationale was that KPC as a driver of SCA has not been adequately researched in the literature (Yu et al. 2017:2). The categorisation of innovative capabilities was based on 2005 Oslo Manual developed by OECD. Once again, the definition of innovative capability is not in line with the dynamic capability perspective and is examined through a limited number of concepts.

KPC was defined based on the SECI model developed by Nonaka and Takeuchi in 1995 where tacit knowledge is socialised through sharing, externalised into explicit concepts, combined with explicit knowledge to create SOPs and internationalised within the broader group setting (Yu et al. 2017:3). The idea was that KPC as determined by the SECI model will lead to the development of value within an organisation. The concept of SCA was defined by assessing the firms' ability to out-compete others based on a given set of performance indicators (Yu et al. 2017:8). Performance measurement indicators are not suitable for determining SCA as they might be inconsistent with the theoretical building blocks of RBT as discussed above (Cao, Berkeley & Finlay 2014:91).

To examine their stated objectives, the authors applied an online questionnaire to collect data from manufacturing firms in China (Yu et al. 2017:6). The 332 valid responses out of 1000 send out survey questionnaires were test for respondents' bias, common method variance (CMV), reliability as well as validity and were found to be consistent (Yu, Zhang, Lin & Wu 2017:60–69). The stated hypotheses were tested using the structural equation modelling (SEM) on the chosen variables and five out of six hypotheses were accepted by the analysis (Yu, Zhang, Lin & Wu 2017:10). The overall results showed that KPC was moderately mediated by technological innovations while there was no positive relationship between the independent variable and SCA (Yu et al. 2017:11). One can argue that this unfavourable result could be a result of model misspecification because KPC might be conflated by tacit knowledge which is a source of SCA within the KBV framework as discussed earlier. The results were also remarkable because the mediating variables were found be significantly positive on SCA. The results were the same for the following study.

Given the challenges of lack of funding, competition from globalisation and effect of Covid-19 pandemic, Teguh et al. (2021:128) examined the importance of entrepreneurial marketing as mediated by innovative capability on SCA. Entrepreneurial marketing was depicted as an unorthodox concept of recognition and exploitation of profitable opportunities through innovative practices where entrepreneurship activity is high, and marketing is low (Teguh et al. 2021:128). Innovative capability as a mediating variable was represented by the concepts of product, process and marketing (Teguh et al. 2021:128). On the other hand, SCA was built on the background of RBT, performance and dynamic capability perspectives (Teguh et al. 2021:129). The study did not elaborate on the items for each variable and as such it is difficult to discern precisely which theoretical tenets were followed.

The authors administered a questionnaire based on a five-point Likert scale to a target population of managers from SMEs in the Food and Beverages sector in the Indonesian city of Tangerang (Teguh et al. 2021:130). Both the reliability and validity tests of the measurement instrument were found to be reasonably good. To test the hypotheses, structural models estimated to test the significance of the relationship between the three variables using Smart PLS software package (Teguh et al. 2021:129). The key result from the analysis of the mediating role innovative capability within the entrepreneurial marketing and SCA relationship was found to be significant; however, the effect of independent variable on the dependent variable was found to be small (Teguh et al. 2021:132). The latter finding might be affected by the innate relationship between entrepreneurship and innovation.

The above studies have not provided a strong case for mediation approach in the research about the relationship between the main variables of this study. Accordingly, the next subsection explores studies that have attempted to examine the direct relationship between innovative capability and SCA.

2.4.2 Innovative Capability and SCA

Innovative capability has been defined and researched from various perspectives as shown above. Hence in this subsection, the discussion highlights some of the studies that have linked the two variables from different perspectives to raise awareness about the gaps in this area of research and identify the methodological approaches followed.

Ardyan, Nurtantiono and Rahmawan (2017:1115) have studied the importance of green innovative capabilities on SMEs SCA in Indonesia as a strategy for competitiveness. This study is peculiar because the theoretical building blocks on both the main variables were very distinct from what is available in the literature. Innovative capability was related to the proficiency in utilising greener production methods, creation of innovative disposal methods and development of recycled storage containers (Ardyan et al. 2017:1118). All these activities were related to the ability of the firm to care for the environment in their production processes. On the other hand, sustainability refers to the eco-friendliness of a firm when compared to its competitors, namely, environmental care, green focus and social responsibility (Ardyan et al. 2017:1118). Even though the definitions are very different from the perspectives followed in this study, they are important in highlighting the existence of diverse views on the topic.

The authors used a questionnaire to collect data on the variables of interest from a sample of SMEs business owners and managers from the cities of Java and Jogjakarta in Indonesia. The tests for reliability, validity and goodness of fit for the data were all found to be suitable and dependable for the study (Ardyan et al. 2017:1118). Four hypotheses were tested with the one of interest being about the positive and significant effect of green innovation on SCA which was found to be true. Accordingly, the conclusion was that learning driven by green innovative capabilities and proactive behaviour towards environmental issues in the production will lead to improved competitive advantage in the form of better eco-friendly practices which will attract more customers and bring profitability over rival firms (Ardyan et al. 2017:1120).

The above study has shown that the concepts of innovative capability and SCA can be defined and researched from different perspectives. However, the study lacks the dynamism aspect followed in this study and has failed to examine sustainability from the RBT view of building resources with the VRIN features. The next study examines the problem using a case study research method.

Volvo is an iconic automobile brand and its success has been examined through a case study. Netland and Aspelund (2013:1531) investigated Volvos' ability to enjoy SCA through the application of its own production (VPS). The authors argued that besides the Toyota Production System, few studies have examined the effect of other car makers' production systems on competitive advantage (Netland & Aspelund 2013:1511). By sharing their production systems in multiple locations, automakers have brought innovations and developed the capabilities of their global operations. The above approach can be evaluated from the knowledge sharing innovativeness that the study has proposed. However, the study under review does not explicitly mention that fact.

To evaluate Volvos' Production System (VPS) as a source of competitive advantage, Netland and Aspelund (2013:1519) examined Volvo's main competencies through the VRIO framework. The authors followed an exploratory analysis using interviews as a method of data collection from eleven individuals working for Volvo subsidiary five in Sweden and the Volvo Production Systems Academy and six in Gothenburg.

The results of the interviews revealed that a systematised production system is profitable and as such offered value and rarity could not be established because the VPS is not patented and only serve a cost reduction strategy (Netland & Aspelund 2013:1523). With the finding of no rarity, based on document analysis, the authors concluded that imitability was logically possible; however, they argued that the Volvo Way (i.e., inherent culture) is difficult to imitate by competitors (Netland & Aspelund 2013:1525). However, the organisational aspect of the VRIO framework could only be confirmed by Volvo's ability to defend it strategy against competition over a long time. The authors maintained that the incorporation of VPS in the company's corporate strategy and support by top management's commitment is a sign of organisational exploitation proposed by the VRIO framework (Netland & Aspelund 2013:1526).

The above study has its own limitations. It cannot be generalised to the automobile manufacturing industry as it only examined a single company. However, the use of publicly available information is unique and valuable in the presence of poor responses from online survey research. Fan and Yan (2010 132) noted that the online survey response rate was 11% lower than other modes of data collection. Furthermore, the approach was not rigorous enough because no data was analysed. The study highlighted the important aspects on innovation and SCA; however, its shortcoming is the narrow theoretical approach and meek analysis. To fill this gap, there has been an attempt to build a conceptual model of the relationships as proposed by this study.

AlQershi (2019 1) has built a conceptual model that focuses on the topic from the perspective of the manufacturing sectors. He proposed a model that can be used to evaluate the level of innovation, competitiveness and their interrelationships in Yemeni manufacturing where innovation activities are limited, and international market competitiveness is weak (AlQershi 2019:2). The model provided a few theoretical definitions of innovation and described competitive advantage from Porter's (1989) view of IO which has limitations as discussed above (AlQershi 2019 4). In the present study, a broader and advanced model has been proposed as discussed in the next section.

2.5 THE CONCEPTUAL FRAMEWORK OF THE STUDY

The objective of this study is to examine the role of innovative capability on SCA in the automobile manufacturing industry. The theoretical review has uncovered 10 variables for innovative capability while five variables were identified as drivers of SCA. Innovative capabilities follow a dynamic capabilities perspective by Teece (2007) and Teece et al. (2016). SCA is based on the RBT by Barney (1991; 1992). The expectation is that innovative capability should have a positive impact on SCA. Accordingly, the conceptual framework that underpinned this study is shown in Figure 2.1.

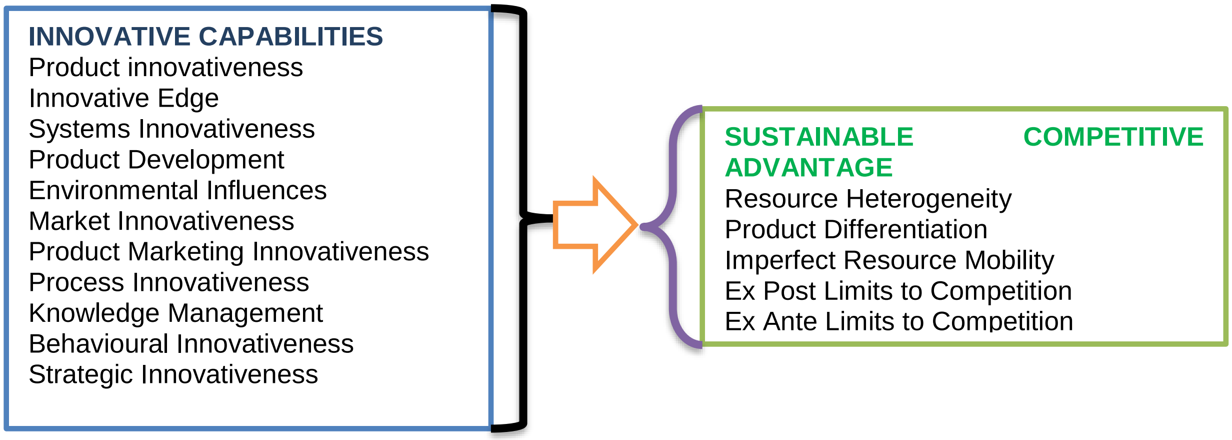

Figure 2.3: Proposed conceptual framework of the study

Source: Researcher's own creation, 2022

2.6 SUMMARY AND CONCLUSION OF THE CHAPTER

The chapter has discussed the theoretical development and empirical evidence on the main concepts relevant for this study. Innovation has been defined and differentiated with innovative capability. Innovative capability was defined in terms of the dynamic capability perspective to highlights its importance and distinct features that are peculiar to the study. Hence, a broader conceptualisation of innovative capability was presented and uncovered 10 theoretical constructs. On the other hand, competitiveness, competitive advantage, and SCA concepts were defined and differentiated to indicate each concept's relevance (or lack thereof) to the study. SCA was considered a relevant construct for the study based on RBT perspective and five salient features have been adopted as outlined above.

Lastly, the chapter critically evaluated the scant empirical evidence on the topic. The empirical evidence analysis has highlighted approaches that consider the mediating role of innovative capability on SCA. However, very few such studies have been found and their findings have shown mixed results regarding mediation. Other studies that have examined the relationship in the same manner as the current study are very few and have implausible theoretical and methodological shortcomings as highlighted above. Accordingly, the next chapter highlights methodological approach applicable in this study as informed by the broader theoretical and advanced statistical techniques presented in this chapter.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The aim of this study was to determine the key factors responsible for internal innovative capability and subsequent SCA in the motor vehicle manufacturing sector. Accordingly, this chapter outlines the method of research employed to investigate the topic of the study. The research methodology covers the research design, the development and measurement of constructs, the development of the questionnaire, sampling approach, data analysis strategy and methodology. The chapter concludes with a discussion of the ethical considerations pertinent to the study.

3.2 RESEARCH PARADIGM

A research paradigm outlines the basis of a scientific approach followed to acquire the best knowledge about the phenomena under study (Antwi & Hamza 2015:218). Scientific research may take the form of deductive or inductive reasoning, or both. Deductive reasoning (hypothetic-deductive method) examines the applicability of a general theory to a specific problem or setting, while inductive reasoning involves observation to generate a theory that explains a particular phenomenon (Sekaran & Bougie 2014:26). Both approaches follow a systematic process of arriving at a solution or a better understanding of the problem and are usually applied sequentially. The inductive approach begins with theory development, while the deductive approach consequently tests the theory being developed (Antwi & Hamza 2015:220). Accordingly, this study follows both processes by first using the exploratory method in reviewing the literature to identify existing gaps in the theory and qualitative approach through structured interviews, and second by applying a causal and quantitative approach to data analysis to test the theory.

Any scientific approach follows a particular view of knowledge acquisition called epistemology and any one or a combination of positivism, constructionism, critical realism and pragmatism perspectives may inform the research setting (Antwi & Hamza 2015:219). Positivists view the world through a cause-and-effect lens and, thus, apply a deductive approach to scientific research (Sekaran & Bougie 2014:29). On the other hand, the constructionist view is the opposite of positivism as it looks at the world in terms of how individuals make decisions in their daily lives and researchers, thus, use qualitative approaches (Sekaran & Bougie 2014:29).

Critical realism is the middle ground between the above two perspectives as it recognises that it is impossible to undercover the truth given the difficulty of measuring emotions, the subjective nature of participants and the biased behaviour of researchers. This requires a triangulated approach to better understand the world (Walliman 2011:24). Triangulation refers to the application of several theories, researchers, data sources and methods of data collection and analysis in conducting scientific research (Sekaran & Bougie 2014:104). Lastly, a pragmatic approach emphasises the importance of practicality in the generation of knowledge and, thus, sees the world from a pluralistic perspective, while still accommodating eclecticism in an evolving practical business environment (Antwi & Hamza 2015:224).

This research leaned more towards the critical and pragmatic perspectives, as it hoped to uncover the links between innovative capability and SCA, by using several approaches. Furthermore, different theoretical perspectives were critically analysed to develop the constructs that were pertinent to the topic, with the aim of offering a practical solution to management practice as per the objectives of the study. Therefore, the next subsection outlines the research design used to collect and analyse the data to address the problem of the study.

3.3 RESEARCH DESIGN

Sekaran and Bougie (2013:95) defined research design as a plan detailing how data collection, measurement and analysis will be carried out to answer the research question of the study. It provides the details of the study, which include the purpose of the study – that is whether it will be “exploratory, descriptive or causal, the extent of interference by the study leader, the setting of the study, the chosen research strategies, the unit of analysis and the time horizon” to be followed (Sekaran & Bougie 2014:95).

3.3.1 The Purpose of the Study

An exploratory study is required when little or no information is known about the topic to develop an additional theoretical framework; it is based on either secondary research like literature review or qualitative methods and formal approaches in interviews or case studies (Sekaran & Bougie 2014:97). On the other hand, descriptive studies collect data to describe the features of individuals, actions or circumstances using either qualitative or quantitative approaches and may examine the correlation among the variables of interest (Walliman 2011:10). With a causal study, a more scientific approach is implemented that seeks to determine the important factors or variables that are responsible for the problematic situation under review in the study (Sekaran & Bougie 2014:98). The research design for this study followed all three approaches.

3.3.1.1 The exploratory approach

Thus, the exploratory approach was carried out above with the review of the relevant literature on dynamic capabilities, innovation, innovative capabilities and SCA. The review of the literature assisted with linking dynamic capabilities with innovation and helped in identifying innovative capability constructs.

From the critical analysis of relevant theoretical literature, a total of 10 innovative capability concepts were identified in the extant literature. On the other hand, five perspectives on SCA were discussed and synthesised. The RBT of SCA was chosen as the most appropriate perspective, as it deals with the internal issues faced by companies as per the objective of this study. From a critical evaluation of RBT, four concepts on SCA were identified.

The last part of the review of the empirical literature critically evaluated the link between innovative capability and SCA. This uncovered scant empirical evidence on the topic and found that there were different conclusions about the mediating role of innovative capability. Studies that attempted to link the two variables were few and revealed certain implausible theoretical and methodological deficiencies as highlighted above.

3.3.1.2 The descriptive approach

The descriptive part of the research covered both preliminary and empirical data analysis. The first part was aimed at examining the status of innovation in the motor vehicle manufacturing industry through a trend analysis using the South African Business Innovation Survey published by the HSRC. However, the HSRC could not provide the data to the level of detail required by the study because of the risk of exposure of confidential information about the motor manufacturing firms that participated in the survey (YB 2021 personal email conversation 2 December)[7]. The HSRC survey provided information about innovation activities based on the Oslo Manual definitions (HSRC 2019:4). Four categories of innovation, namely, product, process, marketing and organisational were examined in the report. The results from the reports published for the periods 2005–2007, 2010–2012 and 2014–2016 were used to analyse innovation activities within the manufacturing sector in general. Accordingly, given the technological advances in motor vehicle manufacturing and its overall contribution, an analysis of the entire industry provided a suitable representation of the innovation activities of OEMs in South Africa. This analysis was important in answering the first research question on the presence of innovation in the sector in general.

3.3.1.3 A mixed design approach

To facilitate the second part of the descriptive analysis and answer both the first, second and third research questions, a mixed design approach was followed. The first approach followed a quantitative approach, where a structured survey questionnaire was administered to individual professionals sourced by the researcher through a private database. It should be noted that the initial target population of seven OEMs did not provide adequate and usable data because of non-response. The next target population appropriate for the study was the motor vehicle component manufacturers and suppliers in South Africa[8]. This group also did not provide adequate results useful for analysis. However, the survey questionnaire was important in identifying the innovative capabilities

[7] A copy of the email conversation is attached in the appendix.
[8] In addition, a request to source information from members of the South African Guild of Mobility Journalists (SAGMJ) was not accepted.

and SCA attributes as defined above. Cronbach's alpha calculations were carried out for each of the concepts to determine validity. The strength of the association between innovativeness and SCA was tested using the Pearson correlation statistic (r) due to the inadequate survey results. To answer the third research question, an inferential analysis could not be carried out to examine the cause-effect relationship between innovative capabilities and SCA due to inadequate data points from the survey. To augment the analysis, a qualitative approach was developed. Hence, the second approach followed a qualitative design, where structured interviews were conducted with 30 individuals who were employees and owners of independent motor vehicle manufacturers. The structured interviews assisted the researcher in obtaining more information about the topic of the study and augmenting the results of the quantitative design. Research design also looks at the extent of control and influence of the study by the primary researcher.

3.3.2 Interference by the Study Leader

The issue of interference by the primary researcher depends on the nature of the study in relation to it being either correlational or casual. A correlational study is where there is little or minimal interference by the researcher in the natural environment of the phenomena under review (Sekaran & Bougie 2014:99). Hence, there was minimal interference when both the interview questions and survey questionnaires were distributed via email to the participants because the researcher did not disrupt the participants from their daily routines or normal workflow to complete the questionnaire.

On the other hand, causal studies involve moderate to excessive interference by the researcher because the researcher attempts to manipulate certain aspects (i.e. independent variables) of the study to examine their overall influence on the phenomenon (dependent variable) under review (Walliman 2011:168). Even though this study also followed a causal approach, there was neither moderate nor excessive interference on the variables, as none of the participants or variables was changed to obtain a certain desired outcome.

3.3.3 The Study Setting

A study setting refers to the nature of the location from which the research is being conducted (Sekaran & Bougie 2014:100). As shown above, research can be conducted in a normal setting or an artificial setting. A normal setting is referred to as non-contrived because the study proceeds without interference within the usual environment, while an artificial setting is called contrived because the environment is being manipulated to some extent by the researcher (Sekaran & Bougie 2014:100). Accordingly, this study was based on a non-contrived setting as it was carried out under a normal setting, with respondents being asked to answer a set of structured questions in their own natural environment. Hence, this was a field study as it attempted to examine the correlations between variables of interest without changing the participants' setting.

3.3.4 The Research Strategy

A research strategy provides a description of the different types of approaches applied in a study to collect the relevant information required for the analysis in answering the research questions (Sekaran & Bougie 2014:102). The most common types of research strategies are "experiments, surveys, observation, case studies, grounded theory, action research and mixed methods".

This study followed a survey approach as this type of approach is mostly applied in business research; it is applicable to one-time studies and is resource-use efficient (Sekaran & Bougie 2014:102). The survey strategy allowed for the collection of data using structured interviews to acquire relevant information for the study. In addition, questionnaires are suitable for coding the results and simplifying the subsequent process of statistical analysis. Hence, the survey methodology applied in this study used both quantitative and qualitative methods of data collection.

3.3.5 The Unit of Analysis

The unit of analysis is the level of data aggregation required to conduct data analysis based on the nature of the research question (Sekaran & Bougie 2014:104). This may take the form of an individual, dyads, groups, organisations or countries. An individual is used as a unit of analysis if the research question is, for instance, about employees in an organisation who would in turn be the main source of data. If the research question is about an interaction or relationship between any two individuals, dyads would be the appropriate source of data. Researchers may also be interested in group dynamics, in which case a group's overall response becomes the main source of data. Organisations may become a unit of analysis where the various divisions are compared and analysed. Lastly, countries become units of analysis where a comparison of a certain behaviour or event is carried out to study the differences between nations.

This study examined the nature of innovative capability in the automobile manufacturing industry as well as its implications for SCA. The data from the individual employees of the automobile manufacturers was aggregated to the sector or industry level for the purposes of analysis. Accordingly, the unit of analysis of this study was the automobile manufacturing industry.

3.3.6 The Time Horizon

The time horizon of the study is based on the length of time taken to collect the relevant data. A cross-sectional or one-time study allows for a period of a few days, weeks or months for data collection to be completed (Sekaran & Bougie 2014:106). The opposite is true of a longitudinal study for which the time horizon for data collection is at different points in time (Walliman 2011:78). Accordingly, the cross-sectional time horizon is appropriate for field studies because of cost constraints, while experimental designs are longitudinal as they examine the cause and effects of relationships over time.

This study followed a one-time approach as the data collection was set for three months to complete a questionnaire that was administered online to reduce effort and save on costs. However, data collection ultimately took approximately 24 months because of the challenges brought by the Covid-19 pandemic. During the period of data collection, which started in February 2019 and ended in September 2021, South Africa had four lockdowns ranging from the most restrictive (alert levels 5, 4 and 3) that lasted for eight months and less restrictive (alert levels 2 and 1) that lasted for four months and became restrictive again from 16 June 2021 to 12 September 2021 (www.gov.za)[9]. This forced most of the companies to have their employees work remotely and the employees were subsequently not readily available to complete the questionnaire. This inaccessibility to respondents and poor response led to the use of structured interviews to augment the results of quantitative analysis, as mentioned earlier.

3.4 RE-STATEMENT OF RESEARCH OBJECTIVES

Research objectives express in a clear and concise manner the purpose of the study (Sekaran & Bougie 2014:38). Based on the purpose of this study and the problem statement, the main objective was as follows:

3.4.1 Primary Objective

The primary objective was to investigate the role of internal innovative capabilities in fostering SCA in the South African motor vehicle manufacturing sector.

Accordingly, the following secondary objectives were developed to address the research questions of the study:

3.4.2 Secondary Objectives

- To examine the role of innovative activities in the motor vehicle manufacturing sector.
- To examine the impact of innovative activities on the South African motor manufacturing sector.
- To identify the key internal capabilities that impact on the innovativeness in the South African motor manufacturing sector.
- To identify the key internal innovative capabilities that impact on the SCA in the South African motor manufacturing sector.
- To investigate the relationship between internal innovative capabilities and SCA in SA motor vehicle manufacturing.
- To recommend the best innovative strategies for OEMs to stay sustainable and competitive.

[9] See Appendix B for a summary of the effect lockdown restrictions in South Africa on the study.

To facilitate the process of addressing the research objectives, a survey strategy was appropriate for the study as outlined below.

3.5 THE SURVEY STRATEGY

As mentioned in the section on research design above, this study followed a survey approach to collect the data. The survey method was effective in answering questions 3, 4 and 5 of the study and addressed the related objectives as stated above. The information collected through the survey was analysed using both qualitative and quantitative approaches. As mentioned before, a survey method is suitable for collecting quantitative data in deductive causal studies (Sekaran & Bougie 2014:26).

This study followed a survey strategy that allowed for a systematic and instantaneous examination of multiple variables. The first part of the survey work took the format of an online self-administered questionnaire that was sent to a selected group of professionals. Initially, the study targeted a larger population in the automobile manufacturing industry, from which an adequate sample could be selected, allowing for the generalisation and replicability of the results to similar settings. However, the results from the survey of OEMs and components manufacturers, respectively, were inadequate to conduct any meaningful analysis. Survey research was appropriate in this study by capturing the often-subjective perceptions and attitudes of participants efficiently and thus assisted the operationalisation process as outlined above. A survey format data collection approach can be administered more quickly and easily by electronic means, saving time and costs, and can be distributed widely to geographically dispersed audiences (Fan & Yan 2010:137). Finally, an interview process took place where a selected group of participants answered carefully structured questions about the topic.

A survey is also valuable in assessing the accuracy of the measurement items developed, as stated earlier. The choice of this method is influenced by its scientific rigour, as is evident from the sampling approach which targets individuals across a broad spectrum of organisational levels. For this study, the survey was emailed to the respondents for self-administration to collect data to examine the relationships among the concepts and address the research objectives.

The concepts of innovative capability and SCA are key to corporations and business units alike and thus require the knowledge of key personnel. Hence, the main unit of analysis in this study was the automobile component manufacturing companies where the targeted audience was top management and expert professionals or specialists who were assumed to have a better awareness and knowledge about the concepts and their applicability in their organisations.

Accordingly, the next section briefly describes the process of gathering the data required in answering the research questions.

3.6 DATA COLLECTION METHODS

Data collection comprises various methods whose objective is to gather information for the analysis required to answer the research questions. Accordingly, in this study, personal interviews and questionnaires were used.

3.6.1 Interviews

This approach to data collection is critical for the exploratory part of the study, as it informs the theoretical development and assists with data collection. Interviews can take an unstructured or structured form and can be administered via telephone, online or in person (Sekaran & Bougie 2014:118). Unstructured interviews take place where the researcher has no planned questions to conduct the interview and aims to establish the pertinent themes that require a comprehensive investigation of the topic at hand (Sekaran & Bougie 2014:118). On the other hand, structured interviews are on the opposite end of the spectrum, where the researcher has planned questions to conduct the interview and concentrates on the issues that are important for the topic (Sekaran & Bougie 2014:118). This study followed the structured interview approach because the information required is already known to the researcher based on the literature review presented above.

3.6.1.1 Structured interview strategy

A structured interview requires that the researcher pay attention to the responses of the participants and writes down important points relevant to the study. Accordingly, in this study, the researcher asked questions in a similar way to all respondents; however, where appropriate, a different approach was followed to discover new information. The researcher first asked the questions as outlined in the interview list and where answers were unclear, the respondents were encouraged to elaborate. The interviews were closed once an adequate number of interviews were completed and the relevant information was obtained. The information was organised in a tabular format and analysed to answer the research questions as discussed in Section 3.10 below. The following techniques were applied to reduce bias during the interview phase.

Unbiased questioning procedures

Bias takes place when there are factual errors in the information collected (Antwi & Hamza 2015:221). The bias is made possible by mistakes that can be made by the interviewer, the respondent or the prevailing conditions during the time of the interview. Hence, a proper rapport must be established between the interviewer and interviewee to avoid misinterpretations of answers, body language and facial expressions. Certain conditions can bias the responses where the interviewee is unavailable because of time, lack of interest or uncomfortable location (Sekaran & Bougie 2014:121). To establish rapport, the following approaches are recommended:

- Use a funnelling technique to obtain a broad understanding of the issues.
- Ask unbiased questions to eliminate interviewers' views and avoid guided answers.
- Rephrase the answers to clarify the information provided by the interviewee.
- Restate the question to make it simpler for the participant.
- Take notes as much as possible to avoid errors from answers based on memory.

The above techniques help in reducing errors in the responses and are valuable when conducting various types of interviews.

3.6.1.2 Interviewing methods

The approaches to conducting either unstructured or structured interviews depend on the complexity of information required, the length of the interview, the availability (i.e., convenience) of participants and researcher, and "the geographical area covered by the survey" (Sekaran & Bougie 2014:123). These issues are discussed below with reference to the following methods of conducting interviews.

Face-to-face and telephonic interviews

In business research, unstructured interviews are often conducted face-to-face because of the method of acquiring information applied. On the other hand, structured interviews are conducted because the information required is already known.

Face-to-face interviews have the advantage of allowing flexibility in asking questions to ensure that the information offered is clear. In addition, the interviewer can see the interviewee's body language to ascertain the veracity of what is said. The disadvantages include the logistical requirements and costs associated with visiting sparse geographical areas when conducting face-to-face interviews (Sekaran & Bougie 2014:124).

Telephonic interviews work well in accessing many respondents as quickly as possible while reducing any uneasiness associated with face-to-face interviews. On the other hand, a telephonic interview can easily be terminated by the respondent without notice and their body language cannot be interpreted to determine the success of the interview (Sekaran & Bougie 2014:124).

Computer-assisted interviews

Computer-assisted interviews are based on software packages that assist interviewees to complete the questions on a computer, laptop, tablet or any other handheld device (Sreejesh, Mohapatra & Anusree 2014:10). With the programming involved, accuracy is enhanced and interviewer bias is greatly reduced (Sekaran & Bougie 2014:124). CATI (computer-assisted telephonic interview) and CAPI (computer-assisted personal interview) interviewing programmes are available, and both require investment in expensive hardware and software as well as competency in the use of computer (and related) devices (Sekaran & Bougie 2014:125). These software packages are quick, accurate and simplify data analysis, but can be costly as indicated above.

The above subsection outlines the methods of interviews and the types of approaches available to the researcher. Accordingly, in this study, structured interviews were applied and data was collected via online tools as the respondents were sparsely located.

3.6.3 Measures of Goodness of Fit

The measures developed to test the accuracy of instruments ensure that the operational definitions have covered all relevant dimensions and the scales selected are faultless. The accuracy of the instruments is important for the quality of the research and its results.

3.6.3.1 Item analysis

Item analysis ensures that the items in the instrument are indeed correctly placed. Every item or dimension is tested for its capacity to differentiate between participants who score the highest against those who score the lowest. A test of significance is then carried out to determine if the differences between the two groups are of any importance (Sekaran & Bougie 2014:225). The items with high test statistics will be eventually included in the instrument.

3.6.3.2 Validity

Validity testing aims to ensure that the instrument used to collect the data is measuring the concept as intended (Sekaran & Bougie 2014:225). The following three broad validity measures are applied in research.

- Content validity – looks at the adequacy and representability of the items that measure the concept. A panel of experts or face value can be used to test content validity.
- Criterion-related validity – is applicable where the measure can correctly differentiate responses between two different responses. In concurrent validity, the scale can distinguish between respondents who are different. On the other hand, predictive validity ensures that the instrument can differentiate participants based on a futuristic notion.
- Construct validity – examines the ability of the instruments to measure the theoretical concepts underlying the research. Convergent validity is established when the scores from two different instruments assessing the same concepts are associated. The

opposite happens under discriminant validity because the scores are unrelated as expected.

Note that correlations analysis is usually carried out to test for criterion-related and construct validity, respectively.

3.6.3.3 Reliability

Reliability is related to validity in that a measure's goodness of fit is determined by both tests and not one without the other. Hence, reliability examines the stability and consistency of the measurement over time and for all items found in the instrument (Sekaran & Bougie 2014:228). Stability refers to the ability of the instrument to measure the concept in the same manner regardless of when it is applied. Test-retest and parallel-form reliability are stability tests applicable where in the former questionnaires are administered to the same respondents at different points in time and for the latter, the wording or ordering of items is changed to establish correlation (Sekaran & Bougie 2014:229).

Internal consistency refers to the ability of the items to independently measure the concepts as determined through interim consistency and split-half reliability tests (Sekaran & Bougie 2014:229). Interim consistency tests for the similarity of responses to all items that measure a concept and is determined using a Cronbach's alpha statistic. Split-half reliability tests for consistency of responses among two halves of an instrument (Sekaran & Bougie 2014:229). This study has applied Cronbach's alpha to measure the reliability of the questionnaire because the test is unbiased to prevailing conditions and more adequate (Sreejesh et al. 2014:116).

3.6.4 Questionnaires

Questionnaire design is critical in the collection of data from the respondents and certain rules must be followed to reduce respondent bias and minimise measurement errors. In some instances, the set questionnaire may be pretested to eliminate any ambiguities or grammatical errors which help in resolving any inadequacies and thus reduce respondents' bias.

3.6.4.1 Questionnaire design

A questionnaire was defined by Hague and Jackson (1976, cited in Tustin, Ligthelm, Martins & Van Wyk 2010:385) as an instrument with a predetermined series of questions designed to elicit information from respondents. As mentioned before in the justification of the choice of the survey strategy, questionnaires are an easy and cost-effective way to collect data for descriptive and explanatory research. However, they are prone to non-response and non-response errors (Sekaran & Bougie 2014:147).

Questionnaires can take two forms, namely personally administered or mailed (electronic) questionnaires. Personally administered questionnaires work better if a researcher is focused on a small area and data collection can be done very quickly (Walliman 2011:97). However, a bias might be introduced when the researcher provides contradictory messages to various respondents, and it takes time and effort to administer questionnaires. On the other hand, mail and electronic questionnaires can cover a vast area and offer convenience to respondents (Sreejesh et al. 2014:11). However, turnaround times are quite slow (follow-ups can assist) and may require computer knowledge (Sekaran & Bougie 2014:148). To facilitate questionnaire development, some guidelines in terms of the wording, measurements and appearance apply.

Wording

The wording of a questionnaire refers to the content, language, question types or form, their sequencing and the type of data required from the respondents (Sekaran & Bougie 2014:149). In this study, the content of the questionnaire was such that the dimensions and elements being measured were of a subjective kind and required clear wording for respondents to understand. The questions applied in this research were closed questions which offered respondents alternative options to select their choice based on a 6-point Likert scale, which assisted coding during the subsequent data analysis (Walliman 2011:97). Care was taken to include both positively and negatively worded questions, and avoid any double-barrelled, ambiguous, leading, loaded, socially undesirable and lengthy questions in the questionnaire to reduce respondents' burden and bias (Sreejesh et al. 2014:148). The sequencing of the questions was developed in such a way that the easy questions were asked first, followed by the more difficult ones – a funnel approach suggested by Festinger and Katz (1996, cited in Sekaran & Bougie 2014:152). Demographic questions were placed at the end to give more time to respondents to complete the critical sections of the questionnaire and served only to provide details about the salient features of the sample population.

Measurement

The measurements used are expected to be appropriate to assist in answering the research questions of the study. This includes the scales and related techniques as required by the type of data to be collected and the "goodness of fit" measures necessary to test the validity and reliability of the data collected. This study used the interval scale as it is suitable for quantitative data and is appropriate for computing the relevant statistics (i.e. mean and standard deviations) that measure the extent of the differences in the participants' preferences regarding a particular variable or concept (Antwi & Hamza 2015:223).

Hence, this study used a 6-point Likert scale (with no neutral options) because the respondents were mostly experts in their field and were less likely not to be knowledgeable about the topic. The researcher believed that neutral options would be less useful in this case. On the other hand, higher point scales have been found to add no value to the analysis (Sekaran & Bougie 2014:215). Furthermore, a Likert scale allows for analysis on an individual dimension as well as in summative format for a given concept (Sreejesh et al. 2014:114). The Likert scale used in this study examined the extent to which the participants agreed or disagreed with the statements as shown in Table 3.1.

Table 3.1: 6-point Likert scale

Strongly Disagree	**Disagree**	**Slightly Disagree**	**Slightly Agree**	**Agree**	**Strongly Agree**

The above scales were applied to individual items to examine the participants' attitudes to statements that measured the concepts of innovative capability and SCA respectively.

Appearance

The presentation of the questionnaire is also critical for an inviting look and ease of completion (Sekaran & Bougie 2014:154). The questionnaire for this study started with an introduction that presented what the study is about, described its purpose, cordially invited participants to complete the questions and concluded with a note of appreciation for taking their time to complete the survey.

The body of the questionnaire was structured in such a way that the questions flowed in a sequence, were arranged carefully and the instructions were clear. The questionnaire was divided into three sections and a brief guide was provided to give clear instructions on how to complete it. This made it easy for the respondents to complete the questions and minimised the completion time (Fan & Yan 2010:132).

3.6.4.2 Questionnaire testing and piloting

Testing and piloting of the survey instrument are carried out to confirm that the questions are clear in terms of wording and measure the concepts as expected (Tustin et al. 2010:413). To ensure that the questionnaire of this study was unambiguous and to reduce respondent bias, a pilot test was conducted.

Piloting

The questionnaire was emailed to a group of six experts with various backgrounds, namely one educational consultant, three newly qualified PhD researchers and two statistical consultants. EvaSys electronic distribution software was used to administer the questionnaire to the group via email[10]. The response rate was 67%, reflecting that only four people responded to the pilot survey questionnaire. The choice of participants was varied and included an educational consultant based on their extensive knowledge in PhD supervision; recent PhD researchers were helpful in identifying any similar problems that they may have encountered in their studies; and statistical consultants who could identify weaknesses in the questionnaire.

[10] The EvaSys is a web-based software for automation of surveys, research projects and evaluations and has licensed to the University of Free State for use by students and faculty.

The feedback from the experts pointed out a few language issues as well rephrasing of some of the dimensions to reduce ambiguity. The inclusion of an item about the hiring of a product development manager was highlighted by one of the experts as being unimportant. The comments from the participants were used to make improvements to the questionnaire.

Testing

The aim of the test was to examine the efficacy of the instrument in measuring the constructs. Computer statistical analysis software (SPSS) was used to load, clean and analyse the data to generate the relevant statistical tests. Hence, a construct validity test based on Cronbach's alpha, which examines the degree of correlation between the dimensions that describe the concepts, was conducted. The results of the test are provided in Section 3.7 below.

The above subsection describes the methods of data collection applicable in the measurement of the main variables of the study. Accordingly, the next section explains the process of rendering these variables measurable.

3.7 DEVELOPMENT OF CONSTRUCTS AND OPERATIONALISATION

An important element of research is the measurement of the abstract and sometimes subjective inputs of the participants. This process involves the allocation of numerical or symbols to the features or attributes of the items under study (Antwi & Hamza 2015:223). In this case, the study looked at measuring the innovative capability (attribute) of companies (objects) within the automobile manufacturing sector. Once the characteristics and objects were identified, the next step was to find a judge. Sekaran and Bougie (2013:198) refer to a judge as an entity that has the expertise or knowledge to provide answers to the abstract phenomena under study. While the judge may be able to provide the relevant information, the measurement may be difficult because of the subjective nature of individuals.

The solution to this problem is through the operationalisation of the concepts or constructs. This involves dividing the abstract into noticeable activities or properties that can be measured (Walliman 2011:35). The noticeable actions or behaviour are referred to as dimensions and are usually transformed into recognisable and quantifiable elements from which an index of measurement of the construct is derived. The steps required to develop these measurements are shown in Figure 3.1.

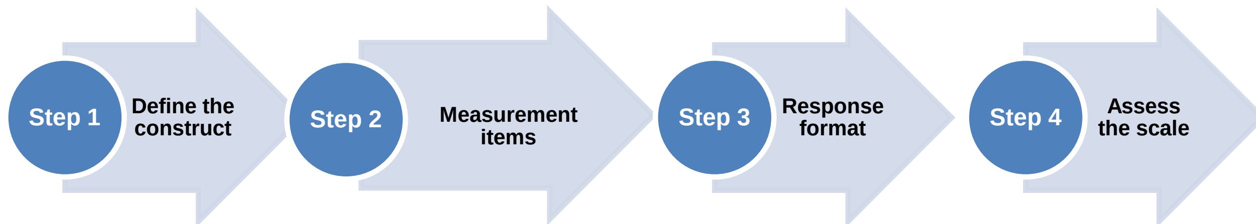

Figure 3.1: Operationalising a concept

Source: Sekaran and Bougie (2013:200)

The above steps provide a structure for developing measurements for variables through operationalisation. The concepts are firstly defined based on the descriptive and critical analysis of extant literature. Once a working definition as per the objective of the study is identified, the concept is categorised into noticeable properties (i.e., measurement items or dimensions) that can be quantified. In the third step, the attributes are assigned a relevant scale to examine the differences between the opinions of the respondents about the concepts of the study and, finally, the scale is tested for "measurement of fitness" before the survey questionnaire is administered (Sekaran & Bougie 2014:225). It is also important that the items are assessed to confirm that the number of items is adequate for the given variables (constructs) using EFA tools. Notably, each concept can be explained by a minimum of three or four dimensions at any given time (Vinayan 2012:116).

The next section will provide a brief description of the process followed in developing the measurement variables of this study.

3.7.1 Operationalisation of Innovative Capability Construct

Innovative capability has been defined above as the ability of the firm to generate new products based on its internal and external strengths (Kim, S 2013:8). The literature review process revealed 11 dimensions and 73 elements for the concept of innovative capability. Table 3.2 provides a summary of the existing dimensions and the number of newly constructed (*) as well as existing elements in the literature.

Table 3.2: Existing dimensions and their elements for innovative capability

Product innovativeness		***Process innovativeness***		***Marketing innovativeness***		***Strategic innovativeness***		***BI***	
0*	**4**	**6***	**3**	**5***	**4**	**6***	**3**	**6***	**4**

As shown in Table 3.1, there are five existing dimensions (i.e., 18 existing elements) as per extant literature (Bhupendra & Sangle 2015; Lin et al. 2010; Wang & Ahmed 2007) from which 23 new elements were created (Balsmeier & Buchwald 2015; Arvanitis & Tobias 2012). It can be noted that Wang and Ahmed (2007) tested and found that the five dimensions are valid for the measurement of the construct.

On the other hand, Table 3.3 shows the newly constructed dimensions and elements.

Table 3.3: New dimensions and their elements for innovative capability

IE*	***Systems innovative****	***Product development****	***Environmental innovativeness****	***Product marketing****	***Knowledge management****
4*	**4***	**10***	**5***	**6***	**3***

As shown in Table 3.2, six more dimensions (**) were created based on the current empirical research from which 32 new elements (*) were created (Kang & Kang 2014; Pedron et al. 2019; Parida 2008; Shigeno et al. 2017; Teece 2017; Talay et al. 2014; Ulah et al. 2017).

Accordingly, innovative capability is based on 11 dimensions in which there are 18 existing elements, and 53 new ones were developed. See Appendix A2 for the questionnaire with a list of all dimensions and elements under innovative capability.

3.7.2 Operationalisation of the Sustainable Competitive Advantage Construct

SCA is the ability of the firm to exclusively develop a value-enhancing strategy that existing and future rivals cannot replicate (Kabue & Kilika 2016:99; Vinayan et al.

2012:30). For SCA, the literature search revealed five dimensions and 29 elements. In this case, there are no new dimensions, but an augmentation of elements as shown in Table 3.4.

Table 3.4: Dimensions and elements of SCA

Resource heterogeneity	***Product differentiation***	***Resource immobility***	***Ex-post limit to competition***	***Ex-ante limit to competition***
7	**7**	**3**	**7**	**4**

As shown in Table 3.4, there are five existing dimensions as per extant literature from which 29 elements were created (Barney et al. 2011; Kozlenkova et al. 2013; Maritan & Peteraf 2011; Mbarki 2017). While there are various perspectives on SCA as per the above literature review (Vinayan 2012:32), this study follows the extended RBT developed by Peteraf in 1993 (cited in Talaja 2012:52). This perspective is in line with the focus on the importance of internal resources in this study.

3.7.3 Pretesting and Piloting the Questionnaire

A pretesting of a questionnaire is necessary in identifying and obtaining appropriate responses, while revealing any confusing words or errors prior to carrying out the actual survey (Walliman 2011: 98). The initial 82 dimensions' survey questionnaire was electronically administered to six experts with diverse knowledge on research methods. The experts were requested to critically evaluate the suitability, the relevance and the simplicity of understanding all 82 dimensions. In addition, the respondents were asked to recognise any difficulties with phrasing, problems with double-barrelled questions, guiding questions and biasness (Sreejesh et al. 2014:158).

The results of the validity and reliability of the pilot test are summarised in Table 3.5.

Table 3.5: Pilot test summary results

Dimensions	Cronbach's Alpha	Number of Items
Product Innovativeness	0,967	4
IE	0,971	5
Systems Innovativeness	0,901	4
PDI	0,992	9
Environmental Innovativeness	0,995	5
Marketing Innovativeness	0,810	7
PMI	0,801	6
Process Innovativeness	0,980	9
Knowledge Marketing Innovativeness	0,995	3
BI	0,997	10
Strategic Innovativeness	0,995	8
Resource Heterogeneity	1,000	6
Product Differentiation	0,975	7
Imperfect Resources Mobility	1,000	3
Ex-Post Limits to Competition	0,958	7
Ex-Ante Limits to Competition	0,990	4

Source: Researcher's own creation, 2022

The results show that all dimensions developed are reliable and indicate that the questionnaire is suitable for conducting the survey for the study.

The next section briefly discusses the different types of scales and measurements of the goodness of fit applied for the above variables.

3.8 MEASUREMENT SCALES AND GOODNESS OF FIT

The previous section outlined the method of transforming the abstract theory into measurable activities; this section outlines the process of assigning numbers and symbols to the subjective views of respondents. The numbers and symbols or scales are pertinent in the computation of statistical analysis and the interpretation of research results. In addition, the measures of the goodness of fit ensure that the instrument (i.e. questionnaires) has captured the variable(s) accurately.

3.8.1 Types of Scales

A scale is a way of measuring the diverse responses or views of candidates for a given study (Sekaran & Bougie 2014:211). Scaling requires assigning numbers to the various attributes or subjective responses of individuals to a questionnaire. This process requires the knowledge and choice of the type of scale for the research study. The four types of scales are briefly discussed below.

Nominal scale

A nominal scale is used to classify the respondents in a study into categories or groups (Sekaran & Bougie 2014:212). In this study, the subjects were classified into three categories to describe the variable for gender – i.e. male, female and other. The three categories were allocated the numbers 1, 2 and 3, respectively. This type of classification leads to mutually exclusive and collectively exhaustive categories that allow for the calculation of frequency distributions for subjects in the study (Sekaran & Bougie 2014:212).

Ordinal scale

An ordinal scale is an improvement on the nominal scale as it classifies the variables into different categories that can be ranked in a particular order (Sekaran & Bougie 2014:213). For this study, the ordinal scale was not applied in its purest form, as there were no variables that required the categorisation based on the order of importance. An ordinal scale provides a categorisation that allows for ordering preferences; however, it does not specify the degree of the differences in the rankings.

Interval scale

An interval scale provides information than can be used to compute important statistics for the data collected from research subjects (Sekaran & Bougie 2014:214). The computed statistics are important in measuring the degree of the differences in the responses of the respondents. Hence, it is an improvement on the nominal scale and an ordinal scale by applying several points on a scale that shows the degree of importance for each of the choice options. This study has applied a 7-point scale to determine the magnitude of the respondents' differences for a given number of statements that measure each variable or construct. This scale offers more value as it allows for the measurements of an arithmetic mean, a range, the standard deviation and the variance.

Ratio scale

The ratio scale is also an improvement on an interval scale because it starts the count from zero (0) and not one (1); which is said to be "a meaningful measurement point" (Sekaran & Bougie 2014:215). The ratio scale extends an interval scale by showing the relative sizes of the differences for a particular category and as such, it is the most effective among the four scales because of its statistical power.

It should be noted that this study chose the interval scale as it is appropriate and relevant for the measurement of variables in this study, as discussed further below.

3.8.2 Rating and Ranking Scales

Rating scales are mainly applied where each item is measured separately from other items in the study (Sekaran & Bougie 2014:218). On the other hand, ranking scales have become important in extracting the order of preferences by respondents for a given number of items in a study (Sekaran & Bougie 2014:223). This study uses a Likert scale where respondents express how strongly they agree or disagree with a given statement on a 5-point scale.

Once scaling and rating have been determined, the next step is to ensure that the data collection instruments measure the concepts and variables accurately.

3.9 SAMPLING

This section provides details about the sampling method and data collection instrument applied in this study.

3.9.1 The Target Population and Sampling Frame

Population is defined as the "whole group of people, events or things that the researcher wishes to investigate" (Sekaran & Bougie 2014:397). Accordingly, in this study, the unit of analysis is an organisation. This study aimed to examine the role of internal innovative capability plays in a SCA in the motor vehicle manufacturing sector. Accordingly, the initial target population were the employees of car and light commercial motor vehicle manufacturing companies in South Africa. This motor vehicle segment is composed of seven companies out of 42 members of NAAMSA. Other members of NAAMSA include 21 importers and distributors and 14 heavy commercial and bus manufacturers. The latest NAAMSA Quarterly Review shows that the motor manufacturing industry in South Africa employs 34 300 workers (NAAMSA 2022: 1).

The above target population did not yield the desired data points because of an inability to access the potential candidates.[11] Subsequent to the start of data collection, national lockdown was instituted because of the Covid-19 pandemic. This made it difficult to get hold of the potential respondents as the majority left offices to work from home. Those that were willing to take the survey expressed their need to rather focus on company work than other activities given the challenges of hybrid working mode. Hence, the next strategy involved examining the adjacent population target. Accordingly, the next target population was the motor vehicle component manufacturers in South Africa. The sample size was determined from the members of the NAACAM. NAACAM is an association of component manufacturers and suppliers in the automobile sector and was established in 1980 to represent the interests of its members at local and international levels (NAACAM 2020:14). The target population were the Tier 1 component manufacturers and suppliers shown in Table 3.6. Note that the table lists the number of individual member companies and employment calculated using the information from the 2020 NAACAM Business Guide.

[11] The results of the questionnaire administration to NAAMSA members are shown in Appendix C.

Table 3.6: Categories of NAACAM members

Tier	Classification	Brief description	Number of firms
1	A	Manufacture and supply to seven OEMs only	97
	B	Manufacture and supply to OEMs and aftermarket components	
2	C	Manufacturers of accessories and replacement parts	25
	D	Manufacturers of allied products supplied to vehicle assembly plants and other sectors of the industry	
3	E	Suppliers of support products to the motor industry	5

Source: NAACAM (2020)

Table 3.6 provided the basis for the sampling frame for this target population. A sampling frame is a list of “all the elements in the population from which a sample will be drawn” (Sekaran & Bougie 2014:425). Accordingly, the sampling frame was all the business firms that are members of NAACAM who supply or manufacture vehicle components directly to the seven OEMs and aftermarket components. This sampling frame was applied in the determination of the sample for the study to represent the automobile manufacturing industry. The original equipment suppliers (OES) provide a better representation for the sector because the products they produce must meet the specific standards required by the local and international OEMs. Hence, their design and innovative capabilities must be on par with that of OEMs (Ambe & Badenhorst-Wess 2013:1).

The final target population were the professionals who have an informed and respected wealth of general knowledge with regard to South African motoring. This target population of 560 individuals was recruited from the researchers’ LinkedIn network of professionals who hold both engineering and MBA degrees. The engineering background has become important in answering the technical questions from the survey and the MBA qualification equips the participants with knowledge and understanding of the concept of SCA. Sigalas (2015:2011) has shown that many practising managers with a background in business education understand the concept from the RBV perspective of strategic management.

To augment the results from the survey questionnaire, a qualitative methodology was also followed via the development of structured interview questions administered to independent local automobile manufacturers. The independent automobile manufacturers include locally owned assembly plants that produce passenger, commercial and other transport equipment[12] on a limited scale when compared to the large multinational plants. The criteria for inclusion are independence and small-scale output (less than 1 000 units per year); these automobile manufacturers must also be locally owned. The target population does not include internationally owned OEMs (large manufacturers) as described earlier. The three targeted companies were involved in the production of vans, sedans and delivery scooters for the local markets.

The participants were recruited by using publicly available information on the company's website to identify the contact person.

3.9.2 Sampling Method

Sampling techniques may take the form of probability or non-probability sampling. Probability sampling refers to the notion that population elements "have an equal chance of being selected" for sampling (Sekaran & Bougie 2014:245). Non-probability sampling means that the chance of selecting the elements of the population for sampling is not known (Sekaran & Bougie 2014:245). The choice of the sampling technique for any study is guided by the research questions and objectives, with the aim of making meaningful conclusions about the population of interest (Sekaran & Bougie 2014:241). In this study, the focus was to examine the link between innovative capability and SCA in the automobile manufacturing sector by targeting individuals with expert knowledge about the research questions. Hence, the sampling strategy employed is non-probability sampling approach as the interest of the study was to obtain relevant information from the targeted group of individuals.

For the initial target population, a disproportionate stratified sampling technique was relevant for collecting information from individuals based on their different job levels. The subjects of the study were senior management and professional personnel from the

[12] Transport equipment is term used to describe the activities involving the production of vehicles of any form for the purposes of trade in the Standard Industrial Classification of Economic activities (SIC).

NAAMSA member organisations. As mentioned above, inaccessibility to this group necessitated the selection of NAACAM members.

Accordingly, a purposive judgemental sampling procedure was selected for this group to meaningfully obtain the relevant information about the topic under investigation (Sekaran & Bougie 2014:254). Respondents were chosen based on whether they were members of NAACAM and were senior managers in their respective companies who have the knowledge and expertise the study required.

The senior personnel targeted for this group included respondents with the following job titles: CEO, business development executive, operations executive, financial executives, logistics manager, plant managers, director, managing directors, sales director, sales and marketing director, customer development director, business director, site director, group managing director, chief operations officer, general manager, senior sales managers, sales account manager, market development manager, commercial managers, factory manager and country manager. For companies with more than one senior personnel member, these respondents were selected for inclusion in the sample.

However, as with the original sample, the data collection did not yield the required results. Hence, a non-probability sampling from the total population of the researchers' network of 506 individuals was applied. Again, a purposive judgement sampling of professionals in the researchers' network was carried out because these were conveniently available to the researcher and met the criterion of having business education knowledge.

To augment the results from the survey questionnaire, a qualitative methodology was followed via the development of structured interview questions administered to individual owners of local automobile manufacturers as outlined above. The sampling technique selected for this methodology is non-probability sampling based on purposive sampling. This sampling method is appropriate in this instance as the potential respondents were selected based on their expertise and knowledge of the companies under investigation.

3.9.3 Sample Selection and Size

A sample size provides the researcher with an adequate number of participants from the given population to collect the data or information necessary to make meaningful conclusions about a study (Sekaran & Bougie 2014:261).

It should be noted that the original target population of study from the motor manufacturing industry was 343 000 people (NAAMSA 2022:1). The number of employees in full-time employment in the passenger and light commercial segments was 23325, as per the 3rd quarter of 2022 (NL 2022, personal communication, 31 January). However, NL (2019, personal communication, 28 August) advised that administration-level staff at NAAMSA constituted 20% of the entire motor manufacturing industry. This meant that the accurate population size for sampling purposes was 4 665 professionals in the industry. Therefore, using the information from NAAMSA, the sample size deemed to be appropriate for the above finite population was approximately 357 individuals (Sekaran & Bougie 2014:268). This was also confirmed by the statistical calculation done on the SurveySystem.com (2022), which gives 355 as the appropriate sample size, given a confidence interval of 5% and a 95% confidence level.

The second target population examined Tier 1 NAACAM member companies. The number of senior personnel employed within tier 1 companies was 151 people (NAACAM 2020:41). A few companies that are classified under both tier 1 and tier 2 were considered by the study because 80% of NAACAM members' output is included in categories A and B as described above (NAACAM 2020:12). The assumption was that most of their output could be from Tier 1 activities.

According to NAACAM (2020:12), there were 52 000 people employed in the component manufacturing segment in 2019. As mentioned above, the Tier 1 category constitutes 80% of component manufacturers, thus their estimated employment was calculated as 41 600 people. The breakdown of employment levels for the NAACAM members was not publicly available and as such the estimate was based on the information found in the business guide.[13] Hence, using the contact details information from the business guide, a total count of 176 senior personnel within tier 1 categories was found. The contact details found included name and surname, email address, direct telephone number and cell phone number. Note that not all respondents had a contact number or email address. Accordingly, 160 respondents with contactable information were available for sampling.

To determine the sample size, the sampling table from Sekaran and Bougie (2013:268) showed that the appropriate sample size for the above target population was 113 participants. The same number was also confirmed using the online sample size calculator from Surveysystem.com at a 5% interval and 95% confidence level, respectively.

Given that the first two sampling approaches did not yield the preferred results, a third attempt applied the sample size determined from the target population of 506 professionals in the researchers' network. From the target population, a purposive sampling was applied to individuals with a university qualification, an MBA, engineering degree and more than one year of working experience. According to the sampling guidance provided by Sekaran and Bougie (2013:268) for the target population of 506, the correct sample size is 260 individuals. However, a purposive (non-probability) sampling technique was followed where 106 participants were selected based on the selection criteria mentioned above.

The sampling approach applied for qualitative research was based on non-probability sampling because it was not aimed at providing any statistical conclusions (Sekaran & Bougie 2014:270). In this research, a purposive sampling technique was followed where five participants were selected based on their expertise and working knowledge about their companies.

[13] The total number of employees within the *Parts and accessories for motor vehicles and their engines* as published by Statistics South Africa is 51 016 (STATSSA 2021:1). This means that approximately nine (9%) of employment can be attributed to managers within the broader automobile component manufacturing sector.

3.9.4 Data Collection

The study collected both secondary and primary data sources. Secondary data refers to the information from already existing sources in the form of books, reports, published official statistics, etc. (Sekaran & Bougie 2014:36). Primary data is generated from new non-existing sources using different measurement instruments that include questionnaires, interviews and focus groups (Sekaran & Bougie 2014:36).

The secondary data was collected from books, journal articles, case studies, dissertations, industry-specific reports and online articles. These secondary resources were used mostly in the write-up of the previous two chapters. The Automobile Industry Association's reports were used in collecting information about the structure of the industry and retrieval of participants' contact information. For the first part of the analysis, the study extracted relevant secondary data from HRSC's Business Innovation Survey reports to examine the innovative position of the manufacturing industry in South Africa. The reports used covered the periods 2008–2010, 2010–2012 and 2014–2016, as these are easily comparable in terms of content and continuity. However, the HSRC has published six rounds of this survey since 1992 (HSRC 2019:4).

Publicly available information on innovation activities of firms in most countries is found in the Community Survey on Innovation developed by the OECD in 2005, commonly known as the Oslo Manual. Following the same methodology, South Africa has been publishing this information since 1998 (HSRC 2022:4) and the innovation activities of South African firms have been grouped into four distinct categories, namely product, process, organisational and marketing (HSRC 2022:1). The survey questionnaire is distributed to a given sample of South African firms determined through a Business Register developed by Statistics South Africa and stratified by size (turnover) according to the DTIs' National Small Business Amendment Act of 2003 (HSRC 2013:2). This study focused on the innovation activities of large manufacturing firms because most of the OEMs fall into this category (AEIC 2019:6). Size categories of manufacturing firms is determined as per Table 3.7.

Table 3.7: Firms' class size as per DTI and Statistics South Africa

Size	Turnover (Rm)	Employment
1 – Large	More than R51 million	More than 200
2 – Medium	Less than R51 million	Less than 200 but more than 50
3 – Small	Less than R13 million	More than 50 but less than 20
4 – Very Small	Less than R5 million	Less than 20

Source: HSRC (2020:59)

Primary data was collected through a structured questionnaire developed from the theoretical constructs discovered during the literature review process as outlined above. For the initial sample, the electronic questionnaires were emailed to the seven offices of the targeted OEMs as per the sample selection method of the study. However, the response is relatively low because of the easiness of email dismissal by recipients and the low effectiveness of reminders (Millar & Dillman 2011:255).

Accordingly, the initial email to NAAMSA members was based on the contact information found on the association's website. Out of the seven OEMs, one completely refused to consider the researcher's request and the rest promised to assist with the contact information of corporate and legal services personnel (i.e. gatekeepers). With lockdown in place from 26 March 2020, it became difficult to get hold of the gatekeepers.[14] Once the lockdown restrictions were eased, most of the companies refused to assist quoting the reasons of hybrid work environments and changes to the company policies regarding the sharing of information with external individuals.

On the other hand, for the NAACAM member companies, the electronic questionnaires were emailed to 160 individuals as per the sample selection method of the study. Of the emails sent out, four were rejected by the recipients' email server system and one respondent refused to participate in the survey. With no improvement in the response rate, the researcher also made 21 calls and sent out 40 short message system (SMS) messages to the participants with mobile number contact details; only two SMSes were

[14] See Appendix H for a summary of the OEMs recruitment activities and feedback.

rejected. Keding, Brabyn, MacPherson, Richmond and Torgerson (2016:90) observed that SMS survey reminders were effective in improving the response rate of participants.

Accordingly, the sample size for emailing the questionnaires was reduced to 109 because of the challenges mentioned above. The response rate for the study was 8%, which is lower than the 11% found in a review of internet surveys compared to other types of surveys (Fan & Yan 2010:136). The total number of responses received from the NAACAM members was nine. The number is very low and a request to obtain endorsement for the survey from a NAACAM executive was also rejected. Hence, given the time constraints for the completion of the study, a third sample from the researcher's professional network was applied for primary data collection. From a target population of 506 potential candidates, one hundred and six (106) messages were sent to the professional network of the researcher. Given the time constraints for the completion of the study, the available information was used for the preliminary part of the quantitative data analysis[15].

In addition to the poor quantitative data collection, the researcher contacted interviews with independent local automobile manufacturers to augment the analysis.

3.10 DATA ANALYSIS STRATEGY

The following subsection provides details about the activities carried out in the preparation of secondary and primary data used in the study. The secondary data was sourced from the HSRC and covers innovation activities of firms in the manufacturing industry. Primary data was collected through a structured electronic questionnaire and interviews administered to participants via email.

[15] Appendix F provides a snapshot summary of the EvaSys report for the surveys conducted and the response rates.

3.10.1 Secondary Data Analysis

This subsection provides details about the method used to examine innovation activities of the motor vehicle manufacturing sector in South Africa. The secondary data utilised is derived the HRSC's Business Innovation Survey covering the periods 2008–2010, 2010–2012 and 2014–2016[16]. These three periods have survey questionnaires that are fairly comparable and the survey results are readily available. While the HSRC has contacted six rounds of the Business Innovation Survey since 1998, at the time of writing the 2019–2021 survey was on the field (HSRC 2019:4). The HSRC survey provides information about innovation activities based on the Oslo Manual definitions (HSRC 2019:4). Four categories of innovation, namely product, process, organisational and marketing were published in the report. However, given that the data from HRSC is highly aggregated for confidentiality purposes and to facilitate international comparisons, the analysis for this study focused on the major group within the transport equipment manufacturing division as the SIC of economic activities published by Statistics South Africa (HSRC 2020:60).

To address Objectives 1 and 2 of the study, the following indicators were deemed appropriate for the analysis:

3.10.1.1 Innovation activities of the automobile manufacturing sector

The first secondary objective of the study is to examine the innovation activities of the motor vehicle manufacturing industry in South Africa. However, as mentioned before, access to data at that level required was not possible. Accordingly, a preliminary analysis of innovation activities in manufacturing was presented on a bar diagram for the four measures of innovation over the designated periods mentioned above. A bar chart provides an appropriate approach for data in which the period of the analysis is a cohort (Tustin et al. 2010:713).

3.10.1.2 Trends in innovation types in the manufacturing sector

The analysis of trends in the different types of innovation activities was also presented graphically to depict the evolution of each activity over the given period. Four diagrams

[16] Reported as HSRC SA Business Innovation Survey 2008, 2013 and 2017.

were presented, where each graph represented each innovation activity separately. Trend analysis is suitable for presenting the cyclical nature of a particular variable over time (Tustin et al. 2010:487–488).

3.10.1.3 Innovation activities and motor manufacturing performance

The second objective involved an examination of the role of innovation activities in the motor vehicle manufacturing industry. The above objective was examined by comparing the impact of innovation on the innovation outcomes of motor vehicle manufacturers. Innovation outcomes include improvements in product and process activities as well business strategic direction. A similar method of analysis was followed to present the results.

3.10.2 Quantitative Data Analysis

Once the questionnaires were distributed to the potential candidates, the data collected from the survey needed to be organised for analysis. The three steps required to get the data ready for analysis are discussed briefly below.

3.10.2.1 Data preparation

This process involves the coding, entry, editing and transformation of data into information suitable for the analysis. Data coding is the assigning of numbers to the responses of participants for the purpose of entering these into a database (Sreejesh et al. 2014:21). For this study, the electronic distribution of the questionnaire assisted in automatically generating data codes from the participants' responses and storing these on a computer.

Once the data is coded, it is entered into a software program to create a database from which an analysis can be carried out (Sekaran & Bougie 2014:278). For this study, the data from the EvaSys survey administration software was saved via SPSS data analysis software.

The next step involves editing the data to identify any inconsistencies, missing information, gaps and non-logical responses from the participants in the survey (Sreejesh et al. 2014:20). For this study, there was a need to edit the data collected, as a few participants responded erroneously and there was some missing information, gaps but no illogical responses. The missing cases were excluded from the analysis.

The last step in data preparation is its transformation from the initial quantitative value to a new or different one to cater for the next advanced level of data analysis (Sekaran & Bougie 2014:280). Any necessary transformation of data for advanced data analysis was implemented in Chapter 4.

3.10.2.2 Descriptive analysis of data

This part of the analysis provides a visual summary, basic statistics and the relationship between any two variables for the data collected. This study applied an interval scale to measure the responses of participants to the questionnaire. As such, the descriptive statistics relevant to each of the variables or concepts are presented in the form of arithmetic means, standard deviations, histograms, correlation matrices and scatterplots. In general, descriptive statistics provide information about frequency distribution, measures of central tendency and, dispersion for each variable in a given research study.

- Frequency distributions – provide the rate at which a particular incidence occurs and is calculated as a percentage (Sekaran & Bougie 2014:283). In this study, frequencies were applied in the presentation of biographical information using histograms.
- Mean – a measure of central tendency and a summary statistic that provides a brief description of an average or a mid-point for a given variable and is calculated as the total number of observations divided by the number of observations (Sekaran & Bougie 2014:285). Accordingly, the majority of scores for each variable and summaries were presented using the mean.
- Median – the median is about the centrality of an observation when items are arranged either in ascending or descending order for a given group (Sekaran & Bougie 2014:285).
- Mode – the mode examines the observations that occur the most among a given variable (Sekaran & Bougie 2014:286).
- Range – is a measure of dispersion that examines the outliers in a given set of observations (Sekaran & Bougie 2014:286).

- Variance – is an important measure of dispersion that gives an indication of the divergence in the data for a given set of data and is calculated as the square root of the difference between the mean and an observed value divided by the number of observations (Sekaran & Bougie 2014:286). Similar to the mean above, the study has presented information about the variance in the key variables of interest.
- Standard deviation – is a measure of dispersion that reveals the nature of the distribution of data and is calculated as a square root of the variance (Sekaran & Bougie 2014:286).
- Correlation – is determined by examining the variations in one variable associated with variations in another variable (Sekaran & Bougie 2014:289). A correlation coefficient or statistic can be positive or negative, depicting a direct or indirect relationship between the variables. In addition, the statistic ranges between -1.0 and +1.0 and its level of significance has to be determined (Sekaran & Bougie 2014:290). In this study, a Pearson correlation coefficient (r) applicable for interval data was computed for all the variables. The level of significance was determined using a p-value of 0.05, as it is usually appropriate in social sciences research (Tustin et al. 2010:638).

3.10.2.3 Measuring fitness of the data

This subsection briefly discusses the techniques applied in substantiating the conclusions drawn from the quantitative data analyses. A normality test is applied to ensure reliable and accurate conclusions from the collected data (Sekaran & Bougie 2014:244). Various tests exist to test the normality assumption, however, in this study the Shapiro – Wilk test is the most applicable as it has a predictive power and usable for small samples (Ghasemi & Zahediasl 2012:487; Mishra, Pandey, Singh, Gupta, Sahu & Keshri 2019:70). Kolmogorov-Smirnov (K-S) test was also included because of its reliability in small samples as well (Kim, H 2013:52). A visual analysis through histograms was also applied to all 16 constructs of the study.

- Reliability – tests for the stability and consistency of the measures in explaining the concept. In this study, the relevant test was the Cronbach alpha coefficient as it is applicable for interval data where the closer the statistic is to 1, the higher the intercorrelation among the dimensions measuring the concept (Sekaran & Bougie 2014:293).

- Validity – looks at the validity of the instrument in measuring the concept (Sekaran & Bougie 2014:225). Accordingly, for this part of the analysis, content and concurrent validity measures were applied. Content validity was established through an evaluation of the instrument by a panel of experts. Concurrent validity was examined by assessing the scores of individuals with engineering backgrounds against those with other experience. Construct validity was established through factor analysis that confirms the appropriateness of the definitions and items used in the construction of the concept (Sreejesh et al. 2014:207). The statistics applicable are the Kaiser-Meyer-Olkin (KMO) and Bartlett's tests which measure sample adequacy and sphericity, respectively. KMO value should be (> 0.6) while Bartlett's factor test should be significant at ($p < 0.001$) for each construct (Ramli, Abu-Hassan & Arifin, 2016:15). Factor analysis is important for the third and fourth secondary objectives of the study, namely; identification of the key internal capabilities that impact on innovativeness and the key factors that impact on the SCA, respectively.

3.10.2.4 Inferential data analysis

This type of analysis is carried out to by applying advanced techniques on the data collected. In this instance, a multivariate analysis involving a multiple regression estimation technique was applicable. The technique examines the influences of two or more independent variables on a dependent variable under study (Walliman 2011:125). For the study, the innovative capability constructs were treated as independent variables and SCA constructs were dependent variables. Five regression models were estimated to evaluate the fifth objective of the relationship between innovative capability and SCA. An F-test for overall significance of the regression model was applied, while R-square tested the efficacy of the independent variables in explaining an independent variable (Sekaran & Bougie 2014:315). The t-test of the independent variables' coefficients was also considered to examine the influence of each variable on the dependent variable in each model (Sekaran & Bougie 2014:262).

3.10.3 Qualitative Data Analysis

A qualitative data analysis methodology is based on "words" as the sources of information used to conduct the analysis (Sekaran & Bougie 2014:336). Words can be derived from interview notes, transcriptions from focus groups or recorded video content, expressed the experience of individuals, news articles or responses to open-ended questions, to mention a few. In this study, the primary source for qualitative data was collected from interviews with individuals who own and operate different types of local (native) automotive manufacturing companies.

According to Creswell (1994, cited in Bargate 2014:11), qualitative research is subjective and biased by the researchers' involvement in all aspects of research work. However, the general approach in qualitative analysis is clearly articulated by Miles and Huberman (1994) and by Sekaran and Bougie (2013:337), as discussed below. Qualitative analysis involves the three steps of data reduction, data display and drawing conclusions.

3.10.3.1 Data reduction

Data reduction refers to the process of organising the collected data into a usable format for analysis and this involves the selection, coding and categorising of data (Sekaran & Bougie 2014:337).

Data selection

This involves the selection of words or quotes that may be used for analysis (Sekaran & Bougie 2014:337).

Data coding

This step involves an analytical process of breaking down the collected data into manageable and theoretical aspects that help in making conclusions about the data (Sekaran & Bougie 2014:339). The words, sentences, paragraphs and themes serve as coding units from which an analysis of data may be conducted. The themes used in this study were based on the initial theoretical developments covered in Chapter 2.

Data categorisation

This step uses the coding units developed above to categorise and arrange the data into meaningful patterns and relationships (Sekaran & Bougie 2014:341).

3.10.3.2 Data display

Data display refers to the way the data is presented to assist in identifying salient trends or patterns that might be used to make conclusions (Sekaran & Bougie 2014:337). The data display may take the form of tables, graphs, diagrams, frequent phrases and matrices. For this study, the data was displayed in the form of diagrams.

3.10.3.3 Drawing conclusions

This is the last step in the process and involves making sense of the observed themes and their interactions with respect to their implications for the research questions (Sekaran & Bougie 2014:349). The conclusions of the above analysis are discussed in detail in Chapter 5.

3.10.4 Reliability and Validity

This subsection discusses the techniques applied in substantiating the conclusions drawn from the qualitative data analyses.

3.10.4.1 Category reliability

This technique assesses the appropriateness of the definitions in the classification of categories (Sekaran & Bougie 2014:351). Broadly (narrowly) defined categories may lead to highly generalised (specific) conclusions that overly reduce (raise) the relevance of the findings. The right balance is determined through the interjudge reliability technique.

3.10.4.2 Interjudge reliability

This technique assumes uniformity in the coding exercise by any two researchers analysing the same qualitative data (Sekaran & Bougie 2014:351). The standard is that in 80% of the coding categories, the two researchers should concur.

3.10.4.3 Validity

In qualitative data analysis, this refers to both the internal and external validity of the results. Internal validity means that the results of the research accurately indicate the data collected, while external validity refers to the generalisability of these results (Sekaran & Bougie 2014:351). Internal validity requires that the selected cases are as representative as possible and that opposing ones are also included to test the strength of the theories developed.

3.11 ETHICAL CONSIDERATIONS

Ethics in business research refers to etiquette when conducting research (Sekaran & Bougie 2014:13). Accordingly, in this study the following ethical considerations apply.

3.11.1 Objectivity

Given that the sector has been blamed for a lack of innovation, the researcher must be objective when collecting and analysing the data. With the needed to avoid any bias in data collection and analysis, a statistically validated questionnaire and a scientific statistical programme SPSS, respectively, were used.

3.11.2 Voluntary Participation

Participation in this research was on a voluntary basis as only personnel who indicated their availability were given the opportunity to take part. The identified personnel were not forced to respond to the questionnaire if they did not want to. Their individual wishes were respected. Approval from top management was acquired where applicable and a prepared introduction was made available to alleviate concerns about sharing company confidential information with researchers to ensure that participants were not misled or coerced into participation.

3.11.3 Informed Consent

There is a possibility that the targeted personnel might think that top management could be involved in the study. Hence, participants were fully informed about the purpose, process, rights and benefits of the research and were requested to sign a consent form indicating their understanding and acceptance of the process.

3.11.4 Confidentiality and Respect

The researcher treated the information provided by respondents with strict confidentiality to avoid any possible information leakage to others and will maintain their anonymity by using numbered questionnaires and coded identifiers.

3.11.5 Data Integrity

A data management system was implemented to ensure the ethical protection of participants during and beyond the data collection phase of the research project.

3.11.6 Permission Obtained

The researcher asked for approval from the management of each company to conduct the research.

3.12 SUMMARY AND CONCLUSIONS

This chapter sought to provide a practical road map of the data-gathering process and analysis applied in the study. First, the objectives of the study were restated to ensure that the proposed research strategy was appropriately aligned with them. Subsequently, an outline of the secondary data analysis was presented to demonstrate the approaches that were to be followed in meeting the first two research questions.

The quantitative approach was outlined as well as the nature of the instrument applied in data collection. In addition, the data analysis strategy was presented to demonstrate how this was appropriate for the study. Given the challenges experienced by the researcher, the research strategy had to include a qualitative approach to augment the analysis. Hence, an additional data collection instrument was developed in the form of interview questions. Both the quantitative and qualitative approaches were important in meeting Objectives 3, 4 and 5 of the study. Accordingly, the next chapter presents the results of the above analysis.

CHAPTER 4

RESEARCH RESULTS

4.1 INTRODUCTION

The aim of this study was to determine the key factors responsible for internal innovative capability and its subsequent impact on SCA in the motor vehicle manufacturing sector. While the previous chapter has outlined method of research employed to investigate the topic of the study, this chapter presents the results of data analysis.

The discussion of the research results presents an overview of data analysis processes followed, a descriptive analysis of the data collected, a presentation of test results on the accuracy of the instruments used in collecting the data, a report of the various data analysis strategies followed. The data analysis strategy is composed of secondary, quantitative and qualitative data analyses approaches. The chapter will conclude a summary and conclusion.

4.2 DATA ANALYSIS PROCESSES

The analysis approaches followed involved the application of secondary and primary data. The secondary data was sourced from the survey results of the Business Innovation Survey (BIS) conducted by the HSRC. The secondary data analysis is aimed at satisfying the first and second objectives of determining the presence of innovation and its impact in the South African motor manufacturing sector. The sourced data covered the periods of BIS, namely, 2008–2010, 2010–2012 and 2014–2016[17]. The variables of interest were the indicators of product, process, organisational and marketing innovation activities as well as the sources of innovation, the barriers to innovation and the impact of innovation on performance. Accordingly, the first part of data analysis results is based on secondary data.

The second part of the results is based on the analysis of data collected through a questionnaire administered to individual professionals carefully selected from LinkedIn.

[17] The BIS for the period 2016 to 2018 focused mainly on formal agricultural business sector's innovation activities while the latest survey for 2019 to 2021 was on the field for data collection at the time of writing.

The results of the questionnaire address the two additional objectives of identifying the key internal innovative capabilities that are relevant in the South African motor manufacturing industry and the relationship between innovative capability and SCA. Given the low responses from the questionnaire survey, structured interviews were conducted to augment the results of the study. Accordingly, the results of the interviews conducted with independent transport equipment manufacturers are also presented below.

4.2.1 Secondary Data Analysis

The analysis of secondary data is based on the indicators generated from the datasets provided by the HSRC for the above-mentioned periods of interest. The datasets were modified to ensure that only the relevant variables form part of the analysis and the identified indicators were generated by calculating basic statistics for each area of interest as presented below.

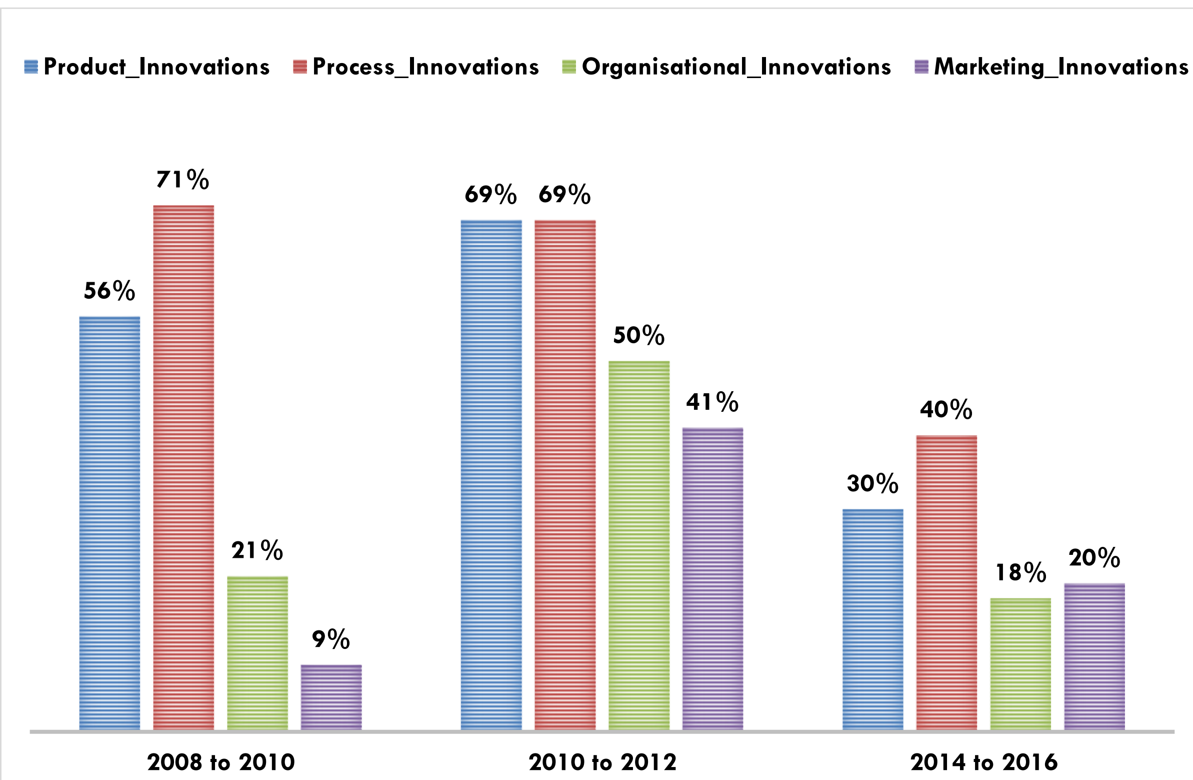

Figure 4.1: Innovation Activities of the Automobile Manufacturing Sector

Figure 4.1 shows the average level of innovation activities that the motor vehicle manufacturing industry engaged in the three periods under review. Based on the researchers' calculations, in the 2008 to 2010 period process innovation was the highest activity at 71%, followed by 56% from product innovation while marketing innovation was the lowest at 9 percent. For the period 2010 to 2012, both product and process innovation activities were the highest at 69% followed by organisational innovation at 50% and the lowest was marketing innovation at 41%. In the period 2014 to 2016, process innovation activity was highest at 40%, followed by product innovation at 30% and the lowest is organisational innovation at 18 percent.

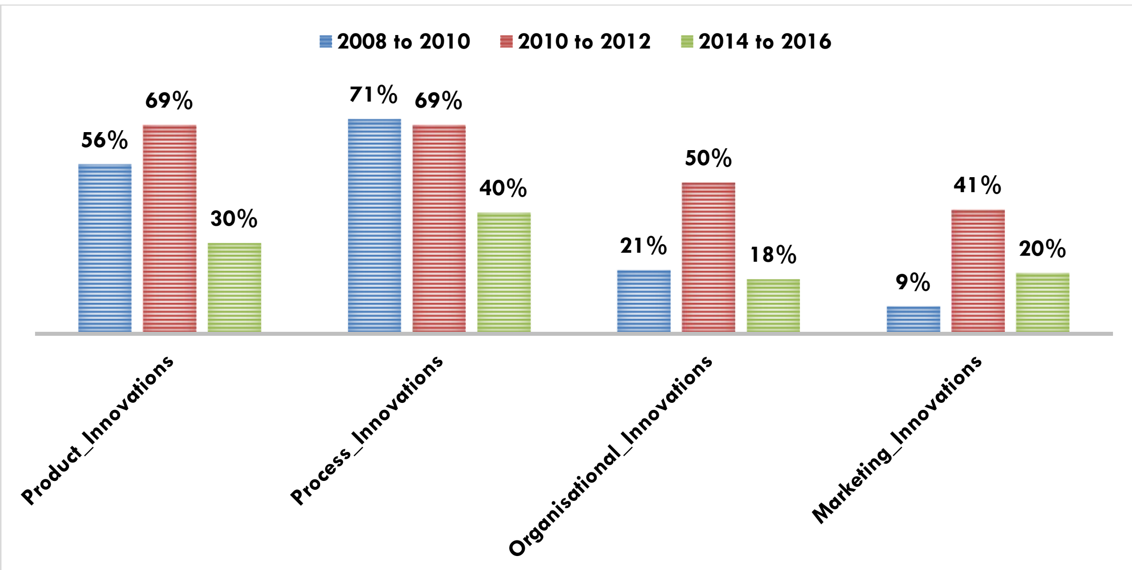

Figure 4.2: Trends on innovation activities in the Automobile Manufacturing Sector

The above diagram shows the changes in the four types of innovation activities over the three periods. Product innovation activities increased from 56% in the period 2008 to 2010 to 69% in the 2010 to 2012 period and subsequently fell to 30% in the 2014 to 2016 period. Process innovation activities were high at 71% in period 2008 to 2010, then decreased to 69% in 2010 to 2012 and eventually fell to 40% in 2014 to 2016. Organisational innovation activities started low at 21% in the 2008 to 2010 period, then increased strongly to 50% in 2010 to 2014 period and substantially fell to 18% in the period 2014 to 2016. Marketing innovation activities started very low at 9% in 2008 to

2010 period, then increased substantially to 41% in the middle period and decreased slightly to 20% in the last period.

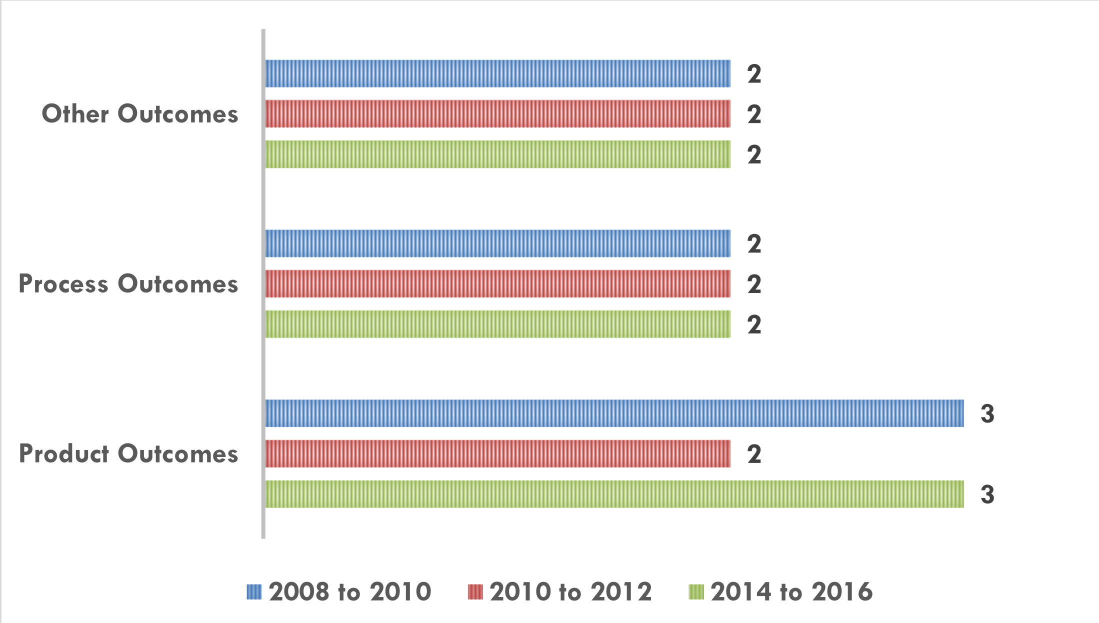

Figure 4.3: Innovation Activities and Motor Vehicle Manufacturing Performance

Figure 4.3 above shows the level of success from the introduction of product and process innovation activities on innovation outcomes[18] for each period. The level of success is measured using numbers 1, 2 and 3 where 1 represents a low level, 2 represents a medium level and 3 represents a high level of success. In the period 2008 to 2010, the introduction of product and process innovation brought about high level of success for product outcomes, medium success for both process and other outcomes (i.e., reduced environmental impact and meeting government regulations). The level of success for the period 2010 to 2012 is medium for all innovation outcomes. In the period 2014 to 2016, the success in product outcomes is high while that of process and other outcomes is medium.

The next subsection presents the results of quantitative data analysis.

[18] Excluded from the analysis are the financial outcomes and strategic outcomes for the period 2014 to 2016 for ease of comparisons. Note that HSRC methodology excluded marketing and organisational innovation activities for this section of the questionnaire because the combined effect becomes overly large rendering international comparisons impossible.

4.2.2 Empirical Data Analysis Process and Results

The process of data preparation involves the coding, entry, editing and transformation of data. In this study the codes were automatically generated from the participants' responses to the electronic questionnaire and the results were stored on the computer. The responses were exported from EvaSys to SPSS to generate a database to be edited and organised for data analysis. The majority of the data was found to be usable except for four cases with missing data. The data did not require any further transformation for advanced data analysis techniques. For the qualitative data, the results of the interview process were carefully classified into themes that describe the main concepts of the study.

The results of the survey and interview processes are presented below.

4.3 DESCRIPTIVE DATA ANALYSIS RESULTS

This section presents the basic statistics that describe the data collected from the sample population that completed the questionnaire.

4.3.1 Response Rate

Table 4.1: Population, sample and response rate breakdown

	Total	
Target population (LinkedIn connections)	506	
Sample size (purposive sampling)	106	
Total Responses	**35**	**33 %**
Invalid responses	4	4 %
Valid responses	31	29 %

A total of 106 questionnaires were send to potential candidates on January 13th 2022 and 35 participants responded to the survey. However, four cases with missing values were invalid and excluded from the analysis. Accordingly, 31 valid responses were utilised for the study. These provided an overall response rate of 29 % which is higher than 11 % found in the majority of online surveys (Fan & Yan 2010:136).

4.3.2 Respondents Demographic Profile

The demographic profile provides an indication of the personal attributes of the participants. In this study, the profile of respondents is based on six different attributes of personal status, education and employment.

Table 4.2 below shows that 8 of the respondents were women while 22 were men and only 1 participant did not specify their gender. This means that the majority of the male respondents were at approximately 70% while females represented 26% of participants. Other is represented by approximately 3% of participants.

Table 4.2: Respondents' gender profile

Gender	Frequency	Percent	Cumulative Percent
Female	8	25,8	25,8
Male	22	71,0	96,8
Other	1	3,2	100,0
Total	31	100,0	

The study also examined the age groups of participants starting with the lowest range of 20 to 30 years and ending with the highest range of greater than 60 years old. There were no respondents in the 20 to 30 years' age group. The distribution of age for the participants per group is shown in Table 4.3 below. The median age group is that of 41 to 50 years old at approximately 55 percent. The younger age group of 31 to 40 years represent about 26% while the older age group of 51 to 60 years old represents 26% of participants.

Table 4.3: Participants' age groups

Age Group	Frequency	Percent	Cumulative Percent
31 to 40	6	19,4	19,4
41 to 50	17	54,8	74,2
51 to 60	8	25,8	100,0
Total	31	100,0	

The educational attainment of participants is another attribute that is important for the study as it indicates the ability of the respondent to answer the questionnaire adequately and in addition clarifies the selection criteria adopted in this research. As shown in Table 4.4, the majority of the participants at approximately 68% hold master's degrees, followed by holders of post graduate qualifications at 13%. The minority were holders of bachelor's degrees and PhDs at 8% and 7% respectively. One participant did not disclose their educational qualification.

Table 4.4: Participants' education level

Education level	Frequency	Percent	Cumulative Percent
Bachelor's Degree	3	9,7	10,0
Post Graduate Diploma	4	12,9	23,3
Master's Degree	21	67,7	93,3
PhD / Doctorate	2	6,5	100,0
Total	30	96,8	
Missing	1	3,2	
Total	31	100,0	

The participants' business unit is another category important in determining the level of understanding of the questionnaire because of the exposure to relevant and varying business activities. Table 4.5 below shows that 29% of the participants work at the Head Office of the company, 19% work in business operations while approximately 10% work in marketing and sales as well in finance, respectively. Five participants chose "Other" as their business unit which represented 16% of answers to the question.

Table 4.5: Participants' business unit

Business Unit	Frequency	Percent	Cumulative Percent
Head Office	9	29,0	29,0
Regional Office	1	3,2	32,3
Marketing & Sales	3	9,7	41,9
Business Operations	6	19,4	61,3
Finance	3	9,7	71,0
HRM & D	2	6,5	77,4
Research & Development	1	3,2	80,6
Assembly Plant	1	3,2	83,9
Other	5	16,1	100,0
Total	31	100,0	

The participants were also asked to select the job categories that represent the level of responsibility in their business unit. Table 4.6 shows that 16 participants are in middle management representing approximately 52% of the respondents. Senior management is represented by 29% of the participants and approximately 10% are administrators. Only two participants chose “Other” as a job category.

Table 4.6: Participants’ job category

Job Category	Frequency	Percent	Cumulative Percent
Senior Management	9	29,0	29,0
Middle Management	16	51,6	80,6
Supervisor	1	3,2	83,9
Administrator	3	9,7	93,5
Other	2	6,5	100,0
Total	31	100,0	

Within the job category is the participant’s area of responsibility as shown in the diagram below. Approximately 13% of the participants are CEOs, 16%are Marketing and Sales Managers and 10% are researchers. Notably, 36% of respondents selected “other” as their area of responsibility. An analysis of the survey results has revealed that three participants did not specify their job position while 8 mentioned the various job titles not listed on the questionnaire.

Table 4.7: Participants’ current positions

Current Position	Frequency	Percent	Cumulative Percent
CEO	4	12,9	12,9
CFO	1	3,2	16,1
Managing Director	2	6,5	22,6
Marketing & Sales Director	5	16,1	38,7
HRD Manager	2	6,5	45,2
Product Developer / Designer	1	3,2	48,4
Researcher	3	9,7	58,1
Engineer	2	6,5	64,5
Other	11	35,5	100,0
Total	31	100,0	

Lastly, the participants were asked about their duration of employment in the current company. As shown in Table 4.8, the majority of the participants have worked for the company for the periods ranging between 11 to 20 years and 6 to 10 years. This is represented by approximately 36% and 26%, respectively. Sixteen percent of the respondents have worked for 3 to 5 years while 13% worked for 21 to 30 years. The least employment duration is that of more than 30 years at approximately 3%.

Table 4.8: Participants' employment duration

Employment Duration	**Frequency**	**Percent**	**Cumulative Percent**
Less than 2 years	2	6,5	6,5
3 to 5 years	5	16,1	22,6
6 to 10 years	8	25,8	48,4
11 to 20 years	11	35,5	83,9
21 to 30 years	4	12,9	96,8
More than 30 years	1	3,2	100,0
Total	31	100,0	

The above subsections have presented the demographic profile of the participants. The next subsection will present the descriptive statistics on the variables developed for the study.

4.3.3 Descriptive Statistics on Innovative Capability Dimensions

The descriptive statistics for each variable are based on results from 5-point Likert scale from Strongly Disagree to Strongly Agree for each statement that describes that explains a particular construct. The opinions of the respondents under each construct are summarised in tables. The results are presented for each dimension by listing the outcome for all elements that represent it. The tables show the respondents' opinion about the items (i.e., statements) in a percentage format. Appendix M provides detailed information about the results. In some cases, the results for a particular scale maybe unavailable because of missing values from the respondents.

Innovative capability is explained by 11 dimensions and the results for each and their related statements are presented in the diagrams below.

4.3.3.1 Product innovativeness

The product innovativeness (PI) construct is described by the four statements shown below.

Table 4.9.a: PI statements and item codes

Code	Statement
PI_1	The industry's new products and services are often perceived as very novel by customers
PI_2	The industry's innovation in connectivity is perceived as important to consumers
PI_3	The industry's innovation in safety is perceived as important by consumers
PI_4	The industry's innovation in fuel economy is perceived as important by consumers

The summary descriptive statistics in Figure 4.4.a show that respondents agree at 54,8% and strongly agree at 45,2% respectively, that connectivity (PI_2) and fuel economy (PI_4) are important to customers. On average, the majority of respondents agree with the statements and this is also confirmed by 88.7 cumulative percentage for the agree scales.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
PI_1			9,7	32,3	35,5	22,6
PI_2			9,7	6,5	54,8	29,0
PI_3	3,2	6,5	6,5	9,7	35,5	38,7
PI_4	3,2	6,5		16,1	29,0	45,2
Average	**3,2**	**6,5**	**8,6**	**16,1**	**38,7**	**33,9**
Cummulative	***3,2***	***9,7***	***18,3***	***16,1***	***54,8***	***88,7***

Figure 4.4.a: Descriptive statistics on the PI dimension

4.3.3.2 Innovative edge

The IE dimension is described by the four statements shown below.

Table 4.9.b: IE statements and item codes

Code	Statement
IE_1	Consumers are willing to pay for innovation in any one of the areas listed in question 1.1 above
IE_2	In comparison to competitors, the industry has introduced more innovative products/services during the past five years
IE_3	In comparison to competitors, the industry's products/ services are generally more successful
IE_4	The industry's recent new products/services are significantly different from our previous products and services

Figure 4.4.b shows that respondents strongly agree at 35.5%and agree at 45.2 percent, respectively, that there is a willingness to pay for innovation (IE_1) and the industry's products are successful (IE_3). On the other hand, 19.4%of respondents slightly disagree that new products are significantly different (IE_4). On average, the majority of respondents agree with the statements and this is also confirmed by 80.6 cumulative percentage for the agree scales.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
IE_1		3,2	12,9	22,6	22,6	35,5
IE_2		6,5	12,9	22,6	29,0	29,0
IE_3	3,2	3,2	6,5	22,6	45,2	19,4
IE_4		6,5	19,4	12,9	35,5	25,8
Average	**3,2**	**4,8**	**12,9**	**20,2**	**33,1**	**27,4**
Cummulative	*3,2*	*8,1*	*21,0*	*20,2*	*53,2*	*80,6*

Figure 4.4.b: Descriptive statistics on the IE dimension

4.3.3.3 Systems innovativeness

The SI dimension is described by the four statements below.

Table 4.9.c: Systems innovativeness statements and item codes

Code	Statement
SyI_1	The industry's ICT uses Enterprise Resources Planning software to enhance production
SyI_2	The industry's ICT uses CRM software to enhance production
SyI_3	The industry's ICT uses Computer Aided Design (CAD)/ Computer Aided Manufacturing (CAM) software to enhance production
SyI_4	The industry's ICT uses Advance Scheduling software to enhance production

Figure 4.4.c shows that respondents strongly agree to the four statements about systems innovativeness. This is confirmed by the highest average of 50.8%for the strongly agreed scale. The cumulative scale is also high at 90.3%for the combined agreement scales.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
SI_1			9,7	9,7	25,8	54,8
SI_2				22,6	29,0	48,4
SI_3	3,2	3,2	9,7	16,1	12,9	54,8
SI_4	3,2		9,7	6,5	35,5	45,2
Average	**3,2**	**3,2**	**9,7**	**13,7**	**25,8**	**50,8**
Cummulative	***3,2***	***6,5***	***16,1***	***13,7***	***39,5***	***90,3***

Figure 4.4.c: Descriptive statistics on the systems innovativeness dimension

4.3.3.4 Product development innovativeness

Below are the ten statements that describe PDI.

Table 4.9.d: PDI statements and item codes

Code	Statement
PDI_1	The industry has hired a new product development managers in the last three years.
PDI_2	The product development managers are able to define a strategy for each product.
PDI_3	The industry's product manager can align product strategy with existing resources (e.g. budget, production capacity, quality and legal requirements).
PDI_4	The industry's product manager can translate product strategy into action plans.
PDI_5	The industry's product manager can ensure alignment between the product in development and the original product strategy.
PDI_6	The industry's product manager usually recommends modifications to products characteristics if necessary.
PDI_7	The industry's product manager ensures products get approval from the organisational internal panel.
PDI_8	The industry's product manager is able to forecast product's expectable demand.
PDI_9	The industry's product manager is able to track product's financial performance.
PDI_10	The industry's product manager is able to monitor product's lifecycle from concept to grave.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
PDI_1		3,2	16,1	29,0	32,3	19,4
PDI_2	3,2	3,2	6,5	32,3	29,0	25,8
PDI_3			12,9	19,4	41,9	25,8
PDI_4			9,7	19,4	41,9	29,0
PDI_5			3,2	22,6	54,8	19,4
PDI_6	3,2		12,9	16,1	38,7	25,8
PDI_7			6,5	19,4	25,8	48,4
PDI_8			9,7	16,1	35,5	38,7
PDI_9	3,2	3,2	3,2	29,0	32,3	29,0
PDI_10	3,2	6,5	12,9	12,9	29,0	35,5
Average	**3,2**	**4,0**	**9,4**	**21,6**	**36,1**	**29,7**
Cummulative	**3,2**	**7,3**	**16,6**	**21,6**	**57,7**	**87,4**

Figure 4.4.d: Descriptive statistics on PDI dimension

Figure 4.4.d shows that respondents slightly disagree at 16.1% that industry has hired new product development managers recently (PDI_1). The respondents agree at 54.8% and strongly agree at 48.4% respectively, that a product manager ensures alignment

between the product in development and the original product strategy (PDI_5) and ensures products get approval from the organisational internal pane (PDI_7). On average, the majority of respondents agree with the statements and this is also confirmed by 87.4 cumulative percentage of the agreement scales.

4.3.3.5 Environmental influences innovativeness

Below are the five statements that describe the environmental influences innovativeness dimension.

Table 4.9.e: Environmental influences innovativeness statements and item codes

Code	Statement
EII_1	The external linkages from local customers are important for product innovations (i.e., upgrades) in the industry
EII_2	The external linkages from local suppliers are important for product innovations (i.e., upgrades) in the industry
EII_3	The external linkages from MNC or JV customer located in my country are important for product innovations (i.e., upgrades) in the industry
EII_4	The external linkages from MNC or JV customer located in a foreign country are important for product innovations in the industry
EII_5	The external linkages from MNC or JV supplier located in my country are important for product innovations in the industry

The summary descriptive statistics in Table 4.9.j show that 41.9% of the respondents agree that external linkages from local customers are important for product innovations (EII_1). 45.9% agree and 19.4% slightly disagree that external linkages from MNC or JV customer located in a foreign country are important for product innovations (EII_4). On average, the majority of respondents agree with the statements and this is confirmed by 81.3 cumulative percentage of the agreement scales.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
EII_1	3,2		6,5	16,1	41,9	32,3
EII_2	3,2	3,2	6,5	25,8	32,3	29,0
EII_3	6,5	3,2	12,9	22,6	35,5	19,4
EII_4	6,5		19,4	6,5	45,2	22,6
EII_5	9,7		12,9	9,7	38,7	29,0
Average	**5,8**	**3,2**	**11,6**	**16,1**	**38,7**	**26,5**
Cumulative	**5,8**	**9,0**	**20,6**	**16,1**	**54,8**	**81,3**

Figure 4.4.e: Descriptive statistics on environmental influences' innovativeness dimension

4.3.3.6 Market innovativeness

Table 4.9.f presents the nine statements that describe market innovativeness dimension.

Table 4.9.f: Market innovativeness statements and item codes

Code	Statement
MI_1	The industry has suitable offering in market place to expand its customer base for existing products
MI_2	The industry is able to identify customer's needs
MI_3	The industry understands the factors that influence consumer choice behaviour
MI_4	New products in any firm give them a competitive advantage against new competition
MI_5	The industry explores new approaches to conduct market research
MI_6	The industry's marketing & advertising campaigns are considered effective
MI_7	The industry is able to develop strong relationships with customers
MI_8	The industry has strong product marketing capabilities
MI_9	The industry has strong product technology capabilities

The summary descriptive statistics in Figure 4.4.f show that 45.2% of the respondents agree that the industry has suitable offering in market place (MI_1). 61.3% agree that the industry is able to identify customer's needs (MI_2) and understands the factors that influence consumer choice behaviour (MI_3). The respondents also slightly disagree at 22.6% that the industry's marketing & advertising campaigns are effective (MI_6). On average, the majority of respondents (39.4%) agree with the statements and this is confirmed by 91.8 cumulative percentage of the agreement scales.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
MI_1				32,3	45,2	22,6
MI_2		3,2		12,9	61,3	22,6
MI_3		3,2		12,9	61,3	22,6
MI_4			9,7	19,4	41,9	29,0
MI_5			6,5	32,3	32,3	29,0
MI_6			22,6	25,8	25,8	25,8
MI_7			12,9	32,3	22,6	32,3
MI_8				19,4	41,9	35,5
MI_9			12,9	32,3	22,6	32,3
Average		**3,2**	**12,9**	**24,4**	**39,4**	**28,0**
Cumulative		**3,2**	**16,1**	**24,4**	**63,8**	**91,8**

Figure 4.4.f: Descriptive statistics on market innovativeness dimension

4.3.3.7 Product marketing innovativeness

Table 4.9.g presents the six statements that describe the PMI dimension.

Table 4.9.g: PMI statements and item codes

Code	Statement
PMI_1	There are complementarities between product marketing capabilities and product technology capabilities.
PMI_2	The industry has hired new product marketing managers to enhance brand awareness.
PMI_3	The industry's product marketing managers have a market learning capability that allows for foresight about future trends in the market place.
PMI_4	The industry's product marketing manager's marketing learning capability guides the organisations' resource reconfiguration decisions.
PMI_5	The industry's product marketing manager's market learning capability fosters capability improvement through learning-by-doing in product development.
PMI_6	The industry's product marketing manager's market learning capability fosters capability improvement through learning-by-imitation in product development.

The summary descriptive statistics in Figure 4.4.g show that 41.9% of the respondents agree that product marketing managers have a market learning capability (PMI_3) and marketing learning capability guides the organisations' resource reconfiguration decisions (PMI_3). 51.6% agree market learning capability fosters capability improvement through learning-by-doing in product development (PMI_5). The respondents also slightly disagree (16.1%) that market learning capability fosters capability improvement through learning-by-imitation in product development (PMI_6). On average, the majority of respondents (39.2%) agree with the statements and this is confirmed by 84.9 cumulative percentage of the agreement scales.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
PMI_1	3,2	3,2	6,5	25,8	29,0	32,3
PMI_2		3,2	6,5	38,7	32,3	19,4
PMI_3			9,7	25,8	41,9	16,1
PMI_4		3,2	9,7	19,4	41,9	22,6
PMI_5		3,2	9,7	16,1	51,6	19,4
PMI_6	3,2	3,2	16,1	29,0	38,7	9,7
Average	**3,2**	**3,2**	**9,7**	**25,8**	**39,2**	**19,9**
Cumulative	**3,2**	**6,5**	**16,1**	**25,8**	**65,1**	**84,9**

Figure 4.4.g: Descriptive statistics on PMI dimension

4.3.3.8 Process innovativeness

Here are the nine statements that describe process innovativeness (PrcI) dimension.

Table 4.9.h: Process innovativeness statements and item codes

Code	Statement
PrcI_1	The industry focuses on smart business processes upgrading.
PrcI_2	The industry has flexible production methods which can be changed efficiently.
PrcI_3	In the past three years the industry has developed new suitable management approaches.
PrcI_4	The industry uses internal knowledge in the development of new activities / processes.
PrcI_5	The industry routinely engages in internal initiatives to identify new technologies.
PrcI_6	The industry routinely engages in internal initiatives to develop new technologies.
PrcI_7	The industry routinely explores technological advancement from outside.
PrcI_8	The industry routinely adopts technological advancements from outside.
PrcI_9	The industry routinely explores innovations by suppliers for adoption.

The summary descriptive statistics in Table 4.9.h show that 61.3% of the respondents agree that the industry routinely engages in internal initiatives to identify new technologies

(PrcI_5). In addition, 45.2% respondents agree (45.2%) with statements PrcI_1, PrcI_4, PrcI_6 and PrcI_9, respectively. The respondents also slightly disagree (16.1%) that the industry has recently developed new suitable management approaches (PrcI_3). On average, the majority of respondents (41.6%) agree with the statements and this is confirmed by 84.2 cumulative percentage of the agreement scales.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
PrcI_1			12,9	19,4	45,2	22,6
PrcI_2		3,2	16,1	35,5	25,8	19,4
PrcI_3		6,5	16,1	25,8	35,5	16,1
PrcI_4		3,2	12,9	25,8	45,2	9,7
PrcI_5		3,2	9,7	12,9	61,3	12,9
PrcI_6		6,5	9,7	19,4	45,2	19,4
PrcI_7		3,2	9,7	12,9	35,5	35,5
PrcI_8		3,2	3,2	19,4	35,5	38,7
PrcI_9		3,2	12,9	19,4	45,2	19,4
Average		**4,0**	**11,5**	**21,1**	**41,6**	**21,5**
Cumulative		**4,0**	**15,5**	**21,1**	**62,7**	**84,2**

Figure 4.4.h: Descriptive statistics on process innovativeness dimension

4.3.3.9 Knowledge management innovativeness

Table 4.9.i below presents the three statements that describe KMI dimension.

Table 4.9.i: KMI statements and item codes

Code	Statement
KMI_1	The industry has a knowledge sharing process through training and development to improve innovation.
KMI_2	The industry uses knowledge sharing process to engender trust to staff members to improve innovation.
KMI_3	The industry uses knowledge sharing process to motivate employees to be more innovative.

The summary descriptive statistics in Figure 4.4.i show that 12.9% disagree that a knowledge sharing process through training and development to improve innovation exists (KMI_1). Some 38.7% of the respondents agree that the industry uses knowledge sharing process to engender trust to staff members to improve innovation (KMI_2) and 32.3% slightly agree with the statement about knowledge sharing as a motivation for innovation among employees exist (KMI_3). On average, the majority of respondents (33.3%) agree with the statements and this is confirmed by 82.8 cumulative percentage of the agreement scales.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
KMI_1		12,9	3,2	19,4	32,3	32,3
KMI_2		3,2	9,7	22,6	38,7	19,4
KMI_3		3,2	12,9	32,3	29,0	22,6
Average		**6,5**	**8,6**	**24,7**	**33,3**	**24,7**
Cumulative		**6,5**	**15,1**	**24,7**	**58,1**	**82,8**

Figure 4.4.i: Descriptive statistics on KMI dimension

4.3.3.10 Behavioural innovativeness

Table 4.9.j presents the ten statements that describe BI dimension.

Table 4.9.j: BI statements

Code	Statement
BI_1	Management is able to inspire everyone around a common purpose.
BI_2	The industry is characterised by individuals with an ambition to get recognised.
BI_3	The industry uses storytelling to motivate staff about acceptable innovative behaviour.
BI_4	The industry has creative spaces where ideas can be openly shared.
BI_5	The industry’s leadership are roles model for innovative behaviour.
BI_6	The industry has a structured process to approve new ideas for implementation.
BI_7	During recruitment, the industry critically evaluates the ability to innovate.
BI_8	In the industry, employees enjoy freedom to excel based on their capabilities, skills and experiences.
BI_9	The industry is characterised by innovative culture (i. e., commitment to foster innovation capacity) across all critical functional areas.
BI_10	In the industry, innovative behaviour is rewarded during performance evaluation.

The summary descriptive statistics in Figure 4.4.j show that 41.9% of the respondents agree that management is able to inspire everyone around a common purpose (BI_1) and that the industry is characterised by individuals with an ambition to get recognised (BI_2). 25.8% slightly disagree with the existence of storytelling to motivate staff (BI_3) and creative spaces where ideas are shared openly (BI_4), respectively. The respondents slightly agree (38.7%) that innovative culture across all critical functional areas (BI_9). On average, a third of the respondents (30.8%) agree with the statements and this is confirmed by 75.3 cumulative percentage of the agreement scales.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
BI_1		3,2	9,7	25,8	41,9	19,4
BI_2	3,2	6,5	12,9	22,6	41,9	12,9
BI_3	3,2	6,5	25,8	32,3	25,8	6,5
BI_4		3,2	25,8	22,6	29,0	19,4
BI_5	6,5	6,5	6,5	32,3	29,0	19,4
BI_6	3,2	3,2	16,1	32,3	22,6	22,6
BI_7	6,5	6,5	16,1	19,4	35,5	16,1
BI_8	3,2	9,7	16,1	32,3	19,4	19,4
BI_9		9,7	9,7	38,7	32,3	9,7
BI_10		6,5	9,7	45,2	19,4	19,4
Average	**4,3**	**6,5**	**15,4**	**30,8**	**28,3**	**16,1**
Cumulative	**4,3**	**10,8**	**26,2**	**30,8**	**59,1**	**75,3**

Figure 4.4.j: Descriptive statistics on BI dimension

4.3.3.11 Strategic innovativeness

Below are the eight statements that describe strategic innovativeness (SI) dimension.

Table 4.9.k: Strategic innovativeness statements and item codes.

Code	Statement
SI_1	Each firm has a range of products to suit the choices of customers.
SI_2	In this industry, senior management have strong abilities to simulate future market.
SI_3	In this industry, senior management proactively seek strategic alliances for competitiveness.
SI_4	The industry has promoted internal candidates to the role of CEO in past three years.
SI_5	The industry's management is characterised by individuals with prior innovation-relevant experience from same industry.
SI_6	The industry's management is characterised by individuals with prior innovation-relevant experience from self-employment.
SI_7	The industry's management is characterised by individuals with prior innovation-relevant experience from R&D.
SI_8	The industry's management is characterised by individuals with concrete innovation-relevant ideas from former occupation.

The summary descriptive statistics in Figure 4.4.k show that 38.7% of the respondents agree about an availability of a range of products to suit the choices of customers (SI_1) and that senior management proactively seek strategic alliances for competitiveness (SI_3) respectively. In addition, the respondents slightly disagree with statements SI_6 (38.7%), SI_7 (25.8%) and SI_8 (19.4%), respectively. The respondents also strongly disagree (12.9%) that management is characterised by individuals with prior innovation-relevant experience from R&D (SI_7). On average, a third of the respondents (33.1%) agree with the statements and this is confirmed by 71.5 cumulative percentage.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
SI_1		3,2	12,9	19,4	38,7	25,8
SI_2	3,3	6,7	6,7	30,0	30,0	23,3
SI_3	3,2		9,7	25,8	38,7	22,6
SI_4	9,7	9,7	16,1	19,4	32,3	12,9
SI_5	6,9	6,9	17,2	24,1	34,5	10,3
SI_6	9,7		38,7	16,1	32,3	3,2
SI_7	12,9		25,8	22,6	25,8	12,9
SI_8	6,5		19,4	29,0	32,3	9,7
Average	**7,5**	**6,6**	**18,3**	**23,3**	**33,1**	**15,1**
Cumulative	**7,5**	**14,1**	**32,4**	**23,3**	**56,4**	**71,5**

Figure 4.4.k: Descriptive statistics on strategic innovativeness dimension

Based on the above descriptive analysis, the respondents are in agreement with the majority of the statements the describe the innovative capability constructs.

The next analysis is on the descriptive statistics of SCA construct.

4.3.4 Descriptive Statistics on Sustainable Competitive Advantage Dimension

SCA is explained by six (6) constructs and the results for each and their related statements are summarised in the diagrams below.

4.3.4.1 Resource heterogeneity

The resource heterogeneity (RH) dimension is described by seven statements shown on Table 4.9.l.

Table 4.9.l: RH statements and item codes

Code	Statement
RH_1	Each firm has access to a unique set of tangible resources not available to competitors.
RH_2	Each firm has access to a unique set of intangible resources not available to competitors.
RH_3	Some firms' spatial location of resources makes it difficult for their competitors to have access to them.
RH_4	Some firms' resource base is limited in supply such that their competitors cannot expand on them anymore.
RH_5	Some firms' resource base is quasi-limited in supply such that their competitors cannot expand on them rapidly.
RH_6	Some firms' resource base is of superior efficiency such that their competitors are not able to match.
RH_7	Some firms' resource base allows for better service to customers that their competitors are not able to meet.

As shown in Figure 4.4.l, 12.9% of the respondents strongly disagree that firms have access to unique set of intangible resources not available to their competitors (RH_2). In addition, 19.4% slightly disagree that spatial location of resources offer firms a superior advantage (RH_3) over competitors. At 45.2%, the respondents agree that firms have resource base that allows superior efficiency (RH_6) and better service to customer that cannot be matched by competitors (RH_7), respectively. On average, 34.6% of the respondents agree with the statements about RH and 72.8 cumulative percentage implies that agree scales were selected in the majority of the cases.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
RH_1	9,7	12,9	12,9	25,8	29,0	9,7
RH_2	12,9	9,7	16,1	22,6	32,3	6,5
RH_3	3,2	12,9	19,4	22,6	35,5	6,5
RH_4	6,5	9,7	16,1	29,0	22,6	16,1
RH_5	6,5	6,5	9,7	32,3	32,3	12,9
RH_6	3,2		9,7	16,1	45,2	25,8
RH_7	3,2	3,2	6,5	25,8	45,2	16,1
Average	**6,5**	**9,1**	**12,9**	**24,9**	**34,6**	**13,4**
Cumulative	**6,5**	**15,6**	**28,5**	**24,9**	**59,4**	**72,8**

Figure 4.4.l: Descriptive statistics on RH dimension

4.3.4.2 Product differentiation

The product differentiation (PD) dimension is described by six statements shown below.

Table 4.9.m: PD statements and item codes

Code	Statement
PD_1	Each firm’s competitiveness is achievable through product differentiation that others cannot copy
PD_2	Each firm’s product differentiation is driven by the superior skills of our employees
PD_3	Each firms’ product differentiation is driven the superior process and technologies in our company
PD_4	Each firm’s product differentiation is driven by superior manufacturing standards set by management
PD_5	Customers perceive some firms’ products as distinctively superior from competitors
PD_6	Suppliers perceive some firms’ products to offer higher profit margins than competitors

In Figure 4.4.m, the majority of the respondents believe a firm’s PD is driven by all of the aspects described by the statements. Overall the respondents are in agreement that the six statements describe PD.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
PD_1		6,5	9,7	25,8	32,3	25,8
PD_2		9,7	16,1	16,1	41,9	16,1
PD_3		6,5	6,5	19,4	51,6	16,1
PD_4	6,5	0,0	16,1	19,4	25,8	32,3
PD_5	6,5	0,0	16,1	25,8	29,0	22,6
PD_6		9,7	9,7	19,4	38,7	19,4
Average	**6,5**	**5,4**	**12,4**	**21,0**	**36,6**	**22,0**
Cumulative	**6,5**	**11,8**	**24,2**	**21,0**	**57,5**	**79,6**

Figure 4.4.m: Descriptive statistics on PD dimension

4.3.4.3 Imperfect mobility of resources

The imperfect mobility of resources (IMR) dimension is described by the three statements shown below.

Table 4.9.n: IMR statements and item codes

Code	Statement
IMR_1	Some firms have access to resources that are specific to that firm's needs – i.e., that cannot be applied anywhere else
IMR_ 2	Some firms uses certain resources in conjunction with other different types of resources (i.e., unique combinations) to add more value
IMR_ 3	Each firm has strategies to manage tacit knowledge (i.e., intellectual assets) that individual employees possess

As shown in Figure 4.4.n, 25.8% of the respondents strongly agree with each statement describing the imperfect mobility of resources (IMR_1; IMR_2 and IMR_3), respectively. The respondents also strongly disagree (6.5 %) that firms have access to resources that are specific to the firms' needs (IMR_1) and are unique combinations (IMR_2), respectively. At an average of 33.3%, the respondents slightly agree with the statements and are in agreement at 87.1 cumulative percent.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
IMR_1	6,5	9,7	3,2	29,0	22,6	25,8
IMR_2	6,5		3,2	35,5	29,0	25,8
IMR_3	3,2		35,5	35,5	32,3	25,8
Average	**5,4**	**9,7**	**14,0**	**33,3**	**28,0**	**25,8**
Cumulative	**5,4**	**15,1**	**29,0**	**33,3**	**61,3**	**87,1**

Figure 4.4.n: Descriptive statistics on IMR dimension

4.3.4.4 Ex-post limits to competition

Ex-post limits to competition (EPLC) construct is described by seven statements shown on Table 4.9.o.

Table 4.9.o: Ex – post limits to competition statements and item codes

Code	Statement
EPLC_1	Firms have put in place intellectual property rights to limit competition
EPLC_2	Firms have access to critical information that cannot be easily accessed by their competitors
EPLC_3	Firms have access to implicit knowledge that cannot be easily accessed by their competitors
EPLC_4	Each firm's learning-by-doing processes makes it difficult for competitors to imitate their methods
EPLC_5	Each firm's previous investment makes it difficult for competitors to imitate their methods
EPLC_6	Each firm has a set of complex assets whose efficiency cannot be imitated by competitors
EPLC_7	Each firms' products are not easily substitutable in the market of similar products.

As shown in Figure 4.4.o, the respondents strongly agree (i.e., 45.2% and 38.7%) that firms have intellectual property in place to limit competition (EPLC_1) and access to critical information not easily accessible to competitors (EPLC_2). The respondents also slightly disagree (16.1 %) that learning-by-doing processes cannot be imitated by competition (EPLC_4). Respondents agree (38.7%) that firms' resource efficiency is inimitable (EPLC_6). 13.3% of respondents also disagree that products are –not easily substitutable in the market (EPLC_7). At an average of 33.3%, the respondents strongly agree with the statements and are in agreement for most of the cases at 85.2 cumulative percent compared to a 19.2 cumulative percent of disagreement.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
EPLC_1			6,5	16,1	32,3	45,2
EPLC_2			9,7	16,1	35,5	38,7
EPLC_3		3,2	9,7	22,6	32,3	32,3
EPLC_4		3,2	16,1	22,6	29,0	29,0
EPLC_5		6,5	9,7	22,6	29,0	32,3
EPLC_6	3,2	9,7	6,5	12,9	38,7	29,0
EPLC_7	3,3	13,3	3,3	30,0	23,3	26,7
Average	**3,3**	**7,2**	**8,8**	**20,4**	**31,4**	**33,3**
Cumulative	**3,3**	**10,5**	**19,2**	**20,4**	**51,9**	**85,2**

Figure 4.4.o: Descriptive statistics on ex-post limits to competition dimension

4.3.4.5 Ex-ante limits to competition

Ex-ante limits to competition (EALC) construct is described by four statements shown in Table 4.9.p.

Table 4.9.p: Ex-ante limits to competition statements and item codes

Code	Statement
EALC_1	Each firm is able to pre-empt the future direction of business.
EALC_2	Firms use a first mover approach in the market.
EALC_3	Firms have the ability to set new standards and norms in the industry.
EALC_4	Firms can quickly adapt a new strategy in the event of crises.

As shown in Figure 4.4.p, the respondents slightly disagree (i.e., 12.9%) that firms have the capability to pre-empt the future direction of business (EALC_1). 32.3% of respondents strongly agree that firms practice a first mover approach in the market (EALC_2) and 58.1% agree that firms are able to set new standards and norms in the industry (EALC_3). The respondents also agree (25.8%) that firms adapt new strategies quickly during crisis (EALC_4). At an average of 35.5%, the respondents agree with the statements and are in agreement for most of the cases at 80.6 cumulative percent compared to 20.4 cumulative percent of disagreement.

Percent	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
EALC_1	3,2	6,5	12,9	22,6	25,8	25,8
EALC_2		6,5	9,7	16,1	32,3	32,3
EALC_3	3,2		6,5	12,9	58,1	19,4
EALC_4	6,5	6,5	9,7	29,0	25,8	22,6
Average	4,3	6,5	9,7	20,2	35,5	25,0
Cumulative	4,3	10,8	20,4	20,2	55,6	80,6

Figure 4.4.p: Descriptive statistics on ex-ante limits to competition dimension

Based on the above descriptive analysis, the respondents are in agreement with the majority of the statements that the describe the SCA constructs.

4.3.5 Normality Test

The test for normality of the data is applied to determine the representativeness of the sample for the target population (Sekaran & Bougie 2014:244). The assumption is that the target population from where the sample is drawn is normally distributed and the inferential method applied requires checking for the normality in the data (Das & Imon 2016:5). The study applied the Skewness and Kurtosis test because they are comparatively robust in both small and large samples sizes (Kim H 2013:52). In addition, the Shapiro-Wilk test is used because of its power in small samples (Mishra, Pandey, Singh, Gupta, Sahu & Keshri 2019:70).

4.3.5.1 Normality tests for innovative capability construct.

The results for the normality test for the dimensions under innovative capability are presented using a histogram and analytical tests mentioned above.

Figure 4.5.a shows that the PI dimension t is negatively tailed but still resembles the bell-shaped normal distribution for the majority of the data.

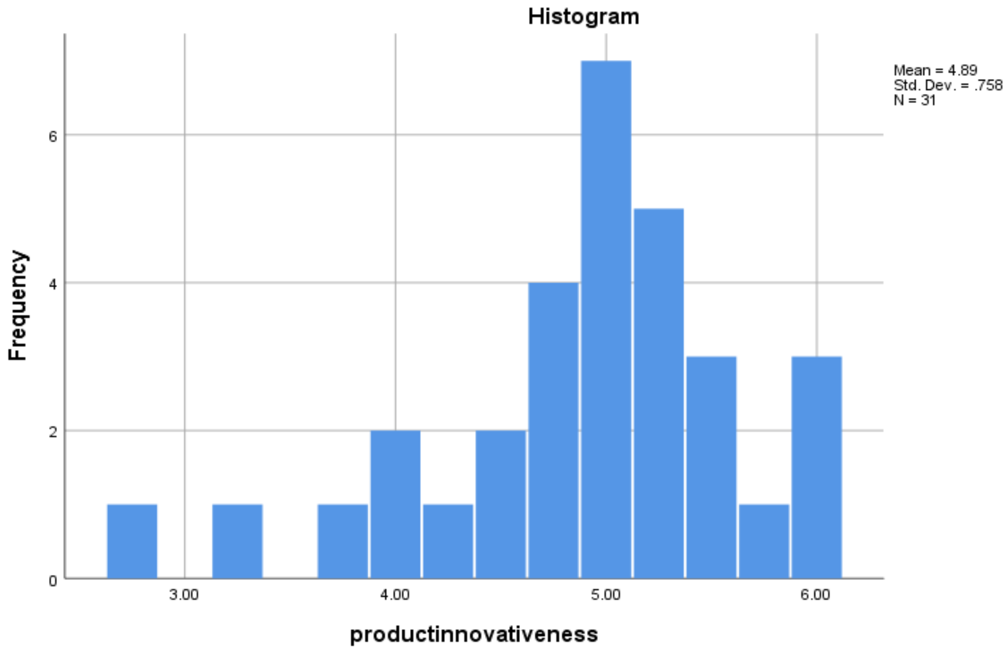

Figure 4.5.a: The distribution of PI dimension.

The table below confirmed that the PI dimension is negatively skewed and the value 0.96 imply a fairly normal distribution. The kurtosis of PI is 1.22 indicating a heavily tailed distribution and a number of outliers as shown in the diagram. However, the Shapiro-Wilk test shows that the construct is not normally distributed because its p-value (0.04) is less than significant level of 0.05.

Table 4.10.a: Normality test for PI dimension.

PI					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,89	**5,00**	**0,76**	**-0,96**	**1,22**	**0,04**

Figure 4.5.b shows that the IE dimension is negatively tailed but still resembles the bell-shaped normal distribution for the majority of the data.

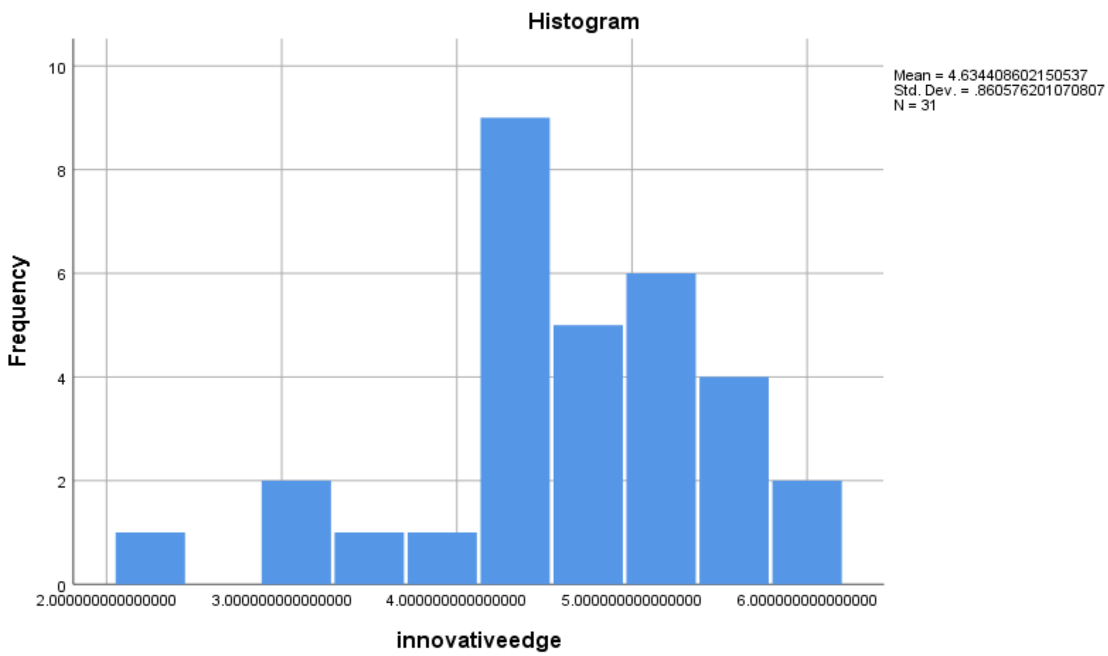

Figure 4.5.b: The distribution of IE dimension

In Table 4.10.b confirmed that the IE dimension is skewed leftwards and the value 0.61 imply a fairly normal distribution. The Kurtosis of IE is 0.73 indicating a lightly tailed distribution indicating a few outliers as shown in the diagram. However, the Shapiro-Wilk test shows that the dimension is normally distributed because its p-value (0.19) is greater than significant level of 0.05.

Table 4.10.b: Normality test for IE dimension

IE					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,63	**4,75**	**0,86**	**-0,61**	**0,73**	**0,19**

Figure 4.5.c shows that the systems innovativeness dimension in negatively tailed but the majority of the points lie within a bimodal normal distribution with very few outliers.

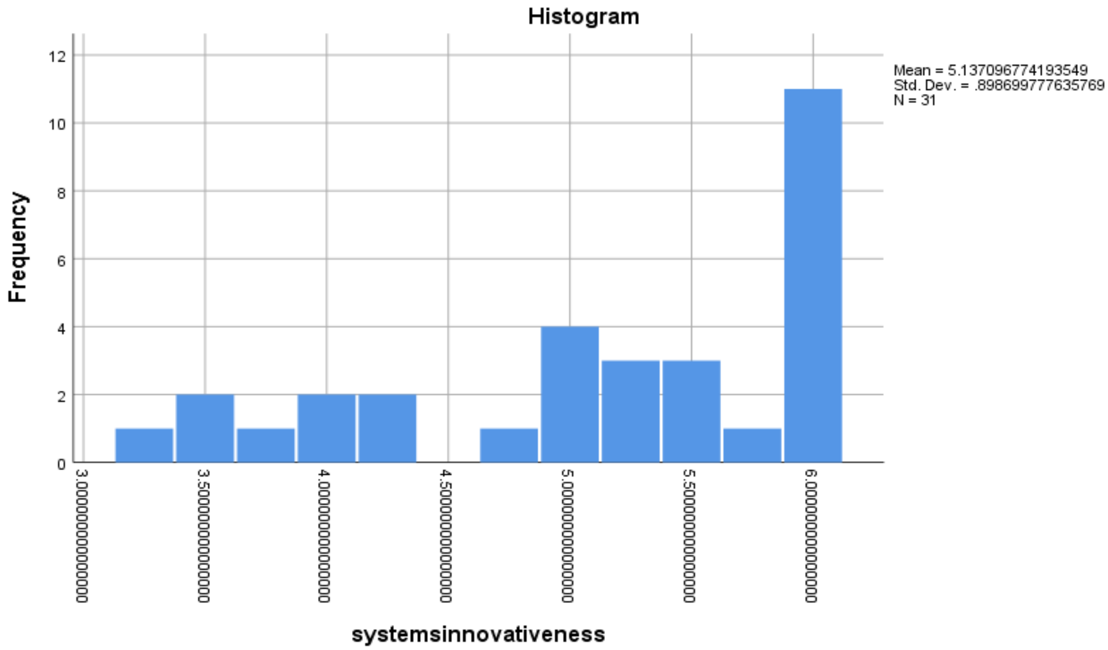

Figure 4.5.c: The distribution of systems innovativeness dimension

As shown in Table 4.10.c below, the systems innovativeness dimension is skewed leftwards and the value 0.74 imply a fairly normal distribution. The kurtosis of systems innovativeness construct is 0.73 indicating a lightly tailed distribution indicating a few outliers as shown in the diagram. However, the Shapiro-Wilk test shows that the construct is not normally distributed because its p-value (0.00) is less than significant level of 0.05.

Table 4.10.c: Normality test for systems innovativeness dimension.

Systems Innovativeness					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
5,14	**5,25**	**0,90**	**-0,74**	**-0,73**	**0,00**

Figure 4.5.d shows that the product development construct is negatively tailed but normally distributed for the majority of the data.

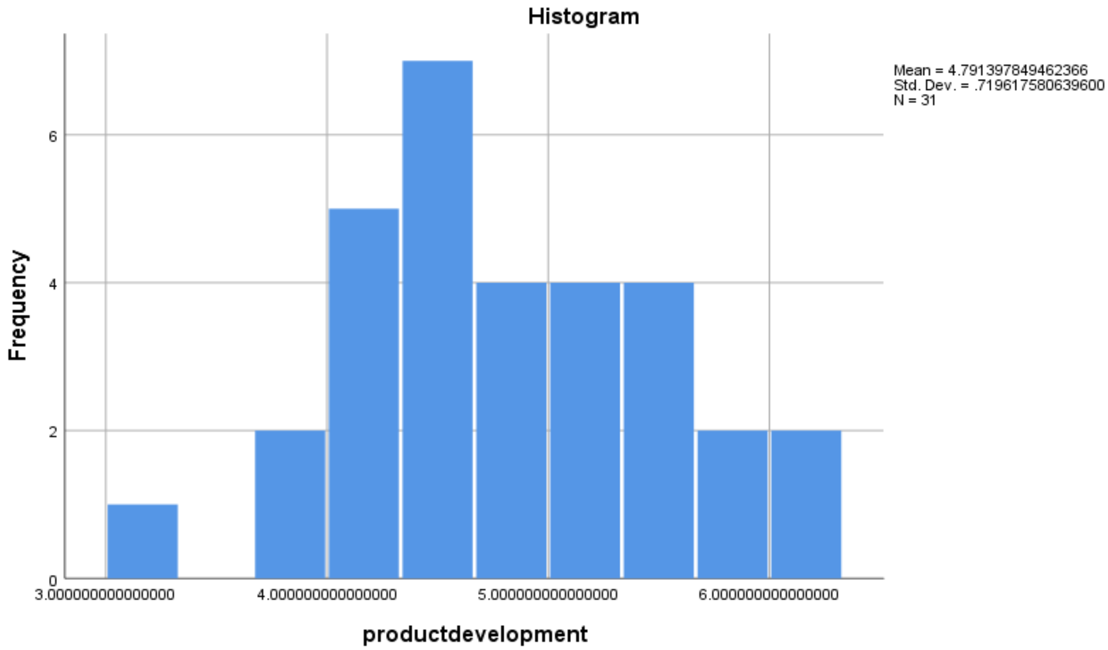

Figure 4.5.d: The distribution of PDI construct

In Table 4.10.d, the PDI construct is skewed leftwards and the value 0.22 implies a near perfect normal distribution. The Kurtosis of PDI is 0.02 indicating a lightly tailed distribution with very few outliers. Hence, the Shapiro-Wilk test shows that the construct is normally distributed because its p-value (0.67) is greater than 0.05.

Table 4.10.d: Normality test for PDI construct.

PDI					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,79	**4,70**	**0,72**	**-0,22**	**-0,02**	**0,67**

Figure 4.5.e shows that the environmental influences construct in negatively tailed but normally distributed for the majority of the data.

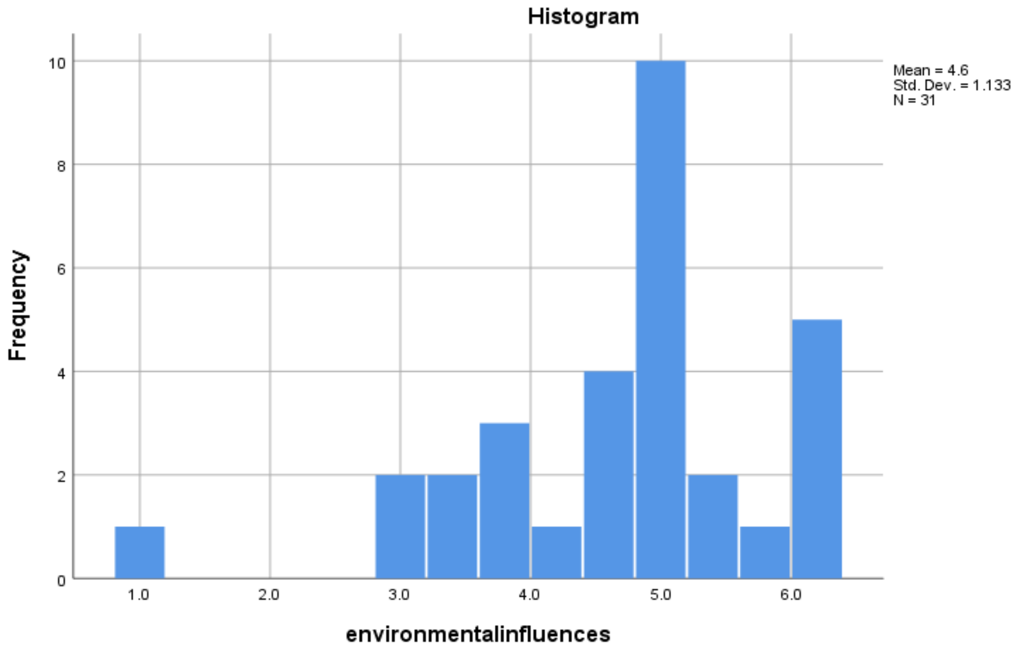

Figure 4.5.e: The distribution of environmental influences innovativeness construct

In Table 4.10.e the environmental influences innovativeness construct is skewed leftwards and the value 1.12 implying a non-normal distribution. The kurtosis of environmental influences innovativeness is 1.97 indicating a heavily tailed distribution with a number of outliers. However, the Shapiro-Wilk test shows that the construct is not normally distributed because its p-value (0.01) is less than significant level of 0.05.

Table 4.10.e: Normality test for environmental influences construct.

Environmental Influences Innovativeness					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,60	**4,80**	**1,13**	**-1,12**	**1,97**	**0,01**

Figure 4.5.f below shows that the market innovativeness construct in positively tailed but normally distributed for the majority of the data.

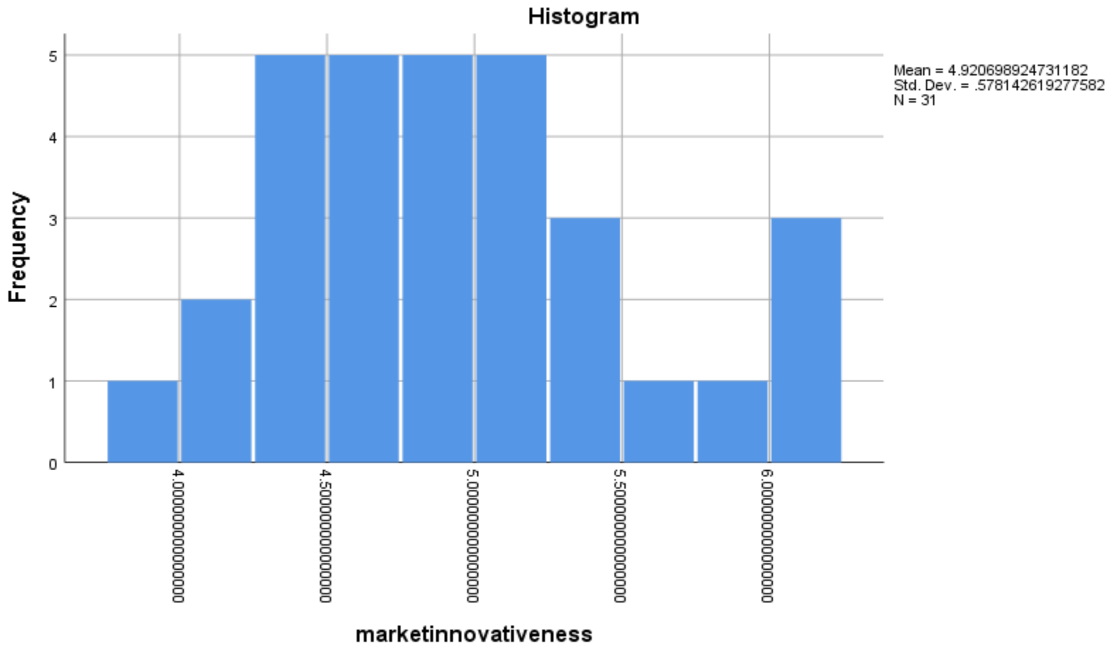

Figure 4.5.f: The distribution of market innovativeness construct

In Table 4.10.f below the market innovativeness construct is skewed rightwards and the value 0.38 implies a fairly normal distribution. The kurtosis of market innovativeness is 0.48 indicating a lightly tailed distribution with a very few outliers. However, the Shapiro-Wilk test shows that the construct is normally distributed because its p-value (0.30) is greater than significant level of 0.05.

Table 4.10.f: Normality test for market innovativeness construct.

Market Innovativeness					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,92	**4,89**	**0,58**	**0,38**	**-0,48**	**0,30**

Figure 4.5.g shows that the PMI construct in negatively tailed but normally distributed for the majority of the data.

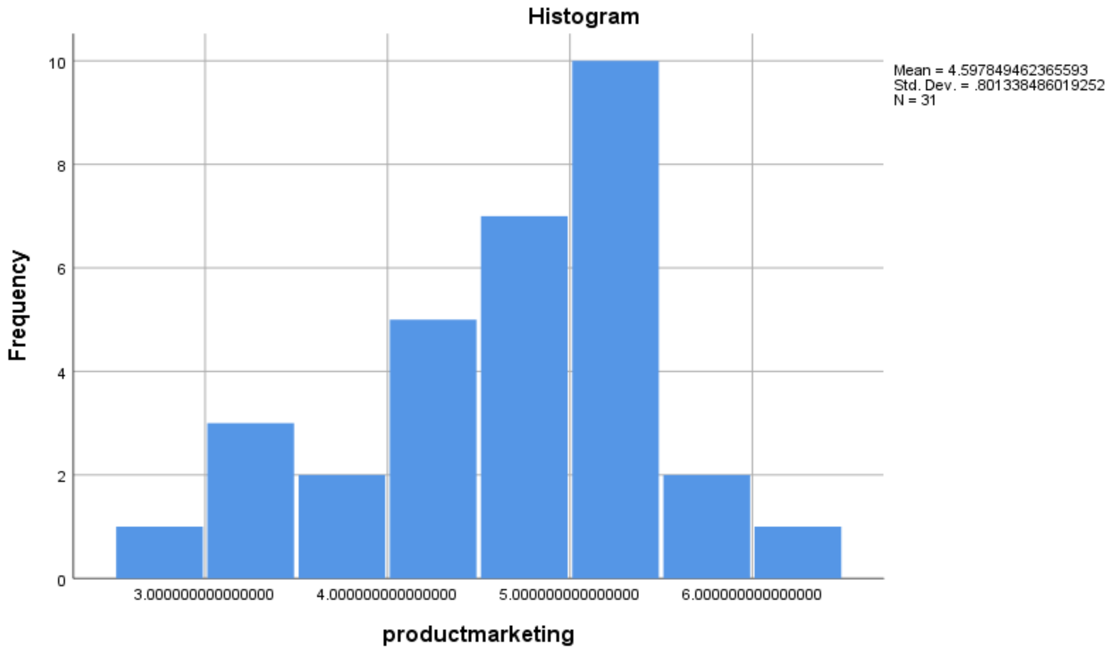

Figure 4.5.g: The distribution of PMI construct.

In Table 4.10.g, the PMI construct is skewed leftwards and the value 0.64 implies a fairly normally distributed data. The Kurtosis of PMI is 0.02 indicating a lightly tailed distribution with a very few outliers. However, the Shapiro-Wilk test shows that the construct is normally distributed because its p-value (0.15) is greater than significant level of 0.05.

Table 4.10.g: Normality test for PMI construct.

PMI					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,60	**4,67**	**0,80**	**-0,64**	**-0,02**	**0,15**

Figure 4.5.h shows that the process innovativeness construct in negatively tailed but normally distributed for the majority of the data.

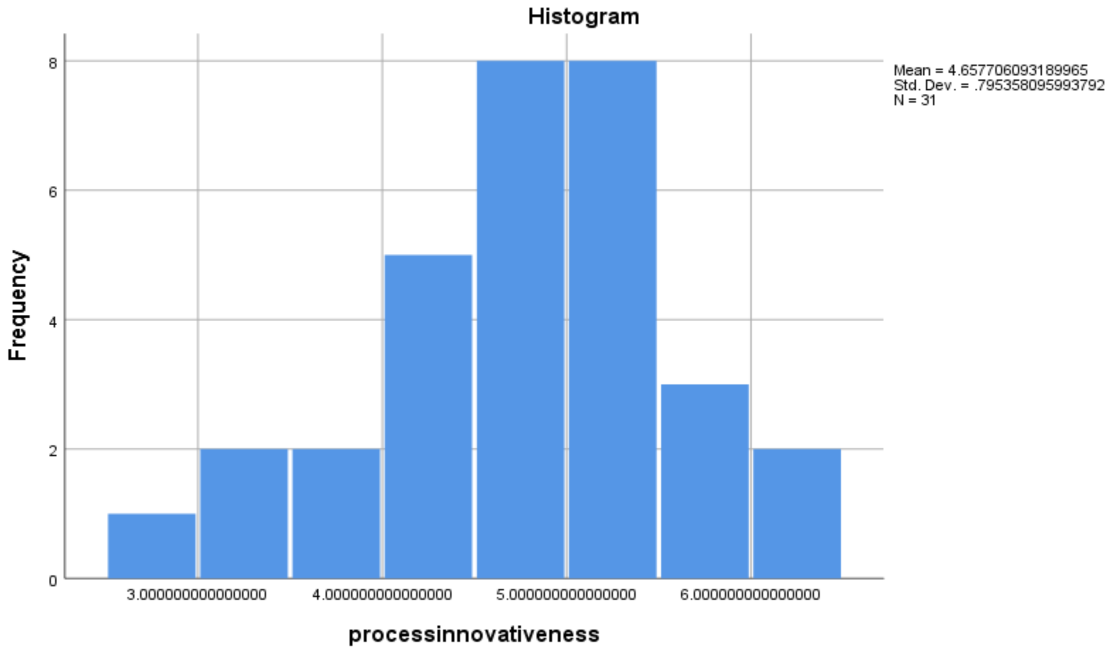

Figure 4.5.h: The distribution of process innovativeness construct

In Table 4.10.h, the process innovativeness construct is skewed leftwards and the value 0.62 implies a fairly normally distributed data. The kurtosis of process innovativeness construct is 0.45 indicating a lightly tailed distribution with a very few outliers. In addition, the Shapiro-Wilk test confirms that the construct is normally distributed because its p-value (0.12) is greater than significant level of 0.05.

Table 4.10.h: Normality test for process innovativeness construct

Process Innovativeness					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,66	**4,67**	**0,80**	**-0,62**	**0,45**	**0,12**

Figure 4.5.i shows that the KMI construct in negatively tailed but the data points lie within a bimodal normal distribution with very few outliers.

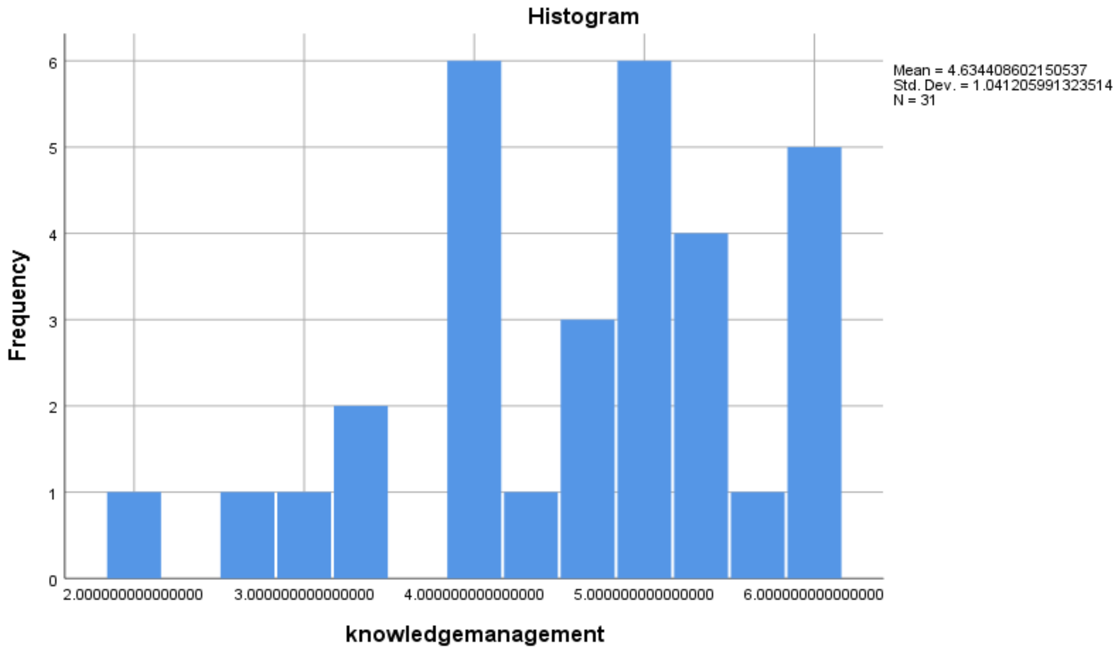

Figure 4.5.i: The distribution of KMI construct

Table 4.10.i shows that the process innovativeness construct is skewed leftwards and the value 0.65 implying a fairly normally distributed data. The Kurtosis of PMI is 0.02 near perfect normal distribution without outliers. Hence, the Shapiro-Wilk test shows that the construct is normally distributed because its p-value (0.07) is greater than significant level of 0.05.

Table 4.10.i: Normality test for KMI construct.

KMI					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,63	**5,00**	**1,04**	**-0,65**	**0,02**	**0,07**

Figure 4.5.j shows that the BI construct is negatively tailed but the data points lie within a normal distribution with very few outliers.

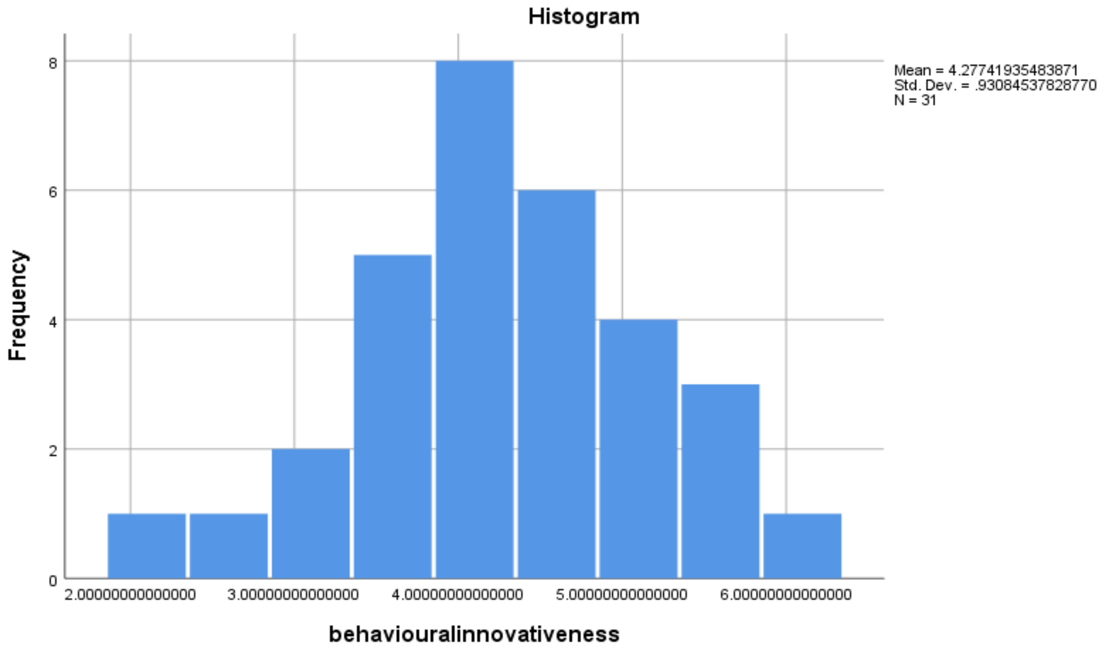

Figure 4.5.j: The distribution of BI construct

Table 4.10.j shows that the BI construct is skewed leftwards and the value 0.25 implies a near perfect normally distributed data. The kurtosis of BI is 0.11 signifying a near perfect normal distribution without outliers. Hence, the Shapiro-Wilk test confirms that the construct is normally distributed because its p-value (0.92) is higher than significant level of 0.05.

Table 4.10.j: Normality test for BI construct

BI					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,28	**4,30**	**0,93**	**-0,25**	**-0,11**	**0,92**

Figure 4.5.k shows that the strategic innovativeness construct is negatively tailed but the data points lie within a normal distribution with very few outliers.

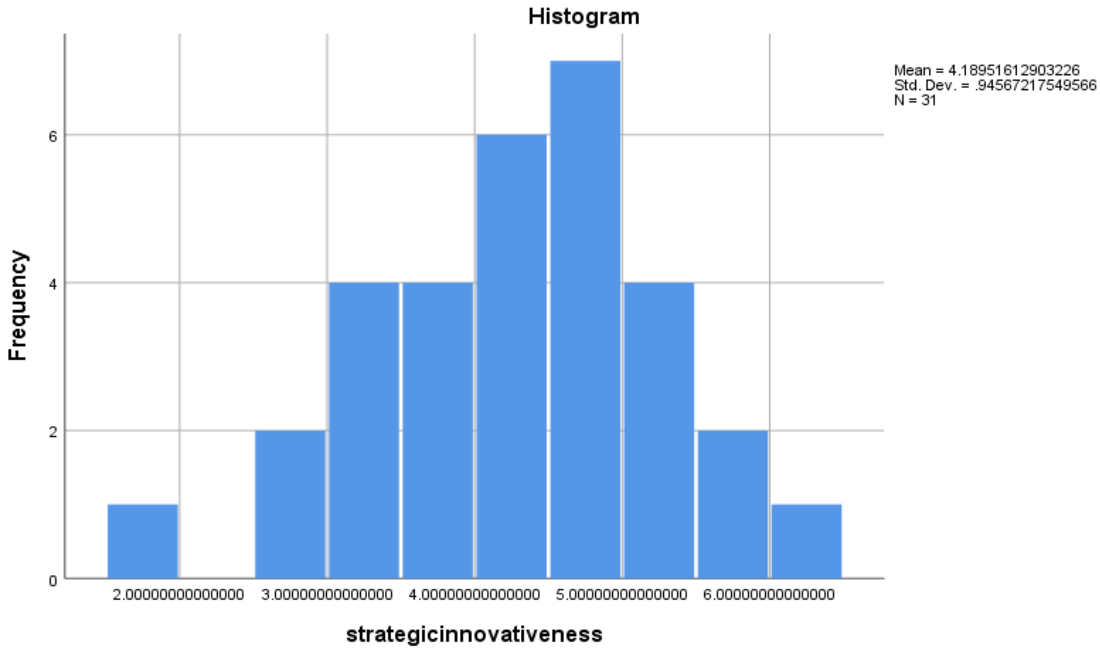

Figure 4.5.k: The distribution of strategic innovativeness construct

Table 4.10.k shows that the strategic innovativeness construct is skewed leftwards and the value 0.53 a fairly normally distributed data. The kurtosis of strategic innovativeness is 0.94 signifying a lightly tailed distribution with a few outliers. Hence, the Shapiro-Wilk test confirms that the construct is normally distributed with a p-value (0.58) greater than 0.05.

Table 4.10.k: Normality test for strategic innovativeness construct

Strategic Innovativeness					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,19	**4,13**	**0,95**	**-0,53**	**0,94**	**0,58**

The above subsection has presented the results for the normality test of innovative capability constructs. The normality test results have shown the majority of the constructs have a skewness of less 1 and kurtosis of less than 1 in absolute terms, respectively. However, the Shapiro-Wilk test has confirmed that eight constructs are normally distributed while three are non-normally distributed. This means that the majority of the constructs explaining innovative capability are reasonably symmetric in nature. The tests for normality of SCA constructs are presented in the next subsection.

4.3.5.2 Normality tests for SCA constructs.

This subsection presents the results of the normality test for the constructs under SCA.

Figure 4.5.l shows that the RH construct is negatively tailed but the data points lie within a normal distribution with very few outliers.

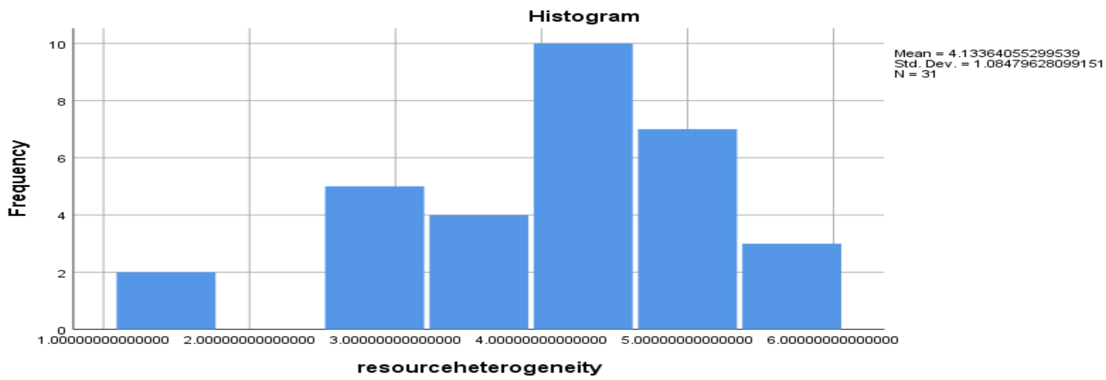

Figure 4.5.l: The distribution of RH construct

Table 4.10.l shows that the RH construct is skewed leftwards and the value 0.66 implies a fairly normally distributed data. The kurtosis of RH is 0.33 signifying a lightly tailed distribution with a very few outliers. Hence, the Shapiro-Wilk test shows that the construct is normally distributed because its p-value (0.28) is higher than significant level of 0.05.

Table 4.10.l: Normality test for RH construct.

RH					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,13	**4,14**	**1,08**	**-0,66**	**0,33**	**0,28**

Figure 4.5.m shows that the PD construct is negatively tailed but the data points lie within a normal distribution with very few outliers.

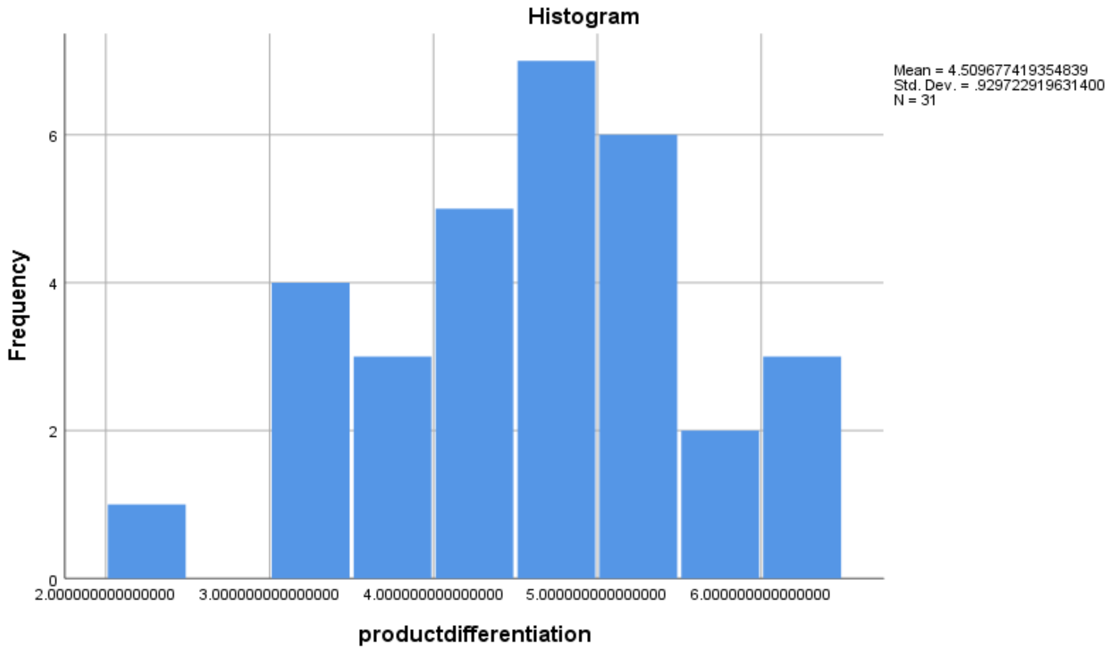

Figure 4.5.m: The distribution of PD construct

Table 4.10.m shows that the PD construct is skewed leftwards and the value 0.33 implies an almost perfect normal distribution. The kurtosis of RH is 0.27 signifying a lightly tailed distribution with a very few outliers. Hence, the Shapiro-Wilk test shows that the construct is normally distributed because its p-value (0.60) is greater than significant level of 0.05.

Table 4.10.m: Normality test for PD construct

PD					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,51	**4,50**	**0,93**	**-0,30**	**-0,27**	**0,60**

Figure 4.5.n shows that the IMR construct is negatively tailed and most of the data points lie outside a normal distribution with a few outliers.

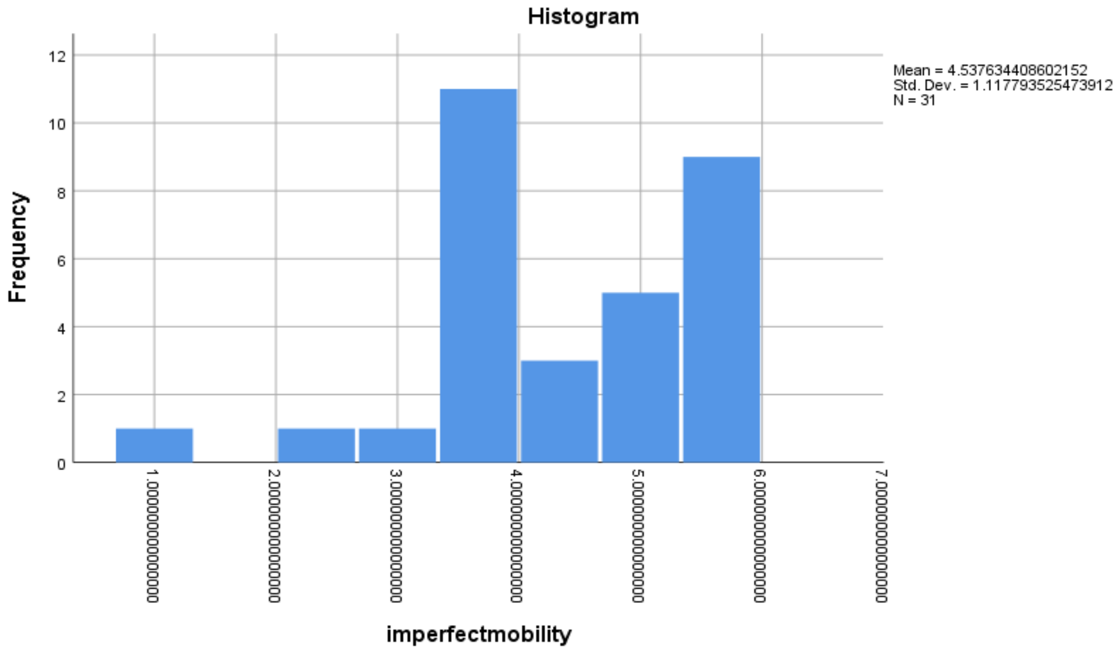

Figure 4.5.n: The distribution of IMR construct

Table 4.10.n shows that the IMR construct is skewed leftwards and the value 1.01 implies a non-normal distribution. The kurtosis of RH is 1.93 signifying a heavily tailed distribution with some outliers. The Shapiro-Wilk test shows that the construct is non-normally distributed because its p-value (0.01) is less than significant level of 0.05.

Table 4.10.n: Normality test for IMR construct

IMR					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,54	**4,67**	**1,12**	**-1,01**	**1,93**	**0,01**

Figure 4.5.o shows that the ex-post limits to competition of construct is negatively tailed but most of the data points lie within a normal distribution with a few outliers.

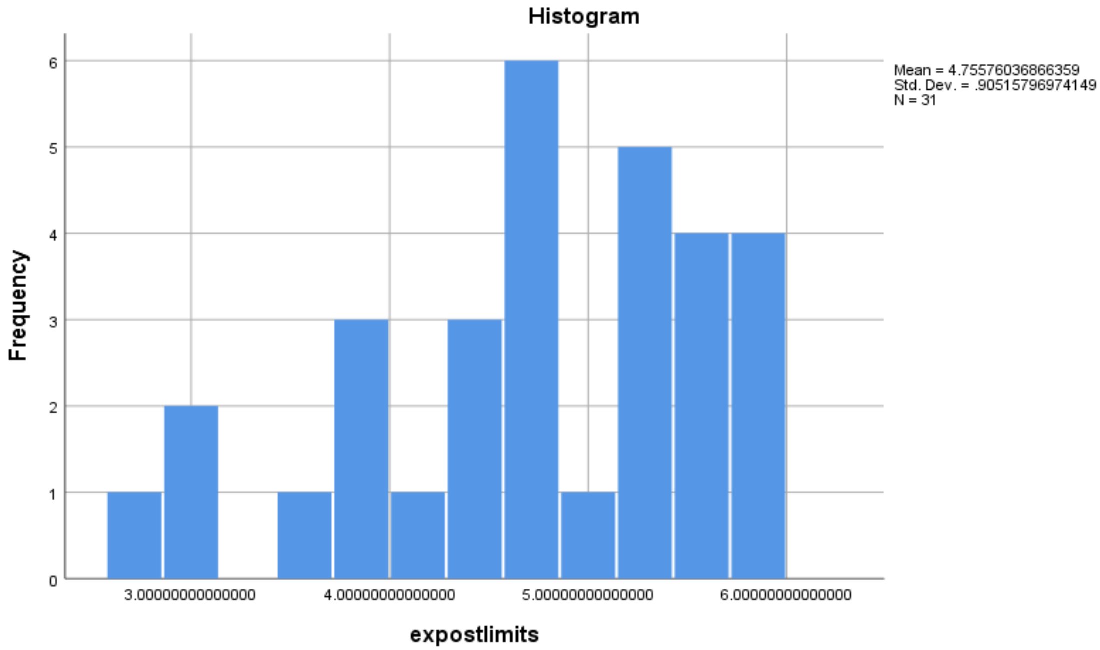

Figure 4.5.o: The distribution of ex-post limits to competition construct

Table 4.10.o shows that the ex-post limits to competition construct is skewed to the left and the value 0.70 implies a fair normal distribution of the data. The kurtosis of ex-post limits to competition is 0.08 signifying an almost perfect distribution with no outliers. Hence, the Shapiro-Wilk test shows that the construct is normally distributed because its p-value (0.06) is greater than significant level of 0.05.

Table 4.10.o: Normality test for ex-post limits to competition construct

Ex-Post Limits to Competition					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,76	**4,71**	**0,91**	**-0,70**	**-0,08**	**0,06**

Figure 4.5.p shows that the ex-ante limits to competition construct is negatively tailed but most of the data points lie within a normal distribution with a few outliers.

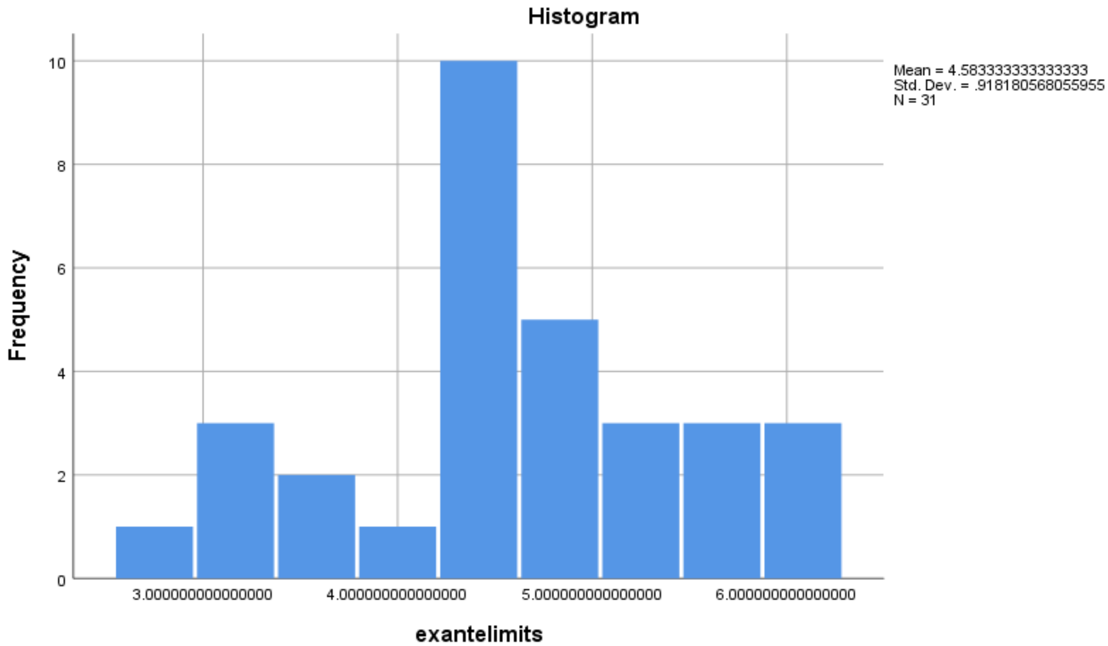

Figure 4.5.p: The distribution of ex-ante limits to competition construct

Table 4.10.p shows that the ex-ante limits to competition construct is skewed to the left and the value 0.50 implies a fair normal distribution of the data. The kurtosis of ex-ante limits to competition is 0.50 signifying a light-tailed distribution with very few outliers. Hence, the Shapiro-Wilk test shows that the construct is normally distributed because its p-value (0.14) is greater than significant level of 0.05.

Table 4.10.p: Normality test for Ex-Ante Limits to Competition Construct

Ex-Ante Limits to Competition					
Mean	**Median**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Shapiro-Wilk**
4,58	**4,50**	**0,92**	**-0,37**	**-0,50**	**0,14**

The above subsection has presented the results for the normality test of SCA constructs. The normality test results have shown the majority of the constructs have a skewness of less 1 and kurtosis of less than 1 in absolute terms, respectively. However, the Shapiro-Wilk test confirms that four out of five constructs are normally distributed. This means that the majority of the constructs explaining SCA are fairly normally distributed in nature.

The next subsection presents the descriptive statistics on reliability and validity of the measures developed to capture the concepts.

4.3.6 Goodness of Fit Tests

This tests are carried out to ensure that the measures developed are valid and reliable in describing the concepts being studied. Correlation analysis, Factor analysis and Cronbach alpha static have been applied to test these measures, respectively.

4.3.6.1 Correlation analysis

The analysis below shows the convergence of items within each construct based on the results from inter-item correlation matrix computed using SPSS. The complete results are found in the Appendix M. Items with a correlation value below 0.3 were either dropped from the analysis or kept if their exclusion does not make any improvements in the analysis.

Table 4.11.a: Correlation Analysis for Innovative Capability Constructs

Innovative Capability Constructs			
Construct	**Item codes**	**Low convergent item (s)**	**Item (s) to drop**
Product Innovativeness	PI_1 to PI_4	PI_1	PI_ 1
Innovative Edge	IE_1 to IE_4	IE_2	None
Systems innovativeness	SysI_1 to SysI_4	None	None
Product development innovativeness	PDI_1 – PDI_10	PDI_9	None
Environmental innovativeness	EI_1 to EI_5	None	None
Market innovativeness	MI_1 to M_9	MI_5	None
Product marketing innovativeness	PMI_1 to PMI_6	None	None
Process innovativeness	Prc_1 to Prc_9	None	None
Knowledge management	KMI_1 to KMI_3	None	None
Behavioural innovativeness	BI_1 to BI_10	None	None
Strategic innovativeness	StrI_1 to StrI_8	None	None

Table 4.11.a shows five items that have low convergence with the rest for each construct. PI_1 refers to the statement *“The industry's new products and services are often*

perceived as very novel by customers" is weakly correlated with the rest of the items on product innovativeness and has been excluded from the analysis.

IE_2 refers to "*In comparison to competitors, the industry has introduced more innovative products/services during the past five years*" is weakly correlated with the items describing the IE constructs. They are not excluded because their exclusion does not markedly improve the relations.

PDI_9 which refers to "*The industry's product manager is able to track product's financial performance*" is weakly correlated with the items on product development innovativeness is not excluded because their exclusion does not improve the relations markedly.

The item coded MI_5 refers to "*The industry explores new approaches to conduct market research*" shows a low convergence with other items that describe market innovativeness has not been excluded for the same reasons as above.

Table 4.11.b: Correlation analysis for SCA constructs

SCA Constructs			
Construct	**Item codes**	**Low convergent item (s)**	**Item (s) to drop**
Resource heterogeneity	RH_1 to RH_7	None	None
Product differentiation	PD_1 to PD_6	None	None
Imperfect mobility of resources	IMR_1 to IMR_3	None	None
Ex-post limits to competition	EPLC_1 to EPLC_7	None	None
Ex-ante limits to competition	EALC_1 to EALC_4	EALC_3	None

Table 4.11.b shows one items that has low convergence with the rest for the ex-ante limits to competition construct. This item that represents the statement "*Firms have the ability to set new standards and norms in the industry*" has not been removed because it exclusion does not lead to a significant improvement in the analysis.

4.3.6.2 Validity results

The following results are based on EFA using the principal component analysis (PCA) method to extract the factors and a Varimax rotation to determine the items responsible for factors loadings. The EFA is a statistical tool used to identify the smallest number of factors (i.e., constructs) that explain the nature of the variables (i.e., concepts) of study with relative precision (Watkins 2018:219). The approach is suitable in the development of new measurement variables (Ramli et al. 2016:14).

The relevant statistics used are the KMO and Bartlett's tests which measure sample adequacy and sphericity, respectively. KMO value should be (> 0.6) while Bartlett's factor test should be significant at ($p < 0.001$) for each construct. (Ramli et al. 2016:15). Robust results from the two statistics provide an indication that factor analysis can be conducted. The results are shown in Table 4.12.a below.

Table 4.12.a: KMO and Bartlett's Test for innovative capability constructs

Construct	KMO Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
		Approx. Chi-Square	Df	Sig.
PI	0,676	19,155	6	0,004
IE	0,544	64,409	6	0,000
System innovativeness	0,712	197,082	45	0,000
Environment influences	0,779	130,065	10	0,000
Market innovativeness	0,555	81,496	36	0,000
Product marketing	0,774	83,127	15	0,000
Process innovativeness	0,728	167,198	36	0,000
Knowledge innovativeness	0,667	54,980	3	0,000
BI	0,847	207,374	45	0,000
Strategic innovativeness	0,725	174,216	28	0,000

From the above Table, the results indicate that KMO statistic is below the threshold of 0.6 for IE and market innovativeness constructs indication a weak correlation. However, the Bartlett's test of sphericity is significant at the p-value 0,000 for most of the constructs expect PI.

The results for SCA are presented below.

Table 4.12.b: KMO and Bartlett's test for SCA constructs

Construct	KMO Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
		Approx. Chi-Square	Degrees of freedom	Significance
RH	0,833	161,520	21	0,000
PD	0,726	79,978	15	0,000
Immobility of Resources	0,617	37,191	3	0,000
Ex-post limits to competition	0,800	107,942	21	0,000
Ex-ante limits to competition	0,580	26,257	6	0,000

The above results indicate that there is adequate sampling for the first four constructs while for the last one the KMO statistic is less than but closer to the 0.6 threshold indicating weak correlation within the sample for this particular construct. Other than that all constructs have a significant p-value for the Bartlett's test indicating factor analysis is possible.

Factor analysis was conducted to extract and identify the number of components belonging to each particular construct using the principal component method.

As shown in Table 4.13.a, innovative capability constructs are explained by one component based on the initial Eigenvalues greater than 1.00. In addition, the number of items identified is the same as the original one for most of the constructs. It is only for the PI construct where three items were identified instead of the original four proposed in the study. The effect of the identified items on the given construct ranges 34% to eighty- 81% given by the cumulative rotation sum of squares. The results imply that the items are appropriate in explaining the constructs.

Table 4.13.a: Factor analysis results for innovative capability constructs

Innovative Capability Constructs	Number of components (Eigenvalue > 1.00)	Number of items identified (versus original items)	Cumulative Rotation sums of squares loading value
PI	1	3 (4)	59,438 %
IE	1	4 (4)	52,058 %
System innovativeness	1	4 (4)	65,598 %
Environment influences	1	5 (5)	71,455 %
Product development	1	10 (10)	47,975 %
Market innovativeness	1	5 (5)	34,424 %
Product marketing	1	9 (9)	57,362 %
Process innovativeness	1	6 (6)	57,525 %
Knowledge innovativeness	1	9 (9)	81,273 %
BI	1	3 (3)	58,401 %
Strategic innovativeness	1	10 (10)	53,489 %

As shown in Table 4.13.b below, SCA constructs are explained by one component based on the initial Eigenvalues greater than 1.00. In addition, the number of items identified is the same as the original for most of the constructs. The effect of the identified items on the given construct ranges 51% to 74% given by the cumulative rotation sum of squares. The results imply that the items are appropriate in explaining the constructs.

Table 4.13.b Factor Analysis results for SCA constructs

Sustainable Competition Advantage Constructs	Number of components (Eigenvalue > 1.00)	Number of items identified (versus original items)	Cumulative Rotation sums of squares loading value
RH	1	7 (7)	66,194 %
PD	1	6 (6)	56,553 %
Immobility of Resources	1	3 (3)	74,222%
Ex-post limits to competition	1	7 (7)	56,046 %
Ex-ante limits to competition	1	4 (4)	51,924%

From the above analysis, the identified items are tested for reliability in the next section.

4.3.6.3 Reliability results

Below are the results of the Cronbach alpha scores and the level of reliability of the constructs for the study.[19]

Table 4.14.a Reliability of innovative capability constructs

Construct	Cronbach's Alpha (α) score	Number of Items	Reliability level
Product innovativeness	0,938	3*	Very reliable
Innovative edge	0,691	4	Reliable
System innovativeness	0,808	4	Very reliable
Environment influences innovativeness	0,859	5	Very reliable
Product development innovativeness	0,899	10	Very reliable
Market innovativeness	0,748	5	Reliable
Product marketing innovativeness	0,830	9	Very reliable
Process innovativeness	0,900	6	Very reliable
Knowledge innovativeness	0,870	9	Very reliable
Behavioural innovativeness	0,916	3	Very reliable
Strategic innovativeness	0,874	10	Very reliable

Table 4.14.a above shows that two constructs are reliable and the rest are very reliable. One item has been removed from PI and the rest of the constructs have applied the same number of original items. The reliability analysis shows that the constructs are internally consistent and can be relied on in measuring innovative capability concept.

[19] The level of reliability is developed by Hair et al. (2010, cited in Adihka 2017:178).

Table 4.14.b: Reliability of SCA constructs

Construct	Cronbach's Alpha score	Number of Items	Reliability level
RH	0,910	7	Very reliable
PD	0,839	6	Reliable
Immobility of resources	0,820	3	Very reliable
Ex-post limits to competition	0,859	7	Very reliable
Ex-ante limits to competition	0,688	4	Reliable

Table 4.14.b above shows that two constructs are reliable and three are very reliable. The reliability analysis shows that the constructs are internally consistent and can be relied on in measuring the SCA concept.

4.4 DATA ANALYSIS RESULTS

The inferential analysis provides advanced quantitative techniques for the data to answer the main research objectives of the study. Hence, the next subsections will present the results of collinearity test to investigate the level correlation between independent variables. Lastly, the regression analysis results are presented to address the fourth objective of investigating the relationship between internal innovative capabilities and SCA in SA motor vehicle manufacturing.

4.4.1 Correlation Analysis

Pearson correlation coefficient (*r*) tests for the strength and direction of a linear association between any two variables (Willaman 2011:121). The test provides an indication of the "significance of the relationship between an independent and dependent variable". The results of correlation analysis have shown the existence of association between the variables. In addition, the association between some of the variables have been found to be strong and significant as shown in Table 4.15 below.[20]

[20] The full results are shown in Appendix N.

Table 4.15: Correlation between dependent and independent variables

		PI	IE	Sys_I	PDI	EI	MI	PMI	Proc_I	KMI	BI	Str_I
RH	rho	-0,18	0,16	0,15	0,24	0,23	-0,12	0,17	-0,02	0,12	0,19	0,18
	Sig.	0,16	0,20	0,20	0,09	0,10	0,25	0,18	0,46	0,26	0,16	0,16
	N	31	31	31	31	31	31	31	31	31	31	31
PD	rho	0,14	.560**	0,01	0,22	0,03	.362*	.348*	.369*	.683**	.562**	.637**
	Sig.	0,22	0,00	0,49	0,12	0,44	0,02	0,03	0,02	0,00	0,00	0,00
	N	31	31	31	31	31	31	31	31	31	31	31
IMR	rho	-0,03	-0,08	0,01	0,17	.460**	0,02	-0,02	0,03	.343*	0,14	0,22
	Sig.	0,44	0,33	0,48	0,19	0,00	0,46	0,46	0,44	0,03	0,23	0,11
	N	31	31	31	31	31	31	31	31	31	31	31
EPLC	rho	-0,22	.380*	0,04	.382*	-0,08	.389*	.412*	0,25	0,21	0,11	0,15
	Sig.	0,11	0,02	0,41	0,02	0,33	0,02	0,01	0,09	0,13	0,28	0,22
	N	31	31	31	31	31	31	31	31	31	31	31
EALC	rho	0,01	.635**	0,13	.493**	0,17	.461**	.570**	.575**	.628**	.603**	.677**
	Sig.	0,48	0,00	0,25	0,00	0,18	0,00	0,00	0,00	0,00	0,00	0,00
	N	31	31	31	31	31	31	31	31	31	31	31

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

The above results show that there is no significant association between RH and the independent variables. In addition, three independent variables have an insignificant negative association with the dependent variable. The table shows that PD is significantly and positively associated with seven of the eleven independent variables.

IMR is significantly and positively associated with only two independent variables and insignificantly associated with the rest of the variables where three have negative signs. For instance, there is a positive correlation between the EI and IMR, rho = 0.460, N = 31 and a significant relationship (p = 0.00). A positive association was also recorded between KMI and IMR, rho = 0.343, N = 31 and a significant relationship (p = 0.03).

Ex-Post Limits to Competition (EPLC) is positively and significantly associated with four independent variables while the rest are insignificant with two variables showing negative relationship. There is a positive correlation between IE and EPLC, rho = 0.380, N = 31 and a significant relationship (p = 0.020). PDI is positively and significantly associated with EPLC, r = 0.382, N = 31 and p = 0,02. Market innovativeness is significantly and positively associated with EPLC, rho = 0,389, N = 31 and p = 0,02. And finally, there is a positive association between PMI and EPLC, r = 0,412, N = 31 and p = 0,01

Ex-Ante Limits to Competition (EALC) is positively and significantly associated with eight independent variables while three showed an insignificant relationship.

4.4.2 Multiple Regression Analysis Results

Regression analysis examines the direction and the significant of the relationship between independent and dependent variables in a specific regression model (Willaman 2011:125). For the purposes of this study the regression analysis is explanatory in nature in order to explain the role of innovative capability on SCA. Hence, a multiple regression analysis of the independent variables (i.e., 11 innovative capability constructs) on the dependent variables (i.e., five SCA constructs). The five models are specified below.

$$RH = a_0 + PI\beta_1 + IE\beta_2 + SyI\beta_3 + PDI\beta_4 + EI\beta_5 + MI\beta_6 + PMI\beta_7 + Prc\beta_8 + KMI\beta_9 + BI\beta_{10} + SI\beta_{11} + \varepsilon_1 \quad (1)$$

$$PD = b_0 + PI_{\alpha_1} + IE\alpha_2 + SyI\alpha_3 + PDI\alpha_4 + EI\alpha_5 + MI\alpha_6 + PMI\alpha_7 + Prc\alpha_8 + KMI\alpha_9 + BI\alpha_{10} + SI\alpha_{11} + \varepsilon_2 \quad (2)$$

$$IMR = c_0 + PI\tau_1 + IE\tau_2 + SyI\tau_3 + PDI\tau_4 + EI\tau_5 + MI\tau_6 + PMI\tau_7 + Prc\tau_8 + KMI\tau_9 + BI\tau_{10} + SI\tau_{11} + \varepsilon_3 \quad (3)$$

$$EPLC = d_0 + PI\pi_1 + IE\pi_2 + SyI\pi_3 + PDI\pi_4 + EI\pi_5 + MI\pi_6 + PMI\pi_7 + Prc\pi_8 + KMI\pi_9 + BI\pi_{10} + SI\pi_{11} + \varepsilon_4 \quad (4)$$

$$EALC = e_0 + PI\delta_1 + IE\delta_2 + SyI\delta_3 + PDI\delta_4 + EI\delta_5 + MI\delta_6 + PMI\delta_7 + Prc\delta_8 + KMI\delta_9 + BI\delta_{10} + SI\delta_{11} + \varepsilon_5 \quad (5)$$

From Model 1 to 5, the constant is represented by the subscript 0 while the coefficients are represented by the statistical symbols. The letter ε represents the residual term. The expectation is that the independent variables have a positive influence on the dependent variables. The results of the estimated models are presented below.

Table 4.16: Regression estimates for model 1: RH as a dependent variable.

Model Summary[b]				
Model 1	R	R-square	Adjusted R-square	Std. Error of the Estimate
	.619[a]	0,383	0,025	1,071

a. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, PI, environmental influences, IE, product development, product marketing, process innovativeness, BI, knowledge management

b. Dependent Variable: RH

ANOVA[a]					
Model 1	Sum of Squares	df	Mean Square	F	Sig.
Regression	13,509	11	1,228	1,071	.431[b]
Residual	21,794	19	1,147		
Total	35,303	30			

a. Dependent Variable: RH

b. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, PI, environmental influences, IE, product development, product marketing, process innovativeness, BI, knowledge management

Coefficients[a]						
Model 1	Unstandardised Coefficients		Standardised Coefficients			
	B	Std. Error	Beta	T	Sig.	variance inflation factor (VIF)
(Constant)	5,497	2,475		2,221	0,039	
Product innovativeness	-0,315	0,208	-0,349	-1,515	0,146	1,635
Innovative edge	0,261	0,374	0,207	0,698	0,494	2,716
Systems innovativeness	-0,147	0,383	-0,122	-0,384	0,705	3,100
Product development	0,333	0,413	0,221	0,806	0,430	2,309
Environmental influences	0,161	0,257	0,168	0,625	0,539	2,218
Market innovativeness	-0,881	0,527	-0,470	-1,673	0,111	2,428
Product marketing	0,686	0,471	0,507	1,457	0,161	3,725
Process innovativeness	-0,698	0,468	-0,512	-1,493	0,152	3,620
Knowledge management	0,168	0,466	0,161	0,361	0,722	6,153
behavioural innovativeness	0,223	0,490	0,191	0,454	0,655	5,437
Strategic innovativeness	0,014	0,456	0,012	0,030	0,977	4,854

a. Dependent Variable: RH

The above results show that RH is not influenced by any of the independent variables as the p-values are greater than 0.05 level of significance.

In addition, the F-test is insignificant and the R-squared statistic shows that the variables explain approximately thirty-eight%(38%) of the variation in the dependent variable. In addition, VIF values for knowledge management and strategic innovativeness are greater than 5 indicating multicollinearity in this variables.

Table 4.17: Regression estimates for model 2: PD as a dependent variable.

Model Summary[b]				
Model 2	**R**	**R-square**	**Adjusted R-square**	**Std. Error of the Estimate**
	.876[a]	0,767	0,632	0,564

a. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, PI, environmental influences, IE, product development, product marketing, process innovativeness, BI, knowledge management

b. Dependent Variable: PD

ANOVA[a]						
Model 2		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
	Regression	19,880	11	1,807	5,674	.001[b]
	Residual	6,052	19	0,319		
	Total	25,932	30			

a. Dependent Variable: product differentiation

b. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, product innovativeness, environmental influences, innovative edge, product development, product marketing, process innovativeness, behavioural innovativeness, knowledge management

Coefficients[a]						
	Unstandardised Coefficients		Standardised Coefficients			
Model 2	B	Std. Error	Beta	t	Sig.	VIF
(Constant)	0,520	1,304		0,399	0,695	
Product innovativeness	-0,154	0,109	-0,199	-1,405	0,176	1,635
Innovative edge	0,420	0,197	0,389	2,129	0,047	2,716
Systems innovativeness	0,285	0,202	0,275	1,410	0,175	3,100
Product development	-0,500	0,218	-0,387	-2,297	0,033	2,309
Environmental influences	-0,109	0,136	-0,133	-0,806	0,430	2,218
Market innovativeness	0,287	0,278	0,179	1,034	0,314	2,428
Product marketing	0,224	0,248	0,193	0,902	0,378	3,725
Process innovativeness	-0,503	0,246	-0,430	-2,041	0,055	3,620
Knowledge management	0,795	0,245	0,890	3,239	0,004	6,153
Behavioural innovativeness	-0,149	0,258	-0,150	-0,579	0,569	5,437
Strategic innovativeness	0,255	0,240	0,260	1,063	0,301	4,854

a. Dependent Variable: product differentiation

In the second model PD is influenced by IE, product development, process innovativeness and knowledge management with p-values less than 0.05 level of significance.

In addition, the F-test is significant and the R-squared statistic shows that the independent variables explain approximately seventy-seven% (77%) of the variation in the dependent variable. Again, the VIF values for knowledge management and strategic innovativeness are greater than 5 indicating multicollinearity in these variables.

Table 4.18: Regression estimates for model 3: IMR as a dependent variable.

Model Summary[b]				
Model 3	**R**	**R-Square**	**Adjusted R-square**	**Std. Error of the Estimate**
	.685[a]	0,469	0,161	1,02

a. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, PI, environmental influences, IE, product development, product marketing, process innovativeness, BI, knowledge management

b. Dependent Variable: imperfect mobility

ANOVA[a]					
Model 3	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	17,564	11	1,597	1,523	.203[b]
Residual	19,920	19	1,048		
Total	37,484	30			

a. Dependent Variable: imperfect mobility

b. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, PI, environmental influences, IE, product development, product marketing, process innovativeness, BI, knowledge management

Model 3	Unstandardised Coefficients		Standardised Coefficients	T	Sig.	VIF
	B	Std. Error	Beta			
(Constant)	2,218	2,366		0,938	0,360	
Product innovativeness	-0,286	0,199	-0,308	-1,442	0,166	1,635
Innovative edge	-0,264	0,358	-0,203	-0,737	0,470	2,716
Systems innovativeness	0,072	0,366	0,058	0,195	0,847	3,100
Product development	0,062	0,395	0,040	0,156	0,877	2,309
Environmental influences	0,454	0,246	0,460	1,847	0,080	2,218
Market innovativeness	0,456	0,504	0,236	0,905	0,377	2,428
Product marketing	-0,105	0,450	-0,076	-0,234	0,817	3,725
Process innovativeness	-0,432	0,447	-0,307	-0,965	0,347	3,620
Knowledge management	0,818	0,445	0,762	1,837	0,082	6,153
Behavioural innovativeness	-0,344	0,468	-0,287	-0,735	0,471	5,437
Strategic innovativeness	0,022	0,436	0,019	0,050	0,960	4,854

a. Dependent Variable: imperfect mobility

The third model shows that imperfect resource mobility is weakly influenced by environmental influences and KMI (p-value > = 0.05) but less so by strategic innovativeness and PDI with p-values higher than 0.05 level of significance.

In addition, the F-test is insignificant and the R-squared statistic shows that the independent variables explain approximately forty-seven%(47%) of the variation in the dependent variable. Again, the VIF values for knowledge management and strategic innovativeness are greater than 5 indicating multicollinearity in these variables.

Table 4.19: Regression estimates for model 4: EPLC as a dependent variable.

Model Summary[b]				
Model 4	**R**	**R-Square**	**Adjusted R-square**	**Std. Error of the Estimate**
	.703[a]	0,494	0,201	0,809

a. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, PI, environmental influences, IE, product development, product marketing, process innovativeness, BI, knowledge management

b. Dependent Variable: ex-post limits

ANOVA[a]					
Model 4	**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Regression	12,141	11	1,104	1,686	.153[b]
Residual	12,438	19	0,655		
Total	24,579	30			

a. Dependent Variable: ex-post limits

b. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, PI, environmental influences, IE, product development, product marketing, process innovativeness, BI, knowledge management

Coefficients[a]						
	Unstandardised Coefficients		Standardised Coefficients			
Model 4	B	Std. Error	Beta	t	Sig.	VIF
(Constant)	1,717	1,870		0,918	0,370	
Product innovativeness	-0,253	0,157	-0,336	-1,612	0,124	1,635
Innovative edge	-0,006	0,283	-0,005	-0,020	0,984	2,716
Systems innovativeness	0,241	0,289	0,239	0,833	0,415	3,100
Product development	0,386	0,312	0,307	1,239	0,231	2,309
Environmental influences	-0,263	0,194	-0,329	-1,355	0,191	2,218
Market innovativeness	0,099	0,398	0,063	0,249	0,806	2,428
Product marketing	0,617	0,356	0,546	1,733	0,099	3,725
Process innovativeness	-0,392	0,353	-0,345	-1,110	0,281	3,620
Knowledge management	0,761	0,352	0,876	2,164	0,043	6,153
Behavioural innovativeness	-0,393	0,370	-0,404	-1,061	0,302	5,437
Strategic innovativeness	-0,226	0,344	-0,237	-0,658	0,518	4,854

a. Dependent Variable: ex-post limits

In the fourth model EPLC is moderately influenced by environmental influences (0.19 > 0.05) and product marketing (0.09 > 0.05) while it is strongly influenced by KMI (0.043 < 0.05).

In addition, the F-test is insignificant and the R-squared statistic shows that the independent variables explain approximately 49% of the variation in the dependent variable. Again, the VIF values for knowledge management and strategic innovativeness are greater than 5 indicating multicollinearity in this variables.

Table 4.20: Regression estimates for model 5: EALC as a dependent variable

Model Summary[b]				
Model 5	**R**	**R-Square**	**Adjusted R-square**	**Std. Error of the Estimate**
	.860[a]	0,739	0,589	0,589

a. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, PI, environmental influences, IE, product development, product marketing, process innovativeness, BI, knowledge management

b. Dependent Variable: ex-ante limits

ANOVA[a]					
Model 5	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	18,701	11	1,700	4,901	.001[b]
Residual	6,591	19	0,347		
Total	25,292	30			

a. Dependent Variable: ex-ante limits

b. Predictors: (Constant), strategic innovativeness, systems innovativeness, market innovativeness, product innovativeness, environmental influences, innovative edge, product development, product marketing, process innovativeness, behavioural innovativeness, knowledge management

Coefficients[a]						
Model 5	**Unstandardised Coefficients**		**Standardised Coefficients**	**t**	**Sig.**	**VIF**
	B	**Std. Error**	**Beta**			
(Constant)	0,972	1,361		0,714	0,484	
Product innovativeness	-0,293	0,114	-0,383	-2,561	0,019	1,635
Innovative edge	0,245	0,206	0,229	1,189	0,249	2,716
Systems innovativeness	-0,015	0,211	-0,015	-0,073	0,942	3,100
Product development	0,020	0,227	0,016	0,089	0,930	2,309
Environmental influences	-0,058	0,141	-0,071	-0,407	0,689	2,218
Market innovativeness	-0,009	0,290	-0,006	-0,033	0,974	2,428
Product marketing	0,275	0,259	0,240	1,063	0,301	3,725
Process innovativeness	-0,083	0,257	-0,072	-0,324	0,749	3,620
Knowledge management	0,415	0,256	0,470	1,619	0,122	6,153
Behavioural innovativeness	0,118	0,269	0,119	0,436	0,668	5,437
Strategic innovativeness	0,207	0,251	0,213	0,827	0,418	4,854

a. Dependent Variable: ex-ante limits

The final model shows that PI strongly influences EALC with a p-value greater than 0.05 while KMI (0.12 > 0.05) has a moderately strong relationship with dependent variable.

The F-statistic is significant and the R-squared shows the variables explain approximately 74% of the variation in EALC.

The results from the regression analysis also show a negative relationship between some of the independent variables and the dependent variables. Furthermore, all the models reveal the present of multicollinearity in the variables as shown by the higher VIF of KMI (6.153), BI (5.437) and to some extent strategic innovativeness (4.85).

Several attempts to remedy multicollinearity did not bring improvements to the results. The first exercise involved removing KMI from the regression analysis. In the second exercise, both KMI and BI were removed from the regression estimates. The third remedy involved removing both KMI and SI from the analysis. The fourth remedy removed both BI and SI from the analysis. The exercise led to the worsening of p-values and F-statistics for all models, however, there was a huge improvement in multicollinearity. The last remedy introduced the interaction term KMI*BI in the analysis.[21] This results are summarised in Table 4.21.

Table 4.21: Effect of remedial methods on regression results

Remedial method	**Effect on P – Values**	**Effect of F - statistic**	**Effect on VIF**	**Overall effect**
Removal of KMI	Insignificant	Insignificant	Moderate	No multicollinearity
Removal of KMI & BI	Insignificant	Insignificant	Moderate	No multicollinearity
Removal of KMI & SI	Insignificant	Insignificant	Moderate	No multicollinearity
Removal of BI & SI	Insignificant	Insignificant	Moderate	No multicollinearity
Interaction of KMI & BI	Insignificant	Same of original	Moderate	No multicollinearity

The above table shows that the remedial methods were effective in removing multicollinearity from the data. However, the methods have led to the insignificant test

[21] The moderating effect of the knowledge management innovativeness was based on the assumption that knowledge is a requirement before any behavioural changes can take effect (Ferraris et al. 2013:17; Rahman, Imm Ng, Sambasivan & Wong 2013:474).

statistics for all models (See Appendix O for full results). Hence, the main results of the regression analysis have been retained.

4.4.3 Qualitative Data Analysis Results

The sample for the interviews targeted 10 companies; however, only four responded and granted the researcher permission to conduct interviews. From the four companies, three completed the interview questions using online EvaSys software and one allowed a thirty-minute interview via Google Meet. The results of the data collection are shown in Appendix Q and these were analysed using four broad themes as described below.

The four broad themes were based on a careful interpretation of the responses from the interviewees where each theme is described by 4 or 5 categories. The process was simplified for analysis by creating the themes for a given set of questions. These results are presented Figure 4.6 below.

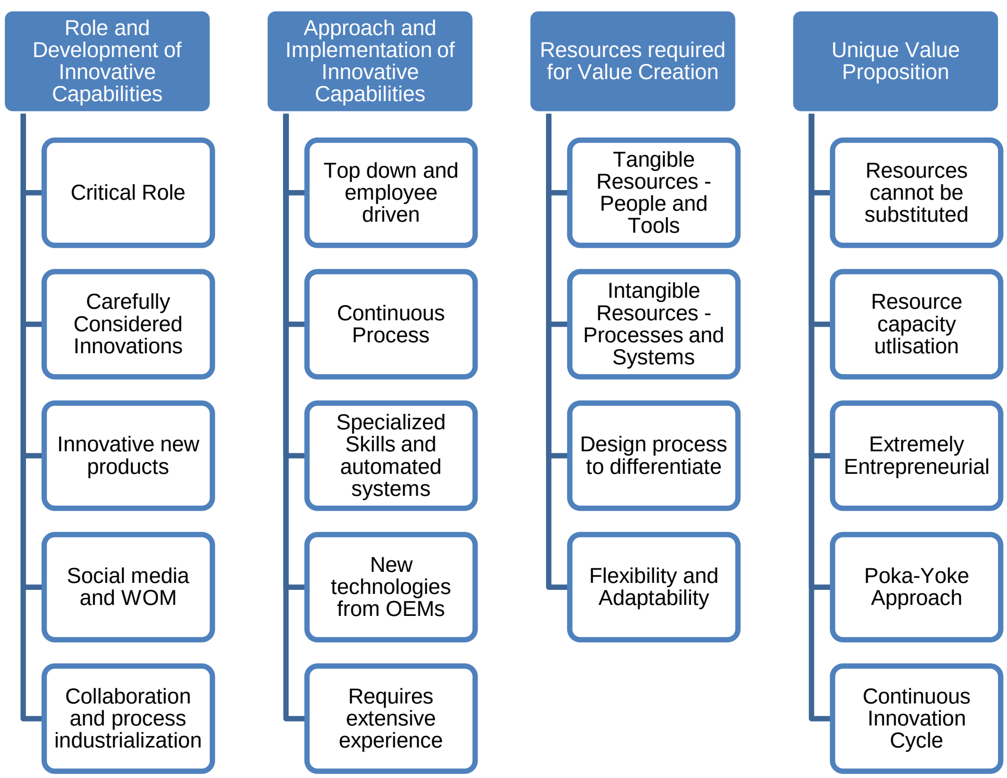

Figure 4.6: Broad themes and categories on interview results

As shown in the above qualitative analysis of innovative capability is represented by the first two themes, role and development and approach and implementation, respectively.

Under the role and development of innovative capabilities, the respondents considered the role of innovation as very important and critical. For example, one respondent stated that “innovation plays a top priority if company wants to compete in the motor industry”.

Furthermore, innovation should not be taken lightly as it requires knowledge of the market and should be provide a return on investment within a reasonable time. For instance, one respondent felt that “you have to evaluate carefully, not all innovation is helpful / what its meant to be”.

The respondents also understand that the new products that are brought to the market have to be unique innovations. This was based on the fact that “the new models are totally new and developed by innovative ways…” while others followed the requirements of the OEMs. For instance, one respondent mentioned that “we manufacture to drawing and not responsible for the design and therefore not responsible for product design”.

Innovative marketing capabilities were assisted by the influence of social media, online presence and customer recommendations. One company’s marketing innovative strategy involved: “we use mostly word-of-mouth marketing because a customer driving this vehicle always shows his / her friends the benefits”.

On the question of activities companies had in place to remain innovative in their production, processing and management, mention was made of collaboration, teamwork and technological equipment that included simulation software and state of the art tooling systems was used. One company was unique in that “the vehicle is 60% hand-built to ensure quality and quality control is checked at every assembly point”.

The approach and implementation of innovative capabilities was based on the five categories extracted from responses to questions 1.6 to 1.11 of the interview. The engendering of innovative culture started with management and cascade to employees even though sometimes employees were able to initiate this activity. There was “encouragement from the top down” while for one company “every employee is passionate and motivated to see the end product”.

Another view was that the implementation of innovative capabilities is a continuous process where “key focus area as need to continuously innovate as a team, individuals = continuous improvement”.

For innovative capabilities to be implemented appropriately, they required specialised skills. However, the respondents showed that their companies did not necessarily employ product managers but relied on the expertise of “engineers with many skills from employment at other car manufacturing plants”. Other companies relied on the blueprint from international OEMs for the introduction, design and development of new products.

In addition, the respondents have shown that they employ different sophisticated and automated systems to develop innovations that include customer relations management (33.3%), computer aided designs (66.7%), CAM (100%) and all of the above (33.3%).

The other approach to the implementation of innovative capabilities was the adoption of new technologies from suppliers. This means that companies relied on the information they shared with “equipment suppliers to acquire new technologies” and sometimes “head hunt some employees to ensure we get the specific skills”.

Lastly, the approach to innovative capabilities based on in-house knowledge required extensive experience. One respondent pointed to the fact that “in-house knowledge comes from many years of experience from the owner because he was involved in many motoring aspects in his life”.

The main objective of the research was to examine the role innovative capabilities on SCA. Hence, the next themes are based on the value creation brought by the company’s unique resources. The first theme is the resources required for value creation and competitiveness and the second theme is the unique value proposition that cannot be competed away.

The theme on the type of resources required for creating value is explained by four categories that were extracted from questions 2.1 to 2.3 of the interview. Firstly, tangible resources that include people and tools were important “because 99% of the vehicle is manufactured in South Africa in the factory and not outsourced”. Secondly, intangible resources that include processes and systems are key in “driving business efficiencies”.

The third category examines the contribution of the design process in creating value. Here the respondents contended that they were “not responsible for product design” but were able to do “differentiation through process design”. And lastly, resources became superior to the rivals where flexibility and adaptability was practised. Respondents were able “to adapt or change self-made tools when a new design is coming out” whereas big manufactured needed to overhaul their operations to be flexible and this could be costly.

The theme for the creation of a unique value proposition that is unmatched is based on five categories from the responses to the last three questions of the interview. Firstly, the non-substitutability of the resources in the production process provided an advantage because “a machine is built for a specific purpose, we make sure that the lifespan of such a machine is sustainable over a long period of time”. However, other respondents felt that their resources “could be substituted”. Secondly, another advantage came from resource capacity utilisation because tooling offers an opportunity “to re-use many parts and other aspects of a machine when the lifespan of the specific machine is running out of time”.

The unique value proposition was also maintained through the non-tradability of the resources. While some respondents felt that “rivals could acquire” similar resources and reduce their advantage, others believed that their “extremely entrepreneurial” approach provided them an advantage over rivals. Furthermore, to maintain the superior position, firms maintained “hard work” and use of fail-proof or “Poka-Yoke innovative systems in assembly operations”. Lastly, this unique value proposition was maintained a through a confidential continuous innovation cycle by “keeping all our methods and ways of manufacturing for us and do not let anybody come into the manufacturing plant to copy with their eye or taking pictures”.

4.5 SUMMARY

This chapter presented the results of the data analysis approaches implemented to answer the research questions of the study. The secondary data analysis examined the twin objectives of determining the level of innovation and its effect in the South African motor vehicle manufacturing industry.

Quantitative data analysis employed an explanatory factor analysis (EFA) to determine the key internal capabilities that impact on the innovativeness (innovative capability measurements) in the industry in order to meet the third objective. In addition, EFA was also used to identify the key items responsible for SCA. Pearson correlation analysis answered the fourth question of the association between independent and dependent variables. Lastly, the regression analysis was presented to examine the relationship between innovative capability and SCA to meet the fifth objective of the study.

The qualitative data analysis uncovered four broad themes that address the views of independent local vehicle manufacturers on the importance of innovative capabilities and SCA on their operations. Each of the four themes was represented by the 4 or 5 categories developed from the information provided by the interviewees.

The next chapter discuss these results in detail and provide their implications for the research.

CHAPTER 5

DISCUSSION OF RESULTS

5.1 INTRODUCTION

Given the problem of external competition facing multinational OEMs in South Africa, this study examined the presence of internal innovativeness as an important catalyst for SCA in the motor vehicle manufacturing industry. The objectives involved identifying innovative activities and their impact on the industry, identifying key innovative capabilities and their relationship with SCA. These research objectives were addressed through an analysis of secondary and primary data. Hence, this chapter discusses the results from these analyses by presenting the key findings with a thorough interpretation of the results.

5.2 KEY FINDINGS AND INTERPRETATIONS

The study applied three approaches to data analysis, namely; secondary, quantitative and qualitative data analysis. The findings and the interpretations from each approach are presented below.

5.2.1 Secondary Data Analysis

This analysis assessed the intensity of the type of innovative activities, their trends and contribution to the motor vehicle manufacturing sector in South Africa. The analysis showed that process innovation activities are the most prevalent in the motor vehicle manufacturing industry followed by the product innovation activities. This means that improvement in the processing activities is important for the automobile manufacturing sector.

However, on the non-technological innovation activities, marketing innovation activities were generally higher than organisational innovation activities. Marketing is also considered a key effect of sales because of strong competition in the industry.

The trend analysis over the three periods, 2008–2010, 2010–2012 and 2014–2016 was that process innovation activities remained relatively higher followed by product innovation activities. This result also supports the earlier finding about the main innovation activity in the sector. Organisational innovations activities were relatively higher than marketing innovations over the period of analysis.

On the overall contribution of innovation activities to performance, the results have shown that the introduction of product and process innovation led mostly to high level of success in product outcomes (i.e., improved quality and increased range of products).

The results are in line with Vargas's (2022:24) analysis of communal innovations surveys who found that product and process innovation practices were important for performance in Latin American manufacturing firms.

5.2.2 Quantitative Data Analysis

This analysis is made up of the descriptive analysis of the constructs, the normality test of the data, goodness of fit tests, correlation analysis and multiple regression estimation.

5.2.2.1 Descriptive statistics on the constructs

Innovative capability was explained by 11 constructs and the results of the analysis of their 72 related statements showed that on average, the respondents were in agreement with the majority of the statements that describe the innovative capability constructs. These implies that each individual respondent on average, relatively believed that the statements used to describe the constructs under innovative capability were appropriate and accurate. The means that the respondents agreed that innovative capabilities exist in the South African automobile manufacturing industry.

SCA is explained by six constructs and the results for each of their related 23 statements have shown that on average, the respondents were in agreement with the majority of these statements. These implies that each individual respondent on average, relatively believed that the statements used to describe the SCA constructs were appropriate and accurate. Again, the respondents generally agreed that South African automobile manufacturers experience SCA.

5.2.2.2 Normality test

The normality test on innovative capability constructs showed that the majority of the constructs had a skewness of less 1 and kurtosis of less than 1 in absolute terms, respectively. However, the Shapiro-Wilk test confirmed that eight constructs are normally distributed while three are non-normally distributed. This means that the majority of the constructs explaining innovative capability were reasonably symmetric in nature and the sample drawn fairly represented the target population in their responses.

The normality test on SCA constructs showed that the majority of the constructs had a skewness of less 1 and kurtosis of less than 1 in absolute terms, respectively. However, the Shapiro-Wilk test confirmed that four out of five constructs were normally distributed. This means that the majority of the constructs explaining SCA were fairly normal distributed in nature and the sample drawn represented the target population very well.

5.2.2.3 Goodness of fit tests

These three main tests were conducted in this instance, namely, correlation analysis, validity (i.e., factor analysis) and reliability analysis (i.e., Cronbach alpha).

The correlation analysis showed that the convergence of items (statements) within each of the innovative capability constructs was high except for the first item under PI which was weakly correlated with the rest other items. This means that the respondents were in agreement that the items or statement used in describing the majority of innovative capability constructs reflected their perceptions regarding the motor vehicle manufacturing industry. For the SCA constructs, one item under EALC did not converge with the rest of the items. The implication is that the respondents did not generally agree that the statement used in describing the ex-ante limits to completion were in line with their perceptions regarding this dimension in explaining the SCA in the motor vehicle industry. Overall the results imply that the combined effect of the items used in explaining the constructs was adequate for the majority of the cases.

The KMO and Bartlett's tests were conducted to formally identify constructs belonging to innovative capability and sustainable competitive competition concepts, respectively.

Under innovative capability, the results indicated that the KMO statistic was below the threshold of 0.6 for IE and market innovativeness constructs indication a weak correlation. However, the Bartlett's test of sphericity was significant at the p-value 0,000 for most of the constructs expect PI.

For the SCA, the results indicated an adequate sampling for the first four constructs while for the last one, the KMO statistic was closer to the 0.6 threshold which indicated a weak correlation within the sample for this particular construct. Other than that, all constructs had a significant p-value for the Bartlett's test indicating factor analysis was possible. These fairly robust results from the two statistics implied that factor analysis could be conducted (Bhupendra & Sangle 2015:187). This meant that there were good interrelationships between the items of the study and the questionnaire used to measure these items.

Based on these tests, EFA was conducted to extract and identify the number of components belonging to each construct using the principal component method.

The results from factor analysis showed that for innovative capability constructs, the number of items identified was the same for the majority of the constructs. However, for the PI construct, three items were identified instead of the original four proposed in the study. This means that for the motor vehicle manufacturing industry, it is better to explain PI using three items or statements instead of four. For the SCA construct, the number of items identified was the same as the original for most of the constructs. This means that for the motor vehicle manufacturing industry, all constructs are adequate in explaining the concept of SCA. Based on the results of factor analysis, the majority of the identified measurements instruments reflected the nature of the proposed constructs for the study.

The reliability analysis was conducted on the above results using the Cronbach's alpha statistic to examine the level of consistency of the constructs in describing the two concepts, respectively. For the innovative capability constructs, the results showed that two constructs were reliable and nine were very reliable. The results indicated that the constructs are important in measuring innovative capability in the South African motor vehicle manufacturing industry. For the SCA, the results showed that two constructs were reliable and the other three were very reliable. The results indicated that the constructs were reliable in measuring SCA in the South African automobile manufacturing industry. In general, the test results mean that the constructs developed for the study were consistent and reliable in describing the underlying concepts of the study.

5.2.2.4 Inferential data analysis

This part of the analysis included the Pearson correlation and the multiple regression analyses. Pearson correlations examine the extent of association between the independent and dependent variables. Regression analysis provides an estimation of the relationship between the independent and dependent variables.

The correlation results showed that there was no significant association between heterogeneity of resources (RH) and the independent variables. This means that RH did not seem to be associated with innovative capability. In addition, three independent variables had an insignificant negative association with the dependent variable. These results indicate that, despite lack of association, innovative capability might reduce RH within the South African automobile manufacturing industry.

PD was significantly and positively associated with seven of the 11 independent variables. These means that innovative capability was to a large extent associated and led to increases in PD within the South African automobile manufacturing industry.

IMR was significantly and positively associated with two independent variables and insignificantly associated with the rest of the variables where three had negative signs. For instance, an increase in IMR was associated with increases in EI and KMI respectively. This means that only two variables were associated with IMR in the South African motor vehicle manufacturing industry.

EPLC was positively and significantly associated with four independent variables while the rest were insignificant with two variables showing a negative relationship. This means an increase in EPLC was associated with increases in IE, PDI, MI and PMI respectively, in the motor vehicle manufacturing industry.

EALC was positively and significantly associated with eight independent variables while three showed an insignificant negative relationship. This means that innovative capability is to a large extent associated with EALC within the South African motor vehicle manufacturing industry.

These results showed that innovative capability or independent variables were relatively associated with three dependent variables as opposed to five suggested by the study. This means that innovative capability is fairly associated with SCA in the South African automobile manufacturing industry. The results would be problematic for meaningful interpretation because of the small sample used for the analysis.

A multiple regression analysis of the independent variables (i.e., 11 innovative capability constructs) on the dependent variables (i.e., five SCA constructs) was estimated using five proposed models. The first model estimated the relationship between the dependent variable RH and independent variables. Seven out of 11 independent variables were positively related with the dependent variables; however, none of the relationships was significant. This means none of the independent variables had any individual effect on RH. It is only a constant variable that is statistically significant which might imply that there are other independent variables that are important predictors of RH. The measure of the combined effect (F-test) of the independent variables was also insignificant and R-squared (measure of goodness of fit) statistic showed that the variables explain approximately 38% of the variation in the dependent variable. This means that the combined effect of innovative capability constructs was poor and only explained 38% of the change in RH.

The second model estimated the relationship between the dependent variable PD and independent variables. Six out of 11 independent variables were positively related with the dependent variables and four were significant. This means IE, PDI, process innovativeness and KMI, individual had an effect on PD. However, PDI and process innovativeness were negatively related. The F-test showed that combined effect of the independent variables was significant and R-squared showed that these variables explained a significant portion of the variation in the PD. This means that the combined effect of innovative capability constructs was strong and explained 77% of the change in PD.

The third model estimated the relationship between the dependent variable immobility of resources and independent variables. Four out of 11 independent variables were negatively related with the dependent variables while environmental influences innovativeness and KMI were weakly significant. This means that the two independent variables are likely to be important predictors of resources immobility in the motor vehicle manufacturing industry. The F-test showed that combined effect of the independent variables was insignificant and R-squared showed that these variables explained an adequate portion of the variation in resource immobility. As a whole, the independent variables had no effect and only explained 47% of the changes in immobility of resources.

The fourth model estimated the relationship between the dependent variable EPLC and 11 independent variables. Six out of 11 independent variables were negatively related with the dependent variables while only KMI was significant. This means that KMI is a strong predictor of EPLC. The F-test showed that combined effect of the independent variables was insignificant and R-squared showed that these variables explained an adequate portion of the variation in resource immobility. On the whole, the independent variables had no effect but explained 49% of the changes in the dependent variable.

The last model estimated the relationship between the dependent variable EALC and 11 independent variables. Five of the 11 independent variables were negatively related with the dependent variable while only PI was significant. However, PI had a negative sign which means that the variable has the effect of lowering the dependent variable. The F-test showed that combined effect of the independent variables was significant and R-squared showed that these variables explained a large proportion of the variation in the dependent variable. Hence, the combined effect of innovative capability constructs on EALC is strong and these constructs explain 74% of changes in the dependent variable.

Overall, the majority of estimated coefficients of the independent variables were found to be insignificant with wrong signs. However, the F-statistic was significant for three out of five regression equations and four models had an R-squared approximately greater than 50%. The problem of multicollinearity identified earlier might have affected the results;

however, remedial measures employed led to the worsening of the estimated statistics and as such the original results have been maintained. Again, the issue of the sample size makes it difficult to advance any meaningful interpretation from the regression analysis results.

5.2.3 Qualitative Data Analysis

The qualitative data analysis was carried out to augment the small sample results of quantitative analysis**.** This analysis uncovered four broad themes; two on innovative capabilities and two on SCA. The themes and their categories were developed and organised into a diagram to display the nature of the relationships between the concepts. Qualitative analysis provided an indication of the nature and application of innovative capabilities as well as the creation and maintenance of value for a firm (i.e., SCA).

5.2.3.1 The role and development of innovative capabilities

The results showed that innovations are critical for the success of a given firm. More importantly, the development of innovations requires careful attention to the introduction of not only novel but innovative products. This finding is in line with the quantitative analysis (i.e., EFA) results that showed that approximately 60% (Table 4.13a) of PI is explained by the items identified that include “novelty”. In addition, Cronbach’s alpha (i.e., = 0,938) on PI was found to be very reliable.

The external feedback from customers and suppliers was highlighted for its importance as a source of innovations by the interviewees. The results from EFA confirmed that approximately 75% of EI is explained by identified factors that comprise feedback from suppliers and customers. A Cronbach’s alpha of 0,859 showed that EI is a very reliable source for innovative capability. Recent empirical research also confirms that collaboration or co-creation with customers and suppliers is valuable for new product development (Najafi-Tavani, Najafi-Tavani, Naudé, Oghazi & Zeynaloo 2018:24).

The results also indicated that firms depend on word-of-mouth for marketing their innovative products. This might mean that market innovation is not as prevalent in these firms because of their relative size in the industry. EFA has shown that MI items accounted for a smallest percentage (34%) in innovation while the construct itself is just reliable as a source of innovative capability with a Cronbach's alpha of 0,748. These results might mean that marketing needs to be completed by word-of-mouth to raise awareness and built brand loyalty. Ngoma and Ntale (2019:10) found evidence of word-of-mouth as an intermediary between relationship marketing and consumer loyalty.

Lastly, innovative capabilities are also built through collaboration and industrialisation of the processes. These require the use sophisticated machinery and software to design, test and produce quality innovative products. Systems were mentioned in the study where the use of industry-specific applications and tooling techniques is key for innovation. This view is supported by the results that showed that systems innovativeness is a very reliable source of innovative capability (i.e., Cronbach's alpha = 0,808). Research has shown that these tools are critical in facilitation the innovative capabilities (Adamides & Karacapilidis 2020:36).

5.2.3.2 The implementation of innovative capabilities

The theme on the operationalisation of innovative capabilities is based on five categories. The first category implies that innovativeness is encouraged by top management and employee driven. This culture is based on the encouragement of innovative behaviour among the employees. BI constructs have been found to be a reliable source of innovative capability with a Cronbach's alpha of 0,916. In addition, innovation is viewed as a continuous process and this also relates to the issue of culture within an organisation. Current research notes that a systematic approach towards promoting an innovative culture within an organisation is paramount for success (Bendak, Shikhli & Abdel-Razek 2020:13).

The implementation of innovative capabilities also requires a specialised skills set and automation. This is evident from the PDI perspective of the study that examines the functions of a product manager. While quantitative research has shown the unavailability of product managers in the industry, qualitative results have also highlighted the need for skilled engineers with experience from vehicle manufacturing. The literature suggested the importance of a product manager throughout the lifecycle of a product; however, the results showed that this does not happen in reality. This was supported by the response that much of the product design is based on “build-to-print” developed by OEMs or MNC systems suppliers. However, PDI was found to be a very reliable source of innovative capability with a Cronbach’s alpha of 0,899.

These mixed results could stem from the terminology applied in the study. A product development manager (PDM) takes similar role to that of sale person in that he or she has to be the link between product design, prototyping, production, marketing and sales. While the researcher understands the complex skills set required from PDM, research has shown that their functions cut across the entire value chain and serve as intermediaries between unconnected areas within a business but their role is misunderstood (Gonzalez & Claro 2019:811).

The other approach to the implementation of innovative capabilities is the use of new technologies that are provided by the suppliers. This means that new knowledge needs to be managed well to enhance innovation. Hence KMI was found to be a very reliable source of innovative capability (i.e., Cronbach’s alpha = 0,870). However, interviewees pointed out that in-house developed knowledge was non-existent. This implies that there could more be a reliance on external knowledge (transfer) for innovation. Alexy, George and Salter (2013:4) indicated that it was not unusual to find certain firms engaging in multiple strategies to obtain critical resources that would eventually assist with their innovation.

5.2.3.3 Resources required for value creation

The interviews viewed the idea of SCA from the perspective of broader value creation. The first category revealed the need for tangible resources that include people and tools. The second category is the intangible resources made up of process and systems in place. This means that both types of resources are important for value creation and this is confirmed by the results that showed that RH as a very reliable source of SCA (i.e., Cronbach’s alpha = 0.914). However, Foon and Nair (2010:74) argued that in the twenty-first century, there is a greater need for intangible resources for SCA than tangible ones.

The third category is based on value creation through differentiation in the design process of the product or production. As shown above, some respondents could not support this view because of non-ownership of the design process while felt that they could create value if they owned the process. This means that the differentiation based on process design is not available to the majority of the manufacturers, making value creation difficult. However, the results showed that PD is a reliable source of SCA with a Cronbach's alpha of 0,839. This is also supported by empirical research (Vinayan et al. 2012:34).

Lastly, value creation stems from the ability to be flexible and adaptable to the changing business environment. This is also related to the level of restrictions present in the adaptation of tools and process as market needs change. This means that not all firms are flexible or able to adapt to the changing environment because of restrictions from OEMs.

5.2.3.4 Unique value proposition

The last theme is on the maintenance and protection of the value proposition through the uniqueness of the type of resources held. In the first instance, the respondents noted that in-house developed tools and equipment cannot be copied and used elsewhere. This means that the tools are only suited for a particular operation in a specific company and cannot be shared with other operations (Douma & Schreuder, 2013:178; Wang 2014:36). Our results above showed that IMR is a very reliable source of SCA with a Cronbach's alpha score of 0.820.

Secondly, the developed tools and equipment become reusable over a longer time period because of their adaptability to the set operations. This means that the resources are not tradable for use outside that specific operation and have a higher utilisation capacity (Teece 2010:180)

Thirdly, the human resources involved in the company are said be extremely entrepreneurial in nature such that their skills cannot be copied and rivals find it difficult to keep up with. While this may not be a finding from other companies, it means that such human resources can be competed away by rivals. Empirical evidence has shown that human resources are "head-hunted" or "poached" from rival organisations (Amankwah-

Amoaha & Yaw 2011:3571). Hence, firms need to have meant of curtailing such competition as it has been shown that EPLC are very reliable for SCA with a Cronbach's alpha of 0.859.

In addition, the resources used have to be failure proof to ensure non-wastage of resources. Hence, the process to have innovative designs requires a continuous effort while maintaining confidentiality of the operations. This means that the maintenance of superior value proposition needs to be constantly maintained. The results showed that EALC are important for SCA with a Cronbach's alpha of 0.688.

5.3 CHAPTER SUMMARY

This chapter has discussed the main results of the study and their implications for the topic. The secondary data analysis has revealed that process innovation activities are important in the South African vehicle manufacturing industry. From the non-technological innovation activities, organisational innovation activities were more important than marketing. Lastly, the key drivers of successful outcomes in the South African automobile manufacturing were the product and process innovation activities.

The dimensions developed for both innovative capability and SCA were largely consistent in describing the individual constructs as shown by EFA. The reliability tests have also confirmed the consistency of the constructs in explaining the two main concepts of the study.

The Pearson correlation coefficient has shown an association between nine innovative capability constructs with four instead of five SCA constructs as proposed by the study. The regression analysis has shown that none of the models have significant p-values for the independent variables while two models had significant F-statistic of the overall effect of variables.

Lastly, the qualitative results were presented and this were based on four themes that relate to the two main concepts of the study. The results showed that there are five factors that play a role in the development of innovative capabilities. The implementation of innovative capabilities requires five distinct approaches. On the other hand, the creation of value through resources is based four factors and lastly, the maintenance of the unique value proposition is possible through five distinct measures.

The next chapter presents conclusions and recommendations of the study.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

The study investigated the role of internal innovative capabilities on SCA in the automobile manufacturing industry of South Africa and identified their key elements while at the same time linked these with value creation within the RBV of SCA. The rationale behind the study is that innovation in the industry is restricted by the influence of foreign multinational OEMs. For the South African vehicle manufacturing industry to compete at a global level requires the creation of independent and locally sourced innovations. In addressing these research topics, a number of objectives served as guidance for the scope of work required.

6.2 EVALUATION OF RESEARCH OBJECTIVES

The primary objective was to investigate the role of internal innovative capabilities in fostering SCA in the South African motor vehicle manufacturing sector. This primary objective was broken down into six secondary objectives as follows:

6.2.1 To determine the role of innovative capabilities in the motor vehicle manufacturing sector

This secondary objective was addressed through a critical assessment of the theoretical literature. From the theoretical literature, 11 constructs on innovative capability were discovered and each was critically assessed and examined for its practical application to the South African motor vehicle manufacturing industry.

6.2.2 To examine the impact of innovative activities on the South African motor manufacturing sector

This objective was investigated through an analysis of the secondary data from the HSRC. For the technological activities, the research has shown that process innovation activities were important while organisational activities were key for non-technological activities. In addition, product and process innovations were responsible for the successful performance of the industry on quality improvement and growth in product range.

6.2.3 To identify the key internal capabilities that impact on the innovativeness of the motor vehicle manufacturing sector

The identification of the main innovative capabilities involved an analysis of the survey data collected using various tests. Firstly, an analysis of inter-item correlation was conducted on the 11 constructs from innovative capability. All items within the constructs were converging except for the product innovation. The second tests of sample adequacy and sphericity also showed that IE, MI and PI constructs were less identifiable with the concepts. These means that the three constructs were unlikely to be key in explaining innovative capability in the South African motor vehicle manufacturing industry. A third and more robust approach was based on EFA for all constructs. The analyses showed that the number of items describing PI were three instead of four as originally proposed by the study. This meant that the statement “the industry's new products and services are often perceived as very novel by customers” does not belong to the construct.[22] In the main, EFA has shown that all 11 constructs are key internal capabilities that impact innovativeness with the exception of PI which is defined by fewer items than originally specified.

This objective was also confirmed by the analysis of qualitative data that revealed similarities with quantitative analysis on the factors responsible for innovative capabilities as well as their implementation. This objective also answered the first research question of the study, namely, what key internal innovative capabilities exist in the automobile manufacturing sector?

Similar analyses were conducted for the SCA to answer the second question of the study, namely, what key factors are applicable to sustainable competitive advantage in the South African automobile manufacturing industry?

[22] The same results have been found with correlation and reliability analyses.

6.2.4 To identify the key internal innovative capabilities that impact on the SCA in the motor vehicle manufacturing sector

This objective was investigated by conducting the Pearson correlation analysis. The results showed that nine out of 11 constructs on innovative capability were associated with SCA constructs. PI and systems innovativeness were not significantly associated with any of the five dependent variables. This means that the two variables are not related to SCA in the South African automobile manufacturing industry. In addition, a few showed insignificant association with the dependent variables while others were negatively correlated. However, the nine constructs were positively and significantly associated with four instead of the five dependent variables as initially proposed by the study. For instance, PD was significantly correlated with seven independent variables, immobility of resources was significantly correlated with only two independent variables, EPLC were significantly associated with four independent variables and EALC was associated with eight independent variables. This means that innovative capability is not associated with RH within the industry. So is there any solution for it?

The analysis of the association between innovative capability and SCA variables helped to answer the third question of the study, namely, what key internal innovative capabilities are associated with SCA?

6.2.5 To investigate the relationship between internal innovative capabilities and SCA in the motor vehicle manufacturing sector

The approach followed here involved an estimation of five regression models of SCA constructs on 11 constructs of innovative capability. None of the estimated coefficients were significant across all regressions and only two models showed a significant F-statistic. This result shows that PD and EALC are significantly related to innovative capability constructs. Innovative capability leads to SCA through PD and EALC. In addition, the R-squared for the two models were highest at 77% and 74% respectively which supports the findings on the relationship between innovative capability and SCA.

The presence of multicollinearity was detected. However, remedial measures led to the worsening of the model statistics. The original results have been kept with the understanding that the problem stem from the small sample of the study. The objective is also related to the fourth and final question of the study, namely, do the internal innovative capabilities in the automobile manufacturing industry lead to SCA?

6.2.6 To recommend the best innovative strategies for OEMs to stay sustainable and competitive

This last objective was addressed by the presentation of the key findings and their interpretations. At the broader company level, the best strategies would be to focus on product and process innovations as shown by the results of secondary data analysis. While respondents reflected that they produce on print, there is a room to be innovative from the process perspective. Accordingly, the best strategy for the South African automobile manufacturer facing restrictions from launching own new products is to introduce new production processes to stay competitive.

From the results of the regression analysis, two models reported a statistically significant F-statistic, namely, Models 2 and 5. Model 2 shows that SCA can be achieved by pursuing a strategy that applies innovative capability that directly targets PD. The fifth model suggests that the best application of innovative capability for generating SCA is by maintaining EALC.

On the other hand, the first model shows that innovative capability does not have any influence on RH based on an insignificant F-statistic. This means that the strategy of pursuing SCA through RH based on innovative capabilities is not recommended for the South African automobile manufacturing industry. The second model has an insignificant F-statistic but a relatively modest R-squared of 49%. This means that innovative capability accounts for almost half of the variation in EPLC and as such it may take half the effort to use this as a strategy for SCA in the industry. The fourth model also had an insignificant F-statistic but a relatively poor R-square of 47%. This means that innovative capability accounts for less than half of the variation in immobility of resources. Hence, a strategy of pursuing SCA based on resource immobility through innovative capability is not recommended.

The three main strategies for engendering and maintaining SCA requires an application of innovative capabilities that enhance PD, limit competitors from entering the market and where possible limit competition from existing competitors.

6.3 CONTRIBUTIONS OF THE STUDY

The study has extended the field of business management and strategy by adding new theoretical aspects under the broader perspectives of dynamic capabilities and resources-based theory, respectively. The dynamic capability's view is based on five theoretical aspects that includes innovative capability (Bhupendra & Sangle 2015; Lin et al. 2010; Wang & Ahmed 2007). It is within the strand of innovative capability that this study has introduced six theoretical aspects whereas previously there were five. The new theoretical views have added 32 dimensions to enrich the nature and understanding of innovative capability. Within the five previously existing constructs, the study has added 23 new dimensions to the literature. This means that the study has operationalised the concepts for which the scales of measurement were previously non-existent. These contributions enrich the dynamic capabilities perspective.

In the development of SCA constructs, the study followed a narrower and more focused approach as opposed to the broader perspective found in literature (Kozlenkova et al. 2013:3). These broader perspectives on SCA have limitations of lack of control as mentioned earlier. While no new constructs or dimensions were added, the approach followed is crucial for managers to be in control (and comprehend) the internal applications of the firms' resources. However, the researcher is of the view that, in applying and testing them using the existing scales on SCA, the study has contributed to the field of knowledge (Vinayan 2013:256). Thus, the approach followed in the study is practical and useful to decision-making within a firm setting rather leaving everything to chance.

The validity of the developed constructs has been tested and thus provides opportunities for other researchers in the field to expand on. This means that the dimensions of both innovative capability and SCA have been statistically substantiated for use in business research and application. In addition, the study has contributed a dynamic approach to the analysis by following a mixed methods approach.

Finally, the study has examined the topic from a perspective of African country while most of the existing literature focuses on the western and Latin American countries.

6.4 LIMITATIONS OF THE STUDY

The study relied on a small sample for both the quantitative and qualitative analysis and has made the generalisation of the results unadvisable. The reasons for these are spelled out below.

The initial target population was the members of NAAMSA for which an email request for participation was sent to the personal assistant of the company's CEO to seek guidance and permission on how to conduct the study at their organisation. Out of the seven OEMs, one completely refused to consider the researcher's request and the rest promised to assist with the contact information of corporate and legal services personnel (i.e. gatekeepers). The first email was sent out on 13 January 2020 with three follow-up emails on 28 January, 14 February and 25 March 2020. With lockdown in place from 26 March 2020, it became difficult to get hold of the gatekeepers. Once the lockdown restrictions were eased, most of the companies refused to assist citing the reasons of hybrid work environments and changes to the company policies regarding the sharing of information with external individuals.

The next attempt to collect relevant data considered members of NAACAM where electronic questionnaires were emailed to 160 individuals as per the sample selection method of the study. Of the emails sent out, four were rejected by the recipients' email server system and one respondent refused to participate in the survey. For this data collection activity, three email reminders were sent to participants at two-weekly intervals. With no improvement in the response rate, the researcher also made 21 calls and sent out 40 SMS messages to the participants with mobile number contact details; only two SMSes were rejected.

In the end, the target population was a group professional from the authors LinkedIn network instead of personnel employed in the automobile manufacturing industry. This means that the respondents were providing their opinion as consumers of the product not as producers. The limitations of this is that their knowledge and experience is different from that of manufacturers and, thus, their understanding of the production side of the industry is limited.

To augment the small responses from the survey and obtain relevant industry opinion, the researcher considered structured interviews with independent local automobile manufacturers. While the result served to augment and resolve the limitation of lack of relevant industry knowledge, the response was still low. Hence, in both cases, the small sample problem is still present and the results cannot, thus, be generalised to the wide industry. In addition, the impact on the results is not known had there been no outright refusal and unwillingness to participate by both automobile and components manufacturers.

6.5 RECOMMENDATIONS AND FUTURE RESEARCH

Despite the limitations of the study of this nature, there are several practical implications for practising managers. For instance, secondary data analysis has shown that product and process innovation activities are key in motor vehicle manufacturing. Product innovation provides companies with a competitive edge and meet the needs of changing customer demands while process innovation allows companies to reduce costs, improve efficiency, and improve quality. By engaging in product and process innovation activities, South African motor vehicle manufacturers can create products that are more appealing to customers, more efficient to manufacture, and more profitable. In particular activities that support the development new products as well as improvement in the production process should be prioritised.

The results of the regression analysis have shown that innovative capabilities are related to product differentiation. This means that there is link between the ability to innovate and value creation. Hence, managers should continue improving innovative capabilities for organisation to remain competitive through product differentiation.

Another regression result shows a positive relationship between innovative capability and ex ante limits to competition. Similarly, for the company to remain competitive over time there is a need to continue developing innovation capabilities that are not easily imitated by rival firms.

Conversely, one of the findings has shown that there is no relationship between innovative capability and resources heterogeneity. Understandably resources are unique in nature and hence, cannot be influence by the level of innovation. In fact, the opposite could be possible with unique set of resources being responsible for innovativeness. Lastly, the innovative capabilities do not guarantee ex post limits to competition based on the results from the second model. It cannot be guaranteed that innovativeness can protect the company from direct competition because it becomes difficult to know the activities of rival firms operating in the same market.

The study has concluded that innovativeness is not a simple solution to a complex problem of achieving sustained competitive advantage. However, for a better understanding, future research should focus on the application of a bigger sample. This will help with resolving some of the data analysis issues encountered in this research. Furthermore, a more dynamic approach that combines case studies with mixed methods will assist in uncovering some of the nuances specific to the individual companies.

Future research could also focus on other industries where response rates are likely to be higher, such as the hospitality industry. The same research question could be applied in specific industry settings where the conditions are different from automobile manufacturing (i.e., services) to examine the salient features of innovative capability and SCA.

Since this study followed a unidimensional approach of focusing on organisations as participants, future research should follow a dyadic methodology. It is of interest to top management to have an understanding of the perceptions of various parties on the value of innovative capability as a value creation strategy in an organisation. Hence, a study that collects data from different interest groups like employees, suppliers, consumers and competitors would be valuable in the future.

With the latest developments in the application of Big Data and advancements in sophisticated tools of analysis like artificial intelligence and machine learning, future studies will benefit from the ability to extract the relevant information to add rigour to the analysis and simultaneously resolve the issue of lack of data.

Future studies should also examine the topic from the perspective of comparing results from different African countries. Different African countries have different cultural practices which inform their management practices. Hence, the research could be conducted between countries or cultural groups. This kind of comparative analysis across different cultures will benefit management to understand the effect of these differences on innovative capability practices and value creation.

This will make a valuable contribution to the broader initiative of African economic integration and the expansion of automobile manufacturing currently taking place within the continent.

6.7 CHAPTER SUMMARY

This chapter provided a brief background on the rationale for the topic and outlined the objectives. These objectives were the building blocks of the study and were discussed in conjunction with the results as well as the main research questions. The contributions of the study were highlighted to indicate the location of the research within the broader theoretical and empirical analysis on the topic.

The limitations of the research could be overcome by conducting future research that uses a larger sample size or that collects data from a different target population. Future research could also use different methods to analyse the data as recommended above. This would allow for a more robust analysis of the research questions and would help to reduce the potential for bias.

In conclusion, the study examined the effect of innovative capability on SCA in the automobile manufacturing industry of South Africa. The analysis has provided some evidence of the relationships between the main variables of and therefore supported the assumptions of the study. The findings have shown that innovative capabilities are essential for value creation in the automobile industry of South Africa, which suggests that companies that invest in innovation are more likely to be successful (than companies that do not). It is the researcher's understanding that the automobile manufacturing industry operates in a rapidly changing business environment where agility is a necessity for staying competitive. Therefore, the implementation of the strategies recommended above should be implemented in the industry. The research suggests a coordinated strategy of executing innovative capabilities that create value through PD, limiting both existing and potential competition from entering the market.

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APPENDICES

Appendix A: Concepts, Dimensions and Elements

Concepts	**Dimensions / Constructs**	**No. of Elements / Items**
Innovative capability	Product innovativeness	3
	Innovative edge	4
	Systems innovativeness	4
	Product development	5
	Environmental influences	10
	Market innovativeness	5
	Product marketing	9
	Process innovativeness	6
	Knowledge management	9
	Behavioural innovativeness	3
	Strategic innovativeness	10
Sustainable competitive advantage	Resource heterogeneity	7
	Product differentiation	6
	Immobility of resources	3
	Ex post limits to competition	7
	Ex-ante limits to competition	4

Appendix B1: Ethics Approval Letter for NAAMSA Participants

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

18-Jul-2019

Dear Mr Matsaseng, Kopano KF

Application Approved

Research Project Title:
The role of innovative capability in fostering sustainable competitive advantage in the automobile manufacturing industry in South Africa

Ethical Clearance number:
UFS-HSD2019/0350

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted to the ethics office to ensure ethical transparency. furthermore, you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for submitting your proposal for ethical clearance; we wish you the best of luck and success with your research.

Yours sincerely

Prof Derek Litthauer
Chairperson: General/Human Research Ethics Committee

Digitally signed by Derek Litthauer
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Appendix B2: Ethics Approval letter for NAACAM participants

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

19-Feb-2021

Dear Mr Matsaseng, Kopano KF

Amendment Approved

Research Project Title:
The role of innovative capability in fostering sustainable competitive advantage in the automobile manufacturing industry in South Africa

Ethical Clearance number:
UFS-HSD2019/0350/1807

We are pleased to inform you that your amendment application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for notifying the ethics committee of the changes/amendments that have been made to your study; we wish you the best of luck and success with your research.

Yours sincerely

Dr Adri Du Plessis
Chairperson: General/Human Research Ethics Committee

Adri du Plessis

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Appendix B3: Ethics Approval letter for Professional Network

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

20-Jul-2022

Dear Mr Kopano Matsaseng KF

Amendment Approved

Research Project Title:
The role of innovative capability in fostering sustainable competitive advantage in the automobile manufacturing industry in South Africa

Ethical Clearance number:
UFS-HSD2019/0350/1807/21

We are pleased to inform you that your amendment application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for notifying the ethics committee of the changes/amendments that have been made to your study; we wish you the best of luck and success with your research.

Yours sincerely

Dr Adri Du Plessis
Chairperson: General/Human Research Ethics Committee

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Appendix C1: Structured Questionnaire: NAAMSA

EvaSys	Automobile innovative capability and sustainable competitive advantage. [Copy]	Electric Paper

FACULTY OF ECONOMICS AND MANAGEMENT

BUSINESS SCHOOL	Online Self Administered Survey
Dear Participant, thank you for your consent to	Use the scale below to indicate your level of
The questionnaire is divided into 3 distinct	1 = Strongly Disagree; 2 = Disagree; 3 = Slightly

Mark as shown: Please use a ball-point pen or a thin felt tip. This form will be processed automatically.
Correction: Please follow the examples shown on the left hand side to help optimize the reading results.

SECTION A: THE STATE OF INNOVATIVENESS

1. The status of *product innovativeness* in your organisation.

		1	2	3	4	5	6
1.1	My organisation's new products and services are often perceived as very novel by customers.	☐	☐	☐	☐	☐	☐
1.2	My organisation's innovation in connectivity is perceived as important to consumers.	☐	☐	☐	☐	☐	☐
1.3	My organisation's innovation in safety is perceived as important by consumers.	☐	☐	☐	☐	☐	☐
1.4	My organisation's innovation in fuel economy is perceived as important by consumers.	☐	☐	☐	☐	☐	☐

2. The status of *innovative edge* in your organisation

		1	2	3	4	5	6
2.1	Consumers are willing to pay for innovation in any one of the areas listed in question 1.1 above.	☐	☐	☐	☐	☐	☐
2.2	In comparison to competitors, my organization has introduced more innovative products/services during the past five years.	☐	☐	☐	☐	☐	☐
2.3	In comparison to competitors, my organization's products/services are generally more successful.	☐	☐	☐	☐	☐	☐
2.4	My organisations' recent new products/services are significantly different from our previous products and services	☐	☐	☐	☐	☐	☐

3. The status of ICT *systems innovativeness* in your organisation.

		1	2	3	4	5	6
3.1	My organisation ICT uses Enterprise Resources Planning (ERP) software to enhance production.	☐	☐	☐	☐	☐	☐
3.2	My organisation ICT uses Customer Relationship Management (CRM) software to enhance production.	☐	☐	☐	☐	☐	☐
3.3	My organisation ICT uses Computer Aided Design (CAD)/ Computer Aided Manufacturing (CAM) software to enhance production.	☐	☐	☐	☐	☐	☐
3.4	My organisation ICT uses Advance Scheduling software to enhance production.	☐	☐	☐	☐	☐	☐

4. The status of *product development innovativeness* in your organisation

		1	2	3	4	5	6
4.1	My organisation has hired a new product development manager within the last three years.	☐	☐	☐	☐	☐	☐
4.2	Our product development manager is able to define a strategy for each product (recognize main competitors, set market segments and establish positioning and value proposition).	☐	☐	☐	☐	☐	☐
4.3	My organisations' product manager can align product strategy with existing resources (e.g. budget, production capacity, quality and legal requirements).	☐	☐	☐	☐	☐	☐
4.4	My organisations' product manager can translate product strategy into action plans.	☐	☐	☐	☐	☐	☐
4.5	My organisations' product manager can ensure alignment between the product in development and the original product strategy.	☐	☐	☐	☐	☐	☐
4.6	My organisations' product manager usually recommends modifications to products' features if necessary.	☐	☐	☐	☐	☐	☐
4.7	My organisations' product manager ensures products get approval from the organisational internal panel.	☐	☐	☐	☐	☐	☐
4.8	Our product manager is able to forecast product's expectable demand.	☐	☐	☐	☐	☐	☐
4.9	Our product manager is able to track product's financial performance.	☐	☐	☐	☐	☐	☐
4.10	Our product manager is able to monitor product's lifecycle from concept to grave.	☐	☐	☐	☐	☐	☐

5. The status of *environmental influences on innovativeness* on your organisation.

		1	2	3	4	5	6
5.1	The external linkages from local customers are important for product innovations (i.e., upgrades) in my organisation.	☐	☐	☐	☐	☐	☐
5.2	The external linkages from local suppliers are important for product innovations (i.e., upgrades) in my organisation.	☐	☐	☐	☐	☐	☐
5.3	The external linkages from MNC or JV customer located in my country are important for product innovations (i.e., upgrades) in my organisation.	☐	☐	☐	☐	☐	☐
5.4	The external linkages from MNC or JV customer located in a foreign country are important for product innovations in my organisation.	☐	☐	☐	☐	☐	☐
5.5	The external linkages from MNC or JV supplier located in my country are important for product innovations in my organisation.	☐	☐	☐	☐	☐	☐

6. The status of *market innovativeness* in your organisation.

		1	2	3	4	5	6
6.1	My organisation has suitable offering in market place to expand its customer base for existing products.	☐	☐	☐	☐	☐	☐
6.2	My organisation is able to identify customer's needs.	☐	☐	☐	☐	☐	☐
6.3	My organisation understands the factors that influence consumer choice behaviour.	☐	☐	☐	☐	☐	☐
6.4	New products in my organisation give us a competitive advantage against new competition.	☐	☐	☐	☐	☐	☐
6.5	My organisation explores new approaches to conduct market research.	☐	☐	☐	☐	☐	☐
6.6	My organisations' marketing & advertising campaigns are considered the most effective in the industry.	☐	☐	☐	☐	☐	☐

6. The status of *market innovativeness* in your organisation. [Continue]

6.7	My organisation is able to develop strong relationships with customers.	☐	☐	☐	☐	☐	☐
6.8	My organisation has strong product marketing capabilities.	☐	☐	☐	☐	☐	☐
6.9	My organisation has strong product technology capabilities.	☐	☐	☐	☐	☐	☐

7. The status of *product marketing innovativeness* in your organisation.

		1	2	3	4	5	6
7.1	There are complementarities between product marketing capabilities and product technology capabilities.	☐	☐	☐	☐	☐	☐
7.2	My organisation has hired a new product marketing manager to enhance brand awareness.	☐	☐	☐	☐	☐	☐
7.3	Our product marketing manager has a market-learning capability that allows for foresight about future trends in the market place.	☐	☐	☐	☐	☐	☐
7.4	Our product marketing manager's marketing-learning capability guides the organisations' resource reconfiguration decisions.	☐	☐	☐	☐	☐	☐
7.5	Our product marketing manager's market learning capability fosters capability improvement through learning by doing in product development.	☐	☐	☐	☐	☐	☐
7.6	Our product marketing manager's market learning capability fosters capability improvement through learning by imitation in product development.	☐	☐	☐	☐	☐	☐

8. The status of *process innovativeness* in your organisation.

		1	2	3	4	5	6
8.1	My organisation focuses on smart business processes upgrading.	☐	☐	☐	☐	☐	☐
8.2	My organisation has flexible production methods which can be changed efficiently.	☐	☐	☐	☐	☐	☐
8.3	In the past three years my organization has developed new management approaches suitable to us.	☐	☐	☐	☐	☐	☐
8.4	My organisation uses internal knowledge in the development of new activities / processes.	☐	☐	☐	☐	☐	☐
8.5	My organisation routinely engages in internal initiatives to identify new technologies.	☐	☐	☐	☐	☐	☐
8.6	My organisation routinely engages in internal initiatives to develop new technologies.	☐	☐	☐	☐	☐	☐
8.7	My organisation routinely explores technological advancement from outside the firm.	☐	☐	☐	☐	☐	☐
8.8	My organisation routinely adopts technological advancements from outside the firm.	☐	☐	☐	☐	☐	☐
8.9	My organisation routinely explores innovations by suppliers for adoption.	☐	☐	☐	☐	☐	☐

9. The status of *knowledge management innovativeness* in your organisation.

		1	2	3	4	5	6
9.1	My organisation has a knowledge sharing process through training and development to improve innovation.	☐	☐	☐	☐	☐	☐
9.2	My organisation uses knowledge sharing process to engender trust to staff members to improve innovation.	☐	☐	☐	☐	☐	☐
9.3	My organisation uses knowledge sharing process to motivate employees to be more innovative.	☐	☐	☐	☐	☐	☐

10. The status of *behavioural innovativeness* in your organisation.

		1	2	3	4	5	6
10.1	My organisation is able to inspire everyone around a common purpose.	☐	☐	☐	☐	☐	☐
10.2	My organisation is characterised by individuals with an ambition to get recognised.	☐	☐	☐	☐	☐	☐
10.3	My organisation uses storytelling to motivate staff about acceptable innovative behaviour.	☐	☐	☐	☐	☐	☐
10.4	My organisation has creative spaces where ideas can be openly shared.	☐	☐	☐	☐	☐	☐
10.5	My organisations' leadership are role models for innovative behaviour.	☐	☐	☐	☐	☐	☐
10.6	My organisation has a structured process to approve new ideas for implementation.	☐	☐	☐	☐	☐	☐
10.7	During recruitment, my organisation critically evaluates the ability to innovate.	☐	☐	☐	☐	☐	☐
10.8	In my organisation, employees enjoy freedom to excel based on their capabilities, skills, and experiences.	☐	☐	☐	☐	☐	☐
10.9	Our organisation is characterised by innovative culture (i. e., commitment to foster innovation capacity) across all critical functional areas.	☐	☐	☐	☐	☐	☐
10.10	In my organisation, innovative behaviours are rewarded during performance evaluation.	☐	☐	☐	☐	☐	☐

11. The status of *strategic innovativeness* in your organisation.

		1	2	3	4	5	6
11.1	My organisation has a range of products to suit the choices of customers.	☐	☐	☐	☐	☐	☐
11.2	In my organization, senior management have strong abilities to simulate the future of the market.	☐	☐	☐	☐	☐	☐
11.3	In my organization, senior management proactively seek strategic alliances for competitiveness.	☐	☐	☐	☐	☐	☐
11.4	My organisation has promoted an internal candidate to the role of CEO in the past three years	☐	☐	☐	☐	☐	☐
11.5	My organisation management is characterised by individuals with prior innovation-relevant experience from industry.	☐	☐	☐	☐	☐	☐
11.6	My organisation management is characterised by individuals with prior innovation-relevant experience from self-employment.	☐	☐	☐	☐	☐	☐
11.7	My organisation management is characterised by individuals with prior innovation-relevant experience from research and development (R&D).	☐	☐	☐	☐	☐	☐
11.8	My organisation management is characterised by individuals with concrete innovation-relevant ideas from former occupation.	☐	☐	☐	☐	☐	☐

Appendix C2: Structured Questionnaire: NAACAM

EvaSys	Automobile innovative capability and sustainable competitive advantage. [Copy] [Copy]	Electric Paper

FACULTY OF ECONOMICS AND MANAGEMENT	
BUSINESS SCHOOL	Online Self Administered Survey
Dear Participant, thank you for your consent to	Use the scale below to indicate your level of
The questionnaire is divided into 3 distinct	1 = Strongly Disagree; 2 = Disagree; 3 = Slightly

Mark as shown: ☐ ☒ ☐ ☐ ☐ Please use a ball-point pen or a thin felt tip. This form will be processed automatically.
Correction: ☐ ■ ☐ ☒ ☐ Please follow the examples shown on the left hand side to help optimize the reading results.

SECTION A: THE STATE OF INNOVATIVENESS

1. The status of *product innovativeness* in your organisation.

		1	2	3	4	5	6
1.1	My organisation's new products and services are often perceived as very novel by customers.	☐	☐	☐	☐	☐	☐
1.2	My organisation's innovation in connectivity is perceived as important to consumers.	☐	☐	☐	☐	☐	☐
1.3	My organisation's innovation in safety is perceived as important by consumers.	☐	☐	☐	☐	☐	☐
1.4	My organisation's innovation in fuel economy is perceived as important by consumers.	☐	☐	☐	☐	☐	☐

2. The status of *innovative edge* in your organisation

		1	2	3	4	5	6
2.1	Consumers are willing to pay for innovation in any one of the areas listed in question 1.1 above.	☐	☐	☐	☐	☐	☐
2.2	In comparison to competitors, my organization has introduced more innovative products/services during the past five years.	☐	☐	☐	☐	☐	☐
2.3	In comparison to competitors, my organization's products/ services are generally more successful.	☐	☐	☐	☐	☐	☐
2.4	My organisations' recent new products/services are significantly different from our previous products and services	☐	☐	☐	☐	☐	☐

3. The status of ICT *systems innovativeness* in your organisation.

		1	2	3	4	5	6
3.1	My organisation ICT uses Enterprise Resources Planning (ERP) software to enhance production.	☐	☐	☐	☐	☐	☐
3.2	My organisation ICT uses Customer Relationship Management (CRM) software to enhance production.	☐	☐	☐	☐	☐	☐
3.3	My organisation ICT uses Computer Aided Design (CAD)/ Computer Aided Manufacturing (CAM) software to enhance production.	☐	☐	☐	☐	☐	☐
3.4	My organisation ICT uses Advance Scheduling software to enhance production.	☐	☐	☐	☐	☐	☐

4. The status of *product development innovativeness* in your organisation

		1	2	3	4	5	6
4.1	My organisation has hired a new product development manager within the last three years.	☐	☐	☐	☐	☐	☐
4.2	Our product development manager is able to define a strategy for each product (recognize main competitors, set market segments and establish positioning and value proposition).	☐	☐	☐	☐	☐	☐
4.3	My organisations' product manager can align product strategy with existing resources (e.g. budget, production capacity, quality and legal requirements).	☐	☐	☐	☐	☐	☐
4.4	My organisations' product manager can translate product strategy into action plans.	☐	☐	☐	☐	☐	☐
4.5	My organisations' product manager can ensure alignment between the product in development and the original product strategy.	☐	☐	☐	☐	☐	☐
4.6	My organisations' product manager usually recommends modifications to products' features if necessary.	☐	☐	☐	☐	☐	☐
4.7	My organisations' product manager ensures products get approval from the organisational internal panel.	☐	☐	☐	☐	☐	☐
4.8	Our product manager is able to forecast product's expectable demand.	☐	☐	☐	☐	☐	☐
4.9	Our product manager is able to track product's financial performance.	☐	☐	☐	☐	☐	☐
4.10	Our product manager is able to monitor product's lifecycle from concept to grave.	☐	☐	☐	☐	☐	☐

5. The status of *environmental influences on innovativeness* on your organisation.

		1	2	3	4	5	6
5.1	The external linkages from local customers are important for product innovations (i.e., upgrades) in my organisation.	☐	☐	☐	☐	☐	☐
5.2	The external linkages from local suppliers are important for product innovations (i.e., upgrades) in my organisation.	☐	☐	☐	☐	☐	☐
5.3	The external linkages from MNC or JV customer located in my country are important for product innovations (i.e., upgrades) in my organisation.	☐	☐	☐	☐	☐	☐
5.4	The external linkages from MNC or JV customer located in a foreign country are important for product innovations in my organisation.	☐	☐	☐	☐	☐	☐
5.5	The external linkages from MNC or JV supplier located in my country are important for product innovations in my organisation.	☐	☐	☐	☐	☐	☐

6. The status of *market innovativeness* in your organisation.

		1	2	3	4	5	6
6.1	My organisation has suitable offering in market place to expand its customer base for existing products.	☐	☐	☐	☐	☐	☐
6.2	My organisation is able to identify customer’s needs.	☐	☐	☐	☐	☐	☐
6.3	My organisation understands the factors that influence consumer choice behaviour.	☐	☐	☐	☐	☐	☐
6.4	New products in my organisation give us a competitive advantage against new competition.	☐	☐	☐	☐	☐	☐
6.5	My organisation explores new approaches to conduct market research.	☐	☐	☐	☐	☐	☐
6.6	My organisations' marketing & advertising campaigns are considered the most effective in the industry.	☐	☐	☐	☐	☐	☐

6. The status of *market innovativeness* in your organisation. [Continue]

6.7	My organisation is able to develop strong relationships with customers.	☐	☐	☐	☐	☐	☐
6.8	My organisation has strong product marketing capabilities.	☐	☐	☐	☐	☐	☐
6.9	My organisation has strong product technology capabilities.	☐	☐	☐	☐	☐	☐

7. The status of *product marketing innovativeness* in your organisation.

		1	2	3	4	5	6
7.1	There are complementarities between product marketing capabilities and product technology capabilities.	☐	☐	☐	☐	☐	☐
7.2	My organisation has hired a new product marketing manager to enhance brand awareness.	☐	☐	☐	☐	☐	☐
7.3	Our product marketing manager has a market-learning capability that allows for foresight about future trends in the market place.	☐	☐	☐	☐	☐	☐
7.4	Our product marketing manager’s marketing-learning capability guides the organisations’ resource reconfiguration decisions.	☐	☐	☐	☐	☐	☐
7.5	Our product marketing manager’s market learning capability fosters capability improvement through learning by doing in product development.	☐	☐	☐	☐	☐	☐
7.6	Our product marketing manager’s market learning capability fosters capability improvement through learning by imitation in product development.	☐	☐	☐	☐	☐	☐

8. The status of *process innovativeness* in your organisation.

		1	2	3	4	5	6
8.1	My organisation focuses on smart business processes upgrading.	☐	☐	☐	☐	☐	☐
8.2	My organisation has flexible production methods which can be changed efficiently.	☐	☐	☐	☐	☐	☐
8.3	In the past three years my organization has developed new management approaches suitable to us.	☐	☐	☐	☐	☐	☐
8.4	My organisation uses internal knowledge in the development of new activities / processes.	☐	☐	☐	☐	☐	☐
8.5	My organisation routinely engages in internal initiatives to identify new technologies.	☐	☐	☐	☐	☐	☐
8.6	My organisation routinely engages in internal initiatives to develop new technologies.	☐	☐	☐	☐	☐	☐
8.7	My organisation routinely explores technological advancement from outside the firm.	☐	☐	☐	☐	☐	☐
8.8	My organisation routinely adopts technological advancements from outside the firm.	☐	☐	☐	☐	☐	☐
8.9	My organisation routinely explores innovations by suppliers for adoption.	☐	☐	☐	☐	☐	☐

9. The status of *knowledge management innovativeness* in your organisation.

		1	2	3	4	5	6
9.1	My organisation has a knowledge sharing process through training and development to improve innovation.	☐	☐	☐	☐	☐	☐
9.2	My organisation uses knowledge sharing process to engender trust to staff members to improve innovation.	☐	☐	☐	☐	☐	☐
9.3	My organisation uses knowledge sharing process to motivate employees to be more innovative.	☐	☐	☐	☐	☐	☐

10. The status of *behavioural innovativeness* in your organisation.

		1	2	3	4	5	6
10.1	My organisation is able to inspire everyone around a common purpose.	☐	☐	☐	☐	☐	☐
10.2	My organisation is characterised by individuals with an ambition to get recognised.	☐	☐	☐	☐	☐	☐
10.3	My organisation uses storytelling to motivate staff about acceptable innovative behaviour.	☐	☐	☐	☐	☐	☐
10.4	My organisation has creative spaces where ideas can be openly shared.	☐	☐	☐	☐	☐	☐
10.5	My organisations' leadership are role models for innovative behaviour.	☐	☐	☐	☐	☐	☐
10.6	My organisation has a structured process to approve new ideas for implementation.	☐	☐	☐	☐	☐	☐
10.7	During recruitment, my organisation critically evaluates the ability to innovate.	☐	☐	☐	☐	☐	☐
10.8	In my organisation, employees enjoy freedom to excel based on their capabilities, skills, and experiences.	☐	☐	☐	☐	☐	☐
10.9	Our organisation is characterised by innovative culture (i. e., commitment to foster innovation capacity) across all critical functional areas.	☐	☐	☐	☐	☐	☐
10.10	In my organisation, innovative behaviours are rewarded during performance evaluation.	☐	☐	☐	☐	☐	☐

11. The status of *strategic innovativeness* in your organisation.

		1	2	3	4	5	6
11.1	My organisation has a range of products to suit the choices of customers.	☐	☐	☐	☐	☐	☐
11.2	In my organization, senior management have strong abilities to simulate the future of the market.	☐	☐	☐	☐	☐	☐
11.3	In my organization, senior management proactively seek strategic alliances for competitiveness.	☐	☐	☐	☐	☐	☐
11.4	My organisation has promoted an internal candidate to the role of CEO in the past three years	☐	☐	☐	☐	☐	☐
11.5	My organisation management is characterised by individuals with prior innovation-relevant experience from industry.	☐	☐	☐	☐	☐	☐
11.6	My organisation management is characterised by individuals with prior innovation-relevant experience from self-employment.	☐	☐	☐	☐	☐	☐
11.7	My organisation management is characterised by individuals with prior innovation-relevant experience from research and development (R&D).	☐	☐	☐	☐	☐	☐
11.8	My organisation management is characterised by individuals with concrete innovation-relevant ideas from former occupation.	☐	☐	☐	☐	☐	☐

SECTION B: THE STATE OF COMPETITIVENESS

12. The status of *resource heterogeneity* in your organisation.

		1	2	3	4	5	6
12.1	My organisation has access to a unique set of tangible resources not available to competitors.	☐	☐	☐	☐	☐	☐
12.2	My organisation has access to a unique set of intangible resources not available to competitors.	☐	☐	☐	☐	☐	☐
12.3	My organisations' spatial location of resources makes it difficult for our competitors to have access to them.	☐	☐	☐	☐	☐	☐
12.4	My organisations' resource base is limited in supply such that our competitors cannot expand on them anymore.	☐	☐	☐	☐	☐	☐
12.5	My organisations' resource base is quasi – limited in supply such that our competitors cannot expand on them rapidly.	☐	☐	☐	☐	☐	☐
12.6	My organisations' resource base is of superior efficiency such that our competitors are not able to match.	☐	☐	☐	☐	☐	☐
12.7	My organisations' resource base allows for better service to customers that our competitors are not able to meet.	☐	☐	☐	☐	☐	☐

13. The status of *product differentiation* in your organisation.

		1	2	3	4	5	6
13.1	My organisations' competitiveness is achievable through product differentiation that others cannot copy.	☐	☐	☐	☐	☐	☐
13.2	My organisations' product differentiation is driven by the superior skills of our employees.	☐	☐	☐	☐	☐	☐
13.3	My organisations' product differentiation is driven by the superior process and technologies our company owns.	☐	☐	☐	☐	☐	☐
13.4	My organisations' product differentiation is driven by superior manufacturing standards set by management.	☐	☐	☐	☐	☐	☐
13.5	Our customers perceive our products as distinctively superior from our competitors.	☐	☐	☐	☐	☐	☐
13.6	Our suppliers perceive our products to offer higher profit margins than our competitors.	☐	☐	☐	☐	☐	☐
13.7	Our suppliers perceive our products to offer higher market share than those of competitors.	☐	☐	☐	☐	☐	☐

14. The status of *imperfect mobility of resources* in your organisation.

		1	2	3	4	5	6
14.1	My organisation has access to resources that are specific to our firm's needs – i.e., that cannot be applied anywhere else.	☐	☐	☐	☐	☐	☐
14.2	My organisation uses certain resources in conjunction with other different types of resources (i.e., unique combinations) to add more value to the firm.	☐	☐	☐	☐	☐	☐
14.3	My organisation has strategies to manage tacit knowledge (i.e., intellectual assets) that individual employees possess.	☐	☐	☐	☐	☐	☐

15. The status of *ex post limits to competition* in your organisation.

		1	2	3	4	5	6
15.1	My organisation has put in place intellectual property rights to limit competition.	☐	☐	☐	☐	☐	☐
15.2	My organisation has access to critical information that cannot be easily accessed by our competitors.	☐	☐	☐	☐	☐	☐
15.3	My organisation has access to implicit knowledge that cannot be easily accessed by our competitors.	☐	☐	☐	☐	☐	☐

15. The status of *ex post limits to competition* in your organisation. [Continue]

15.4	My organisations' learning by doing processes makes it difficult for competitors to imitate our methods.	☐	☐	☐	☐	☐	☐
15.5	My organisations' previous investment makes it difficult for competitors to imitate our methods.	☐	☐	☐	☐	☐	☐
15.6	My organisation has a set of complex assets whose efficiency cannot be imitated by competitors.	☐	☐	☐	☐	☐	☐
15.7	My organisations' products are not easily substitutable in the market of similar products.	☐	☐	☐	☐	☐	☐

16. The status of *ex ante limits to competition* in your organisation.

		1	2	3	4	5	6
16.1	My organisation is able to pre-empt the future direction of business.	☐	☐	☐	☐	☐	☐
16.2	My organisation uses a first mover approach in the market.	☐	☐	☐	☐	☐	☐
16.3	My organisation has the ability to set new standards and norms in the industry.	☐	☐	☐	☐	☐	☐
16.4	My organisation can quickly adapt a new strategy in the event of crises.	☐	☐	☐	☐	☐	☐

THANK YOU. PLEASE CONTINUE BELOW.

SECTION C: DEMOGRAPHIC PROFILE

17. GENDER

17.1 Choose one box only.
- ☐ Female
- ☐ Male
- ☐ *Other

17.2 *Other (please specify below):

18. AGE (Years)

18.1 Choose one box only.
- ☐ 20 - 30
- ☐ 31 - 40
- ☐ 41 - 50
- ☐ 51 - 60
- ☐ > 60

19. HIGHEST LEVEL OF EDUCATION OBTAINED

19.1 Choose one box only.
- ☐ Matric
- ☐ Post School Certificate
- ☐ Diploma
- ☐ Bachelors Degree
- ☐ Post Graduate Degree (Diploma)
- ☐ Masters Degree
- ☐ PhD / Doctorate

20. NATURE OF COMPONENTS MANUFACTURED

20.1 Choose all that apply.
- ☐ Accessories
- ☐ Body and chassis
- ☐ Drive transmission and steering parts
- ☐ Electrical parts
- ☐ Engine parts
- ☐ Exterior components
- ☐ Interior components
- ☐ Suspension and brake parts

20.2 Other (please specify briefly below):

21. CURRENT BUSINESS UNIT

21.1 Choose one box only.
- ☐ Marketing & Sales
- ☐ Business Operations
- ☐ Finance
- ☐ HRM&D
- ☐ Research & Development
- ☐ Manufacturing Facility
- ☐ Head Office
- ☐ *Other
- ☐ Regional Office

21.2 *Other (please specify below):

22. JOB CATEGORY

22.1 Choose one box only.
- ☐ Senior Management
- ☐ Middle Management
- ☐ Supervisor or Junior Management
- ☐ Administrator or Support Services
- ☐ *Other

22.2 *Other (please specify below):

23. CURRENT POSITION

23. CURRENT POSITION [Continue]

23.1 Choose one box only.

- ☐ CEO
- ☐ CFO
- ☐ Managing Director
- ☐ Marketing & Sales Manager
- ☐ Human Resource & Development Manager
- ☐ Product Developer or Designer
- ☐ Researcher
- ☐ Engineer
- ☐ *Other

23.2 *Other (please specify below):

24. EMPLOYMENT DURATION IN THE COMPANY (choose one)

24.1 Choose one box only.

- ☐ < 2 years
- ☐ 3 - 5 years
- ☐ 6 - 10 years
- ☐ 11 - 20 years
- ☐ 21 - 30 years
- ☐ > 30 years

THIS IS THE END OF THE SURVEY .
THANK YOU FOR YOUR TIME AND PARTICIPATION.

Appendix C3: Structured Questionnaire: Professional Network

EvaSys	Automobile innovative capability and sustainable competitive advantage. [Copy] [Copy] [Copy] [Copy]	Electric Paper

FACULTY OF ECONOMICS AND	Kopano Matsaseng	
BUSINESS SCHOOL	Online Self Administered Survey	
Dear Participant, thank you for your consent to	Use the scale below to indicate your level of	
The questionnaire is divided into 3 distinct	1 = Strongly Disagree; 2 = Disagree; 3 = Slightly	

Mark as shown: ☐ ☒ ☐ ☐ ☐ Please use a ball-point pen or a thin felt tip. This form will be processed automatically.

Correction: ☐ ■ ☐ ☒ ☐ Please follow the examples shown on the left hand side to help optimize the reading results.

1. The status of *product innovativeness* in the industry.

		1	2	3	4	5	6
1.1	The industry's new products and services are often perceived as very novel by customers.	☐	☐	☐	☐	☐	☐
1.2	The industry's innovation in connectivity is perceived as important to consumers.	☐	☐	☐	☐	☐	☐
1.3	The industry's innovation in safety is perceived as important by consumers.	☐	☐	☐	☐	☐	☐
1.4	The industry's innovation in fuel economy is perceived as important by consumers.	☐	☐	☐	☐	☐	☐

2. The status of *innovative edge* in the industry

		1	2	3	4	5	6
2.1	Consumers are willing to pay for innovation in any one of the areas listed in question 1.1 above.	☐	☐	☐	☐	☐	☐
2.2	In comparison to competitors, the industry has introduced more innovative products/services during the past five years.	☐	☐	☐	☐	☐	☐
2.3	In comparison to competitors, the industry's products/ services are generally more successful.	☐	☐	☐	☐	☐	☐
2.4	The industry's recent new products/services are significantly different from our previous products and services	☐	☐	☐	☐	☐	☐

3. The status of ICT *systems innovativeness* in the industry.

		1	2	3	4	5	6
3.1	The industry's ICT uses Enterprise Resources Planning (ERP) software to enhance production.	☐	☐	☐	☐	☐	☐
3.2	The industry's ICT uses Customer Relationship Management (CRM) software to enhance production.	☐	☐	☐	☐	☐	☐
3.3	The industry's ICT uses Computer Aided Design (CAD)/ Computer Aided Manufacturing (CAM) software to enhance production.	☐	☐	☐	☐	☐	☐
3.4	The industry's ICT uses Advance Scheduling software to enhance production.	☐	☐	☐	☐	☐	☐

4. The status of *product development innovativeness* in the industry

		1	2	3	4	5	6
4.1	The industry has hired a new product development managers in the last three years.	☐	☐	☐	☐	☐	☐
4.2	The product development managers are able to define a strategy for each product (recognize main competitors, set market segments and establish positioning and value proposition).	☐	☐	☐	☐	☐	☐
4.3	The industry's product manager can align product strategy with existing resources (e.g. budget, production capacity, quality and legal requirements).	☐	☐	☐	☐	☐	☐
4.4	The industry's product manager can translate product strategy into action plans.	☐	☐	☐	☐	☐	☐
4.5	The industry's product manager can ensure alignment between the product in development and the original product strategy.	☐	☐	☐	☐	☐	☐
4.6	The industry's product manager usually recommends modifications to products characteristics if necessary.	☐	☐	☐	☐	☐	☐
4.7	The industry's product manager ensures products get approval from the organisational internal panel.	☐	☐	☐	☐	☐	☐
4.8	The industry's product manager is able to forecast product's expectable demand.	☐	☐	☐	☐	☐	☐
4.9	The industry's product manager is able to track product's financial performance.	☐	☐	☐	☐	☐	☐
4.10	The industry's product manager is able to monitor product's lifecycle from concept to grave.	☐	☐	☐	☐	☐	☐

5. The status of environmental influences on innovativeness in the industry.

		1	2	3	4	5	6
5.1	The external linkages from local customers are important for product innovations (i.e., upgrades) in the industry.	☐	☐	☐	☐	☐	☐
5.2	The external linkages from local suppliers are important for product innovations (i.e., upgrades) in the industry.	☐	☐	☐	☐	☐	☐
5.3	The external linkages from MNC or JV customer located in my country are important for product innovations (i.e., upgrades) in the industry.	☐	☐	☐	☐	☐	☐
5.4	The external linkages from MNC or JV customer located in a foreign country are important for product innovations in the industry.	☐	☐	☐	☐	☐	☐
5.5	The external linkages from MNC or JV supplier located in my country are important for product innovations in the industry.	☐	☐	☐	☐	☐	☐

6. The status of market innovativeness in the industry.

		1	2	3	4	5	6
6.1	The industry has suitable offering in market place to expand its customer base for existing products.	☐	☐	☐	☐	☐	☐
6.2	The industry is able to identify customer's needs.	☐	☐	☐	☐	☐	☐
6.3	The industry understands the factors that influence consumer choice behaviour.	☐	☐	☐	☐	☐	☐
6.4	New products in any firm give thenm a competitive advantage against new competition.	☐	☐	☐	☐	☐	☐
6.5	The industry explores new approaches to conduct market research.	☐	☐	☐	☐	☐	☐
6.6	The industry's marketing & advertising campaigns are considered effective.	☐	☐	☐	☐	☐	☐
6.7	The industry is able to develop strong relationships with customers.	☐	☐	☐	☐	☐	☐

6. The status of market innovativeness in the industry. [Continue]

6.8	The industry has strong product marketing capabilities.	☐	☐	☐	☐	☐	☐
6.9	The industry has strong product technology capabilities.	☐	☐	☐	☐	☐	☐

7. The status of product marketing innovativeness in the industry.

		1	2	3	4	5	6
7.1	There are complementarities between product marketing capabilities and product technology capabilities.	☐	☐	☐	☐	☐	☐
7.2	The industry has hired new product marketing managers to enhance brand awareness.	☐	☐	☐	☐	☐	☐
7.3	The industry's product marketing managers have a market-learning capability that allows for foresight about future trends in the market place.	☐	☐	☐	☐	☐	☐
7.4	The industry's product marketing manager's marketing-learning capability guides the organisations' resource reconfiguration decisions.	☐	☐	☐	☐	☐	☐
7.5	The industry's product marketing manager's market learning capability fosters capability improvement through learning by doing in product development.	☐	☐	☐	☐	☐	☐
7.6	The industry's product marketing manager's market learning capability fosters capability improvement through learning by imitation in product development.	☐	☐	☐	☐	☐	☐

8. The status of process innovativeness in the industry.

		1	2	3	4	5	6
8.1	The industry focuses on smart business processes upgrading.	☐	☐	☐	☐	☐	☐
8.2	The industry has flexible production methods which can be changed efficiently.	☐	☐	☐	☐	☐	☐
8.3	In the past three years the industry has developed new suitable management approaches.	☐	☐	☐	☐	☐	☐
8.4	The industry uses internal knowledge in the development of new activities / processes.	☐	☐	☐	☐	☐	☐
8.5	The industry routinely engages in internal initiatives to identify new technologies.	☐	☐	☐	☐	☐	☐
8.6	The industry routinely engages in internal initiatives to develop new technologies.	☐	☐	☐	☐	☐	☐
8.7	The industry routinely explores technological advancement from outside.	☐	☐	☐	☐	☐	☐
8.8	The industry routinely adopts technological advancements from outside.	☐	☐	☐	☐	☐	☐
8.9	The industry routinely explores innovations by suppliers for adoption.	☐	☐	☐	☐	☐	☐

9. The status of knowledge management innovativeness in the industry.

		1	2	3	4	5	6
9.1	The industry has a knowledge sharing process through training and development to improve innovation.	☐	☐	☐	☐	☐	☐
9.2	The industry uses knowledge sharing process to engender trust to staff members to improve innovation.	☐	☐	☐	☐	☐	☐
9.3	The industry uses knowledge sharing process to motivate employees to be more innovative.	☐	☐	☐	☐	☐	☐

10. **The status of *behavioural innovativeness* in** the industry.

		1	2	3	4	5	6
10.1	Management is able to inspire everyone around a common purpose.	☐	☐	☐	☐	☐	☐
10.2	The industry is characterised by individuals with an ambition to get recognised.	☐	☐	☐	☐	☐	☐
10.3	The industry uses storytelling to motivate staff about acceptable innovative behaviour.	☐	☐	☐	☐	☐	☐
10.4	The industry has creative spaces where ideas can be openly shared.	☐	☐	☐	☐	☐	☐
10.5	The industry's leadership are roles model for innovative behaviour.	☐	☐	☐	☐	☐	☐
10.6	The industry has a structured process to approve new ideas for implementation.	☐	☐	☐	☐	☐	☐
10.7	During recruitment, the industry critically evaluates the ability to innovate.	☐	☐	☐	☐	☐	☐
10.8	In the industry, employees enjoy freedom to excel based on their capabilities, skills, and experiences.	☐	☐	☐	☐	☐	☐
10.9	Our organisation is characterised by innovative culture (i. e., commitment to foster innovation capacity) across all critical functional areas.	☐	☐	☐	☐	☐	☐
10.10	In the industry, innovative behaviour is rewarded during performance evaluation.	☐	☐	☐	☐	☐	☐

11. The status of strategic innovativeness in the industry.

		1	2	3	4	5	6
11.1	Each firm has a range of products to suit the choices of customers.	☐	☐	☐	☐	☐	☐
11.2	In this industry, senior management have strong abilities to simulate future market.	☐	☐	☐	☐	☐	☐
11.3	In this industry, senior management proactively seek strategic alliances for competitiveness.	☐	☐	☐	☐	☐	☐
11.4	The industry has promoted internal candidates to the role of CEO in past three years.	☐	☐	☐	☐	☐	☐
11.5	The industry's management is characterized by individuals with prior innovation-relevant experience from same industry.	☐	☐	☐	☐	☐	☐
11.6	The industry's management is characterized by individuals with prior innovation-relevant experience from self-employment.	☐	☐	☐	☐	☐	☐
11.7	The industry's management is characterized by individuals with prior innovation-relevant experience from research and development (R&D).	☐	☐	☐	☐	☐	☐
11.8	The industry's management is characterized by individuals with concrete innovation-relevant ideas from former occupation.	☐	☐	☐	☐	☐	☐

12. The status of resource heterogeneity in the industry.

	1	2	3	4	5	6
12.1 Each firm has access to a unique set of tangible resources not available to competitors.	☐	☐	☐	☐	☐	☐
12.2 Each firm has access to a unique set of intangible resources not available to competitors.	☐	☐	☐	☐	☐	☐
12.3 Some firms' spatial location of resources makes it difficult for their competitors to have access to them.	☐	☐	☐	☐	☐	☐
12.4 Some firm's resource base is limited in supply such that their competitors cannot expand on them anymore.	☐	☐	☐	☐	☐	☐
12.5 Some firm's resource base is quasi – limited in supply such that their competitors cannot expand on them rapidly.	☐	☐	☐	☐	☐	☐
12.6 Some firm's resource base is of superior efficiency such that their competitors are not able to match.	☐	☐	☐	☐	☐	☐
12.7 Some firm's resource base allows for better service to customers that their competitors are not able to meet.	☐	☐	☐	☐	☐	☐

13. The status of product differentiation in the industry.

	1	2	3	4	5	6
13.1 My organisations competitiveness is achievable through product differentiation that others cannot copy.	☐	☐	☐	☐	☐	☐
13.2 My organisations product differentiation is driven by the superior skills of our employees.	☐	☐	☐	☐	☐	☐
13.3 My organisation's product differentiation is driven the superior process and technologies in our company.	☐	☐	☐	☐	☐	☐
13.4 My organisations' product differentiation is driven by superior manufacturing standards set by management.	☐	☐	☐	☐	☐	☐
13.5 Our customers perceive our products as distinctively superior from our competitors.	☐	☐	☐	☐	☐	☐
13.6 Our suppliers perceive our products to offer higher profit margins than our competitors.	☐	☐	☐	☐	☐	☐
13.7	☐	☐	☐	☐	☐	☐

14. The status of imperfect mobility of resources in your organisation.

	1	2	3	4	5	6
14.1 Some firms have *access to resources that are specific to that firm's needs* – i.e., that cannot be applied anywhere else.	☐	☐	☐	☐	☐	☐
14.2 Some firms uses certain resources in conjunction with other different types of resources (i.e., unique combinations) to add more value.	☐	☐	☐	☐	☐	☐
14.3 Each firm has strategies to manage tacit knowledge (i.e., intellectual assets) that individual employees possess.	☐	☐	☐	☐	☐	☐

15. **The status of *ex post limits to competition* in the industry.**

	1	2	3	4	5	6
15.1 Firms have put in place *intellectual property rights* to limit competition.	☐	☐	☐	☐	☐	☐
15.2 Firms have *access to critical information that cannot be easily accessed* by their competitors.	☐	☐	☐	☐	☐	☐
15.3 Firms have *access to implicit knowledge that cannot be easily accessed* by their competitors.	☐	☐	☐	☐	☐	☐

15. The status of *ex post limits to competition* in the industry. [Continue]

		1	2	3	4	5	6
15.4	Each firm's *learning by doing* processes makes it difficult for competitors to imitate their methods.	☐	☐	☐	☐	☐	☐
15.5	Each firm's *previous investment* makes it difficult for competitors to imitate their methods.	☐	☐	☐	☐	☐	☐
15.6	Each firm has a *set of complex assets whose efficiency* cannot be imitated by competitors.	☐	☐	☐	☐	☐	☐
15.7	Each firms' products *are not easily substitutable* in the market of similar products.	☐	☐	☐	☐	☐	☐

16. The status of ex ante limits to competition in the industry.

		1	2	3	4	5	6
16.1	Each firm is able *to pre-empt the future direction of business.*	☐	☐	☐	☐	☐	☐
16.2	Firms use *a first mover approach* in the market.	☐	☐	☐	☐	☐	☐
16.3	Firms have the ability *to set new standards and norms in the industry.*	☐	☐	☐	☐	☐	☐
16.4	Firms *can quickly adapt a new strategy* in the event of crises.	☐	☐	☐	☐	☐	☐

THANK YOU. PLEASE CONTINUE BELOW.

17. GENDER

17.1 Choose one box only. ☐ Female ☐ Male ☐ *Other

17.2 *Other (please specify below):

18. AGE (Years)

18.1 Choose one box only. ☐ 20 - 30 ☐ 31 - 40 ☐ 41 - 50 ☐ 51 - 60 ☐ > 60

19. HIGHEST LEVEL OF EDUCATION OBTAINED

19.1 Choose one box only. ☐ Matric ☐ Post School Certificate ☐ Diploma ☐ Bachelors Degree ☐ Post Graduate Degree (Diploma) ☐ Masters Degree ☐ PhD / Doctorate

20. CURRENT BUSINESS UNIT

20.1 Choose one box only. ☐ Head Office ☐ Regional Office ☐ Marketing & Sales ☐ Business Operations ☐ Finance ☐ HRM&D ☐ Research & Development ☐ Assembly Plant ☐ *Other

20.2 *Other (please specify below):

21. JOB CATEGORY

21.1 Choose one box only. ☐ Senior Management ☐ Middle Management ☐ Supervisor or Junior Management ☐ Administrator or Support Services ☐ *Other

21.2 *Other (please specify below):

22. CURRENT POSITION

22.1 Choose one box only. ☐ CEO ☐ CFO ☐ Managing Director ☐ Marketing & Sales Manager ☐ Human Resource & Development Manager ☐ Product Developer or Designer ☐ Researcher ☐ Engineer ☐ *Other

22.2 *Other (please specify below):

23. EMPLOYMENT DURATION IN THE COMPANY (choose one)

23.1 Choose one box only. ☐ < 2 years ☐ 3 - 5 years ☐ 6 - 10 years ☐ 11 - 20 years ☐ 21 - 30 years ☐ > 30 years

THIS IS THE END OF THE SURVEY .
THANK YOU FOR YOUR TIME AND PARTICIPATION.

Appendix C4: Interview Questions for participants

Questionnaire number: ________ Date: ___/ ___/ 2022

Title: **The internal innovative capability and sustainable competitive advantage in the South African motor vehicle manufacturing industry**.

Introduction

Good day Mr. / Mrs. ___________. My name is Kopano Matsaseng and I am conducting an interview for my PhD thesis and would like your opinion on the subject.

Background

The motor vehicle manufacturing industry is important for the economy of South Africa. It contributes to the economy through employment, export earnings and production. However, the industry has been found to be less innovative and cost inefficient.

Hence, this study seeks to determine role of innovative capability in fostering sustainable competitive advantage in this industry.

Section 1: Innovative Capability

Innovative capability is defined as the ability of the company to develop new products, enter new markets, develop new processes, behavioral changes and new strategies using both internal and external strengths (Bhupendra and Sangle 2015:185).

Hence, the study seeks to understand innovative capability within a dynamic setting by asking the following questions:

Question 1: What role does innovation play in your company?

Question 2: What is your company's opinion about the regular introduction of innovative (i.e., unique, new and valuable) products in the market?

Question 3: In your opinion, is your company's current innovative products significantly different from previous ones? Please elaborate.

Question 4: What activities or tools are in place to make your company's marketing strategy innovative?

Question 5: What are the activities or instruments are in place that make your company's production, management and technological processes innovative in nature?

Question 6: What is your company approach in engendering an innovative culture across all levels of organization including individuals, teams and management?

Question 7: Which systems within the information, communication and technology (ICT), customer targeted strategies (i.e., Customer Relations Management) and engineering capabilities (i.e., Computer Aided Designs / Manufacturing) does your company employ to develop innovations?

Question 8: What skills and competencies does your product manager hold that allow the introduction, design and development of new products in your organization?

Question 9: What tools does your company employ to acquire and implement knowledge gained through local or external links to make you more innovative?

Question 10: Does your company have a product marketing manager with a solid appreciation of the market and its future trends? If yes, please elaborate. If not, why haven't you hired one?

Question 11: How does your company apply an inhouse acquired knowledge to develop innovative products?

End of questions on Innovative Capability.

Thank you for answering the above question. Please continue with the questions below.

Section 2: Sustainable Competitive Advantage

The following questions are based on Sustainable Competitive Advantage which refers to the firms' ability to create value from its unique intangible and tangible resources through coordination with the external environment (Kabue and Kilika 2016:98; Brahma and Chakraborty 2011:10; Maritan and Peteraf 2011:1378; and Piotr 2015:92).

Question 12: What role do resources (i.e., tangible and intangible) play in creating value in your organization?

Question 13: How would you differentiate your company's resources from its competitors? / What makes your company's resources uniquely different from competitors?

Question 14: What makes your resources superior to rivals in the creation of differentiated products?

Question 15: What makes the quality of your resources inimitable, and their usage is non-substitutable in the production process?

Question 16: What makes the type of resources your company has non-tradable in the market such that rival firms are not able to acquire them?

Question 17: How does your firm use its resources to maintain the superior position acquired as per above?

End of questions on Sustainable Competitive Advantage.

Thank you for answering the above questions. Please complete the last section below.

Section 3: General information about the company.

1. Please provide a brief description of your company's main business activity.

   ____

   ____

2. Is your company a sole enterprise or part of a group of companies?

   ____

3. How many people does your company employ?

   ____

4. Which figure from the list below bests approximates your company's annual turnover?
   a. More
   b. < R170 million
   c. < R50 million
   d. < R10 million
   e. Less

5. What is the average years of experience of your employees (team)?
    a. Less than 1 year
    b. 2 to 3 years
    c. 4 to 5 years
    d. 6 to 7 years
    e. More than 7 years

End of interview questions.

Thank you very much for your participation.

Appendix D: POPIA Compliant Consent Forms to participants

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

RESEARCH STUDY INFORMATION LEAFLET AND CONSENT FORM

DATE *27th June 2022*

TITLE OF THE RESEARCH PROJECT

Internal innovative capability and sustainable competitive advantage in the South African motor vehicle manufacturing industry.

PRINCIPLE INVESTIGATOR / RESEARCHER(S) NAME(S) AND CONTACT NUMBER(S):

Kopano Matsaseng *2015087543* *0827804558*

FACULTY AND DEPARTMENT:

Faculty of Economics and Management
Business School

STUDY LEADER(S) NAME AND CONTACT NUMBER:

Dr Prince Sarpong (051) 401 2451

Dr Johan Van Zyl (051) 507 3980

WHAT IS THE AIM / PURPOSE OF THE STUDY?

The primary objective of the study is to investigate how internal innovative capabilities can play a role in fostering sustainable competitive advantage in the South African motor vehicle manufacturing sector. The study will identify the internal ability of a firm to help improve its position in a rapid changing business environment.

WHO IS DOING THE RESEARCH?

Identify yourself and explain whom you work for and/or why you are doing the project.

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

This part of the study has NOT received approval from the Research Ethics Committee of UFS.

Approval number: *Insert approval number*

WHY ARE YOU INVITED TO TAKE PART IN THIS RESEARCH PROJECT?

205 Nelson Mandela Drive/Rylaan, Park West/Parkwes, Bloemfontein 9301, South Africa/Suid-Afrika
P.O. Box/Posbus 339, Bloemfontein 9300, South Africa/Suid-Afrika, T: +27(0)51 401 9111, www.ufs.ac.za

Your organization was chosen because it is an independent OEM in the automobile manufacturing industry. Hence, the survey targets owners, senior technical experts and professionals involved in the day-to-day operations of the assembly plant and any other strategic business units of independent automobile producers across the country. You have been chosen because of your expertise and knowledge about the information being requested. Your contacts details have been obtained from the company's public available information media.

WHAT IS THE NATURE OF PARTICIPATION IN THIS STUDY?

Your role is to kindly answer a number of interview questions to be best of your knowledge. The study involves a face-to face structured interview of 17 questions. The first part of the interview will focus on ten (10) questions about innovative capabilities within your organization. The last part of the interview will be about sustainable competitive advantage found in your organization and involves seven (7) questions. The interview will take one and half hours and the first part will take forty-five minutes while the last part will be completed in thirty minutes. The reminder of the time will be used for follow-up questions and for clarifying any difficult questions.

CAN THE PARTICIPANT WITHDRAW FROM THE STUDY?

Please note your participation is voluntary and that there is no penalty or loss of benefit for non-participation. Being in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You will not be forced to respond to the questionnaire if you do want to. However, once you consent to participate you may not withdraw from a research project at any time because the project involves the submission of non-identifiable material. You will not be able to withdraw once your answers have been submitted from the interview session.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

Please note that no compensation or reward is offered for your participation in the study. At no time will the name of your company or any of your staff be revealed. Information will be coded in order to ensure this and the only person who will have access to this information is the researcher, himself.

WHAT IS THE ANTICIPATED INCONVENIENCE OF TAKING PART IN THIS STUDY?

There is a possibility that participants will lose time during the interview session. To reduce these risk, the interview questions are concise and will be automated using EvaSys online survey software to give the participant an opportunity to complete the questions at their own convenience to ensure that time is not lost during completion. EvaSys is very user-friendly and securely hosted by the University ICT systems. An online face-to-face interviews will be conducted where the geographic distance from the researcher and interviewee is long or it is not possible to contact face-to-face interviews.

WILL WHAT I SAY BE KEPT CONFIDENTIAL?

The researcher will treat the information provided by participants with strict confidentiality and will maintain their anonymity by using numbered questionnaires and coded identifiers. For instance, *personal details will not be recorded anywhere and no one will be able to connect you to the answers you give. Your answers will be given a fictitious code number or a pseudonym and you will be referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings. Only the principal researcher, the study leader and the statistician will have access to the data. All of them are bounded by the ethics and confidentiality rules of the school. Your answers may be reviewed by people responsible for making sure that research is done properly, including the external transcriber and members of the Research Ethics Committee. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records. Your anonymous data may be used for other purposes, e.g. research report, journal articles, conference presentation, etc. The publications will use the information in such a way that individuals or the company information remain unidentifiable. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report. y in the data, any publications, or other research reporting methods such as conference proceedings.*

HOW WILL THE INFORMATION BE STORED AND ULTIMATELY DESTROYED?

Hard copies of your answers will be stored by the researcher for a period of five years in a locked filing cabinet at the researcher's primary residence for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. The documents will be shredded and any electronic material will be deleted from the researcher's computer.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICPATING IN THIS STUDY?

There will not be any payment or reward offered, financial or otherwise to participants in this study. You are not going to incur any costs for by the participating in this research.

HOW WILL THE PARTICIPANT BE INFORMED OF THE FINDINGS / RESULTS OF THE STUDY?

If you would like to be informed of the final research findings, please contact the principle researcher Kopano Matsaseng on 082 780 4558 or 2015087543@ufs4life.ac.za. The findings will be accessible from the university library once they have been approved. If you require any further information or want to contact the researcher about any aspect of this study, please contact the principle researcher on the above details. Any concerns about the way in which the research has been conducted, you may contact the research leader Dr Johan Van Zyl on 051 507 3980 or jvanzyl@cut.ac.za.

Thank you for taking the time to read this information sheet and for participating in this study.

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

CONSENT TO PARTICIPATE IN THIS STUDY

I, the undersigned,

____ (*participant's full names to be included*), (the "**Participant**")

confirm that I voluntarily agree to participate in the research study referred to as the

____ (the **"Study"**) in relation to

____

____

and which Study is being conducted by

____

(*insert the name of the researcher*), (the "**Researcher**").

I, the undersigned Participant, further confirm that–

1. the Researcher has explained the nature, procedure, potential benefits and anticipated inconvenience of my participation in the Study;
2. I have read (or had explained to me) and understood the Study as explained in the attached information sheet;
3. I have had sufficient opportunity to ask questions and am prepared to participate in the Study;
4. I understand that my participation in the Study is entirely voluntary and that I am free to withdraw at any time without penalty (if applicable);
5. I voluntarily provide the UFS and the Researcher with my personal information and consent to the UFS and the Researcher collecting, disclosing and processing my personal information in order to conduct the Study and any related activities in relation thereto;
6. I hereby acknowledge and confirm that I understand the purpose for which the UFS and the Researcher may collect, store, use, delete, destroy, outsource, transfer or otherwise process, as the context and circumstances may require and as contemplated in terms of POPIA, my personal information as set out herein;
7. I am aware that the findings of the Study will be anonymously processed into a research report, journal publications and/or conference proceedings and that my personal information will be aggregated and deidentified at such stage;
8. I also give the UFS permission to share, without notification, the collected data with other researchers at the UFS or other Higher Education Institutions. This permission is dependent on the same principles of ethical research practices, anonymity/confidentiality, safekeeping of information, and other issues listed above applying.

I, the Participant, agree to the recording of the interview questions.

Full Name of Participant: ____

Signature of Participant: ________________________________ Date: __________________

Full Name(s) of Researcher(s): Kopano Matsaseng

Signature of Researcher: kmatsaseng Date: 27th July 2022

Appendix E1: Invitation email to NAAMSA participants

UFS UV

Kopano Matsaseng <2015087543@ufs4life.ac.za>

Request for information

25 messages

Kopano Matsaseng <2015087543@ufs4life.ac.za> Mon, Jan 13, 2020 at 10:34 AM
To: gisela.sember@vwsa.co.za, ranch01@vwsa.co.za

Dear Mr Thomas Schaefer,

I am an economist in the National Statistics office in Pretoria and a PhD student in the Business School at the University of the Free State.
I am conducting a study on innovative capabilities within the seven OEMs in the passenger and light commercial production segment.

The research is important in the context of the SA economy as the sectors' contribution and foreign currency earnings have been falling over time. In addition, the sectors' dynamism serves as a basis of the level of technological and innovative advancements within component manufacturers and the industry as a whole.

Through our consultation with NAAMSA, we have been advised to start the recruitment process for survey participants by first conducting your office.

Accordingly, I would like to request your time and the contact details of relevant personnel in your company to complete the attached survey which is available online. Additional information is attached.

Once we have a full list of contact details (i.e., email addresses) of employees, a request to complete the survey will be sent.

Any issues of clarity regarding this study may be forwarded to me and my supervisor, Dr Johan Van Zyl on 051 507 3980 and at: jvanzyl@cut.ac.za.

Your assistance in this regard will be greatly appreciated.

Yours sincerely
Kopano Matsaseng
Ph.D. Candidate: Business School
Cell: 082 780 4558 / 076 430 7885
Alternative email: kmatsaseng@gmail.com

4 attachments

Questionnaire_Final_Kopano Matsaseng.pdf
514K

RequestforPermissiontoconductResearch-NAAMSA_NEW_KOPANO_signed.pdf
507K

Matsaseng_GHREC Ethics Approval_signed.pdf.pdf
215K

ParticipantConsentForm_Kopano MATSASENG.pdf
603K

Appendix E2: Invitation emails to NAACAM participants

Kopano Matsaseng <2015087543@ufs4life.ac.za>

Invitation to participate in a PhD research survey

Kopano Matsaseng <2015087543@ufs4life.ac.za> Thu, Jul 22, 2021 at 2:50 PM
To: darren.hayes-powell@goodyear.com

Dear Participant

I am an economist in the National Statistics office in Pretoria and a PhD student in the Business School at the University of the Free State.

My PhD study examines the link between innovative capabilities and competitiveness in the automobile manufacturing sector in South Africa.

The research is important in the context of the SA economy as the sectors' contribution and foreign currency earnings have been falling over time. In addition, the sectors' dynamism serves as a basis of the level of technological and innovative advancements within component manufacturers and the industry as a whole.

Accordingly, your company was chosen because it is a major player in the automotive manufacturing industry and would be a good candidate in providing the information we are looking for. Your participation in the survey is of utmost importance to ensure that, not only is my PhD successful, but also to make a contribution towards the motor industry and the innovativeness in the industry. After the study is done, and you are interested in the final overall results, I can make it available to you.

Our survey will take 10 - 15 minutes and requires just a click to answer the majority of the questions.
Here is a link to the online questionnaire: https://surveys.ufs.ac.za/evasys/online.php?p=HFM4Q

Kindly forward the link to the rest of your personnel who might be in a position to complete the questionnaire.

Please note that participation in this study is voluntary and all information required will be kept confidential and anonymised. An approval letter for conducting this survey from the University of Free State Research Ethics Committee is attached below.

All issues of clarity regarding this study may be forwarded to me and my supervisor, Dr Johan Van Zyl on 051 507 3980 and at: jvanzyl@cut.ac.za

Your assistance in this regard is greatly appreciated.

Kopano Matsaseng
Ph.D. Candidate: Business School
Cell: 082 780 4558 / 076 430 7885
Alternative email: kopano@mbatutor.co.za

Matsaseng_2019-0350_GHREC Amendment Approved_Signed.pdf.pdf
98K

Appendix E3: Invitation message to Professional network of participants

Dear Friend, I am conducting a survey on innovations and competitiveness in the motoring industry. Kindly assist me with completing this 10-minute survey.
https://surveys.ufs.ac.za/evasys/online.php?p=EH65D

Best regards Kopano

evasys

Survey Distribution_General

Appendix E4: Invitation email to seek participants for interviews

UFS
UV

Kopano Matsaseng <2015087543@ufs4life.ac.za>

Request for permission
14 messages

Kopano Matsaseng <2015087543@ufs4life.ac.za> Wed, Aug 10, 2022 at 2:59 PM
To: admin@greenscooterza.com
Cc: "jvanzyl@cut.ac.za" <jvanzyl@cut.ac.za>

Dear Administrator

The above matter refers.

I am a PhD student at the University of Free State Business School and would like to request permission to conduct research at your company. My study leader is Dr Johan Van Zyl cc'd above.

The purpose of the study is to investigate the role of innovative capabilities within automobile manufacturing firms in bringing about sustainable competitive advantage.

Accordingly, your company was selected because it is an independent local automobile manufacturer and is a relevant unit of study for this research.

The research questions are attached to this email as well as an ethical approval from the University to conduct the study.

Kindly let us know whom we can get in touch with regarding the permission to conduct the study and their contact details.

Best regards

Kopano Matsaseng
Ph.D. Candidate: Business School
Cell: 082 780 4558 / 076 430 7885
Alternative email: kopano@mbatutor.co.za

2 attachments

2019-0350_GHREC Amendment Approved_Signed.pdf.pdf
98K

Interview questions_extended.pdf
122K

Appendix F: Summary of Results from Data Collection (EvaSys)

Display Surveys

Motor vehicle manuf | ALL, Matsaseng | ALL, S2/22, 2022, S2/21, SS/21 | ALL, InnovSus, InnovSus1, InnovSus2, InnovSus3

Additional filters 1&2: ALL / ALL

Show

No. of Surveys: 18

Motor vehicle manufacturing innovation survey: Matsaseng

Type	Name	Status	# Forms	Processed	Form	Report	Export	Actions
S2/22								
	Survey Distribution_AutomobileManufacturing	In Progress	000 -- %		InnovSus6	Show PSWDs		
	Survey Distribution_AutomobileManufacturing	Data available	003 -- %	30.11.2022	Quali_method2			
	Survey Distribution_AutomobileManufacturing	In Progress	000 -- %		Quali_method	Show PSWDs		
	Survey Distribution_AutomobileManufacturing	In Progress	000 -- %		Quali_method1	Password: 124F3		
2022								
	Survey Distribution_AutomobileManufacturing	In Progress	000 -- %		InnovSus6	Password: VMZC8		
	Survey Distribution_AutomobileManufacturing	In Progress	000 -- %		Quali_method3	Password: XK32T		
	Survey Distribution_AutomobileManufacturing	In Progress	000 -- %		InnovSus7	Password: 3EDXG		
S2/21								
	Survey Distribution_AutomobileManufacturing	Data available	002 -- %	01.02.2021	MotoringJournalits1			
	Survey Distribution_General (General)	Data available	037 -- %	19.10.2022	InnovSus5			
	Survey Distribution_General (General)	Data available	009 -- %	27.10.2021	NAACAMTier1Suppliers2			
SS/21								
	Survey Distribution_AutomobileManufacturing	In Progress	000 -- %		NAACAMTier1Suppliers	Password: AP5X3		
	Survey Distribution_AutomobileManufacturing	In Progress	000 -- %		MotoringJournalits1	Details		
S1/20								
	Survey Administration	In Progress	000 -- %		InnovSus1	Password: 88K96		
	Survey Distribution	Data available	001 -- %	05.03.2020	InnovSus2			
	Survey Distribution	In Progress	000 -- %		InnovSus3	Password: EKNG2		
	Survey Distribution	In Progress	000 -- %		InnovSus4	Password: 4AADG		
SS/20								
	Survey Distribution_General (General)	Data available	006 -- %	17.11.2020	MotoringJournalits			

SS/19

Type	Name	Status	# Forms	Processed	Form	Report	Export	Actions
	Survey Distribution_General (General)	Data available	004 67 %	11.02.2020	InnovSus			

Back

Appendix G: The timeline of Covid-19 lockdown restrictions in South Africa

The National State of Disaster was lifted on 5 April 2022.

Adjusted alert level 1 was in place from 1 October 2021 to 4 April 2022.

Adjusted alert level 2 was in place from 13 to 30 September 2021.

Adjusted alert level 3 was in place from 26 July to 12 September 2021.

Adjusted alert level 4 was in place from 28 June to 25 July 2021.

Adjusted alert level 3 was in place from 16 June 2021 to 27 June 2021.

Adjusted alert level 2 was in place from 31 May to 15 June 2021.

Adjusted alert level 1 was in place from 1 March 2021 to 30 May 2021.

Adjusted alert level 3 was in place from 29 December 2020 until 28 February 2021.

Alert level 1 was in effect from 21 September to 28 December 2020.

Alert level 2 was in effect from 18 August to 20 September 2020.

Alert level 3 was in effect from 1 June to 17 August 2020.

Alert level 4 was in effect from 1 to 31 May 2020.

Alert level 5 was in effect from midnight 26 March to 30 April 2020.

Source: Alert system from www.gov.za

Appendix H: An overview of non-response from NAAMSA members

OEM – 1

Date	Correspondence type	Feedback
13th Jan 2020	Email	Requested clarity
28th Jan 2020	Email	Promised to assist
14th Feb 2020	Email	Distributed the questionnaire

OEM – 2

Date	Correspondence type	Feedback
13th Jan 2020	Email	Refused
28th Jan 2020	Email	Refused
14th Feb 2020	Email	Refusal and not interested

OEM – 3

Date	Correspondence type	Feedback
13th Jan 2020	Email	Requested clarity
28th Jan 2020	Email	Promised to assist
14th Feb 2020	Email	Contact person allocated
25th Mar 2020	Email	Lockdown restrictions

OEM – 4

Date	Correspondence type	Feedback
13th Jan 2020	Email	Promised to assist

28th Jan 2020	Email	Contact persons allocated
14th Feb 2020	Email	No response
25th Mar 20202	Email	Lockdown restrictions

OEM – 5

Date	**Correspondence type**	**Feedback**
13th Jan 2020	Email	Promised to assist
28th Jan 2020	Email	Promised to assist
14th Feb 2020	Email	Contact person allocated
25th Mar 2020	Email	Lockdown restrictions

OEM – 6

Date	**Correspondence type**	**Feedback**
13th Jan 2020	Email	No response
28th Jan 2020	Email	Promised to assist
14th Feb 2020	Email	Promised to assist
25th Mar 2020	Email	Lockdown restrictions

OEM – 7

Date	Correspondence type	Feedback
13th Jan 2020	Email	No response
28th Jan 2020	Email	Promised to assist
14th Feb 2020	Email	Promised to assist

25th Mar 2020	Email	Refusal i.e., company policy

Appendix I: Email correspondences

Response from HSRC on the risk exposure of participants in the Innovation Survey.

UFS UV

Kopano Matsaseng <2015087543@ufs4life.ac.za>

Data Request_Motor vehicle manufacturing

Yasser Buchana <YBuchana@hsrc.ac.za> Thu, Dec 2, 2021 at 12:28 PM
To: Kopano Matsaseng <2015087543@ufs4life.ac.za>
Cc: DataHelp <datahelp@hsrc.ac.za>, "Moses M. Sithole" <MSithole@hsrc.ac.za>, "TAMokele@hsrc.ax.za" <TAMokele@hsrc.ax.za>, "jvanzyl@cut.ac.za" <jvanzyl@cut.ac.za>, Nazeem Mustapha <NMustapha@hsrc.ac.za>

Dear Kopano,

Our data team have studied your request and have informed me that,

The data requested is at 3 digit SIC (381: manufacture of motor vehicles) which is too specific. A quick look through the 2014-2016 BIS data, for this SIC there are only 4 firms. (I don't think this may be enough for your analysis)

Our data team has also checked at 2 digit SIC (the manufacture of transport equipment), there are only 18 units/firms

Unfortunately due to the specificity of your request, this may create a problem where the confidentiality and anonymity of our respondent may be compromised at 3 digits SIC.

At 2 digits, we would have to consult the rest of our data committee.

Thank you for your time,

Regards,

Dr. Yasser Buchana,

Senior Research Specialist,

Agri-BIS Project Lead/Manager

Chairperson of Data Committee

Center for Science, Technology and Innovation Indicators (CeSTII)

HUMAN SCIENCES RESEARCH COUNCIL (HSRC)

Merchant House, 4th floor, 116 – 118 Buitengracht Street, Cape Town

Private Bag X9182, Cape Town, 8001

E: ybuchana@hsrc.ac.za
T: +27 21 422 7840

Appendix J: Descriptive Statistics on Sustainable Competitive Advantage

Each firm has access to a unique set of tangible resources not available to competitors.

		Frequency	Percent	Valid Percent	Cumulative Percent
Resource Heterogeneity 1	Strongly Disagree	3	9,7	9,7	9,7
	Disagree	4	12,9	12,9	22,6
	Slightly Disagree	4	12,9	12,9	35,5
	Slightly Agree	8	25,8	25,8	61,3
	Agree	9	29,0	29,0	90,3
	Strongly Agree	3	9,7	9,7	100,0
	Total	31	100,0	100,0	

Each firm has access to a unique set of intangible resources not available to competitors.

		Frequency	Percent	Valid Percent	Cumulative Percent
Resource Heterogeneity 2	Strongly Disagree	4	12,9	12,9	12,9
	Disagree	3	9,7	9,7	22,6
	Slightly Disagree	5	16,1	16,1	38,7
	Slightly Agree	7	22,6	22,6	61,3
	Agree	10	32,3	32,3	93,5
	Strongly Agree	2	6,5	6,5	100,0
	Total	31	100,0	100,0	

Some firms' spatial location of resources makes it difficult for their competitors to have access to them.

		Frequency	Percent	Valid Percent	Cumulative Percent
Resource Heterogeneity 3	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	4	12,9	12,9	16,1
	Slightly Disagree	6	19,4	19,4	35,5
	Slightly Agree	7	22,6	22,6	58,1
	Agree	11	35,5	35,5	93,5
	Strongly Agree	2	6,5	6,5	100,0

		Frequency	Percent	Valid Percent	Cumulative Percent
	Total	31	100,0	100,0	

Some firm's resource base is limited in supply such that their competitors cannot expand on them anymore.

		Frequency	Percent	Valid Percent	Cumulative Percent
Resource Heterogeneity 4	Strongly Disagree	2	6,5	6,5	6,5
	Disagree	3	9,7	9,7	16,1
	Slightly Disagree	5	16,1	16,1	32,3
	Slightly Agree	9	29,0	29,0	61,3
	Agree	7	22,6	22,6	83,9
	Strongly Agree	5	16,1	16,1	100,0
	Total	31	100,0	100,0	

Some firm's resource base is quasi - limited in supply such that their competitors cannot expand on them rapidly.

		Frequency	Percent	Valid Percent	Cumulative Percent
Resource Heterogeneity 5	Strongly Disagree	2	6,5	6,5	6,5
	Disagree	2	6,5	6,5	12,9
	Slightly Disagree	3	9,7	9,7	22,6
	Slightly Agree	10	32,3	32,3	54,8
	Agree	10	32,3	32,3	87,1
	Strongly Agree	4	12,9	12,9	100,0
	Total	31	100,0	100,0	

Some firm's resource base is of superior efficiency such that their competitors are not able to match.

		Frequency	Percent	Valid Percent	Cumulative Percent
Resource Heterogeneity 6	Strongly Disagree	1	3,2	3,2	3,2
	Slightly Disagree	3	9,7	9,7	12,9
	Slightly Agree	5	16,1	16,1	29,0
	Agree	14	45,2	45,2	74,2
	Strongly Agree	8	25,8	25,8	100,0
	Total	31	100,0	100,0	

Some firm's resource base allows for better service to customers that their competitors are not able to meet.

		Frequency	Percent	Valid Percent	Cumulative Percent
Resource Heterogeneity 7	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	1	3,2	3,2	6,5
	Slightly Disagree	2	6,5	6,5	12,9
	Slightly Agree	8	25,8	25,8	38,7
	Agree	14	45,2	45,2	83,9
	Strongly Agree	5	16,1	16,1	100,0
	Total	31	100,0	100,0	

Some firm's competitiveness is achievable through product differentiation that others cannot copy.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Differentiation 1	Disagree	2	6,5	6,5	6,5
	Slightly Disagree	3	9,7	9,7	16,1
	Slightly Agree	8	25,8	25,8	41,9
	Agree	10	32,3	32,3	74,2
	Strongly Agree	8	25,8	25,8	100,0
	Total	31	100,0	100,0	

The firm's product differentiation is driven by the superior skills of our employees.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Differentiation 2	Disagree	3	9,7	9,7	9,7
	Slightly Disagree	5	16,1	16,1	25,8
	Slightly Agree	5	16,1	16,1	41,9
	Agree	13	41,9	41,9	83,9
	Strongly Agree	5	16,1	16,1	100,0
	Total	31	100,0	100,0	

The firm's product differentiation is driven the superior process and technologies in our company.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Product Differentiation 3	Disagree	2	6,5	6,5	6,5
	Slightly Disagree	2	6,5	6,5	12,9
	Slightly Agree	6	19,4	19,4	32,3
	Agree	16	51,6	51,6	83,9
	Strongly Agree	5	16,1	16,1	100,0
	Total	31	100,0	100,0	

The firm's product differentiation is driven by superior manufacturing standards set by management.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Product Differentiation 4	Strongly Disagree	2	6,5	6,5	6,5
	Slightly Disagree	5	16,1	16,1	22,6
	Slightly Agree	6	19,4	19,4	41,9
	Agree	8	25,8	25,8	67,7
	Strongly Agree	10	32,3	32,3	100,0
	Total	31	100,0	100,0	

Customers perceive firm's products as distinctively superior from competitors.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Product Differentiation 5	Strongly Disagree	2	6,5	6,5	6,5
	Slightly Disagree	5	16,1	16,1	22,6
	Slightly Agree	8	25,8	25,8	48,4
	Agree	9	29,0	29,0	77,4
	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

Suppliers perceive firms' products to offer higher profit margins than competitors.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Differentiation 6	Disagree	3	9,7	10,0	10,0
	Slightly Disagree	3	9,7	10,0	20,0
	Slightly Agree	6	19,4	20,0	40,0
	Agree	12	38,7	40,0	80,0
	Strongly Agree	6	19,4	20,0	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

Some firms have access to resources that are specific to that firm's needs i.e., that cannot be applied anywhere else.

		Frequency	Percent	Valid Percent	Cumulative Percent
Immobility of Resources 1	Strongly Disagree	2	6,5	6,7	6,7
	Disagree	3	9,7	10,0	16,7
	Slightly Disagree	1	3,2	3,3	20,0
	Slightly Agree	9	29,0	30,0	50,0
	Agree	7	22,6	23,3	73,3
	Strongly Agree	8	25,8	26,7	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

Some firms uses certain resources in conjunction with other different types of resources (i.e., unique combinations) to add more value.

		Frequency	Percent	Valid Percent	Cumulative Percent
Immobility of Resources 2	Strongly Disagree	2	6,5	6,5	6,5
	Slightly Disagree	1	3,2	3,2	9,7
	Slightly Agree	11	35,5	35,5	45,2
	Agree	9	29,0	29,0	74,2
	Strongly Agree	8	25,8	25,8	100,0
	Total	31	100,0	100,0	

Each firm has strategies to manage tacit knowledge (i.e., intellectual assets) that individual employees possess.

		Frequency	Percent	Valid Percent	Cumulative Percent
Immobility of Resources 3	Strongly Disagree	1	3,2	3,2	3,2
	Slightly Disagree	1	3,2	3,2	6,5
	Slightly Agree	11	35,5	35,5	41,9
	Agree	10	32,3	32,3	74,2
	Strongly Agree	8	25,8	25,8	100,0
	Total	31	100,0	100,0	

Firms have put in place intellectual property rights to limit competition.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex post Limits to Competition 1	Slightly Disagree	2	6,5	6,5	6,5
	Slightly Agree	5	16,1	16,1	22,6
	Agree	10	32,3	32,3	54,8
	Strongly Agree	14	45,2	45,2	100,0
	Total	31	100,0	100,0	

Firms have access to critical information that cannot be easily accessed by their competitors.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex post Limits to Competition 2	Slightly Disagree	3	9,7	9,7	9,7
	Slightly Agree	5	16,1	16,1	25,8
	Agree	11	35,5	35,5	61,3
	Strongly Agree	12	38,7	38,7	100,0
	Total	31	100,0	100,0	

Firms have access to implicit knowledge that cannot be easily accessed by their competitors.

		Frequency	Percent	Valid Percent	Cumulative Percent
	Disagree	1	3,2	3,2	3,2

Ex post Limits to Competition 3	Slightly Disagree	3	9,7	9,7	12,9
	Slightly Agree	7	22,6	22,6	35,5
	Agree	10	32,3	32,3	67,7
	Strongly Agree	10	32,3	32,3	100,0
	Total	31	100,0	100,0	

Each firm's learning by doing processes makes it difficult for competitors to imitate their methods.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex post Limits to Competition 4	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	5	16,1	16,1	19,4
	Slightly Agree	7	22,6	22,6	41,9
	Agree	9	29,0	29,0	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

Each firm's previous investment makes it difficult for competitors to imitate their methods.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex post Limits to Competition 5	Disagree	2	6,5	6,5	6,5
	Slightly Disagree	3	9,7	9,7	16,1
	Slightly Agree	7	22,6	22,6	38,7
	Agree	9	29,0	29,0	67,7
	Strongly Agree	10	32,3	32,3	100,0
	Total	31	100,0	100,0	

Each firm has a set of complex assets whose efficiency cannot be imitated by competitors.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex post Limits to Competition 6	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	3	9,7	9,7	12,9
	Slightly Disagree	2	6,5	6,5	19,4

	Slightly Agree	4	12,9	12,9	32,3
	Agree	12	38,7	38,7	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

Each firm's products are not easily substitutable in the market of similar products.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex post Limits to Competition 7	Strongly Disagree	1	3,2	3,3	3,3
	Disagree	4	12,9	13,3	16,7
	Slightly Disagree	1	3,2	3,3	20,0
	Slightly Agree	9	29,0	30,0	50,0
	Agree	7	22,6	23,3	73,3
	Strongly Agree	8	25,8	26,7	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

Each firm is able to pre-empt the future direction of business.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex-ante Limits to Competition 1	Strongly Disagree	1	3,2	3,3	3,3
	Disagree	2	6,5	6,7	10,0
	Slightly Disagree	4	12,9	13,3	23,3
	Slightly Agree	7	22,6	23,3	46,7
	Agree	8	25,8	26,7	73,3
	Strongly Agree	8	25,8	26,7	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

Firms use a first mover approach in the market.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex-ante Limits to Competition 2	Disagree	2	6,5	6,7	6,7
	Slightly Disagree	3	9,7	10,0	16,7

	Slightly Agree	5	16,1	16,7	33,3
	Agree	10	32,3	33,3	66,7
	Strongly Agree	10	32,3	33,3	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

Firms have the ability to set new standards and norms in the industry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex-ante Limits to Competition 3	Strongly Disagree	1	3,2	3,2	3,2
	Slightly Disagree	2	6,5	6,5	9,7
	Slightly Agree	4	12,9	12,9	22,6
	Agree	18	58,1	58,1	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

Firms can quickly adapt a new strategy in the event of crises.

		Frequency	Percent	Valid Percent	Cumulative Percent
Ex-ante Limits to Competition 4	Strongly Disagree	2	6,5	6,5	6,5
	Disagree	2	6,5	6,5	12,9
	Slightly Disagree	3	9,7	9,7	22,6
	Slightly Agree	9	29,0	29,0	51,6
	Agree	8	25,8	25,8	77,4
	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

Appendix K: Descriptive Statistics on Innovative Capability

The industry's new products and services are often perceived as very novel by customers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Innovativeness 1	Slightly Disagree	3	9,7	9,7	9,7
	Slightly Agree	10	32,3	32,3	41,9
	Agree	11	35,5	35,5	77,4
	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

The industry's innovation in connectivity is perceived as important to consumers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Innovativeness 2	Slightly Disagree	3	9,7	9,7	9,7
	Slightly Agree	2	6,5	6,5	16,1
	Agree	17	54,8	54,8	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

The industry's innovation in safety is perceived as important by consumers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Innovativeness 3	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	2	6,5	6,5	9,7
	Slightly Disagree	2	6,5	6,5	16,1
	Slightly Agree	3	9,7	9,7	25,8
	Agree	11	35,5	35,5	61,3
	Strongly Agree	12	38,7	38,7	100,0
	Total	31	100,0	100,0	

The industry's innovation in fuel economy is perceived as important by consumers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Innovativeness 4	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	2	6,5	6,5	9,7
	Slightly Agree	5	16,1	16,1	25,8

	Agree	9	29,0	29,0	54,8
	Strongly Agree	14	45,2	45,2	100,0
	Total	31	100,0	100,0	

Consumers are willing to pay for innovation in any one of the areas listed in question 1.1 above.

		Frequency	Percent	Valid Percent	Cumulative Percent
Innovative Edge 1	Disagree	1	3,2	3,3	3,3
	Slightly Disagree	4	12,9	13,3	16,7
	Slightly Agree	7	22,6	23,3	40,0
	Agree	7	22,6	23,3	63,3
	Strongly Agree	11	35,5	36,7	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

In comparison to competitors, the industry has introduced more innovative products/services during the past five years.

		Frequency	Percent	Valid Percent	Cumulative Percent
Innovative Edge 2	Disagree	2	6,5	6,5	6,5
	Slightly Disagree	4	12,9	12,9	19,4
	Slightly Agree	7	22,6	22,6	41,9
	Agree	9	29,0	29,0	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

In comparison to competitors, the industry's products/services are generally more successful.

		Frequency	Percent	Valid Percent	Cumulative Percent
Innovative Edge 3	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	1	3,2	3,2	6,5
	Slightly Disagree	2	6,5	6,5	12,9
	Slightly Agree	7	22,6	22,6	35,5
	Agree	14	45,2	45,2	80,6

	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The industry's recent new products/services are significantly different from our previous products and services

		Frequency	Percent	Valid Percent	Cumulative Percent
Innovative Edge 4	Disagree	2	6,5	6,5	6,5
	Slightly Disagree	6	19,4	19,4	25,8
	Slightly Agree	4	12,9	12,9	38,7
	Agree	11	35,5	35,5	74,2
	Strongly Agree	8	25,8	25,8	100,0
	Total	31	100,0	100,0	

The industry's ICT uses Enterprise Resources Planning (ERP) software to enhance production.

		Frequency	Percent	Valid Percent	Cumulative Percent
Systems Innovativeness 1	Slightly Disagree	3	9,7	9,7	9,7
	Slightly Agree	3	9,7	9,7	19,4
	Agree	8	25,8	25,8	45,2
	Strongly Agree	17	54,8	54,8	100,0
	Total	31	100,0	100,0	

The industry's ICT uses Customer Relationship Management (CRM) software to enhance production.

		Frequency	Percent	Valid Percent	Cumulative Percent
Systems Innovativeness 2	Slightly Agree	7	22,6	22,6	22,6
	Agree	9	29,0	29,0	51,6
	Strongly Agree	15	48,4	48,4	100,0
	Total	31	100,0	100,0	

The industry's ICT uses Computer Aided Design (CAD)/ Computer Aided Manufacturing (CAM) software to enhance production.

		Frequency	Percent	Valid Percent	Cumulative Percent

Systems Innovativeness 3	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	1	3,2	3,2	6,5
	Slightly Disagree	3	9,7	9,7	16,1
	Slightly Agree	5	16,1	16,1	32,3
	Agree	4	12,9	12,9	45,2
	Strongly Agree	17	54,8	54,8	100,0
	Total	31	100,0	100,0	

The industry's ICT uses Advance Scheduling software to enhance production.

		Frequency	Percent	Valid Percent	Cumulative Percent
Systems Innovativeness 4	Strongly Disagree	1	3,2	3,2	3,2
	Slightly Disagree	3	9,7	9,7	12,9
	Slightly Agree	2	6,5	6,5	19,4
	Agree	11	35,5	35,5	54,8
	Strongly Agree	14	45,2	45,2	100,0
	Total	31	100,0	100,0	

The industry has hired a new product development managers in the last three years.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Development Innovativeness 1	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	5	16,1	16,1	19,4
	Slightly Agree	9	29,0	29,0	48,4
	Agree	10	32,3	32,3	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The product development managers are able to define a strategy for each product (recognize main competitors, set market segments and establish positioning and value proposition).

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	1	3,2	3,2	3,2

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Development Innovativeness 2	Disagree	1	3,2	3,2	6,5
	Slightly Disagree	2	6,5	6,5	12,9
	Slightly Agree	10	32,3	32,3	45,2
	Agree	9	29,0	29,0	74,2
	Strongly Agree	8	25,8	25,8	100,0
	Total	31	100,0	100,0	

The industry's product manager can align product strategy with existing resources (e.g. budget, production capacity, quality and legal requirements).

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Development Innovativeness 3	Slightly Disagree	4	12,9	12,9	12,9
	Slightly Agree	6	19,4	19,4	32,3
	Agree	13	41,9	41,9	74,2
	Strongly Agree	8	25,8	25,8	100,0
	Total	31	100,0	100,0	

The industry's product manager can translate product strategy into action plans.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Development Innovativeness 4	Slightly Disagree	3	9,7	9,7	9,7
	Slightly Agree	6	19,4	19,4	29,0
	Agree	13	41,9	41,9	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

The industry's product manager can ensure alignment between the product in development and the original product strategy.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Development Innovativeness 5	Slightly Disagree	1	3,2	3,2	3,2
	Slightly Agree	7	22,6	22,6	25,8
	Agree	17	54,8	54,8	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The industry's product manager usually recommends modifications to products characteristics if necessary.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Development Innovativeness 6	Strongly Disagree	1	3,2	3,3	3,3
	Slightly Disagree	4	12,9	13,3	16,7
	Slightly Agree	5	16,1	16,7	33,3
	Agree	12	38,7	40,0	73,3
	Strongly Agree	8	25,8	26,7	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

The industry's product manager ensures products get approval from the organisational internal panel.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Development Innovativeness 7	Slightly Disagree	2	6,5	6,5	6,5
	Slightly Agree	6	19,4	19,4	25,8
	Agree	8	25,8	25,8	51,6
	Strongly Agree	15	48,4	48,4	100,0
	Total	31	100,0	100,0	

The industry's product manager is able to forecast product's expectable demand.

		Frequency	Percent	Valid Percent	Cumulative Percent
	Slightly Disagree	3	9,7	9,7	9,7
	Slightly Agree	5	16,1	16,1	25,8

Product Development Innovativeness 8	Agree	11	35,5	35,5	61,3
	Strongly Agree	12	38,7	38,7	100,0
	Total	31	100,0	100,0	

The industry's product manager is able to track product's financial performance.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Development Innovativeness 9	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	1	3,2	3,2	6,5
	Slightly Disagree	1	3,2	3,2	9,7
	Slightly Agree	9	29,0	29,0	38,7
	Agree	10	32,3	32,3	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

The industry's product manager is able to monitor product's lifecycle from concept to grave.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Development Innovativeness 10	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	2	6,5	6,5	9,7
	Slightly Disagree	4	12,9	12,9	22,6
	Slightly Agree	4	12,9	12,9	35,5
	Agree	9	29,0	29,0	64,5
	Strongly Agree	11	35,5	35,5	100,0
	Total	31	100,0	100,0	

The external linkages from local customers are important for product innovations (i.e., upgrades) in the industry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Environmental Influences' Innovativeness 1	Strongly Disagree	1	3,2	3,2	3,2
	Slightly Disagree	2	6,5	6,5	9,7
	Slightly Agree	5	16,1	16,1	25,8
	Agree	13	41,9	41,9	67,7
	Strongly Agree	10	32,3	32,3	100,0

	Total	31	100,0	100,0	

The external linkages from local suppliers are important for product innovations (i.e., upgrades) in the industry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Environmental Influences' Innovativeness 2	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	1	3,2	3,2	6,5
	Slightly Disagree	2	6,5	6,5	12,9
	Slightly Agree	8	25,8	25,8	38,7
	Agree	10	32,3	32,3	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

The external linkages from MNC or JV customer located in my country are important for product innovations (i.e., upgrades) in the industry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Environmental Influences' Innovativeness 3	Strongly Disagree	2	6,5	6,5	6,5
	Disagree	1	3,2	3,2	9,7
	Slightly Disagree	4	12,9	12,9	22,6
	Slightly Agree	7	22,6	22,6	45,2
	Agree	11	35,5	35,5	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The external linkages from MNC or JV customer located in a foreign country are important for product innovations in the industry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Environmental Influences' Innovativeness 4	Strongly Disagree	2	6,5	6,5	6,5
	Slightly Disagree	6	19,4	19,4	25,8
	Slightly Agree	2	6,5	6,5	32,3
	Agree	14	45,2	45,2	77,4

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

The external linkages from MNC or JV supplier located in my country are important for product innovations in the industry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Environmental Influences' Innovativeness 5	Strongly Disagree	3	9,7	9,7	9,7
	Slightly Disagree	4	12,9	12,9	22,6
	Slightly Agree	3	9,7	9,7	32,3
	Agree	12	38,7	38,7	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

The industry has suitable offering in market place to expand its customer base for existing products.

		Frequency	Percent	Valid Percent	Cumulative Percent
Market Innovativeness 1	Slightly Agree	10	32,3	32,3	32,3
	Agree	14	45,2	45,2	77,4
	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

The industry is able to identify customer’s needs.

		Frequency	Percent	Valid Percent	Cumulative Percent
Market Innovativeness 2	Disagree	1	3,2	3,2	3,2
	Slightly Agree	4	12,9	12,9	16,1
	Agree	19	61,3	61,3	77,4
	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

The industry understands the factors that influence consumer choice behaviour.

		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly Disagree	1	3,2	3,3	3,3

Market Innovativeness 3	Slightly Disagree	2	6,5	6,7	10,0
	Slightly Agree	4	12,9	13,3	23,3
	Agree	13	41,9	43,3	66,7
	Strongly Agree	10	32,3	33,3	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

New products in any firm give them a competitive advantage against new competition.

		Frequency	Percent	Valid Percent	Cumulative Percent
Market Innovativeness 4	Slightly Disagree	3	9,7	9,7	9,7
	Slightly Agree	6	19,4	19,4	29,0
	Agree	13	41,9	41,9	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

The industry explores new approaches to conduct market research.

		Frequency	Percent	Valid Percent	Cumulative Percent
Market Innovativeness 5	Slightly Disagree	2	6,5	6,5	6,5
	Slightly Agree	10	32,3	32,3	38,7
	Agree	10	32,3	32,3	71,0
	Strongly Agree	9	29,0	29,0	100,0
	Total	31	100,0	100,0	

The industry’s marketing andamp; advertising campaigns are considered effective.

		Frequency	Percent	Valid Percent	Cumulative Percent
Market Innovativeness 6	Slightly Disagree	7	22,6	22,6	22,6
	Slightly Agree	8	25,8	25,8	48,4
	Agree	8	25,8	25,8	74,2
	Strongly Agree	8	25,8	25,8	100,0
	Total	31	100,0	100,0	

The industry is able to develop strong relationships with customers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Market Innovativeness 7	Slightly Disagree	4	12,9	12,9	12,9
	Slightly Agree	10	32,3	32,3	45,2
	Agree	7	22,6	22,6	67,7
	Strongly Agree	10	32,3	32,3	100,0
	Total	31	100,0	100,0	

The industry has strong product marketing capabilities.

		Frequency	Percent	Valid Percent	Cumulative Percent
Market Innovativeness 8	Slightly Agree	6	19,4	20,0	20,0
	Agree	13	41,9	43,3	63,3
	Strongly Agree	11	35,5	36,7	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

The industry has strong product technology capabilities.

		Frequency	Percent	Valid Percent	Cumulative Percent
Market Innovativeness 9	Slightly Disagree	1	3,2	3,3	3,3
	Slightly Agree	3	9,7	10,0	13,3
	Agree	16	51,6	53,3	66,7
	Strongly Agree	10	32,3	33,3	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

There are complementarities between product marketing capabilities and product technology capabilities.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Marketing Innovativeness 1	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	1	3,2	3,2	6,5
	Slightly Disagree	2	6,5	6,5	12,9
	Slightly Agree	8	25,8	25,8	38,7
	Agree	9	29,0	29,0	67,7
	Strongly Agree	10	32,3	32,3	100,0
	Total	31	100,0	100,0	

The industry has hired new product marketing managers to enhance brand awareness.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Marketing Innovativeness 2	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	2	6,5	6,5	9,7
	Slightly Agree	12	38,7	38,7	48,4
	Agree	10	32,3	32,3	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The industry's product marketing managers have a market-learning capability that allows for foresight about future trends in the market place.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Marketing Innovativeness 3	Slightly Disagree	3	9,7	10,3	10,3
	Slightly Agree	8	25,8	27,6	37,9
	Agree	13	41,9	44,8	82,8
	Strongly Agree	5	16,1	17,2	100,0
	Total	29	93,5	100,0	
Missing	System	2	6,5		
Total		31	100,0		

The industry's product marketing manager's marketing-learning capability guides the organisation's resource reconfiguration decisions.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Marketing Innovativeness 4	Disagree	1	3,2	3,3	3,3
	Slightly Disagree	3	9,7	10,0	13,3
	Slightly Agree	6	19,4	20,0	33,3
	Agree	13	41,9	43,3	76,7
	Strongly Agree	7	22,6	23,3	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

The industry's product marketing manager's market learning capability fosters capability improvement through learning by doing in product development.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Marketing Innovativeness 5	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	3	9,7	9,7	12,9
	Slightly Agree	5	16,1	16,1	29,0
	Agree	16	51,6	51,6	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The industry's product marketing manager's market learning capability fosters capability improvement through learning by imitation in product development.

		Frequency	Percent	Valid Percent	Cumulative Percent
Product Marketing Innovativeness 6	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	1	3,2	3,2	6,5
	Slightly Disagree	5	16,1	16,1	22,6
	Slightly Agree	9	29,0	29,0	51,6
	Agree	12	38,7	38,7	90,3

	Strongly Agree	3	9,7	9,7	100,0
	Total	31	100,0	100,0	

The industry focuses on smart business processes upgrading.

		Frequency	Percent	Valid Percent	Cumulative Percent
Process Innovativeness 1	Slightly Disagree	4	12,9	12,9	12,9
	Slightly Agree	6	19,4	19,4	32,3
	Agree	14	45,2	45,2	77,4
	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

The industry has flexible production methods which can be changed efficiently.

		Frequency	Percent	Valid Percent	Cumulative Percent
Process Innovativeness 2	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	5	16,1	16,1	19,4
	Slightly Agree	11	35,5	35,5	54,8
	Agree	8	25,8	25,8	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

In the past three years the industry has developed new suitable management approaches.

		Frequency	Percent	Valid Percent	Cumulative Percent
Process Innovativeness 3	Disagree	2	6,5	6,5	6,5
	Slightly Disagree	5	16,1	16,1	22,6
	Slightly Agree	8	25,8	25,8	48,4
	Agree	11	35,5	35,5	83,9
	Strongly Agree	5	16,1	16,1	100,0
	Total	31	100,0	100,0	

The industry uses internal knowledge in the development of new activities / processes.

		Frequency	Percent	Valid Percent	Cumulative Percent
Process Innovativeness 4	Disagree	1	3,2	3,3	3,3
	Slightly Disagree	4	12,9	13,3	16,7
	Slightly Agree	8	25,8	26,7	43,3
	Agree	14	45,2	46,7	90,0
	Strongly Agree	3	9,7	10,0	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

The industry routinely engages in internal initiatives to identify new technologies.

		Frequency	Percent	Valid Percent	Cumulative Percent
Process Innovativeness 5	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	3	9,7	9,7	12,9
	Slightly Agree	4	12,9	12,9	25,8
	Agree	19	61,3	61,3	87,1
	Strongly Agree	4	12,9	12,9	100,0
	Total	31	100,0	100,0	

The industry routinely engages in internal initiatives to develop new technologies.

		Frequency	Percent	Valid Percent	Cumulative Percent
Process Innovativeness 6	Disagree	2	6,5	6,5	6,5
	Slightly Disagree	3	9,7	9,7	16,1
	Slightly Agree	6	19,4	19,4	35,5
	Agree	14	45,2	45,2	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The industry routinely explores technological advancement from outside.

		Frequency	Percent	Valid Percent	Cumulative Percent
Process Innovativeness 7	Disagree	1	3,2	3,3	3,3
	Slightly Disagree	3	9,7	10,0	13,3
	Slightly Agree	4	12,9	13,3	26,7
	Agree	11	35,5	36,7	63,3
	Strongly Agree	11	35,5	36,7	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

The industry routinely adopts technological advancements from outside.

		Frequency	Percent	Valid Percent	Cumulative Percent
Process Innovativeness 8	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	1	3,2	3,2	6,5
	Slightly Agree	6	19,4	19,4	25,8
	Agree	11	35,5	35,5	61,3
	Strongly Agree	12	38,7	38,7	100,0
	Total	31	100,0	100,0	

The industry routinely explores innovations by suppliers for adoption.

		Frequency	Percent	Valid Percent	Cumulative Percent
Process Innovativeness 9	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	4	12,9	12,9	16,1
	Slightly Agree	6	19,4	19,4	35,5
	Agree	14	45,2	45,2	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The industry has a knowledge sharing process through training and development to improve innovation.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Knowledge Management Innovativeness	Disagree	4	12,9	12,9	12,9
	Slightly Disagree	1	3,2	3,2	16,1
	Slightly Agree	6	19,4	19,4	35,5
	Agree	10	32,3	32,3	67,7
	Strongly Agree	10	32,3	32,3	100,0
	Total	31	100,0	100,0	

The industry uses knowledge sharing process to engender trust to staff members to improve innovation.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Knowledge Management Innovativeness	Disagree	1	3,2	3,4	3,4
	Slightly Disagree	3	9,7	10,3	13,8
	Slightly Agree	7	22,6	24,1	37,9
	Agree	12	38,7	41,4	79,3
	Strongly Agree	6	19,4	20,7	100,0
	Total	29	93,5	100,0	
Missing	System	2	6,5		
Total		31	100,0		

The industry uses knowledge sharing process to motivate employees to be more innovative.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Knowledge Management Innovativeness	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	4	12,9	12,9	16,1
	Slightly Agree	10	32,3	32,3	48,4
	Agree	9	29,0	29,0	77,4
	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

Management is able to inspire everyone around a common purpose.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 1	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	3	9,7	9,7	12,9
	Slightly Agree	8	25,8	25,8	38,7
	Agree	13	41,9	41,9	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The industry is characterised by individuals with an ambition to get recognised.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 2	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	2	6,5	6,5	9,7
	Slightly Disagree	4	12,9	12,9	22,6
	Slightly Agree	7	22,6	22,6	45,2
	Agree	13	41,9	41,9	87,1
	Strongly Agree	4	12,9	12,9	100,0
	Total	31	100,0	100,0	

The industry uses storytelling to motivate staff about acceptable innovative behaviour.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 3	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	2	6,5	6,5	9,7
	Slightly Disagree	8	25,8	25,8	35,5
	Slightly Agree	10	32,3	32,3	67,7
	Agree	8	25,8	25,8	93,5
	Strongly Agree	2	6,5	6,5	100,0
	Total	31	100,0	100,0	

The industry has creative spaces where ideas can be openly shared.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 4	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	8	25,8	25,8	29,0
	Slightly Agree	7	22,6	22,6	51,6
	Agree	9	29,0	29,0	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The industry's leadership are roles model for innovative behaviour.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 5	Strongly Disagree	2	6,5	6,5	6,5
	Disagree	2	6,5	6,5	12,9
	Slightly Disagree	2	6,5	6,5	19,4
	Slightly Agree	10	32,3	32,3	51,6
	Agree	9	29,0	29,0	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

The industry has a structured process to approve new ideas for implementation.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 6	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	1	3,2	3,2	6,5
	Slightly Disagree	5	16,1	16,1	22,6
	Slightly Agree	10	32,3	32,3	54,8
	Agree	7	22,6	22,6	77,4

	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

During recruitment, the industry critically evaluates the ability to innovate.

		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 7	Strongly Disagree	2	6,5	6,5	6,5
	Disagree	2	6,5	6,5	12,9
	Slightly Disagree	5	16,1	16,1	29,0
	Slightly Agree	6	19,4	19,4	48,4
	Agree	11	35,5	35,5	83,9
	Strongly Agree	5	16,1	16,1	100,0
	Total	31	100,0	100,0	

In the industry, employees enjoy freedom to excel based on their capabilities, skills, and experiences.

		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 8	Strongly Disagree	1	3,2	3,2	3,2
	Disagree	3	9,7	9,7	12,9
	Slightly Disagree	5	16,1	16,1	29,0
	Slightly Agree	10	32,3	32,3	61,3
	Agree	6	19,4	19,4	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

Our organisation is characterised by innovative culture (i.e., commitment to foster innovation capacity) across all critical functional areas.

		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 9	Disagree	3	9,7	9,7	9,7
	Slightly Disagree	3	9,7	9,7	19,4
	Slightly Agree	12	38,7	38,7	58,1
	Agree	10	32,3	32,3	90,3

	Strongly Agree	3	9,7	9,7	100,0
	Total	31	100,0	100,0	

In the industry, innovative behaviour is rewarded during performance evaluation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Behavioural Innovativeness 10	Disagree	2	6,5	6,5	6,5
	Slightly Disagree	3	9,7	9,7	16,1
	Slightly Agree	14	45,2	45,2	61,3
	Agree	6	19,4	19,4	80,6
	Strongly Agree	6	19,4	19,4	100,0
	Total	31	100,0	100,0	

Each firm has a range of products to suit the choices of customers.

		Frequency	Percent	Valid Percent	Cumulative Percent
Strategic Innovativeness 1	Disagree	1	3,2	3,2	3,2
	Slightly Disagree	4	12,9	12,9	16,1
	Slightly Agree	6	19,4	19,4	35,5
	Agree	12	38,7	38,7	74,2
	Strongly Agree	8	25,8	25,8	100,0
	Total	31	100,0	100,0	

In this industry, senior management have strong abilities to simulate future market.

		Frequency	Percent	Valid Percent	Cumulative Percent
Strategic Innovativeness 2	Strongly Disagree	1	3,2	3,3	3,3
	Disagree	2	6,5	6,7	10,0
	Slightly Disagree	2	6,5	6,7	16,7
	Slightly Agree	9	29,0	30,0	46,7
	Agree	9	29,0	30,0	76,7
	Strongly Agree	7	22,6	23,3	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		

Total		31	100,0		

In this industry, senior management proactively seek strategic alliances for competitiveness.

		Frequency	Percent	Valid Percent	Cumulative Percent
Strategic Innovativeness 3	Strongly Disagree	1	3,2	3,2	3,2
	Slightly Disagree	3	9,7	9,7	12,9
	Slightly Agree	8	25,8	25,8	38,7
	Agree	12	38,7	38,7	77,4
	Strongly Agree	7	22,6	22,6	100,0
	Total	31	100,0	100,0	

The industry has promoted internal candidates to the role of CEO in past three years.

		Frequency	Percent	Valid Percent	Cumulative Percent
Strategic Innovativeness 4	Strongly Disagree	3	9,7	9,7	9,7
	Disagree	3	9,7	9,7	19,4
	Slightly Disagree	5	16,1	16,1	35,5
	Slightly Agree	6	19,4	19,4	54,8
	Agree	10	32,3	32,3	87,1
	Strongly Agree	4	12,9	12,9	100,0
	Total	31	100,0	100,0	

The industry's management is characterized by individuals with prior innovation-relevant experience from same industry.

		Frequency	Percent	Valid Percent	Cumulative Percent
Strategic Innovativeness 5	Strongly Disagree	2	6,5	6,9	6,9
	Disagree	2	6,5	6,9	13,8
	Slightly Disagree	5	16,1	17,2	31,0
	Slightly Agree	7	22,6	24,1	55,2
	Agree	10	32,3	34,5	89,7

	Strongly Agree	3	9,7	10,3	100,0
	Total	29	93,5	100,0	
Missing	System	2	6,5		
Total		31	100,0		

The industry's management is characterized by individuals with prior innovation-relevant experience from self-employment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Strategic Innovativeness 6	Strongly Disagree	3	9,7	9,7	9,7
	Slightly Disagree	12	38,7	38,7	48,4
	Slightly Agree	5	16,1	16,1	64,5
	Agree	10	32,3	32,3	96,8
	Strongly Agree	1	3,2	3,2	100,0
	Total	31	100,0	100,0	

The industry's management is characterized by individuals with prior innovation-relevant experience from research and development (Rand D).

		Frequency	Percent	Valid Percent	Cumulative Percent
Strategic Innovativeness 7	Strongly Disagree	4	12,9	12,9	12,9
	Slightly Disagree	8	25,8	25,8	38,7
	Slightly Agree	7	22,6	22,6	61,3
	Agree	8	25,8	25,8	87,1
	Strongly Agree	4	12,9	12,9	100,0
	Total	31	100,0	100,0	

The industry's management is characterized by individuals with concrete innovation-relevant ideas from former occupation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Strategic Innovativeness 8	Strongly Disagree	2	6,5	6,7	6,7
	Slightly Disagree	6	19,4	20,0	26,7
	Slightly Agree	9	29,0	30,0	56,7
	Agree	10	32,3	33,3	90,0

	Strongly Agree	3	9,7	10,0	100,0
	Total	30	96,8	100,0	
Missing	System	1	3,2		
Total		31	100,0		

Appendix L: Correlation Analysis based on SPSS output

Inter-Item Correlation Matrix

Product Innovativeness	PI_1	PI_2	PI_3	PI_4
PI_1	1,000	0,499	-0,012	-0,115
PI_2	0,499	1,000	0,144	0,230
PI_3	-0,012	0,144	1,000	0,694
PI_4	-0,115	0,230	0,694	1,000

Inter-Item Correlation Matrix

Innovative Edge	IE_1	IE_2	IE_3	IE_4
IE_1	1,000	0,377	0,247	0,375
IE_2	0,377	1,000	0,279	0,334
IE_3	0,247	0,279	1,000	0,538
IE_4	0,375	0,334	0,538	1,000

Inter-Item Correlation Matrix

Systems Innovativeness	SE_1	SE_2	SE_3	SE_4
SE_1	1,000	0,816	0,554	0,289
SE_2	0,816	1,000	0,474	0,388
SE_3	0,554	0,474	1,000	0,709
SE_4	0,289	0,388	0,709	1,000

Inter-Item Correlation Matrix

Product Development	PDI_1	PDI_2	PDI_3	PDI_4	PDI_5	PDI_6	PDI_7
PDI_1	1,000	0,415	0,494	0,240	0,427	0,108	0,154
PDI_2	0,415	1,000	0,599	0,599	0,466	0,375	0,057
PDI_3	0,494	0,599	1,000	0,700	0,657	0,493	0,188

PDI_4	0,240	0,599	0,700	1,000	0,696	0,390	0,216
PDI_5	0,427	0,466	0,657	0,696	1,000	0,342	0,107
PDI_6	0,108	0,375	0,493	0,390	0,342	1,000	0,599
PDI_7	0,655	0,414	0,547	0,434	0,548	0,410	0,174
PDI_8	0,352	0,445	0,614	0,741	0,658	0,513	0,298
PDI_9	0,182	0,143	0,146	0,119	0,004	0,584	0,872
PDI_10	0,154	0,057	0,188	0,216	0,107	0,599	1,000

Inter-Item Correlation Matrix

Environmental innovativeness	EI_1	EI_2	EI_3	EI_4	EI_5
EI_1	1,000	0,729	0,427	0,519	0,436
EI_2	0,729	1,000	0,533	0,561	0,481
EI_3	0,427	0,533	1,000	0,894	0,856
EI_4	0,519	0,561	0,894	1,000	0,918
EI_5	0,436	0,481	0,856	0,918	1,000

Inter-Item Correlation Matrix

Market innovativeness	MI_1	MI_2	MI_3	MI_4	MI_5	MI_6
MI_1	1,000	0,525	0,319	0,379	0,213	0,079
MI_2	0,525	1,000	0,695	0,321	0,025	0,201
MI_3	0,319	0,695	1,000	0,251	0,009	0,211
MI_4	0,379	0,321	0,251	1,000	0,581	0,468
MI_5	0,213	0,025	0,009	0,581	1,000	0,544
MI_6	0,079	0,201	0,211	0,468	0,544	1,000
MI_7	0,075	0,313	0,178	0,342	0,022	0,361
MI_8	0,036	0,017	-0,025	0,346	0,209	0,363
MI_9	0,165	0,197	0,017	0,243	0,104	0,495

Inter-Item Correlation Matrix

Product Marketing Innovativeness	PMI_1	PMI_2	PMI_3	PMI_4	PMI_5	PMI_6
PMI_1	1,000	0,550	0,480	0,556	0,265	0,211
PMI_2	0,550	1,000	0,891	0,742	0,414	0,339
PMI_3	0,480	0,891	1,000	0,659	0,345	0,339
PMI_4	0,556	0,742	0,659	1,000	0,599	0,371
PMI_5	0,265	0,414	0,345	0,599	1,000	0,204
PMI_6	0,211	0,339	0,339	0,371	0,204	1,000

Inter-Item Correlation Matrix

Process innovativeness	Prc_1	Prc_2	Prc_3	Prc_4	Prc_5	Prc_6
Prc_1	1,000	0,499	0,196	0,537	0,645	0,677
Prc_2	0,499	1,000	0,703	0,475	0,383	0,377
Prc_3	0,196	0,703	1,000	0,499	0,317	0,288
Prc_4	0,537	0,475	0,499	1,000	0,588	0,698
Prc_5	0,645	0,383	0,317	0,588	1,000	0,758
Prc_6	0,677	0,377	0,288	0,698	0,758	1,000
Prc_7	0,335	0,347	0,381	0,732	0,614	0,595
Prc_8	0,636	0,359	0,252	0,625	0,556	0,536
Prc_9	0,529	0,177	0,388	0,669	0,588	0,586

Inter-Item Correlation Matrix

Knowledge management innovativeness	KMI_1	KMI_2	KMI_3
KMI_1	1,000	0,599	0,663
KMI_2	0,599	1,000	0,884
KMI_3	0,663	0,884	1,000

Inter-Item Correlation Matrix

Strategic innovativeness	SI_1	SI_2	SI_3	SI_4	SI_5	SI_6
SI_1	1,000	0,569	0,581	0,514	0,512	0,017
SI_2	0,569	1,000	0,910	0,546	0,492	0,309
SI_3	0,581	0,910	1,000	0,514	0,519	0,286
SI_4	0,514	0,546	0,514	1,000	0,775	0,471
SI_5	0,512	0,492	0,519	0,775	1,000	0,493
SI_6	0,017	0,309	0,286	0,471	0,493	1,000
SI_7	0,025	0,377	0,367	0,555	0,513	0,888
SI_8	0,028	0,110	0,055	0,402	0,446	0,782

Inter-Item Correlation Matrix

Resource heterogeneity	RH_1	RH_2	RH_3	RH_4	RH_5	RH_6
RH_1	1,000	0,684	0,582	0,606	0,697	0,285
RH_2	0,684	1,000	0,709	0,799	0,730	0,288
RH_3	0,582	0,709	1,000	0,899	0,795	0,148
RH_4	0,606	0,799	0,899	1,000	0,845	0,344
RH_5	0,697	0,730	0,795	0,845	1,000	0,436
RH_6	0,285	0,288	0,148	0,344	0,436	1,000
RH_7	0,530	0,536	0,564	0,645	0,674	0,476

Inter-Item Correlation Matrix

Product differentiation	PD_1	PD_2	PD_3	PD_4	PD_5	PD_6
PD_1	1,000	0,502	0,464	0,414	0,457	0,449
PD_2	0,502	1,000	0,383	0,478	0,446	0,150
PD_3	0,464	0,383	1,000	0,837	0,602	0,399
PD_4	0,414	0,478	0,837	1,000	0,588	0,300
PD_5	0,457	0,446	0,602	0,588	1,000	0,592

PD_6	0,449	0,150	0,399	0,300	0,592	1,000

Inter-Item Correlation Matrix

Imperfect mobility of resources	IMR_1	IMR_2	IMR_3
IMR_1	1,000	0,768	0,443
IMR_2	0,768	1,000	0,614
IMR_3	0,443	0,614	1,000

Inter-Item Correlation Matrix

Ex post limits to competition	EPLC_1	EPLC_2	EPLC_3	EPLC_4	EPLC_5	EPLC_6
EPLC_1	1,000	0,753	0,671	0,423	0,223	0,239
EPLC_2	0,753	1,000	0,675	0,549	0,272	0,214
EPLC_3	0,671	0,675	1,000	0,581	0,244	0,337
EPLC_4	0,423	0,549	0,581	1,000	0,600	0,386
EPLC_5	0,223	0,272	0,244	0,600	1,000	0,530
EPLC_6	0,239	0,214	0,337	0,386	0,530	1,000
EPLC_7	0,400	0,513	0,520	0,731	0,728	0,488

Inter-Item Correlation Matrix

Ex-ante limits to competition	EALC_1	EALC_2	EALC_3	EALC_4
EALC_1	1,000	0,674	0,176	0,308
EALC_2	0,674	1,000	0,200	0,267
EALC_3	0,176	0,200	1,000	0,507
EALC_4	0,308	0,267	0,507	1,000

Appendix M: Correlation analysis between dependent and independent variables

		productinnovativeness	innovativeedge	systemsinnovativeness	productdevelopment	environmentalinfluences	marketinnovativeness	productmarketing	processinnovativeness	knowledgemanagement	behaviouralinnovativeness	strategicinnovativeness	resourceheterogeneity	productdifferentiation	imperfectmobility	expostlimits	exantelimits
productinnovativeness	Pearson Correlation	1	-0,023	-0,108	0,139	0,129	0,035	0,072	0,194	.532**	.493**	.435**	-0,183	0,141	-0,030	-0,223	0,011
	Sig. (1-tailed)		0,451	0,282	0,228	0,245	0,426	0,351	0,148	0,001	0,002	0,007	0,163	0,225	0,437	0,114	0,477
	N	35	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
innovativeedge	Pearson Correlation	-0,023	1	0,298	.541**	0,052	.472**	.545**	.659**	.360*	.354*	.488**	0,156	.560**	-0,083	.380*	.635**
	Sig. (1-tailed)	0,451		0,052	0,001	0,391	0,004	0,001	0,000	0,023	0,025	0,003	0,202	0,001	0,328	0,017	0,000
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
systemsinnovativeness	Pearson Correlation	-0,108	0,298	1	.461**	.485**	0,018	0,252	.306*	-0,114	0,244	0,211	0,154	0,006	0,010	0,041	0,126
	Sig. (1-tailed)	0,282	0,052		0,005	0,003	0,463	0,086	0,047	0,271	0,093	0,128	0,204	0,487	0,479	0,413	0,249
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
productdevelopment	Pearson Correlation	0,139	.541**	.461**	1	.430**	.423**	.555**	.581**	.391*	.464**	.542**	0,243	0,217	0,166	.382*	.493**
	Sig. (1-tailed)	0,228	0,001	0,005		0,008	0,009	0,001	0,000	0,015	0,004	0,001	0,093	0,121	0,186	0,017	0,002
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
environmentalinfluences	Pearson Correlation	0,129	0,052	.485**	.430**	1	-0,019	0,244	.341*	0,275	0,293	.389*	0,233	0,027	.460**	-0,080	0,173
	Sig. (1-tailed)	0,245	0,391	0,003	0,008		0,460	0,093	0,030	0,067	0,055	0,015	0,104	0,442	0,005	0,335	0,177
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
marketinnovativeness	Pearson Correlation	0,035	.472**	0,018	.423**	-0,019	1	.707**	.574**	0,257	.320*	.358*	-0,125	.362*	0,019	.389*	.461**
	Sig. (1-tailed)	0,426	0,004	0,463	0,009	0,460		0,000	0,000	0,081	0,039	0,024	0,252	0,023	0,459	0,015	0,005
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
productmarketing	Pearson Correlation	0,072	.545**	0,252	.555**	0,244	.707**	1	.718**	0,293	.479**	.497**	0,172	.348*	-0,018	.412*	.570**
	Sig. (1-tailed)	0,351	0,001	0,086	0,001	0,093	0,000		0,000	0,055	0,003	0,002	0,177	0,027	0,462	0,011	0,000
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
processinnovativeness	Pearson Correlation	0,194	.659**	.306*	.581**	.341*	.574**	.718**	1	.500**	.494**	.596**	-0,019	.369*	0,029	0,252	.575**
	Sig. (1-tailed)	0,148	0,000	0,047	0,000	0,030	0,000	0,000		0,002	0,002	0,000	0,461	0,021	0,439	0,086	0,000
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
knowledgemanagement	Pearson Correlation	.532**	.360*	-0,114	.391*	0,275	0,257	0,293	.500**	1	.756**	.784**	0,122	.683**	.343*	0,210	.628**
	Sig. (1-tailed)	0,001	0,023	0,271	0,015	0,067	0,081	0,055	0,002		0,000	0,000	0,257	0,000	0,029	0,128	0,000
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
behaviouralinnovativeness	Pearson Correlation	.493**	.354*	0,244	.464**	0,293	.320*	.479**	.494**	.756**	1	.823**	0,185	.562**	0,136	0,111	.603**
	Sig. (1-tailed)	0,002	0,025	0,093	0,004	0,055	0,039	0,003	0,002	0,000		0,000	0,159	0,000	0,233	0,275	0,000
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
strategicinnovativeness	Pearson Correlation	.435**	.488**	0,211	.542**	.389*	.358*	.497**	.596**	.784**	.823**	1	0,183	.637**	0,224	0,146	.677**
	Sig. (1-tailed)	0,007	0,003	0,128	0,001	0,015	0,024	0,002	0,000	0,000	0,000		0,163	0,000	0,113	0,216	0,000
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
resourceheterogeneity	Pearson Correlation	-0,183	0,156	0,154	0,243	0,233	-0,125	0,172	-0,019	0,122	0,185	0,183	1	0,081	.348*	.600**	0,298
	Sig. (1-tailed)	0,163	0,202	0,204	0,093	0,104	0,252	0,177	0,461	0,257	0,159	0,163		0,332	0,027	0,000	0,052
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
productdifferentiation	Pearson Correlation	0,141	.560**	0,006	0,217	0,027	.362*	.348*	.369*	.683**	.562**	.637**	0,081	1	0,271	0,220	.723**
	Sig. (1-tailed)	0,225	0,001	0,487	0,121	0,442	0,023	0,027	0,021	0,000	0,000	0,000	0,332		0,070	0,117	0,000
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
imperfectmobility	Pearson Correlation	-0,030	-0,083	0,010	0,166	.460**	0,019	-0,018	0,029	.343*	0,136	0,224	.348*	0,271	1	0,260	0,143
	Sig. (1-tailed)	0,437	0,328	0,479	0,186	0,005	0,459	0,462	0,439	0,029	0,233	0,113	0,027	0,070		0,079	0,222
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
expostlimits	Pearson Correlation	-0,223	.380*	0,041	.382*	-0,080	.389*	.412*	0,252	0,210	0,111	0,146	.600**	0,220	0,260	1	.433**
	Sig. (1-tailed)	0,114	0,017	0,413	0,017	0,335	0,015	0,011	0,086	0,128	0,275	0,216	0,000	0,117	0,079		0,007
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
exantelimits	Pearson Correlation	0,011	.635**	0,126	.493**	0,173	.461**	.570**	.575**	.628**	.603**	.677**	0,298	.723**	0,143	.433**	1
	Sig. (1-tailed)	0,477	0,000	0,249	0,002	0,177	0,005	0,000	0,000	0,000	0,000	0,000	0,052	0,000	0,222	0,007	
	N	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Appendix N: Collinearity and normality of residuals diagnostics results

Model 1: Resource Heterogeneity is a dependent variable

Collinearity Diagnostics[a]

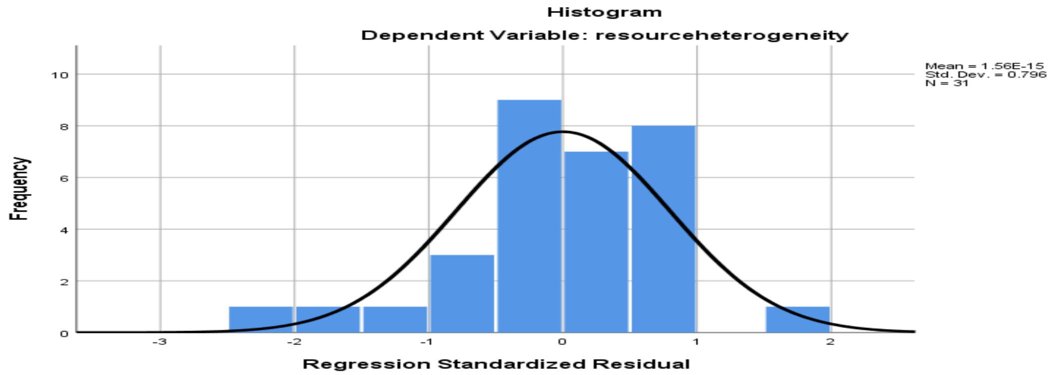
Model 1	Eigenvalue	Condition Index	Variance Proportions				
			Constant	product innovativeness	innovative edge	market innovativeness	process innovativeness
1	11,750	1,000	0,00	0,00	0,00	0,00	0,00
2	0,079	12,164	0,00	0,15	0,01	0,00	0,00
3	0,053	14,820	0,00	0,02	0,03	0,01	0,00
4	0,038	17,480	0,02	0,37	0,00	0,01	0,00
5	0,021	23,803	0,00	0,00	0,01	0,02	0,02
6	0,016	26,752	0,01	0,00	0,21	0,01	0,00
7	0,014	29,056	0,13	0,35	0,08	0,05	0,09
8	0,009	36,356	0,02	0,01	0,01	0,00	0,10
9	0,007	40,535	0,02	0,02	0,06	0,03	0,17
10	0,006	44,775	0,00	0,03	0,50	0,02	0,35
11	0,003	58,987	0,23	0,01	0,08	0,63	0,01
12	0,003	67,035	0,55	0,04	0,01	0,23	0,25

a. Dependent Variable: resource heterogeneity

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2,67	5,22	4,13	0,67	31
Residual	-2,27	1,68	0,00	0,85	31
Std. Predicted Value	-2,182	1,622	0,000	1,000	31
Std. Residual	-2,123	1,569	0,000	0,796	31

a. Dependent Variable: resource heterogeneity



Model 2: Resource Heterogeneity is a dependent variable

Collinearity Diagnostics[a]

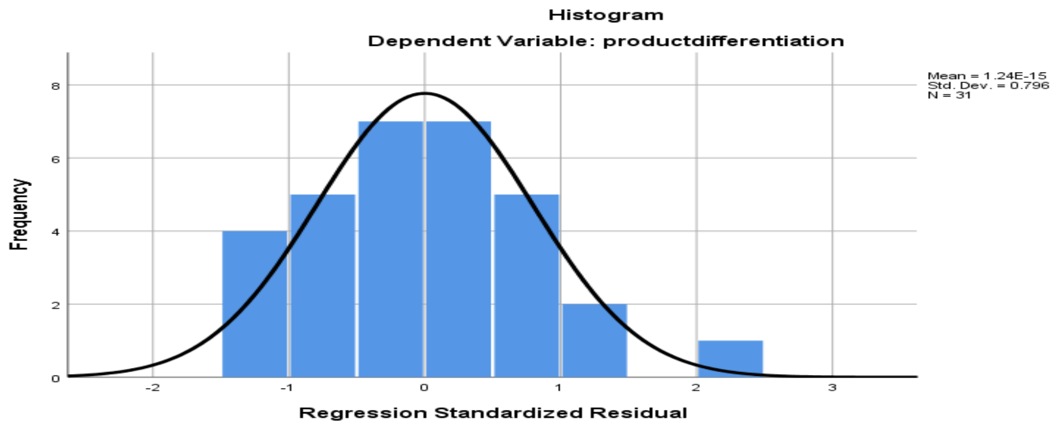
Model 2	Eigenvalue	Condition Index	Variance Proportions				
			(Constant)	product innovativeness	innovative edge	market innovativeness	process innovativeness
1	11,750	1,000	0,00	0,00	0,00	0,00	0,00
2	0,079	12,164	0,00	0,15	0,01	0,00	0,00
3	0,053	14,820	0,00	0,02	0,03	0,01	0,00
4	0,038	17,480	0,02	0,37	0,00	0,01	0,00
5	0,021	23,803	0,00	0,00	0,01	0,02	0,02
6	0,016	26,752	0,01	0,00	0,21	0,01	0,00
7	0,014	29,056	0,13	0,35	0,08	0,05	0,09
8	0,009	36,356	0,02	0,01	0,01	0,00	0,10
9	0,007	40,535	0,02	0,02	0,06	0,03	0,17
10	0,006	44,775	0,00	0,03	0,50	0,02	0,35
11	0,003	58,987	0,23	0,01	0,08	0,63	0,01
12	0,003	67,035	0,55	0,04	0,01	0,23	0,25

a. Dependent Variable: product differentiation

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2,45	5,74	4,51	0,81	31
Residual	-0,68	1,21	0,00	0,45	31
Std. Predicted Value	-2,531	1,516	0,000	1,000	31
Std. Residual	-1,211	2,153	0,000	0,796	31

a. Dependent Variable: product differentiation



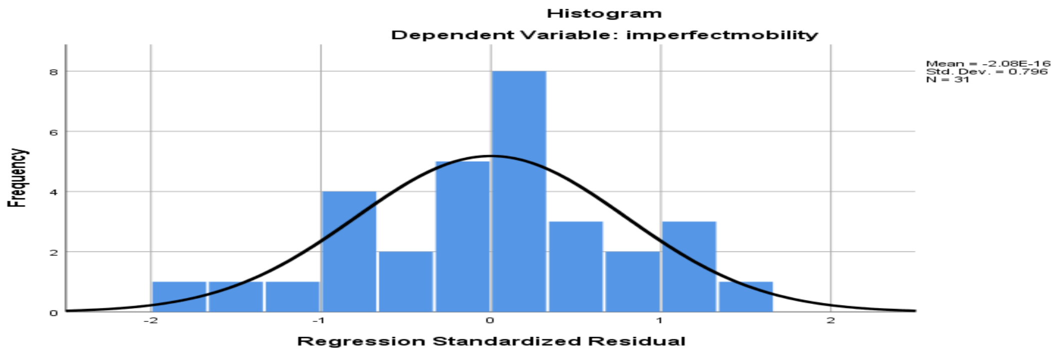
Model 3: Immobility of resources is a dependent variable

Collinearity Diagnostics[a]							
			Variance Proportions				
Model 3	Eigenvalue	Condition Index	(Constant)	product innovativeness	innovative edge	market innovativeness	process innovativeness
1	11,750	1,000	0,00	0,00	0,00	0,00	0,00
2	0,079	12,164	0,00	0,15	0,01	0,00	0,00
3	0,053	14,820	0,00	0,02	0,03	0,01	0,00
4	0,038	17,480	0,02	0,37	0,00	0,01	0,00
5	0,021	23,803	0,00	0,00	0,01	0,02	0,02
6	0,016	26,752	0,01	0,00	0,21	0,01	0,00
7	0,014	29,056	0,13	0,35	0,08	0,05	0,09
8	0,009	36,356	0,02	0,01	0,01	0,00	0,10
9	0,007	40,535	0,02	0,02	0,06	0,03	0,17
10	0,006	44,775	0,00	0,03	0,50	0,02	0,35
11	0,003	58,987	0,23	0,01	0,08	0,63	0,01
12	0,003	67,035	0,55	0,04	0,01	0,23	0,25

a. Dependent Variable: imperfect mobility

Residuals Statistics[a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2,88	5,85	4,54	0,77	31
Residual	-2,01	1,52	0,00	0,81	31
Std. Predicted Value	-2,173	1,709	0,000	1,000	31
Std. Residual	-1,961	1,487	0,000	0,796	31

a. Dependent Variable: imperfect mobility



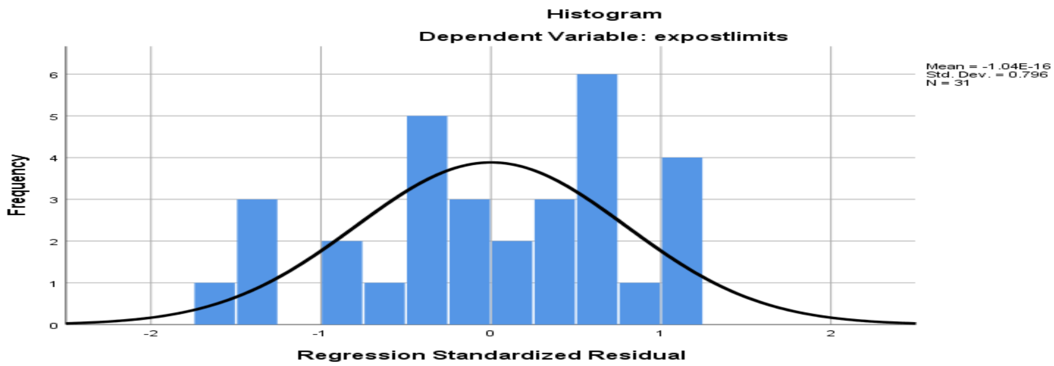
Model 4: Ex post limits to competition is a dependent variable

Collinearity Diagnostics[a]							
			Variance Proportions				
Model 4	Eigenvalue	Condition Index	(Constant)	product innovativeness	innovative edge	market innovativeness	process innovativeness
1	11,750	1,000	0,00	0,00	0,00	0,00	0,00
2	0,079	12,164	0,00	0,15	0,01	0,00	0,00
3	0,053	14,820	0,00	0,02	0,03	0,01	0,00
4	0,038	17,480	0,02	0,37	0,00	0,01	0,00
5	0,021	23,803	0,00	0,00	0,01	0,02	0,02
6	0,016	26,752	0,01	0,00	0,21	0,01	0,00
7	0,014	29,056	0,13	0,35	0,08	0,05	0,09
8	0,009	36,356	0,02	0,01	0,01	0,00	0,10
9	0,007	40,535	0,02	0,02	0,06	0,03	0,17
10	0,006	44,775	0,00	0,03	0,50	0,02	0,35
11	0,003	58,987	0,23	0,01	0,08	0,63	0,01
12	0,003	67,035	0,55	0,04	0,01	0,23	0,25

a. Dependent Variable: ex post limits

Residuals Statistics[a]					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3,25	5,67	4,76	0,64	31
Residual	-1,24	0,94	0,00	0,64	31
Std. Predicted Value	-2,371	1,433	0,000	1,000	31
Std. Residual	-1,532	1,165	0,000	0,796	31

a. Dependent Variable: ex post limits



Model 5: Ex-ante limits to competition is a dependent variable

Collinearity Diagnostics[a]							
			Variance Proportions				
Model 5	Eigenvalue	Condition Index	(Constant)	product innovativeness	innovative edge	market innovativeness	process innovativeness
1	11,750	1,000	0,00	0,00	0,00	0,00	0,00
2	0,079	12,164	0,00	0,15	0,01	0,00	0,00
3	0,053	14,820	0,00	0,02	0,03	0,01	0,00
4	0,038	17,480	0,02	0,37	0,00	0,01	0,00
5	0,021	23,803	0,00	0,00	0,01	0,02	0,02
6	0,016	26,752	0,01	0,00	0,21	0,01	0,00
7	0,014	29,056	0,13	0,35	0,08	0,05	0,09
8	0,009	36,356	0,02	0,01	0,01	0,00	0,10
9	0,007	40,535	0,02	0,02	0,06	0,03	0,17

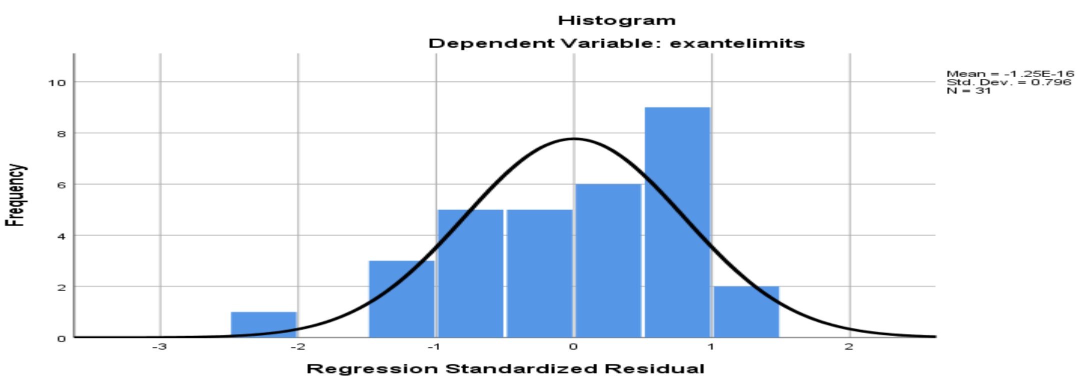
10	0,006	44,775	0,00	0,03	0,50	0,02	0,35
11	0,003	58,987	0,23	0,01	0,08	0,63	0,01
12	0,003	67,035	0,55	0,04	0,01	0,23	0,25

a. Dependent Variable: ex-ante limits

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2,86	5,92	4,58	0,79	31
Residual	-1,34	0,76	0,00	0,47	31
Std. Predicted Value	-2,181	1,694	0,000	1,000	31
Std. Residual	-2,274	1,283	0,000	0,796	31

a. Dependent Variable: ex-ante limits



Appendix O: SPSS Output on Regression Analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.619[a]	0,383	0,025	1,0710153	0,383	1,071	11	19	0,431	2,462

a. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness, marketinnovativeness, productinnovativeness,

b. Dependent Variable: resourceheterogeneity

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13,509	11	1,228	1,071	.431[b]
	Residual	21,794	19	1,147		
	Total	35,303	30			

a. Dependent Variable: resourceheterogeneity

b. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness, marketinnovativeness,

Coefficients[a]

Model		Unstandardized Coefficients: B	Unstandardized Coefficients: Std. Error	Standardized Coefficients: Beta	t	Sig.	95.0% Confidence Interval for B: Lower Bound	95.0% Confidence Interval for B: Upper Bound	Collinearity Statistics: Tolerance	Collinearity Statistics: VIF
1	(Constant)	5,497	2,475		2,221	0,039	0,317	10,677		
	productinnovativeness	-0,315	0,208	-0,349	-1,515	0,146	-0,750	0,120	0,612	1,635
	innovativeedge	0,261	0,374	0,207	0,698	0,494	-0,522	1,045	0,368	2,716
	systemsinnovativeness	-0,147	0,383	-0,122	-0,384	0,705	-0,949	0,655	0,323	3,100
	productdevelopment	0,333	0,413	0,221	0,806	0,430	-0,531	1,197	0,433	2,309
	environmentalinfluences	0,161	0,257	0,168	0,625	0,539	-0,377	0,699	0,451	2,218
	marketinnovativeness	-0,881	0,527	-0,470	-1,673	0,111	-1,985	0,222	0,412	2,428
	productmarketing	0,686	0,471	0,507	1,457	0,161	-0,299	1,672	0,268	3,725
	processinnovativeness	-0,698	0,468	-0,512	-1,493	0,152	-1,677	0,281	0,276	3,620
	knowledgemanagement	0,168	0,466	0,161	0,361	0,722	-0,807	1,143	0,163	6,153
	behaviouralinnovativeness	0,223	0,490	0,191	0,454	0,655	-0,803	1,248	0,184	5,437
	strategicinnovativeness	0,014	0,456	0,012	0,030	0,977	-0,940	0,967	0,206	4,854

a. Dependent Variable: resourceheterogeneity

Model Summary[b]										
					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
2	.876[a]	0,767	0,632	0,5643679	0,767	5,674	11	19	0,001	2,323

a. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness, marketinnovativeness, productinnovativeness,

b. Dependent Variable: productdifferentiation

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	19,880	11	1,807	5,674	.001[b]
	Residual	6,052	19	0,319		
	Total	25,932	30			

a. Dependent Variable: productdifferentiation

b. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness, marketinnovativeness,

Coefficients[a]										
		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
2	(Constant)	0,520	1,304		0,399	0,695	-2,210	3,249		
	productinnovativeness	-0,154	0,109	-0,199	-1,405	0,176	-0,383	0,075	0,612	1,635
	innovative edge	0,420	0,197	0,389	2,129	0,047	0,007	0,833	0,368	2,716
	systemsinnovativeness	0,285	0,202	0,275	1,410	0,175	-0,138	0,707	0,323	3,100
	productdevelopment	-0,500	0,218	-0,387	-2,297	0,033	-0,955	-0,044	0,433	2,309
	environmentalinfluences	-0,109	0,136	-0,133	-0,806	0,430	-0,393	0,174	0,451	2,218
	marketinnovativeness	0,287	0,278	0,179	1,034	0,314	-0,294	0,868	0,412	2,428
	productmarketing	0,224	0,248	0,193	0,902	0,378	-0,296	0,743	0,268	3,725
	processinnovativeness	-0,503	0,246	-0,430	-2,041	0,055	-1,019	0,013	0,276	3,620
	knowledgemanagement	0,795	0,245	0,890	3,239	0,004	0,281	1,309	0,163	6,153
	behaviourallinnovativeness	-0,149	0,258	-0,150	-0,579	0,569	-0,690	0,391	0,184	5,437
	strategicinnovativeness	0,255	0,240	0,260	1,063	0,301	-0,247	0,758	0,206	4,854

a. Dependent Variable: productdifferentiation

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
3	.685[a]	0,469	0,161	1,023922	0,469	1,523	11	19	0,203	2,548

a. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness, marketinnovativeness, productinnovativeness,

b. Dependent Variable: imperfectmobility

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
3	Regression	17,564	11	1,597	1,523	.203[b]
	Residual	19,920	19	1,048		
	Total	37,484	30			

a. Dependent Variable: imperfectmobility

b. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness,

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
3	(Constant)	2,218	2,366		0,938	0,360	-2,734	7,170		
	productinnovativeness	-0,286	0,199	-0,308	-1,442	0,166	-0,702	0,129	0,612	1,635
	innovative edge	-0,264	0,358	-0,203	-0,737	0,470	-1,013	0,485	0,368	2,716
	systemsinnovativeness	0,072	0,366	0,058	0,195	0,847	-0,695	0,838	0,323	3,100
	productdevelopment	0,062	0,395	0,040	0,156	0,877	-0,765	0,888	0,433	2,309
	environmentalinfluences	0,454	0,246	0,460	1,847	0,080	-0,060	0,969	0,451	2,218
	marketinnovativeness	0,456	0,504	0,236	0,905	0,377	-0,599	1,511	0,412	2,428
	productmarketing	-0,105	0,450	-0,076	-0,234	0,817	-1,048	0,837	0,268	3,725
	processinnovativeness	-0,432	0,447	-0,307	-0,965	0,347	-1,368	0,504	0,276	3,620
	knowledgemanagement	0,818	0,445	0,762	1,837	0,082	-0,114	1,751	0,163	6,153
	behaviouralinnovativeness	-0,344	0,468	-0,287	-0,735	0,471	-1,324	0,636	0,184	5,437
	strategicinnovativeness	0,022	0,436	0,019	0,050	0,960	-0,890	0,933	0,206	4,854

a. Dependent Variable: imperfectmobility

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
4	.703[a]	0,494	0,201	0,809109	0,494	1,686	11	19	0,153	2,276

a. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness, marketinnovativeness, productinnovativeness,

b. Dependent Variable: expostlimits

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
4	Regression	12,141	11	1,104	1,686	.153[b]
	Residual	12,438	19	0,655		
	Total	24,579	30			

a. Dependent Variable: expostlimits

b. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness,

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
4	(Constant)	1,717	1,870		0,918	0,370	-2,196	5,630		
	productinnovativeness	-0,253	0,157	-0,336	-1,612	0,124	-0,581	0,076	0,612	1,635
	innovative edge	-0,006	0,283	-0,005	-0,020	0,984	-0,598	0,586	0,368	2,716
	systemsinnovativeness	0,241	0,289	0,239	0,833	0,415	-0,365	0,847	0,323	3,100
	productdevelopment	0,386	0,312	0,307	1,239	0,231	-0,266	1,039	0,433	2,309
	environmentalinfluences	-0,263	0,194	-0,329	-1,355	0,191	-0,670	0,143	0,451	2,218
	marketinnovativeness	0,099	0,398	0,063	0,249	0,806	-0,734	0,933	0,412	2,428
	productmarketing	0,617	0,356	0,546	1,733	0,099	-0,128	1,361	0,268	3,725
	processinnovativeness	-0,392	0,353	-0,345	-1,110	0,281	-1,132	0,347	0,276	3,620
	knowledgemanagement	0,761	0,352	0,876	2,164	0,043	0,025	1,498	0,163	6,153
	behaviouralinnovativeness	-0,393	0,370	-0,404	-1,061	0,302	-1,167	0,382	0,184	5,437
	strategicinnovativeness	-0,226	0,344	-0,237	-0,658	0,518	-0,947	0,494	0,206	4,854

a. Dependent Variable: expostlimits

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
5	.860[a]	0,739	0,589	0,58898	0,739	4,901	11	19	0,001	1,771

a. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness, marketinnovativeness, productinnovativeness,

b. Dependent Variable: exantelimits

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
5	Regression	18,701	11	1,700	4,901	.001[b]
	Residual	6,591	19	0,347		
	Total	25,292	30			

a. Dependent Variable: exantelimits

b. Predictors: (Constant), strategicinnovativeness, systemsinnovativeness,

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
5	(Constant)	0,972	1,361		0,714	0,484	-1,877	3,820		
	productinnovativeness	-0,293	0,114	-0,383	-2,561	0,019	-0,532	-0,053	0,612	1,635
	innovative edge	0,245	0,206	0,229	1,189	0,249	-0,186	0,676	0,368	2,716
	systemsinnovativeness	-0,015	0,211	-0,015	-0,073	0,942	-0,456	0,426	0,323	3,100
	productdevelopment	0,020	0,227	0,016	0,089	0,930	-0,455	0,495	0,433	2,309
	environmentalinfluences	-0,058	0,141	-0,071	-0,407	0,689	-0,354	0,238	0,451	2,218
	marketinnovativeness	-0,009	0,290	-0,006	-0,033	0,974	-0,616	0,597	0,412	2,428
	productmarketing	0,275	0,259	0,240	1,063	0,301	-0,267	0,818	0,268	3,725
	processinnovativeness	-0,083	0,257	-0,072	-0,324	0,749	-0,622	0,455	0,276	3,620
	knowledge management	0,415	0,256	0,470	1,619	0,122	-0,121	0,951	0,163	6,153
	behaviouralinnovativeness	0,118	0,269	0,119	0,436	0,668	-0,446	0,681	0,184	5,437
	strategicinnovativeness	0,207	0,251	0,213	0,827	0,418	-0,317	0,732	0,206	4,854

a. Dependent Variable: exantelimits

Appendix P: Data Collection from Interviews

The link to the video interview with the first interviewee.

https://drive.google.com/file/d/1YAW_icgyIxBtHtGz7KhiAU82T_cRdgON/view?usp=drive_web

The results of the interviews from three interviewees are pasted below.

Matsaseng

Survey Distribution_AutomobileManufacturing ()
No. of responses = 3

Survey Results

1. SECTION A: INNOVATIVE CAPABILITY

1.7) Which systems within the information, communication and technology (ICT), customer targeted strategies (i.e., Customer Relations Management) and engineering capabilities (i.e., Computer Aided Designs / Manufacturing) does your company employ to develop innovations?

Customer Relations Management	33.3%	n=3
Computer Aided Designs	66.7%	
Computer Aided Manufacturing	100%	
All of the above	33.3%	
None of the above	0%	

3. SECTION C: GENERAL COMPANY INFORMATION

3.2) Is your company a sole enterprise or part of a group of companies?

Sole enterprise	66.7%	n=3
Part of a group	33.3%	

3.4) Which figure from the list below bests approximates your company's annual turnover?

More	33.3%	n=3
< R170 million	33.3%	
< R50 million	0%	
< R10 million	0%	
Less	33.3%	

3.5) What is the average years of experience of your employees (team)?

Less than 5 year	0%	n=3
6 to 10 years	33.3%	
11 to 15 years	33.3%	
16 to 20 years	0%	
21 to 25 years	33.3%	
More than 26 years	0%	

Comments Report

1. SECTION A: INNOVATIVE CAPABILITY

1.1) What role does innovation play in your company?

- Critical role from a process point of view.
- Innovation plays a top priority especially if a company want to compete in the motor industry. Although this is a totally South African concept, it needs to comply with all the regulations of the motor industry.
  To develop a new model, innovation is also the main aspect and priority.
- Very important role as drives competitive advantage and drives business and process efficiencies.

1.2) What is your company's opinion about the regular introduction of innovative (i.e., unique, new and valuable) products in the market?

- Need to flexible and understand market trends with regards to innovation however should not be to frequent as need to achieve the required payback.
- Yes, but not only using innovation as a priority for new car developments but also to ensure that current models be upgrades as technology is changing.
- You have to evaluate carefully, not all innovation is helpful/what its meant to be.

1.3) In your opinion, is your company's current innovative products significantly different from previous ones? Please elaborate.

- We build to print.
- We manufacture to drawing and not responsible for design and therefore not responsible for product design.
- Yes, the current range of products is far more innovative from the first models we build. The new models are totally new and developed by innovative ways that we discovered by communicating with the customers as well as in the production process there are innovative ways of manufacturing.

1.4) What activities or tools are in place to make your company's marketing strategy innovative?

- We use mostly word-of-mouth marketing because a customer driving this vehicle always shows his / her friends the benefits. Social media also plays a role but in a lesser way.
- Website deployment.
- not applicable

1.5) What are the activities or instruments are in place that make your company's production, management and technological processes innovative in nature?

- Drive innovation with regards to business processes and manufacturing techniques to manufacture our products = Innovation with regards to process industrialization i.e. Poke Yoke systems , traceability etc. OEE management. CATIA used for tooling innovation.
- Team work approach
  Various software including simulation
- The main activities in place that is different from a normal car manufacturing production line is that the vehicle is 60% hand build to ensure quality and quality control is checked at every assembly point.

1.6) What is your company approach in engendering an innovative culture across all levels of organization including individuals, teams and management?

- Encouragement from the top down
- Every employee is passionate and motivated to see the end product and to ensure that there is no comeback. Employees are eager to see how their ideas are implemented in the final product.
- Key focus area as need to continuously innovate as a team, individuals = continuous improvement

1.8) What skills and competencies does your product manager hold that allows for the introduction, design and development of new products in your organization?

- Many employees in the production and development side are engineers with many skills from employment at other car manufacturing plants.
- We are not design responsible for Products as work to drawing.
- not applicable

1.9) What tools does your company employ to acquire and implement knowledge gained through local or external links to make you more innovative?

- AIDC and NAACAM. Equipment Suppliers to gain understanding of new technologies.
- We head hunt some employees to ensure we get the specific skills we need in all the different divisions in the business.
- project control and review

1.10) Does your company have a product marketing manager with a solid appreciation of the market and its future trends? If yes, please elaborate. If not, why haven't you hired one?

- We have a commercial team who understand customer trends and ensure that we are well positioned to support new program launches.
- Yes, we have. It is very important to bring the marketing and the production together to ensure a practical, workable product to satisfy the customer.
- not applicable

1.11) How does your company apply an inhouse acquired knowledge to develop innovative products?

- N/A
- Well, inhouse knowledge comes from many years of experience from the owner because he was involved in many motoring aspects in his life.
- not applicable

2. SECTTION B: SUSTAINABLE COMPETITIVE ADVANTAGE

2.1) What role do resources (i.e., tangible and intangible) play in creating value in your organization?

- Internal processes supported by Engineering through CI / Value streams / Six Sigma.
  Tooling manufacture through design for Six Sigma.
  OEE / ERP systems driving business efficiencies.
- Tangible resources like machines, equipment and tools plays a very important role because 99% of the vehicle is manufactured in South Africa in the factory and not outsourced.
- resources are key - both people and "tools

2.2) How would you differentiate your company's resources from its competitors? / What makes your company's resources uniquely different from competitors?

- Inhouse design capacity with a fully integrated toolroom.
- We do not really have direct competition but what makes us unique is the fact that 80% plus of the tooling and machines are also self-build to suit the project.
- resources are similar but the way we implement is the differentiation

2.3) What makes your resources superior to rivals in the creation of differentiated products?

- Because the tooling and machines are self-made, it is easier to adapt of change it when a new design is coming out. In this way, the machines are different as in a big manufacturing plant where all machines need to be changes for a new mode, which is billions of rands.
- Differentiation through process design as not responsible for product design.
- not applicable

2.4) What makes the quality of your resources inimitable, and their usage non-substitutable in the production process?

- Could be substituted.
- When a machine is built for a specific purpose, we make sure that the lifespan of such a machine is sustainable over a long period of time. It is also important to re-use many parts and other aspects of a machine when the lifespan of the specific machine is running out of time.

2.5) What makes the type of resources your company has non-tradable in the market such that rival firms are not able to acquire them?

- Because it is custom build specifically and cannot make to fit another product.
- People make the difference and the way in which we work. We are extremely entrepreneurial.
- Rivals could acquire.

2.6) How does your firm use its resources to maintain the superior position acquired as per above?

- This is never ending hard work.
- We focus in developing innovative tool designs in order to maintain superior position. Also focus on Innovative poke yoke systems considering assembly operations.
- We keep all our methods and ways of manufacturing for us and do not let anybody come into the manufacturing plant to copy with their eye or taking pictures.

3. SECTION C: GENERAL COMPANY INFORMATION

3.1) Please provide a brief description of your company's main business activity

- Manufacturing, marketing and servicing BRV vehicles, a sole South African product.
- We manufacture Metal Seat Structures for the local OEM's = Front Seat Back and Cushions as well as Rear Seat Back and Cushion structures. We also manufacture metal pressings and sub assemblies for Local Tier 1's and OEM's (local and international auto component market segment)
- machining, casting and forging

3.3) How many employees does your company employ?

- 15 people in total
- 850
- 1100

Appendix Q: Turnitin Report

KopanoFM2

ORIGINALITY REPORT

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25 February 2023

Declaration of professional editing

INTERNAL INNOVATIVE CAPABILITY AND SUSTAINABLE COMPETITIVE ADVANTAGE IN THE SOUTH AFRICAN AUTOMOBILE MANUFACTURING INDUSTRY

by

Kopano Matšaseng

I declare that I have edited and proofread this thesis. My involvement was restricted to language usage and spelling, completeness and consistency and referencing style. I did no structural re-writing of the content.

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