Journal of Transport and Supply Chain Management
ISSN: (Online) 1995-5235, (Print) 2310-8789

Investigating open innovation strategic alignment for sustainable competitive advantage in the automotive supply chain in South Africa

Authors:
Arthur M. Gonyora[1]
Stephen Migiro[1]
Bongani Ngwenya[1]
Pfano Mashau[1]

Affiliations:
[1]Department of Law and Management Studies, Graduate School of Business Leadership, University of KwaZulu-Natal, Durban, South Africa

Corresponding author:
Arthur Gonyora,
agonyora@icloud.com

Dates:
Received: 20 Nov. 2020
Accepted: 08 Jan. 2021
Published: 10 Feb. 2021

How to cite this article:
Gonyora, A.M., Migiro, S., & Ngwenya, B. & Mashau, P., 2021, 'Investigating open innovation strategic alignment for sustainable competitive advantage in the automotive supply chain in South Africa', *Journal of Transport and Supply Chain Management* 15(0), a554. https://doi.org/10.4102/jtscm.v15i0.554

Background: The automotive supply chain (ASC) is mainly composed of Small Medium Enterprises (SMEs) who are the most crucial drivers of South African economic activities. However, the sector faces many challenges that threaten its survival. Besides the added impact of COVID-19, the industry is experiencing financial and operational pressures, which are exacerbated by the proliferation of cheap imported components that have flooded the local market. These factors affect not only the component manufacturers but also the complete automotive supply chain. Hence, in order to survive, management has realigned its operational strategies to the open innovation archetype to stimulate sustainable competitive advantage.

Objectives: This study investigates how an open innovation strategic alignment influences sustainable competitive advantage decision-making amongst the various levels of management of selected automotive supply chain in South Africa.

Method: This article adopted an exploratory, qualitative approach. Fourteen semi-structured interviews were conducted amongst Chief Executiver Officers (CEOs), senior managers and Research and Development (R&D) managers of four selected firms who understood their organisation's research and development initiatives. Thematic analysis was used to process the data

Results: This study identified that the process of strategic alignment is central to the implementation of open innovation strategies, which hinges on the operational levels of the employees in an organisation.

Conclusion: This study provides a further academic understanding of the open innovation strategic alignment imperatives and assists management to understand how they can ensure that strategic alignment between and amongst themselves, as managers should cascade to all levels in their firms to enhance sustainable competitive advantage.

Keywords: open innovation; strategy alignment; competitive advantage; resource-based view; dynamic capabilities; absorptive capacity; collaboration.

Introduction

Ever-pressing economic hurdles have resulted in organisations engaging in focused innovation approaches, emanating from the recent developments in globalisation, information communications and technology (ICT) and the complexity of technology. These approaches are collaborative and termed as 'open innovation'; they are different from the traditional 'closed' innovation approaches. Closed innovation advocates the optimum innovative processes on the principle of improving offerings, cost-cutting and the management of macro-economic factors whilst increasing technological expansion and diffusion (Lichtenthaler 2011).

The concept of open innovation strategy alignment primarily stems from observing innovation changes and the evolution of how managers respond to their business environments' (Chesbrough 2003, 2006). This practice-based approach explains to some extent why open innovation strategy alignment research has not received proper attention in previous studies (Chesborough 2003). The failure to adapt to the phenomenon of this model to current theories of management represents a gap in the available literature and an urgent necessity to overcome this deficit in the available theory.

As a result of this deficit, there is a need to focus on the theoretical foundation of open innovation strategic alignment.

The growing interest in open innovation management in many organisations, including the automotive supply chain, provides several opportunities to shed new light on existing theoretical frameworks on innovation. The study argues that existing management theories should be combined to develop a consistent body of knowledge about this paradigm, particularly in this industry, as none of them can fully explain how the automotive supply chain can benefit from the open innovation strategic alignment. This article sheds light on open innovation from multiple perspectives and brings theories together as illustrated in Figure 1 to develop a better theoretical grounding of open innovation in this industry (Chesborough 2003). Specifically, it explored the necessity to link open innovation to the literature on strategies comprising of collaboration, inventiveness, commercialisation and versatility to different theories of the firm, for instance, the competitive advantage, resource-based view (RBV) theory, dynamic capabilities-based views and portfolio theory.

Background

The expansion of the automotive supply chain has seen South Africa emerging from humble beginnings to become a force to reckon with as the world's 23rd most significant producer of automobiles. In 2012, from Africa's total output, the automotive industry produced 92% (David 2014). They attracted four major European automotive manufacturers, namely, BMW, Mercedes Benz, Renault and Volkswagen, which were foreign owned.

At the same time, General Motors, Toyota, Ford and Nissan, which is Japanese, and other multinational producers, became 100% owned subsidiaries (Boonpan 2012).

The automotive industry contributes significantly to the rapidly growing economy and industrial development, accounting for 7% of the Gross Domestic Product (GDP) in 2012. This country was ranked number 23 in global automotive production, sharing 0.6% of the market in 2012 (David 2014). There has been massive investment in this industry, which has facilitated growth in exports, with capital expenditure support to Original Equipment Manufacturers (OEMs) over the period 1995-2011. This investment amounted to R43.5 billion. At the same time, the actual value of automotive component exports grew over the 16 years (1995-2011) to R685.3 billion, contributing to the annual growth rate of 20.5% (Merven 2012).

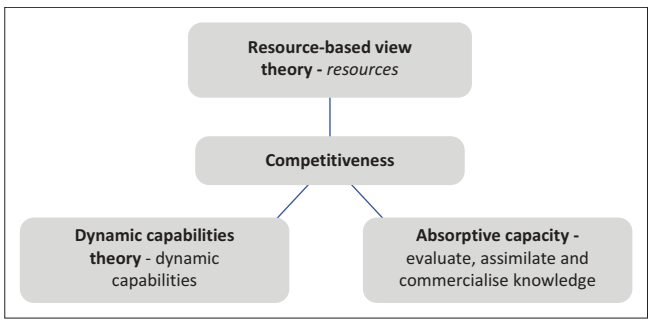


FIGURE 1: Automotive supply chain management competitiveness drivers.

The local automotive industry is driven strongly by the parent OEMs in terms of operation strategies, and this is the norm worldwide. As a result, the industry's structure has always been kept firmly in fit with the OEMs' requirements in the domestic and international markets. This orientation is a deliberate attempt to making OEMs export driven and significantly transforming the industry's operational structure and the outlook of the component manufacturing sector (Barnes 2010).

The country's membership of the World Trade Organisation (WTO), the excellent trading relationships with the European Union (EU) and the competitive advantages over its competitors have stimulated the integration of the industry into a global supplier and sourcing amongst their global peers (Ambe 2013).

From a worldwide perspective, flexibility and competitivity are critical as they are catalysts of business models. These attributes, namely, the flexibility and competitivity, are suitable in successful niche markets requiring the same platforms to produce large quantities of products at low cost with specific model derivatives (Tolmay 2012:9). The industry has significantly reserved its capacity and potential, with single facilities manufacturing a range of products at competitive costs for both domestic and export markets.

Problem statement

As stated before, the South African automotive supply chain faces challenges of global competition exacerbated by the sluggish pace of innovation that has seen the domestic industry lagging behind its global competitors. The domestic automotive component manufacturing sector has seen its innovation efforts scuttled by challenges, such as weak technology diffusion, environmental factors and uncertainties inherent in their operations. Within this context, the following problem statement was formulated:

- There is a lack of knowledge in the alignment of open innovation strategies to achieve competitive advantage faced by automotive component managers, which may negatively affect the sustainability of their business unless the processes are managed.

Accordingly, the following research objectives guided this study:

- To identify the nature of open innovation strategies implemented by the automotive supply chain in the automotive industry in South Africa.
- To examine the extent of open innovation strategic alignment for sustainable competitive advantage amongst the levels of management of the automotive supply chain in the automotive industry in South Africa.

Contribution

The context of this study is the South African automotive industry, particularly the supply chain open innovation strategic alignment imperatives, and the decisions arrived at in managing competitive advantage. There has been an increase in the interest of academics and practitioners in the area of open innovation strategic alignment globally (Conell 2012). However, there is a lack of research on this topic in developing countries, compared with that conducted in developed countries (Edwards et al. 2005; Lee et al. 2010; Rahman & Ramos 2010; Wynarczyk et al. 2013).

Various research studies have been conducted on open innovation in South Africa in areas such as appetite and use of open innovation amongst Small Medium Enterprises (SMEs) (Krause & Schutte 2015), open innovation in the SME manufacturing sector (Kasende 2016), open innovation business model for SMEs (Moonsamy 2017), and role of universities in open innovation activities (Mashau 2018).

There is, however, no evidence of previous research conducted on the use of strategic open innovation alignment to achieve competitive advantage (Krause & Schutte 2015) amongst the automotive supply chain in South Africa, necessitating this study.

The findings of this study contribute to the body of knowledge in the automotive industry and the field of supply chain management. The results give rise to several managerial implications that will add value, particularly to the automotive supply chain's approach to open innovation and management of their open innovation trajectories for sustainable competitiveness.

Practical suggestions are made, which could help the automotive supply chain to better manage its supply chain open innovation strategic alignment for attaining competitive advantage.

The next section deals with a summary of the literature review, followed by a description of the research methodology. Then the findings are presented, followed by the practical implications of the research. Finally, the article then concludes with the research limitations and areas of future research.

Literature review

This section presents an overview of competitive advantage, open innovation strategies and the different firm theories underpinning the study.

Competitive advantage

The concept of strategic management is a broad term consisting of various facets that are essential for any organisation that thrives on being prosperous through competitiveness. Porter (1980) proposed that competitiveness is attainable using the competitive force approach that assesses strategy formulation in industrial ecosystems. The plan advocates that there are five different forces in the industry, namely, competition in the industry, entry barriers, risks of substitutes, brokering capacity of consumers and suppliers, enmity in the business environment (Reed, Storrud-Barnes & Jessup 2012).

These forces determine how the organisation is ranked in the industry and, accordingly, assists in finding an approach that an organisation can use to protect itself. When an organisation shifts from one force to the other, it indicates that the organisation is benchmarking according to the business and market conditions. A style that is related to the above scenario is the strategic conflict approach (Shapiro 1989). It acknowledges the existence of product and market imperfections, barriers to entry and strategic collaboration, and examines how organisations achieve competitiveness through investments, prices, signalling the evidence given using the game theory; the key determinant in these approaches is the market position.

Barney (2001) suggested that competitive advantage occurs when organisations and their resources become heterogeneous. In this regard, the most crucial factor is the growth of dynamic capabilities (Teece, Pisano & Shuen 1997).

These views revealed that organisation-specific resources and capabilities are central to the development of competitive advantage in an organisation. They introduced different factors to explain the industry dynamics amongst rivalries that presented an opportunity for alternative strategic approaches. When comparing the framework proposed by Porter (1980) with the structure of dynamic capability (Teece 2007), exciting themes emerged. A depiction of a sharp break from the Five Forces (Teece 2007:67) is the framework for dynamic capabilities. This framework, in the environmental context, does not represent industries at large as articulated by Porter (1980) but instead, they present the ecosystem business operates in. This is commonly referred to as an association of 'counterparts, providers, legal authorities, evaluators and educational and exploration institutions'. These capabilities occur when creating tools and business simulations that develop a competitive advantage in amassing and composing complex assets (Teece 2007:78).

Resources based view

The central theme in attaining a competitive advantage is the way an organisation utilises the RBV theory, which regulates the strategic resources available to them.

Organisations control these resources and use them to improve their efficiency. It is possible to distinguish the basis of competitive advantage because organisations possess heterogeneous resources (Barney 2001).

Achieving continuous competitive advantage means the support of the organisation must have four attributes, namely, valuable, rare, imperfectly imitable and

non-substitutable. When these attributes are all present, the organisation can or will achieve sustained competitive advantage. It follows that organisations should seek inside their boundaries to establish vital resources that will enhance their competitive advantage, instead of merely focusing on competitors and the markets (Barney 2001).

Lavie (2006) extended this theory 'to include the network resources of interrelated organisations' identified as an addition to the RBV. The inclusion of resources from other organisations indicates that companies must not focus on the control or ownership of their support.

He differentiated the shared with the non-shared resources to demonstrate the recognition of new types of rental and how organisational relations and partnership-specific factors affect networks.

Based on the comparison of the RBV, which focuses resources that are owned and managed by an organisation, he argued that the model proposed overcame this weakness as other organisations can use the same resources simultaneously.

Dynamic capabilities view

The Dynamic Capabilities (DC) model (Teece et al. 1997) emphasises both internal and external capabilities. This approach introduces the notion that innovation is a source of competitive advantage. 'Dynamic', however, represents the renewal of capabilities to adapt to the ever-shifting business landscape. Whilst 'capabilities' signify the adaptation of strategy by management, the integration and reconfiguration of internal and external skills are signified to meet uncertainties in the environment where businesses operate in (Teece et al. 1997).

Consequently, achieving the organisation's position via a process confined to the route of minimum imitability in capabilities is possible. These capabilities include administration, Research and Development (R&D), product and operation development and manufacturing.

The ability to reconfigure assets and structure them is central to attain sustainable profits and market advantage, especially as growth in the business and markets or technologies progresses with time. Additionally, reconfiguration is critical in avoiding path dependencies that are negative to the organisation (Teece 2007). He further argued that DC is the key ingredient to gaining a competitive advantage. Rapid changes in technology indicate how successful an organisation is in the conception and operation of intangible assets based on economic profits.

The approach of dynamic capabilities has, however, received critique important to knowledge generation.

According to Winter (2003), no organisation can certainly protect itself from the fast ever-changing business landscape through DC over time. Nevertheless, there is a continued advantage of achieving potential success by focusing on the present strategic changes. A literature review by Barreto (2010) explains how various scholars criticised the concept. Specifically, it was Williamson (1999) who stated that dynamic capabilities trace back to incorrectly unutilised success. Concerning its vagueness, Kraatz and Zajac (2001) reported that practical skills as a concept are quite undistinguishable and problematic to manage. A further understanding of the idea of DC would benefit the field, and this understanding could include an in-depth analysis of the possible processes and routines, which might add to the existing theory. Nonetheless, the possibility of using and studying a concept leads to understanding and acknowledgement of its shortcomings.

Absorptive capacity

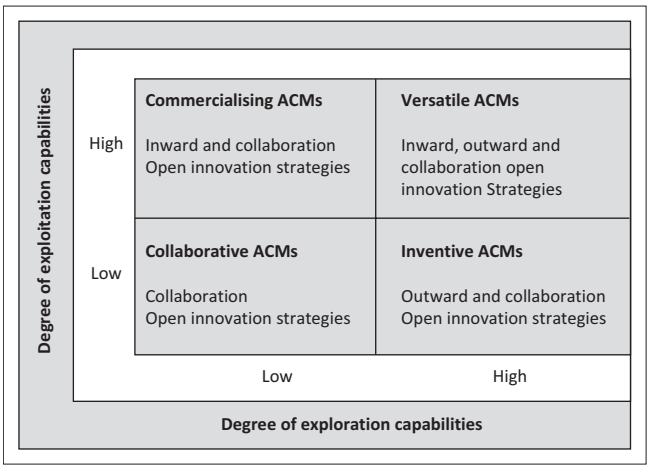
Absorptive capacity is an organisational ability to evaluate, assimilate and commercialise knowledge that originates outside the firm. Cohen and Levinthal popularised the concept with their model, describing the dual roles of R&D, as a source of innovation and as a means of enhancing the firm's ability to learn. According to Cohen and Levinthal (1989, 1990), through absorptive capacity, the organisation can recognise the benefit of new information and apply it to achieve business success. The literature on the archetype 'open innovation' (Chesbrough 2003, 2006; eds. Chesbrough, Vanhaverbeke & West 2006; Christensen, Olesen & Kjær 2005) and absorptive capacity (Arora & Gambardella 1990; Hughes & Wareham 2010; Lenox & King 2004) emphasises on how innovation in organisations benefits them when they utilise the technology acquired outside the organisation. This conclusion is mainly as absorptive capacity focuses on obtaining and exploiting outward knowledge inside the organisation (Lichtenthaler & Lichtenthaler 2009); it is a concept at the heart of the external and internal knowledge. The connection between absorptive capacity and open innovation stems from the link between them.

Open innovation strategies model

The automotive supply chain management (ASCM) Open Innovation Strategies model represents the various approaches that diverse ASCMs are likely to apply to strengthen the performance of an organisation by increasing innovation activity and economic performance. The strategies are responsible for the successful overwhelming core challenges faced by component manufacturers about their size, otherwise coined (size-related challenges).

This archetype is referred to as 'resource scarcity, inadequate dynamic capabilities, and extreme exposure to risk'. This archetype assumes that ASCM's 'knowledge exploration', referred to as 'creation of value', and 'knowledge exploitation', referred to as value capture, help to select the appropriate strategic options to follow.

It assumes that ASCM's leverage changes over time and can hypothetically accept other alternatives in the future.



Source: Cornell, B.T., 2012, Open innovation strategies for overcoming competitive challenges facing small and mid-sized enterprises, University of Maryland University College
ACM, Automotive supply chain management.

FIGURE 2: Automotive supply chain management open innovation strategies.

Cornell (2012) suggested that the open innovation strategies model (Figure 2) assumes that the ASCM must concentrate on essential elements in the management process, which encompass guidance, reinforcement of absorptive and adsorptive capacities, cultivation of risk-taking culture, employee motivation, exploiting functional business systems, effective decision-making and employee assurance, and other numerous factors. The proposed archetype highlights those facets as they are vital in determining which strategy an ASCM should pursue. This model incorporates management considerations to focus on lower forms of innovation strategies that can be followed by ASCMs who possess unique strengths in competition depending on whether they are 'exploration and exploitation capabilities' (Dahlander & Gann 2010).

With the automotive industry being the focal point, the study author adopted this archetype to assess a variety of ASCM approaches for contending with others in this environment, given ASCM's relative innovation exploration and exploitation strengths. There are many combinations of strategies and sub-strategies. For example, inward open innovation viewed in numerous ways, including strategies such as procurement or hiring of a patent, exchange of stock for a patent, acquiring mutually joint patents, acquisitions and subcontracting R&D projects.

Inward and outward innovation can coincide by combining other unique strategies such as cross-licensing. Simply put, this model focuses on the three main groupings (inward, outward and collaboration strategies) of open innovation. The model pairs them to the categories of ASCMs that will use and benefit from them. A theoretical assessment was carried out based on the following:

- Its ability to increase ASCM innovation outputs and financial performance.
- Its strategic mitigation or aggravation of the mentioned challenges, which are resource scarcity, limited dynamic capabilities and disproportionate risk exposure.

This study intends to establish the link between the reduction of challenges affecting these ASCMs and the actual performance outcomes; the study allows us to evaluate the impact and challenges encountered by ASCMs in the implementation of the archetype. It also evaluates the archetype's validity, allowing it to apply to a variety of industries and product range, and be intentionally recognised. The configuration of resources and dynamic capabilities determines the organisation's unique quantity and quality of value capturing and creation capability from one product to the next. For example, from a study based on the microprocessor industry, an ASCM with characteristics of advanced research expertise may not possess high knowledge value creation in the mobile device or hard drive manufacturing sector. Also, an organisation may have a product in the Inventive quadrant (Product A), whilst the more recent product may be in the Collaborative quadrant (Product B). This situation is acceptable when an organisation does not have exploration capabilities associated with Product B.

Each quadrant is identified by a name that describes the archetypal strategic positioning in that quadrant. As an illustration, ASCMs at the lower right quadrant are focused on investing in the production of new knowledge, whereas ASCMs at the upper left quadrant will focus on commercialisation initiatives. Each quadrant describes all ASCMs, and the classification designed to give an easy reference. All ASCMs could follow the collaborative route, but the ASCMs in the lower left quadrant could employ only collaborative strategies. This choice is a result of the lack of proficiency in the creation of value, and hence, classified as 'inventive', and the capturing of value capabilities classified as 'commercialising' and combined capabilities classified as 'versatile'. It follows that ASCMs in the other quadrants are known to be 'collaborative'. The collaborative approach is available as a strategic option in every quadrant.

Collaborative automotive supply chain management quadrant

Collaborating ASCMs that are represented in the lower left quadrant in the model lack innovative exploration and exploitation capabilities. Besides the lack of explorative or exploitative capabilities, they possess the option to implement various collaboration approaches that permit control of the exploration and exploitation strengths over other organisations. Also, there are three core classifications of collaborations with employees termed 'closed innovation approach'. These collaborations are (Poot, Faems & Vanhaverbeke 2009) vertical, horizontal and knowledge-intensive collaborations. Whilst collaboration is the primary open innovation strategy available, it is not exceptional to the collaborative organisations only as ASCMs in supplementary quadrants could, by choice, implement collaboration-interrelated strategies. These subsequent suggestions are about ASCMs universally notwithstanding the quadrant they occupy.

Inventive automotive supply chain quadrant

The inventive quadrant is at the lower right side of the model. As the ASCMs in this quadrant have strong knowledge creation (exploration) abilities, referred to as 'inventive', they are likely to be dependent on their unique configuration of resources and capabilities. Many ASCMs belong to this group because they experience challenges with value capture (Lee et al. 2010). Additionally, Motohashi (2008) revealed that ASCMs who possess fewer capabilities to commercialise resort to the option of licensing-out their innovations to willing partners.

Commercialising automotive component manufactures quadrant

The upper left quadrant of the model is the 'Commercialising' ASCMs quadrant. These organisations are synonymous of intense commercialisation, termed 'exploitation capabilities' matched with not as much robust knowledge creation, termed 'exploration capabilities'. The conversion of external ideas into new products achieved through commercialisation, and ASCMs in this quadrant focus on this activity. There are fewer ASCMs in this group than in Inventive or Collaborative quadrants because many organisations lack commercialisation abilities (Keupp & Gassmann 2009). This group includes manufacturers and niche organisations with specialised distribution channels. Other organisations are bound to gain an advantage by obtaining intellectual property (IP) since their status makes them better positioned to consider IP as a feasible option. 'Inward open innovation' gives ASCMs a competitive advantage when bringing products to the market.

Versatile automotive component manufactures quadrant

The Versatile ASCMs quadrant is on the upper right side of the model and depicts organisations that are the strongest. More established mid-sized and small organisations included in this cluster have reached maturity and are deeply rooted in niche markets. They possess a robust knowledge creation and exploitation capabilities. They are self-reliant in terms of exploration or exploitation assistance and can opt for a more closed innovation approach. They can benefit by implementing more than one innovation strategy; these are inward, outward or collaboration. In order to enhance their organisational performance and competitive standing, these ASCMs can implement an approach of using different strategies, sub or coupled strategies. When negligible benefits derived from the formation of these actions are equal to the marginal costs, these organisations start seeking an approach to change the excellent symmetry of depth (intensity) and breadth (scope) of these activities; hence, we reach final proposition.

Methodology

The research methodology addresses the research approach and design, sampling, data collection, data analysis and ethical considerations.

Research approach and design

In this article, a phenomenological paradigm was followed as the study sought to establish how members of a group interpret the world around them (Mertens 2010). Hence a phenomenology-based qualitative research approach was used to conduct this study. Qualitative research is about recording, analysing and attempting to uncover the more profound meaning and significance of human behaviour and experience, including contradictory beliefs, practices and emotions (Blumberg, Cooper & Schindler 2014). Use of the qualitative approach in this study afforded participants the opportunity and freedom of expression and provided them with latitude to respond honestly. The qualitative approach is less rigid and allows for thoughts, feelings and behaviour to be used rather than when they select from predetermined responses (Leedy & Ormrod 2015)

Sampling design

The target population for this study included Chief Executive Officers (CEOs), senior and R&D managers drawn from the automotive supply chain in the KwaZulu Natal, Gauteng and Eastern Cape. The sampling frame for this study is a list maintained by the National Association of Automotive Component and Allied Manufacturers (NAACAM).

The record shows all firms within the automotive component manufacturing industry, which are full members of the association, have gone through the NAACAM audit according to its code of conduct.

A non-probability purposive sampling approach was used to select participants. Non-probability sampling is used when there is no way of either predicting or guaranteeing that each element of the target population will be represented in the sample (Leedy & Ormrod 2015). In purposive sampling, people or units are chosen for a particular purpose (Cresswell & Plano Clark 2011). In this research study, only managers who had worked for at least 5 years in the automotive industry were recruited as participants. There was no pre-set sample size for participants because the study used the sequential method of data collection in which the saturation point determined the sample size.

Target population and sample

Blanche, Durrheim and Painter (2006) stated that the bigger pool from where the study draws sampling elements and findings generalised is the target population. Goodenough and Waite (2012) additionally argued that the target population emanates from the cosmos of elements. Saunders, Lewis and Thornhill (2009) concurred by upholding that the target population is the complete instances of the sample.

This study targeted South African ASCMs producing and selling components to the OEMs. Naude and Badenhorst-Wess (2011) applied this target population in their research to investigate supply chain management problems encountered by ASCMs. The target population included ASCMs in South Africa.

This group plays a vital role in the local automotive industry by manufacturing and supplying components to the domestic OEM market.

The ASCMs, as the primary key stakeholder, are vital in providing better information and more insights into the supply chain management problems than the target population. This target population was also used by Ambe and Badenhorst-Wess (2013:1) when they investigated 'challenges faced by companies in the local vehicle supply chain in South Africa'. The selection focused on the role, expertise and experience in the automotive industry.

Finally, this target group established the influence that supply chain sources of knowledge have on innovation within developing country automotive component manufacturing (Amojee & Steyn 2015:1). In their study, the target population was ASCMs, and the selection justified by their representation in the sector.

From the above assertions, the inference is that it is beneficial for this study also to utilise this target group as it is a central player in the South African automotive industry. The organisations used for this current study are ASCMs based in KwaZulu-Natal, Gauteng and Eastern Cape. The unit of analysis sampled included employees of these organisations, namely, the CEOs, Senior and R&D managers. The NAACAM database provided the target population for this study, which constitutes companies participating in the automotive industry. In other words, the study considered respondents from the component suppliers segmented amongst business owners or managers and innovation decision makers (Van de Vrande et al. 2008).

Qualitative data collection

Data were collected using face-to-face semi-structured in-depth interviews. A semi-structured in-depth interview is one in which the interviewer has a checklist of topic areas or questions to make the participants communicate in their terms (Jamshed 2014). An interview protocol was developed to aid the process of data collection and was used in interviews that lasted for periods ranging between 20 min and 30 min per session. A voice recorder was used to record all conversations.

For this study, an interview guide containing details of the topics with interviewees was developed for the qualitative data collection purposes. The interview protocol guide helped to check the correctness of all relevant subjects about the objectives of the study during the interview.

The purpose of the interviews was to identify the view of the 14 key industry experts in the automotive component sector in establishing the automotive component manufacturer's challenges and strategic imperatives of open innovation adoption based on the size of the firms. There was an initial telephonic contact with the secretaries of the organisations in order to elicit assistance to conduct the study and set the date and time for their interview.

All 14 industry experts accepted to participate in the interview on receipt of the emailed interview guide. The interviews took place in Durban, Pretoria and East London between January and February 2020. The interview schedule (see Table 1) shows the following respondents who participated in the interviews.

Data analysis

The data were analysed by thematic analysis. Thematic analysis is a general approach for analysing qualitative data, and it involves identifying themes and/or reporting patterns in the data (Wagner et al. 2012:231). This analysis was performed in this study by following the six steps proposed by Braun and Clarke (2013:3).

These steps included understanding the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. The field notes added further context to the participants' answers in the transcription documents and were used to confirm comments made by the participants.

Validity and reliability

The validity of purposive research results or data depends on the level of their merit and worth, that is, their trustworthiness. The term 'trustworthiness' was used by Lincoln and Guba (1999:394–444) to describe the criteria involved in establishing the credibility, consistency, transferability and confirmability of data. Credibility was improved using the researcher's personal notes, which included a brief review checklist of observations and were matched against the transcribed interviews. The questions in the interview guide were phrased in simple language in order to ensure that there was no ambiguity. The participants were given the opportunity to ask questions and seek clarity, if needed, before responding to the questions. Therefore, consistency was maintained during the interviews, which contributed to the trustworthiness of the results of the study. In order to ensure conformity of the data, the interviews were recorded using 'Listen N Write Freeware' and transcribed verbatim using the same software. An assistant carried out the transcription

TABLE 1: Demographic profile of participants.

Description	Position	Diploma	Degree	Masters	Phd
CEO	3	0	0	2	1
Senior manager	3	1	1	1	0
R&D manager	5	3	2		0
Total	**11**	**4**	**3**	**3**	**1**

CEO, Chief Executive Officer; R&D, Research and Development; Phd, Doctor of Philosophy.

process, and the transcribed data were reviewed and checked for accuracy twice by the author.

Research findings

This section presents the findings based on the study objectives, which sought to

- identify the nature of open innovation strategies implemented by the automotive supply chain in the automotive industry in South Africa
- examine the extent of open innovation strategic alignment for sustainable competitive advantage amongst the levels of management of the supply chain in the automotive industry in South Africa

Description of the sample

A total of 14 managers drawn from the automotive supply chain were interviewed. However, three managers responded late, and hence, were considered to be unavailable to confirm the accuracy of their transcripts in the audit trail. As a result, their insights were excluded from this study, leaving 11 participants whose ideas were captured and used in the final analysis of data. An extensive body of book chapters, scholarly articles and books (e.g. Baker & Edwards 2012; Charmaz 1990; Dworkin 2012; Morse 2000) recommend guidance and suggest anywhere from five to 50 participants as adequate for qualitative interviews. Moreover, in this study, saturation, which is the point at which the data collection process no longer offers any new or relevant data (Mason 2010), was reached at nine interviews, although 14 interviews were conducted eventually. The final sample size of 11 participants was, therefore, recognised as sufficient for this study. The demographic profiles of all participants are presented in Table 1.

Table 1 shows that the final participants included 11 managers representing CEOs, senior and R&D managers and their levels of academic qualifications; all participants had more than 5 years of experience within the automotive supply chain. Amongst the management of the automotive supply chain, R&D managers appear to be the least qualified with no academic masters and Doctor of Philosophy (PhD) qualifications. It is not surprising in this industry to have such a phenomenon as the R&D personnel are more on the technical side of the industrial business. Their technical diplomas and first-degree qualification suffice for the roles they play in the automotive supply chain, unlike the CEOs and senior managers who are expected to play more of conceptual and strategic roles.

Themes emerging from this study

The themes that emerged from this study are categorised into four groups (Table 2):

- similar executive management, strategic thinking and open innovation orientation – *strategic thinking*
- same level and degree of management commitment to open innovation initiatives – *open-mindedness*
- willingness to explore external knowledge acquisition - *inbound and outbound focus*
- a culture that fosters leadership support for external collaboration and external knowledge sharing – *External knowledge acquisition*

TABLE 2: Emerged themes.

Research question	Emerged themes summary		
	Category	Central theme	Interviewee
'The nature and extent of automotive supply chain open innovation strategic alignment for sustainable competitive advantage in the automotive industry'.	1. Similar executive management, strategic thinking and open innovation orientation	Strategic alignment	CEO 1
	2. Same level and degree of management commitment to open innovation initiatives	Open-mindedness	Senior manager 3
	3. Willingness to explore external knowledge acquisition	Inbound and outbound focus	CEO 2
	4. A culture that fosters leadership support for external collaboration and external knowledge sharing	External knowledge acquisition	CEO 1

CEO, Chief Executive Officer.

Strategic thinking

Chief Executive Officer 1 had the following to say:

> 'The fundamental principles for the success of open innovation initiatives are the ability within the top organisational management to be able to set plans and organise the innovation activities that are linked and drive the organisation's sustainable competitive advantage in this industry. Embedded in the organisation's culture is the ability of the executives to see these things with the same eye. There must be strategic alignment in thinking, in understanding and way forward in pushing this open innovation trajectory.' (CEO01, Chief Executive Officer, 27 January 2020)

Senior Manager 3, who suggested the following, corroborated the views of the Chief Executive Officer:

> 'Like any other strategic initiative by us, open innovation requires careful planning, organising, staffing, controlling … Uhm, by a dedicated team of managers, working together in harmony, in the same mind and vision, not half-hearted, it must be dedicated persons – that is essential for me.' (SM03, Senior Manager, 14 February 2020)

Chief Executive Officer 2 was quite elaborate on this concept of open innovation and how they are implementing open innovation in their automotive component manufacturing firm. He had the following to say:

> 'It takes basic knowledge of what open innovation is, its environment, its constituencies both within the organisation and externally and also the necessary skills and expertise that are required to be able to handle and drive the organisation's open innovation initiatives. These skills mean a lot about the people involved. Think in the first instance; these persons should be strategists, Uhm … not on their capacities but as a collective body of top management to get an understanding of the strategic positioning of the company's open innovation plans. Strategically going from innovative products, processes so forth … and to

> great sustainable competitive advantage, if that is the decision. So, these persons should be strategists, strategic, understand the strategy, should understand structure relationships, and should understand the implementation of the open innovation strategy. What does it look like on the ground? They have to bear that in mind.' (CEO02, Chief Executive Officer, 29 January 2020)

It is clear from the participants` views that at the centre of successful adoption and implementation of open innovation lies the abilities of top managers to be able to work together and understand the strategic direction that the firm seeks to take in its open innovation adoption. In other words, when executives disenfranchise, the firm's open innovation strategy becomes unsuccessful. Strategic alignment amongst the top management is critical for the success of organisational open innovation adoption.

Open-mindedness

Open innovation identifies new product development prospects and performance by organisational internal R&D activity. R&D provides new product development needs solely, whilst open innovation needs external sources, such as external knowledge of expert individuals, ideas of customers and technologies (Chiaroni et al. 2011; Trott 2008). There are several attempts concerning open innovation models with the notion that openness could steer and stimulate the processes of innovation by integrating large and different pools of external sources, resulting in increased product development diversity and optimal matching of consumer preferences and products (Boudreau 2006; Chesbrough 2003; Von Hippel 2005).

Senior Manager 1 intimated as follows:

> 'It takes new idea generation and pushing these ideas through by seeking new outside applications for these internally generated new ideas to fruition as developed innovations, developed new knowledge, developed new processes and tools.' (SM01, Senior Manager, 07 February 2020)

In support of Senior Manager 1, Senior Manager 3 suggested as follows:

> 'Open innovation hinges on open-mindedness and creativity in coming up with new products, new processes, and services to sustain the livelihood of the company bearing in mind that successful development of new ideas requires various stakeholders' input and several different sources such as competitors, suppliers, customers, other industries and employers of course.' (SM03, Senior Manager, 14 February 2020)

Chief Executive Officer 2 could only say:

> 'Innovation in new product development only takes creative minds…nhm...creativity, creativity, no more, no less.' (CEO02, Chief Executive Officer, 29 January 2020)

From the assertions of the participants, open innovation impacts new product development prospects for the automotive supply chain. There was one thing in common, in what all the participants said in response. At the centre of new product development, new processes and services lie individual creativity and open-mindedness.

Inbound and outbound focus

Erosion factors include factors such as the increasing mobility of employees, universities becoming more capable, declining country hegemony and increasing access to start-up venture capital. These erosion factors have changed the conditions under which firms innovate. The automotive industry in South Africa is not an exception. In essence, erosion factors are at the centre, and at a core of why open innovation defines and reflects a paradigm shift as underlying assumptions, solutions, problems and methodologies for conducting research and practices of the 21st industrial century of Innovation (Chesbrough 2006).

Senior Manager 3 had this to say regarding the open innovation erosion factors:

> 'In our efforts to continue innovating and reaping the benefits of first-mover, we find ourselves gradually eroded in terms of ability to leverage inflows and outflows of knowledge within and across our business boundaries, abilities to manipulate or leverage external sources of knowledge in particular and see our commercialisation paths carved. We find ourselves gradually losing our positions as integrators of technology internally and externally in the automotive industry.' (SM03, Senior Manager, 14 February 2020)

Chief Executive Officer 1 corroborated the above assertions as follows:

> 'From a strategic point of view, while benefits are accruing to us as we engage in open innovation, there is a trade-off or what economics would refer to as opportunity costs … Uhm, open innovation renders us vulnerable and susceptible to skills migration to our competitors. Inbound knowledge from suppliers increases and this has an effect of diluting our claims on purposive inflows and outflows of knowledge; at the same time, we are experiencing increased knowledge exploration and exploitation from the original equipment manufacturers. Research and development costs, in the long run, become unsustainable.' (CEO01, Chief Executive Officer, 27 January 2020)

Erosion factors are the downside of open innovation. However, the benefits of innovation outweigh the negative impacts of engaging in open innovation. In essence, erosion factors are evidence of spillover effects of open innovation.

External knowledge acquisition

Organisational culture is the assortment of standard values, beliefs, habits, norms, representations and behaviours commonly shared by the organisation's members. Organisational culture serves as the social cement binding the life of organisations. It is also a powerful management instrument and tool that allows organisational members to act consistently and independently. In contrast, innovation culture is a distinct and particular configuration that stimulates innovative thinking within organisations and encourages innovation initiatives and activities at the organisational leadership level, as well as within all organisational employees (Rahman & Ramos 2010).

Chief Executive Officer 2 motivated his thoughts on the phenomenon as follows:

> 'Organisational culture lies at the heart of successful open innovation … mm … particularly the culture of fostering independent thinking among top organisational management. The whole thing begins with individual idea generation, promotion of the new ideas through external engagements by way of seeking new outside applications for the internally developed innovations and knowledge. Without the cultivation of the right culture, the culture that promotes individual independent thinking engaging in open innovation becomes a futile activity. There is a correlation between sound organisational culture and open innovation efforts and activities.' (CEO02, Chief Executive Officer, 29 January 2020)

Like any other competitiveness driving strategic management trajectories, open innovation hinges on the embedded organisational culture. In essence, organisational culture is the driving force behind these business competitiveness drivers.

Chief Executive Officer 1 had the following to say:

> 'As a competitive firm, we are small as we need to cultivate a culture of encouraging workers creativity. Management supports external collaboration and external knowledge sharing. This culture is the starting point ... nhmm ... the initial step in innovation. There is a positive correlation between organisational culture and innovation. Knowledge acquisition is key and technological advancement.' (CEO01, Chief Executive Officer, 27 January 2020)

Senior Manager 2 expressed himself as follows:

> 'Since engaging in consistent innovation in terms of new products, new processes, quick and positive response to market demand changes, and customer preferences, we have seen our financial performance improving tremendously. We have been able to meet our set financial objectives to the satisfaction of our shareholders.' (SM02, Senior Manager, 11 F/02/2020)

Senior Manager 3 had this to say:

> 'Innovation can be in the form of new products, new services, processes, or novel technology converted to a monetary value for the good of the company. It is our duty as management just to do that; otherwise, all the technical knowledge and creativity becomes useless.' (SM03, Senior Manager, 14 February 2020)

It is quite clear from the participants' responses that organisational culture plays a critical role in driving organisational innovation initiatives to create needed sustainable, competitive advantage. Alternatively, there is a positive correlation, moderate or intense, existing between organisational culture and innovation initiatives for competitiveness.

The implication of results for policy and practice

The results of this study from a qualitative analysis point of view showed that the automotive components manufacturers Chief Executives, and their functional senior and R&D managers are in the same mind when it comes to an understanding of the nature of their open innovation strategies and implementation. Even though R&D managers who are technically inclined with lower qualifications than their counterparts with higher academic qualifications and expected to demonstrate more of conceptual roles in the automotive industry supply chain, they still demonstrate strategic alignment There is a vital strategic alignment position between the top management of automotive components manufacturers. From a strategic management perspective, this is the right phenomenon; harmonious strategic thinking and alignment are required and necessary to drive the organisation's open innovation strategies to achieve competitiveness. The primary objective of why the automotive component manufacturers engage in open innovation is to leverage sustainable competitiveness. The study recommends that the management of the automotive components should ensure that the evidenced strategic alignment between and amongst themselves as managers should cascade to all levels of employees in their firms. This strategic alignment is critical as the implementation of strategies hinges on the strategic dispositions of the operational levels of organisational employees.

Study limitations and suggestions for future research

This study is limited in its use of a qualitative approach, which suggests that the findings are subjective opinions of the participants. Additionally, the study is limited as it was based on a small sample of (n = 11) participants, which limits the transferability of its findings to other automotive supply chains elsewhere in South Africa and beyond.

A mixed-method approach could be, therefore, applied to elicit further information that could not be covered in this study. This study can also be extended to OEMs industries in South Africa, which provides a basis for understanding open innovation challenges between these entities. Similar studies can be conducted in different industries and sectors that are critical to the South African economy, such as mining, steel and cement.

Conclusion

From a broader perspective, this study aimed to examine the nature and extent to which the automotive supply chain in KwaZulu-Natal, Gauteng and Eastern Cape strategically engages in open innovation to overcome the open innovation challenges and embrace prospects of open innovation in terms of its strategic alignment in enhancing competitiveness. The analysis focused on the use of the four open innovation strategic options in the automotive supply chain and their ability or inability to assist ASCMs with incapacitating their main size-related competitive challenges, which includes lack of resources, limited dynamic capabilities and high-risk exposure. The study also provides a further academic understanding of the open innovation strategic alignment imperatives and academic debate on the concept of open innovation that influences the decisions taken in selecting the appropriate

strategies based on the challenges encountered by the firms in the automotive supply chain. Additionally, this study assists management to understand how they can ensure that strategic alignment between and amongst themselves as managers should cascade to all levels in their firms in order to enhance sustainable competitive advantage.

Acknowledgements

The author declares that he has no financial or personal relationships that may have inappropriately influenced him in writing this research article.

Competing interests

The author declares that he has no financial or personal relationships that may have inappropriately influenced him in writing this article.

Authors' contributions

A.M.G. was the principal researcher in this article, whilst S.O.M and P.M. were the supervisors. B.N. contributed to this article by providing the required necessary support and direction.

Ethical consideration

The research study complied with all ethical measures in communicating with the participants, in line with the formal application for ethical clearance at the University of KwaZulu-Natal Ethics Committee (Reference number: HSSREC/00000071/s2019). This also includes voluntary participation, anonymity, confidentiality and respect for the participants.

Funding information

This research study was funded by the researcher fund maintained by the University of KwaZulu-Natal.

Data availability statement

Data sharing is not applicable to this research article as no new data were created or analysed in this study.

Disclaimer

The views and opinions expressed in this research article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

References

Achtziger, A. & Gollwitzer, P., 2010, 'Motivation und Volition im Handlungsverlauf', in J. Heckhau-Sen & H. Heckhausen (Hg.), *Motivation und Handeln. 4. Aufl*, 309–336, Spring-er Verlag, Berlin.

Arora, A. & Gambardella, A., 1990, 'Complementarity and external linkages: The strategies of the large firms in biotechnology', *The Journal of Industrial Economics* 38(4), 361–379. https://doi.org/10.2307/2098345

Barney, J.B., 2001, 'Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view', *Journal of Management* 27(6), 643–650. https://doi.org/10.1177/014920630102700602

Barreto, I., 2010, 'Dynamic capabilities: A review of past research and an agenda for the future', *Journal of Management* 36(1), 256–280. https://doi.org/10.1177/0149206309350776

Chesbrough, H., Vanhaverbeke, W. & West, J. (eds.), 2006, *Open innovation: Researching a new paradigm*, Oxford University Press on Demand, Oxford, England.

Chesbrough, H.W., 2003, *Open innovation: The new imperative for creating and profiting from technology*, Harvard Business Press, Boston.

Christensen, J.F., Olesen, M.H. & Kjær, J.S., 2005, 'The industrial dynamics of open innovation – Evidence from the transformation of consumer electronics', *Research Policy* 34(10), 1533–1549. https://doi.org/10.1016/j.respol.2005.07.002

Cohen, W.M. & Levinthal, D.A., 1989, 'Innovation and learning: The two faces of R & D', *The Economic Journal* 99(397), 569–596. https://doi.org/10.2307/2233763

Cohen, W.M. & Levinthal, D.A., 1990, 'Absorptive capacity: A new perspective on learning and innovation', *Administrative Science Quarterly* 35(1), 128–152. https://doi.org/10.2307/2393553

Cornell, B.T., 2012, *Open innovation strategies for overcoming competitive challenges facing small and mid-sized enterprises*, University of Maryland University College.

Dahlander, L. & Gann, D.M., 2010, 'How open is innovation?', *Research Policy* 39(6), 699–709. https://doi.org/10.1016/j.respol.2010.01.013

Hughes, B. & Wareham, J., 2010, 'Knowledge arbitrage in global pharma: A synthetic view of absorptive capacity and open innovation', *R&D Management* 40(3), 324–343.

Kasende, C.M., 2016, 'Open innovation for manufacturing in small and medium enterprises', Doctoral dissertation, University of Johannesburg, Johannesburg.

Keupp, M.M. & Gassmann, O., 2009, 'Determinants and archetype users of open innovation', *R&D Management* 39(4), 331–341. https://doi.org/10.1111/j.1467-9310.2009.00563.x

Kraatz, M.S. and Zajac, E.J., 2001, 'How organisational resources affect strategic change and performance in turbulent environments: Theory and evidence', *Organisation Science* 12(5), 632–657. https://doi.org/10.1287/orsc.12.5.632.10088

Krause, W. & Schutte, C.S.L., 2015, 'A perspective on open innovation in small-and medium-sized enterprises in South Africa, and design requirements for an open innovation approach', *South African Journal of Industrial Engineering* 26(1), 163–178. https://doi.org/10.7166/26-1-997

Lavie, D., 2006, 'Capability reconfiguration: An analysis of incumbent responses to technological change', *Academy of Management Review* 31(1), 153–174. https://doi.org/10.5465/amr.2006.19379629

Lee, S., Park, G., Yoon, B. & Park, J., 2010, 'Open innovation in SMEs – An intermediated network model', *Research Policy* 39(2), 290–300. https://doi.org/10.1016/j.respol.2009.12.009

Lenox, M. & King, A., 2004, 'Prospects for developing absorptive capacity through internal information provision', *Strategic Management Journal* 25(4), 331–345. https://doi.org/10.1002/smj.379

Lichtenthaler, U., 2011, 'Open innovation: Past research, current debates, and future directions', *Academy of Management Perspectives* 25(1), 75–93. https://doi.org/10.5465/amp.25.1.75

Lichtenthaler, U. & Lichtenthaler, E., 2009, 'A capability-based framework for open innovation: Complementing absorptive capacity', *Journal of Management Studies* 46(8), 1315–1338.

Mashau, P., 2018, 'The role of university innovation activities in developing agglomeration economies', *Journal of Gender, Information and Development in Africa (JGIDA)* 7(Special Issue 1), 45–68. https://doi.org/10.31920/2050-4284/2018/S1n1a3

Moonsamy, U., 2017, 'Open innovation in South African SMEs: A business model perspective', Doctoral dissertation, University of Pretoria.

Poot, T., Faems, D. & Vanhaverbeke, W., 2009, 'Toward a dynamic perspective on open innovation: A longitudinal assessment of the adoption of internal and external innovation strategies in the Netherlands', *International Journal of Innovation Management* 13(02), 177–200. https://doi.org/10.1142/S136391960900225X

Porter, M.E., 1980, 'Industry structure and competitive strategy: Keys to profitability', *Financial Analysts Journal* 36(4), 30–41. https://doi.org/10.2469/faj.v36.n4.30

Reed, R., Storrud-Barnes, S. & Jessup, L., 2012, 'How open innovation affects the drivers of competitive advantage: Trading the benefits of I.P. creation and ownership for free invention', *Management Decision* 50(1), 58–73. https://doi.org/10.1108/00251741211194877

Shapiro, C., 1989, 'The theory of business strategy', *The Rand Journal of Economics* 20(1), 125–137. https://doi.org/10.2307/2555656

Teece, D.J., 2007, 'Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance', *Strategic Management Journal* 28(13), 1319–1350. https://doi.org/10.1002/smj.640

Teece, D.J., Pisano, G. & Shuen, A., 1997, 'Dynamic capabilities and strategic management', *Strategic Management Journal* 18(7), 509–533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7%3C509::AID-SMJ882%3E3.0.CO;2-Z

Williamson, O.E., 1999, 'Strategy research: Governance and competence perspectives', *Strategic Management Journal* 20(12), 1087–1108. https://doi.org/10.1002/(SICI)1097-0266(199912)20:12%3C1087::AID-SMJ71%3E3.0.CO;2-Z

Winter, S.G., 2003, 'Understanding dynamic capabilities', *Strategic Management Journal* 24(10), 991–995. https://doi.org/10.1002/smj.318