Made in South Africa?

An Assessment of Local Content within the Automotive Value Chain

by

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Abstract

Despite rising vehicle production, the South African automotive industry has experienced declining levels of local content in locally produced vehicles. This is partly a result of increasing international competition, worsening factor and overhead costs, and insufficient economies of scale. Prior to the global and national lockdowns prompted by the COVID-19 pandemic, the automotive supply chain had already been under strain for several years. This study examines the evolution of the South African automotive value chain and discusses the key challenges and opportunities facing localisation efforts. The study uses a combination of existing literature, industry reports, time series data and benchmarking data to analyse the development of the industry. The study reaffirms the underdevelopment of the local supply chain and points to its continued decline. The introduction of an amended national automotive industrial programme (the APDP 2) promises to address some of the shortcomings of its predecessor. However, several challenges remain, namely: limited domestic market protection for automotive components; high tax rates on locally produced vehicles; an ineffective transformation policy (BBBEE) that harms small businesses; a managerial leadership and skills shortage among 2nd and 3rd tier firms as well as the broader manufacturing community; and an expensive and dysfunctional national ports system. Without serious structural redress, this study finds that the automotive industry is not poised to meet the target of 60% local content by 2035 as laid out in the South African Automotive Masterplan. Finally, five internal combustion engine vehicle models are identified as having significant potential around which to grow the local supply chain. However, global pressures are driving the transition to electric vehicles at an unprecedented rate. The industry must urgently localise the sourcing and production of new electric vehicle technologies if it is to maintain its role as a leader for industrialisation in South Africa and the Sub-Saharan region.

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I would like to dedicate this academic contribution to my late mother, Angela Bowden (née Adelson). Thank you for giving me your smile!

Disclaimer

This thesis made use of data kindly provided by Lightstone Auto and B&M Analysts. Every effort was expended in an endeavour to ensure the integrity and accuracy of this research. The author, Lightstone Auto and B&M Analysts take no responsibility whatsoever for decisions derived from its content.

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List of Acronyms

AIEC – Automotive Industry Export Council

AIS – Automotive Investment Scheme

APDP – Automotive Production and Development Programme

APDP 2 – Automotive Production and Development Programme Phase 2

ASEAN – Association of Southeast Asian Nations

BBBEE – Broad-Based Black Economic Empowerment

BEE – Black Economic Empowerment

CBU – Completely Built-up

CKD – Completely Knocked-down

SKD – Semi Knocked-down

GVC – Global Value Chain

IRCC – Import Rebate Credit Certificate

KPI – Key Performance Indicator

LCV – Light Commercial Vehicle

MIDP – Motor Industry Development Programme

MNC – Multinational Corporation

OE – Original Equipment

OEM – Original Equipment Manufacturer

PI – Production Incentive

PRC – Production Rebate Certificate

PRCC – Production Rebate Credit Certificate

R&D – Research and Development

RRLP – Recommended Retail List Price

SAABC – South African Automotive Benchmarking Club

SAAM – South African Automotive Masterplan

SSA – Sub-Saharan Africa

TPS – Toyota Production System

VAA – Volume Assembly Allowance

VALA – Volume Assembly Localisation Allowance

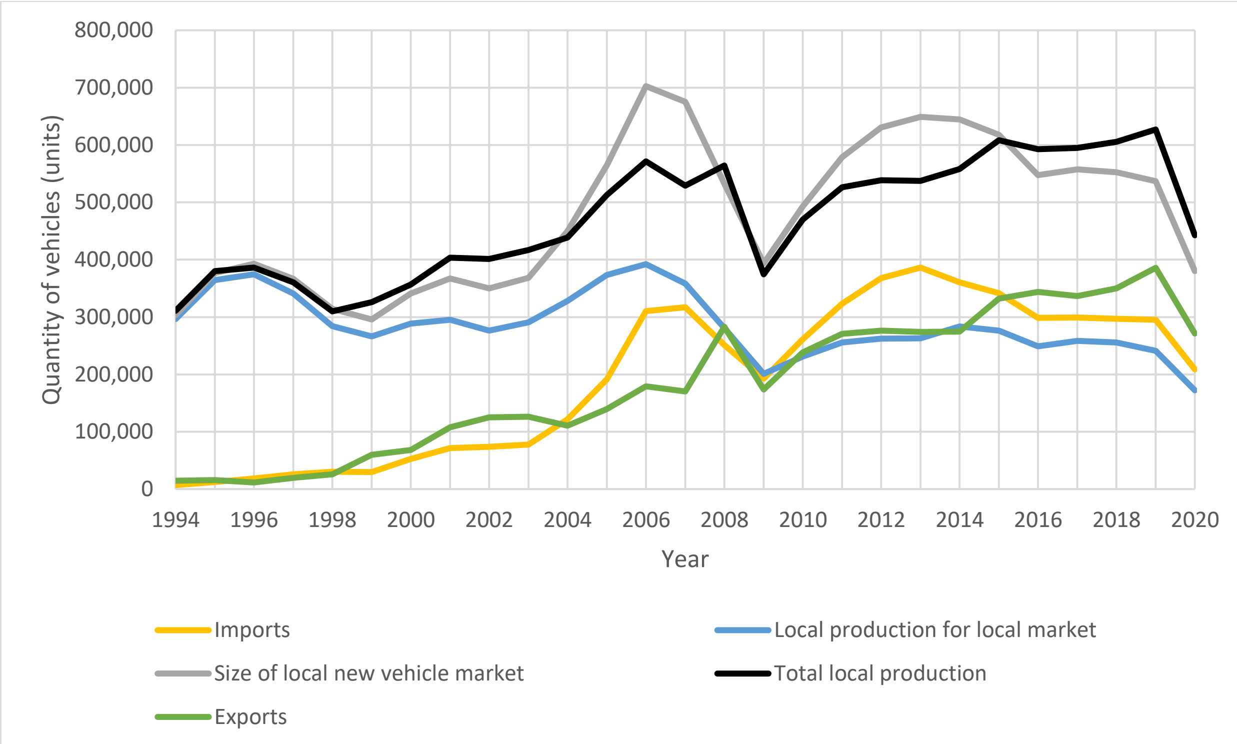
Chapter 1 – Introduction

1.1. Background and Context

South Africa's automotive industry has been the recipient of significant government support. The industry is a cornerstone for manufacturing-led industrialisation and is a vital driver of job creation, skills development, technological onshoring, and materials beneficiation. As one of the country's largest manufacturing sectors, automotive manufacturing (excluding retail) accounted for 4% of South Africa's GDP and 27.6% of manufacturing value addition in 2019 (Automotive Industry Export Council [AIEC], 2020). That same year, the industry assembled a record 631 983 vehicles with domestic sales of new vehicles and components amounting to R169.5 billion and R116.7 billion, respectively (Lightstone Auto, 2020; Statistics South Africa, 2019). Across the value chain there were more than 100 000 people employed and over R10 billion in capital expenditure invested that year (AIEC, 2020).

Figure 1 shows the industry's development from 1994 to 2020. While the industry has seen significant growth since the turn of the century, its vulnerability to global economic shocks (the 2008 Global Financial Crisis and COVID-19) and the downturn of the local market since 2012 are clearly visible. Figure 1 provides context to the several structural challenges that threaten the continued development of South Africa's automotive industry.

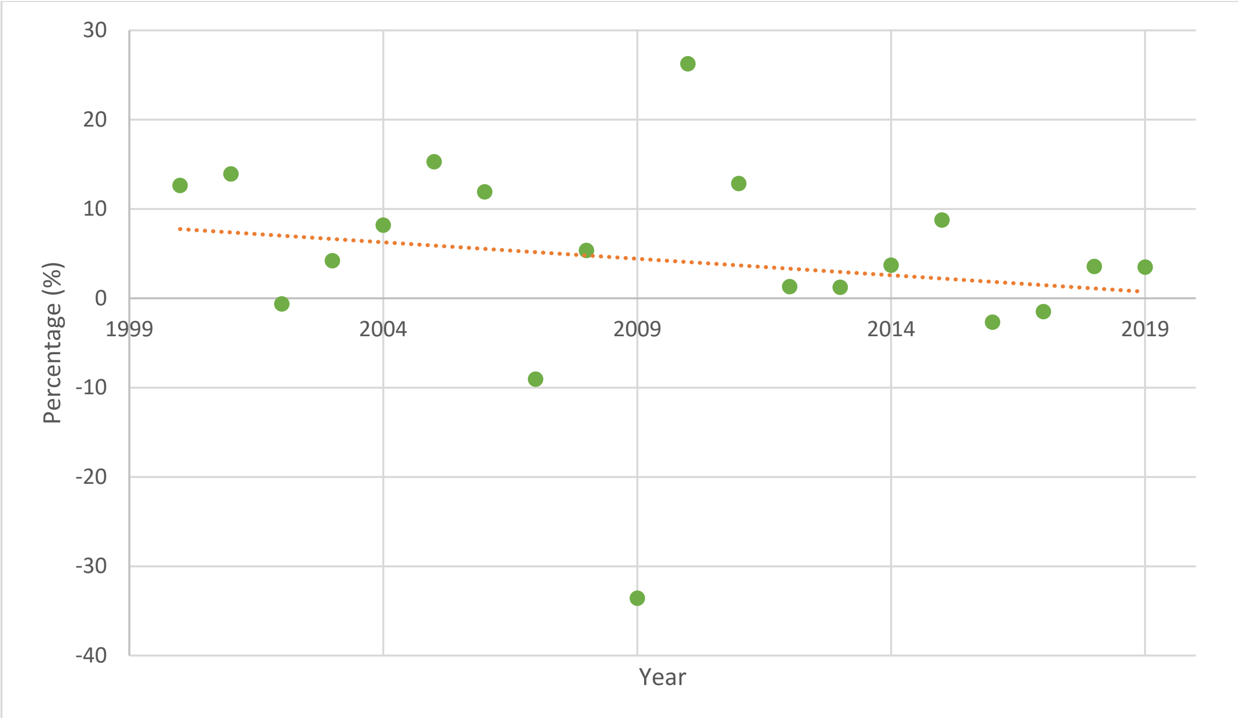
Figure 1: Development of local new vehicle market, production and trade (1994-2020)



Source: Lightstone Auto (2020)

Automotive manufacturing has proven to be a driver of widespread economic development in China, South Korea, India, Mexico, and Thailand. It proved vital in the rebuilding of war-torn economies in Europe and Japan after the Second World War. Globally, the automotive industry has been referred to as "the industry of industries" due to the complex range of materials and technology that make up a fully assembled vehicle and the numerous value chains that feed into this assembly process (Drucker, 1946). Therefore, South Africa's automotive industry is hugely significant to economic development and transformation within the country. In light of this, Figure 2, along with the erosion of local content in locally produced vehicles, shows significant cause for concern as it shows a sustained declining trend in the growth of South African vehicle production.

Figure 2: Year to year growth rate of vehicle production



Source: derived from OICA (2021)

South Africa's Original Equipment Manufacturers (OEMs) such as Toyota, Volkswagen, Ford, Mercedes-Benz, BMW and several others are important role players in the creation of upstream opportunities for local value addition. However, the "hollowing out" of the local supply chain has been well documented for several years (Higuchi et al., 2021; Barnes, Black and Monaco, 2021; Black, Barnes and Monaco 2019; 2018). Worryingly, it is in component manufacturing that the bulk of employment creation and skills development should take place. Should the erosion of this foundation continue, it will be disastrous to the realisation of manufacturing-led industrialisation and the levels of economic development that have been witnessed in other successful developing automotive producing countries. Given the level of government support afforded to the industry, this trajectory is extremely concerning. At present the industry appears increasingly unlikely to reach the goals set out under the South African Automotive Masterplan[1] (SAAM), especially since industry commentators had stated their reservations prior to the emergence of COVID-19 (Black,

[1] The South African Automotive Masterplan was announced by former Minister of Trade and Industry, Rob Davies, and is an overarching strategy document meant to guide decision making around industrial policy for the automotive industry (Davies, R., 2018).

Barnes & Monaco, 2018). A lot, then is riding on the continued development of the industry and whether this development is inclusive of 2nd and 3rd tier component producers.

On top of this, the industry must face the added challenges of COVID-19, subsequent national lockdowns (the effects of which can be seen in Figure 1) and prepare itself for fast approaching technological disruptions associated with the rise of electric vehicles and their associated technologies. The rise of electric vehicles and advanced manufacturing practices (i.e. industry 4.0) will pose significant challenges and potential opportunities for South Africa's automotive industry as it transitions away from the production of internal combustion engine vehicles. While OEMs will play a leading role in navigating this transition, it is important that this does not lead to further erosion of the 2nd and 3rd tier supply base.

1.2. Research questions and hypothesis

The objective of this research is to assess the industry's trajectory as a primary driver of industrialisation, employment creation and economic transformation. Key then, to the industry's ability to promote and realise the benefits of manufacturing-led industrialisation, is the development of local content. To this end, the primary research question around which this thesis is based is:

How is South Africa's automotive industry poised to meet the target of 60% local content, by 2035, and unlock deeper levels of value addition within the local supply chain?

The central hypothesis of this thesis is that it is not possible to reach 60% local content by 2035. In order to investigate this, this research was organised around two secondary questions:

How has the South African automotive industry evolved over time and what does this mean for the industry's current development trajectory?

What are the key challenges and opportunities facing the industry?

1.3. Research methods and data

Within this context, this research makes use of mixed methodologies (qualitative and quantitative) to analyse the development of South Africa's automotive industry. It examines the role of government industrial policy and the likely effectiveness of future policy through an extensive review of available literature, country case studies, industrial related commentary, expert discussion and available macro-level data on national economic and industrial performance.

This research also aggregates automotive production and trade data provided by Lightstone Auto to identify the country's core automotive products around which there are opportunities to build local content. It does so through the use of graphical representation and descriptive statistics.

Finally, this research uses descriptive statistics and graphical representations from micro level benchmarking data to discuss and depict the development of the automotive supply chain over the period 1999-2019.

1.4. Thesis outline

The body of the thesis is divided into five chapters. Chapter Two, *Global Automotive Manufacturing Trends*, analyses the development of lean production and benchmarking practices as vital prerequisites in such an internationally competitive industry. The chapter also discusses the rise of developing automotive producing countries (i.e. China, India, Thailand, Turkey, etc.) within Global Value Chains (GVCs) and draws key lessons from their successes and shortcomings for South Africa.

Chapter Three, *Development of the South African Automotive Industry*, looks at the historical trajectory of South Africa's automotive value chain. The chapter focusses on the role of industrial policy, production incentives and support and how this has affected the development of South Africa's automotive market, the nature of vehicle assembly and component production in the country. The chapter, first, focusses on the series of local content programmes instituted by the government from 1961 to 1994. Secondly, it looks at the more recent history of the South African automotive industry from 1995 till 2020 which saw significant trade liberalisation and increased export performance under the Motor Industry Development Programme (MIDP) followed by stagnation and the erosion of local content under the Automotive Production and Development Programme (APDP). It then looks at the development of the local automotive supply chain and the state of localisation. Finally, the chapter discusses the future of South Africa's automotive industrial policy from 2021 and beyond and how this is likely to affect the industry. It does so by analysing the key elements of the SAAM as well as the amendments proposed under the APDP Phase 2 and the degree to which these will be effective in combatting the key industry challenges that have arisen under previous policy regimes.

Chapter Four, *Identifying Areas of Competitiveness*, makes use of data on local vehicle production and trade from 1994 to 2019 provided by Lightstone Auto and in the Automotive Industry Export Council's (AIEC's) annual Export Manuals. The chapter identifies key vehicle models and market segments around which there are opportunities for achieving economies of scale that can enable competitive growth of the local supply chain. The chapter also highlights those international markets which are key to automotive and component exports and crucial to driving economies of scale.

Chapter Five, *Benchmarking the Development of the Automotive Supply Chain*, makes use of panel data collected by the South African Automotive Benchmarking Club (SAABC) provided by B&M Analysts. The chapter examines several key performance and competitiveness variables for sampled 1^{st}, 2^{nd} and 3^{rd} tier firms in order to assess the progression of the local automotive supply chain.

Chapter Six, *Challenges Facing Industry Progression Toward 60% Localisation*, looks at the key obstacles facing greater levels of localisation. It discusses South Africa's low growth trajectory, limited market protection, the country's harmful automotive tax regime along with the effect of its BBBEE policy for small 2^{nd} and 3^{rd} tier firms, the lack of skills training and leadership within the manufacturing environment, expensive logistics services, and the impact of COVID-19. The chapter argues that it is not possible to achieve 60% local content without confronting these challenges.

Finally, this research concludes by summarising the key contributions of each chapter and by discussing key policy recommendations for the sustainable development of the local automotive supply chain in the context of a fast-approaching global transition to electric vehicles.

Chapter 2 – Global Automotive Manufacturing Trends: Lean Production and Global Value Chains

2.1. Brief History of Global Automotive Production Best Practice

2.1.1. Evolution of Craft and Mass Production

The global automotive industry has seen three key phases in terms of manufacturing processes. At its inception in 1885 until roughly 1908, motor vehicles were manufactured by small craft producers. A limited number of highly skilled craftspeople built small numbers of vehicles, largely by hand, with the use of simple general purpose machine tools. This process incurred significant time, labour, and material costs making finished automotives extremely expensive (Womack, Jones & Roos, 1990). Moreover, the nature of craft production created high levels of product variation making it impossible to produce large quantities of vehicles at a time and unlock economies of scale.

In 1908 the Ford Motor Company began production of the Model T – the world's first successfully mass-produced vehicle, designed and widely affordable for working class consumers. Model T owners could, for the first time, conduct their own maintenance and fit replacement parts by themselves with relative ease. What made this possible was "the complete and consistent interchangeability of parts and the simplicity of attaching them to each other" (Womack, Jones & Roos, 1990: 27). Under mass production the motor vehicle went from being a luxury good produced exclusively for the wealthy to a product that was affordable and widely accessible to a growing middle class.

Unlike craft production, where a few highly skilled workers used general-purpose machine tools to build a car, mass production used many unskilled and semiskilled workers to perform a single and simple task on many cars repeatedly. Technological advancements allowed for greater levels of standardization and precision (Womack, Jones & Roos, 1990). As a result, skilled artisans were replaced by the assembly line, task cycles and more complex specialised machines that greatly reduced the skill required for fitting and turning. Crucially, the interchangeability of components was made possible by increased levels of precision meaning that components and tools could be made to uniform gauge.

While craft production focusses on producing a single car to the specifications of the customer, mass production focusses on producing as many of the same cars as quickly as possible in order to unlock economies of scale and lower unit costs. Before the introduction of the Model T, assemblers at Ford took 8.56 hours on average to complete a task cycle. The introduction of component delivery to workstations and the famous “moving assembly line”, now synonymous with Mass Production, saw huge improvements to task cycle times. When the Model T entered production the average task cycle time of an assembler at Ford had decreased to 1.19 minutes (Womack, Jones & Roos, 1990). Ford’s production volumes made the Model T truly affordable which in turn stoked greater demand and led to further reductions in unit costs.

In 1925 General Motors (GM) combined Ford’s factory practices with a managerial and marketing system that rendered Mass Production the complete system as we know it today. This consisted of a decentralised system of corporate control which eliminated product overlap between GM’s numerous subsidiaries. As such GM, unlike Ford, was able to offer a number of different vehicle models at scale for “every purse and purpose” (Sloan, 1972: 508). This decentralised system also proved more effective in managing the supply chain and allowed GM to operate in different countries whilst maintaining the flexibility to successfully accommodate local consumer preferences and adjust to local markets (Womack, Jones & Roos, 1990).

The diffusion of mass production saw the growth of national automotive industries around the world. In 1955 the USA and Europe accounted for roughly 72% and 24%, respectively, of total world vehicle production. (Womack, Jones & Roos, 1990). The oil crisis of 1973 sent fuel prices rocketing and consumers turned away from fuel hungry American built cars that proved too costly to run (Barnes, 2001). By 1989 America’s percentage of total world vehicle production had shrunk to 25% (Womack, Jones & Roos, 1990: 44). The crisis and its secondary effects had exposed high levels of waste at the factory level under mass production. Understanding and measuring such waste paved the way for Japanese OEM’s with more innovative production processes, better quality and cheaper motor vehicles to take a leading role in the global automotive market.

2.1.2. The Development of Lean Production

In 1950 Eiji Toyoda, of the Toyoda family which founded the Toyota Motor Corporation (TMC), visited Ford's largest manufacturing plant – Rouge in Detroit. Along with his chief production engineer Taiichi Ohno they reasoned that mass production would never work in a resource constrained post-war Japan (Womack, Jones & Roos, 1990). Toyoda and Ohno noted several forms of waste, namely: overproduction, waiting time, transport, processing waste, inventory, and poor quality (Barnes, 2001). From their observations, Toyoda and Ohno gradually developed a new form of work organisation that sought to eliminate this waste throughout the value chain. Within Toyota this system was known as the Toyota Production System (TPS), however it came to be more commonly known as lean production or World Class Manufacturing.

In addition to Japan's resource constraints, its local automotive market was small, price sensitive and diverse thereby demanding a range of vehicles that were affordable and of high quality. The TPS, therefore, was "a highly efficient and flexible small batch manufacturing system" designed to match customer requirements (Barnes, 2001). Unlike mass production which produced high volumes in order to cut unit costs, the TPS was focussed on reducing all forms of waste so that production could take place on a Just-in-Time basis (Barnes, 2001). This meant that Toyota could produce vehicles in much lower volumes at far less expense, allowing the company to offer superior product variation more closely aligned with ever-changing consumer preferences. In the late 1980s, Toyota was able to offer twice as many vehicle models to its consumers while spending the same amount of money on research and development as its western competitors. Furthermore, it was able to update its vehicle models every 4 years as opposed to every 10 (Womack, Jones & Roos, 1990).

Under mass production, large batch sizes and product standardisation required high levels of capital and machinery to build large inventories of stampings and vehicle parts. In turn, this required excessive warehousing and factory floor space. Conversely, lean production sought to utilise machinery and space more efficiently. This created a drastic reduction in inventory holdings to a Just-in-Time basis and allowed for better quality control. In short, Toyota discovered that small batch production required less capital cost through fewer machines, less carrying cost for inventories, less reworking or scrap costs and lower unit costs per vehicle compared to mass producers (Womack, Jones & Roos, 1990).

To reduce waste associated with reworking and scrap, lean production sought to build in quality-at-source. This required a greater role for skilled workers, but more importantly it depended upon their active participation in a perpetual learning journey that sought to unlock continuous improvements at all levels in the operation. To this end, the experience and insight of workers over their own particular processes was seen as critical to the elimination of waste and as such they were given greater agency in decision making and were encouraged to solve problems on the factory floor (Barnes, 2001).

Toyota further sought to eliminate waste beyond its own operations and across the value chain as a whole. Under mass production the OEM-supplier and OEM-consumer relationships were highly antagonistic. Information asymmetries through aggressive pricing and marketing strategies created a battle over margins and led to greater costs and lower quality (Barnes, 2001). In contrast, Toyota recognised that "if any firm in a particular value chain wished to become globally competitive it therefore needed to ensure that its suppliers were also globally competitive" (Barnes, 2001: 17). Fundamental to lean production, therefore, was the implementation of Supply Chain Management (SCM) with OEMs driving lean philosophies and continuous improvement further up the value chain (Hines, 1994).

2.1.3. The Importance of Benchmarking

The globalisation of automotive manufacturing and the dissemination of lean production has created new "world class" competitiveness standards within the industry. Therefore, benchmarking industry and firm-level competitiveness is critical in measuring progress, but also in guiding decision making as firms and industries seek to respond to their competitors (Delbridge, Lowe & Oliver, 1995). The use of benchmarking practices was essential in Toyota's lean journey and the advances it made over its mass-producing competitors were, in part, made possible by the insights gained from benchmarking activities. As a critical component of lean production, benchmarking within the automotive industry commonly measures productivity, competitiveness, and quality. This usually covers indicators such as operating efficiency, waste reduction, timely delivery, employee motivation, customer satisfaction and quality standards (Nazarko et al., 2009; Benson, Cummingham & Leachman, 1995).

Benchmarking is crucial for industries and firms wishing to “catch up” and compete with local and international competitors. Indeed, it was pivotal in highlighting the decline of Western OEMs in the latter half of the 20^{th} century. Subsequently, it was crucial in their revitalisation as they began to incorporate lean production in their own operations. Since then, new OEMs and their supply chains in South Korea and China have also unlocked competitiveness levels that are “world class” (Barnes, 2001; Brown, 1996; Schonberger, 1986). Understanding Toyota’s advances in developing lean production are an important reminder of the competitiveness standards required in such a globalised industry and the need to measure and benchmark Key Performance Indicators (KPIs) at a firm and industry level. Benchmarking South Africa’s supply chain productivity, competitiveness and quality is crucial to the industry’s future development. While this thesis does exactly that, there is an imperative for policy makers, lead firms and other stakeholders to actively encourage sector wide benchmarking on a routine and transparent basis.

2.2. The Rise of Developing Country Automotive Producers

In recent decades developing automotive producers have become increasingly important in global automotive production. The rise of global value chains (GVCs) and regionalisation has supported the fragmentation of automotive manufacturing. Gereffi (1994) explains the role of multinational OEMs at the head of “producer-driven” value chains in coordinating the integration of “latecomer” economies, through forward and backward linkages, in various segments of the automotive value chain. Since the 1990’s the global automotive industry has transitioned from discrete national industries to a more globally integrated industry with value adding activities taking place in multiple countries (Sturgeon, Chagas & Barnes, 2017; Gereffi, 2001). Nowadays, motor vehicles tend to be designed, engineered and tested in the historical automotive hubs such as Detroit, Stuttgart and Tokyo, but produced regionally or globally (Sturgeon, Chagas & Barnes, 2017).

The impact of globalisation has had positive implications for automotive sectors in some developing countries. Mexico, Thailand, Slovakia, Turkey and Morocco have emerged as successful regional hubs (Black et al., 2020). They have experienced ongoing and increasing investment; witnessed growth in productive output, export quantity and revenue; and have enjoyed widespread industrial and productive upgrading. However, the positive outcomes of globalisation on developing automotive manufacturing countries can also be accompanied by less favourable outcomes such as declining local ownership; offshoring of technological research and development capabilities; and overexposure of domestic markets to international trade. Furthermore, in some cases globalisation has also rendered some national automotive industries completely uncompetitive as experienced in Pakistan, Colombia and Australia (Black et al., 2020).

2.2.1. Experiences of Developing Country Automotive Producers in the Global Auto Industry

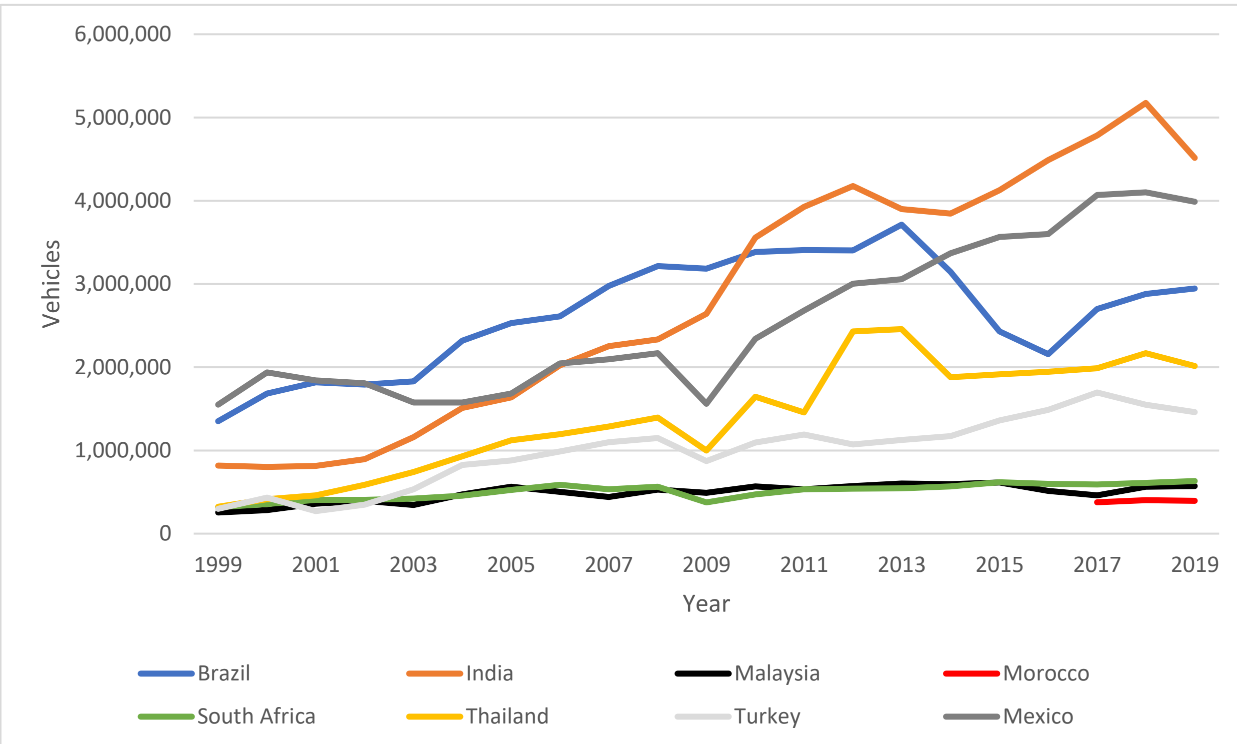
The fragmentation of production processes has opened opportunities for developing countries to increase manufacturing exports and productive capacity more generally. Firms in developing countries can specialise in specific activities within GVCs without needing to develop upstream capabilities. This can have important effects on exports, employment, technology transfers, skills building, productivity growth and capability building (Morris & Staritz, 2019). However, specialising in low-value-adding activities in GVCs can also be limiting. The low rents derived from operating at lower levels of GVCs can also be accompanied by minimal technology and skills transfers. This makes it difficult for developing countries to advance their productive capacities and upgrade their position within GVCs (Morris & Staritz, 2019; Sturgeon, Chagas & Barnes, 2017). In the meantime, these countries still face competition from other developing regions with even lower wages in what Griffith (2011) defines as the "middle-income trap" – a phenomenon in which a middle-income country fails to transition to a high-income country because of rising costs and worsening competitiveness.

Industrial policy is critically important for developing countries wishing to develop greater competitiveness in higher value-added activities and advance within GVCs. However, designing and applying a suitable industrial policy is more complicated than simply applying what has worked in other countries. Geography, market size, trade barriers, labour productivity, foreign ownership, and bargaining dynamics between firms and government are important factors, amongst others, that shape the success or failure of industrial policy and the development of national automotive industries.

South Korea and China are two prominent examples of latecomer economies that have successfully escaped middle-income traps – building strong and highly competitive automotive industries. The use of industrial policies and firm level decisions to ensure knowledge and technology transfers to aspiring domestic firms was essential in upgrading domestic capabilities.

Both countries followed what Lee et al. (2018) and Chang (2003) describe as an "in-out-in-again" process whereby a country engages within GVCs – initially at lower value-added segments – then exits so that it can build local competitiveness using the acquired technologies. Finally, the country re-enters GVCs once it has built up local capabilities at higher value-adding functions and can now use GVCs to source cheaper inputs. While many developing automotive producing countries have had varying degrees of success, South Korea and China are two of very few that were able to develop their own internationally competitive automotive brands. Domestic brands such as Hyundai, Kia, Geely, Haval, Changan and Cherry have effectively reorganised the traditional hubs for automotive design, engineering and testing – placing Seoul and Shanghai in the same basket as Detroit, Stuttgart and Tokyo.

Figure 3: Annual vehicle production of developing automotive producers (1999-2019)



Source: derived from OICA (2021)

Other developing automotive producers have also experienced success in recent decades – while not on the same scale as China or South Korea – their achievements are certainly noteworthy and perhaps more relatable to the South African automotive industry and its challenges. Figure 3 shows the annual vehicle production for eight developing automotive manufacturing countries since

1999. With the exception of Morocco – which has shown impressive growth in vehicle production since 2012 with investment from Renault – it is clear from the graph that India, Mexico, Thailand and Turkey have enjoyed largely consistent growth over the 20-year period. Malaysia and South Africa have shown very little growth and appear almost stagnant over the 20 years.

With the exception of South Africa – which has a small domestic and regional automotive market – the countries in Figure 3 either contain large domestic markets and/or have access to large regional automotive markets. Excluding Malaysia, this is a major contributing factor to the positive performances of these countries.

Malaysia's two nationally owned automotive manufacturers were given major government support and near monopoly status over the domestic industry from 1983 till 2009. Extremely limited market competition and major government support rendered these firms internationally uncompetitive (Barnes et al., 2017c). Furthermore, the two firms failed to pursue upgrading opportunities due to limited domestic competition and as such little effort was made to increase localisation. While there has been expansion beyond initial investments in Malaysia's automotive sector, Black, Barnes and Monaco (2018) explain that this has been severely curtailed by high levels of protection that have rendered its industry uncompetitive with shallow capabilities.

Thailand has followed an OEM strategy, focussed on the production of light commercial vehicles (LCVs), that has seen a fair amount of success. The country's focus on LCVs has been a key factor in achieving significant economies of scale. While Thailand has experienced impressive growth over the last 20 years it has had limited success in upgrading value-adding activities. This is a symptom of limited local ownership and as explained in the next section is a sign of an OEM trap. Barnes, Black and Techakanont (2017) explain, in a comparison between South Africa and Thailand, that the Thai automotive sector has major firm-level cost and market advantages. The country's location within ASEAN, its proximity to other large markets, efficient trade and industrial policy support, and competitive production capabilities have led to large-scale investment within the Thai automotive industry.

Like South Africa, Turkey underwent quite rapid liberalisation at the turn of the century – in their case – due to the establishment of a customs union with the EU. The existence of a strong automotive manufacturing base prior to liberalization combined with a strong and growing domestic market allowed the industry to successfully integrate into the regional automotive value chain (Black et al., 2020). Today several Turkish automotive assemblers operate as joint ventures between MNCs and domestic firms (Black et al., 2020). This element of local ownership has been important in deepening the local value chain as well as motivating the upgrading of value-adding activities. The alignment of Turkey's tariff regime with the EU, due to its membership in the Customs Union, means that the country has low tariffs on automotive vehicles and components. However, the country has employed sophisticated non-tariff barriers that have ensured high levels of protection from cheap and low quality imports (Sturgeon, Chagas & Barnes, 2017).

2.2.2. Key Conditions for the Successful Development of Automotive Industries

According to Black et al. (2020) successful development policies for the automotive sector require three interconnected attributes. Firstly, it is important to protect and establish a regional or national "automotive space". This secures a local or regional market that is big enough to facilitate efficient economies of scale for both vehicle and component producers. For example: India has maintained significant tariff protection over its domestic vehicle, motorcycle and component market; Thailand is well positioned within ASEAN and therefore has access to a significant regional market; and Turkey and Morocco both have preferential trade access to the EU, whilst having relatively cheap factor costs and enjoying close geographic proximity that minimises logistics overheads. Secondly, policy needs to make sure that the industry is competitive at the sectoral level. This requires the use of tariffs, incentives, and the effective provision of key public goods such as infrastructure, training and R&D (Black et al., 2020). Thirdly, firms need to upgrade their own capabilities through investing in appropriate capital, supplier development, effective management of technology and improving upon work organisation (Black et al., 2020; Lee & Mathews, 2012; Giuliani, Pietrobelli & Rabellotti, 2005).

Amsden and Chu (2003) argue that to overcome the extremely thin margins associated with such a globally competitive industry latecomer firms and economies have to take advantage of economies of scale and manufacture in large volume. In a globalised world latecomer firms need to scale up rapidly and achieve high levels of output, even more so than before, in order to survive. This requires investment in assets that enhance productivity such as, production engineering and R&D. Moreover, it requires – as a bare minimum – the implementation of lean production principles that ensure the efficient allocation of factors of production (Barnes, 2001). Amsden and

Chu (2003) further explain that nationally owned firms are more likely to quickly assemble such assets compared to foreign owned MNCs (Amsden & Chu, 2003).

However, GVC literature describes several mechanisms that determine the patterns of upgrading and distributing rents within a value chain (i.e., chain governance, market insertion, power asymmetry, ownership and embeddedness, and the importance of standards) (Kaplinsky and Morris, 2015). Local ownership or "ownership and embeddedness" is one way of achieving this, but it is not the only means nor is it the most appropriate in such a globally competitive automotive markets, as experienced in Malaysia (explained in the previous section). This is further supported by Black et al. (2020) who explain that in order to achieve developmental outcomes it is imperative that governments simply have the capability to discipline those firms benefitting from government support so that they upgrade value-adding activities and increase local levels of production. Kaplinsky (2010) explains the rise of private sector standards as a mechanism for determining rents within GVCs, in particular the automotive value chain in which lead firms (e.g., Toyota, Mercedes, Ford, VW etc.) are responsible for setting process and quality standards. In such value chains the primary responsibility of industrial policy, especially in developing countries, should simply be to ensure that lead firms invest in or promote the upgrading of local capabilities (Morris & Staritz, 2019; Giuliani, Pietrobelli & Rabellotti, 2005; Humphrey & Schmitz, 2002).

Humphrey and Schmitz (2002) describe four patterns of upgrading within GVCs: process, product, functional, and intersectoral. Process upgrading refers to improving upon the effectiveness of production processes. Product upgrading is where firms seek to move into higher value-added product lines. Functional upgrading describes the process of changing into new and higher-revenue-earning business functions within the value chain (i.e., moving from manufacturing to product design). Finally, intersectoral upgrading is where firms apply the competencies gained in doing one particular function to move into a new sector altogether. Giuliani, Pietrobelli and Rabellotti (2005) explain that while process and product upgrading are common, functional and intersectoral upgrading are extremely rare and difficult to achieve. However, it is precisely these two types of upgrading – functional and intersectoral – that is required for firms and national economies to advance into the highest levels of value addition within GVCs. Indeed, this was the experience of automotive firms and the manufacturing community more broadly in South Korea and China. Again, it is fundamentally important that firms are motivated to pursue such upgrading opportunities – either through their own initiative in the face of competition, through government incentives or through national ownership (Morris & Staritz, 2019; Giuliani, Pietrobelli & Rabellotti, 2005; Humphrey & Schmitz, 2002).

Original Equipment Manufacturing (OEM) has been vitally important for allowing latecomer firms, in developing countries, access into highly competitive global industries with high barriers to entry. It has also been useful in enabling technological learning and knowledge transfers from MNCs with well established brands to subcontracting locally based firms. Furthermore, OEM is often accompanied by strong FDI in local subsidiaries who would otherwise have faced significant barriers to entry without MNC ownership (Gereffi, 1994). However, Lee (2005) explains that while the OEM model is useful during early-stage development of latecomer firms, it is highly uncertain over the long-term period and if not accompanied with efforts to upgrade local capabilities it can become an "OEM trap". The reasons for this are twofold. Firstly, brand owners will stop supplying technology, designs and licenses for fear that subcontractors could turn into competitors. Secondly, successful OEM strategies inevitably cause wages to rise in which case brand owners will transfer production to countries with lower wage rates (Lee & Mathews, 2012).

Therefore, OEM strategies are useful during early-stage development of automotive industries. However, this must be accompanied with firm level attempts to upgrade value-adding capabilities otherwise local firms will come under pressure from new low-wage sites or countries and potentially be priced out of the market. Black et al. (2020) explain that differing outcomes from similar policies of state-induced industrialisation are linked to two factors: (1) the ability of governments or ruling coalitions to discipline capitalists, that were beneficiaries of state support, to produce successful outcomes; and (2) the development of a credible domestic market. They argue that success in these two areas leads to upgrading, improvement of technological capabilities and the development of a vibrant automotive industry.

2.3. Concluding Remarks

The diffusion of lean production across the global automotive industry has created new "world class" competitiveness standards within the automotive industry. To this end, benchmarking sectoral and firm-level competitiveness is integral to the successful development and the ongoing prosperity of a country's automotive industry. The fragmentation and globalisation of automotive manufacturing has created opportunities for developing countries to enter into regional and global automotive value chains. However, the creation of a vibrant automotive industry depends upon: (1) the establishment and protection of a national or regional automotive space that can support the scaling up of local production; (2) sectoral competitiveness through efficient infrastructure, public services and public goods; and (3) upgrading of firm-level capabilities.

These are important considerations to ponder while discussing the development of South Africa's automotive industrial policy in the following chapter. Not only are these vital pre-conditions for the success of future industrial policy, but it highlights the need for greater levels of coordination across all government policy.

Chapter 3 – Development of the South African Automotive Industry: History, Policy and Industry Structure

3.1. History of the South African Automotive industry: 1924 to 1994

3.1.1. Origins of South African Vehicle Production

The history of vehicle production in South Africa began in 1924 with the Ford Motor Company establishing an assembly plant in Port Elizabeth and General Motors soon following in 1926. The first vehicle engines were assembled that same year and by 1928 Ford had opened a second assembly plant in Port Elizabeth. At the time, Port Elizabeth did not have a harbour and ships had to anchor almost a mile offshore, meaning that broken down vehicles destined for assembly had to be offloaded onto barges at sea before being offloaded at the beach head. It was only after the Second World War that more automotive assembly plants began to dot the landscape near Cape Town, East London, Uitenhage, Durban and Johannesburg – financed by South African capital and foreign firms (South African Ministry of Transport, 1960).

Import controls aided this rapid expansion of vehicle assembly in South Africa, which promoted the use of local labour and materials that could be justified by quality and price, in order to save foreign currency. A survey in 1957 showed that there were no less than 25 vehicle makes or brands being assembled in South Africa at that time. This comprised of more than 100 different vehicle models which included: passenger cars, vans, trucks, station wagons, jeeps and tractors. That same year a record figure of 100 000 vehicles were assembled locally (South African Ministry of Transport, 1960). The automotive components industry was in its infancy at that stage, only producing low value-added components such as springs, shock absorbers, brake linings, axle shafts, radiators, tail pipes, exhaust mufflers, brake drums, trailer axles and wheel balancing weights. The production of electrical components was limited to generator armatures, starter armatures, generator and starter field coils, batteries and spark plugs (South African Ministry of

Transport, 1960). This meant that in 1958 local content levels in locally assembled vehicles sat at just 20%. This forced increasing levels of government support for locally produced components in order to offset the balance of payments deficit due to high levels of imported content (Black, 1994).

3.1.2. Local Content Programmes: 1961 to 1994

In 1959 the Board of Trade and Industry was commissioned by the government to investigate the expansion of local component manufacturing and the development of deeper productive capabilities for the first time (South African Ministry of Transport, 1960). In 1961 the government introduced the first of a series of local content programmes – making it compulsory to locally source several peripheral components while rewarding higher local content with more import permits. By the end of Phase II of the local content programmes, in 1971, local content had soared to 52% of vehicle mass. Under phase III local content reached 66% of vehicle mass in 1977 and under phase V the programme was extended from passenger vehicles to include light commercial vehicles in 1982 (Black, 1994; Bell, 1990).

Throughout these local content programmes, the need for industry rationalisation[2] and greater economies of scale around fewer vehicle models was apparent. However, the government sought to preserve consumer choice and control foreign exchange outflows, assuming that market forces would bring about rationalisation. This did not happen and until the 1980's the number of assemblers increased. Assemblers were drawn by growing consumer demand without the need to integrate these production facilities into global automotive supply chains. This resulted in many different vehicle models being produced at low volumes, which in turn led to low levels of standardisation and low volume component production. Furthermore, measuring of local content by weight incentivised component producers to manufacture heavy components such as body panels and metal pressings which had low levels of value addition (Black, 1994). Ultimately, the local components industry was far from unlocking the productive and competitiveness capabilities

[2] The Cambridge Business English Dictionary (2011) explains that rationalisation allows for greater economies of scale and higher levels of international competitiveness as the local industry is able to reach the maximum number of customers with the minimum number of products.

that come from producing at world class volumes and found itself locked in to a "low volume, high-cost production structure" (Board of Trade and Industry 1988, cited in Black, 1994: 52).

In 1986 there were seven vehicle assemblers producing 20 different vehicle models for a vehicle market of 172 000 passenger cars (Black, 1994). The Phase VI local content programme was introduced in 1989 and it marked a significant shift in government policy as it attempted to address the industry's fragmentation and low volume output. Local content was measured by value instead of mass and producers were given duty rebates based on the value of local content. At the same time, the government also introduced tariff protections on imports of CBU vehicles, spare parts and vehicle accessories (Black, 1994). The Phase VI Programme marked a structural adjustment and policy change that is still apparent today.

3.2. Recent Government Policy and Incentives: 1995-2020

3.2.1. Motor Industry Development Programme

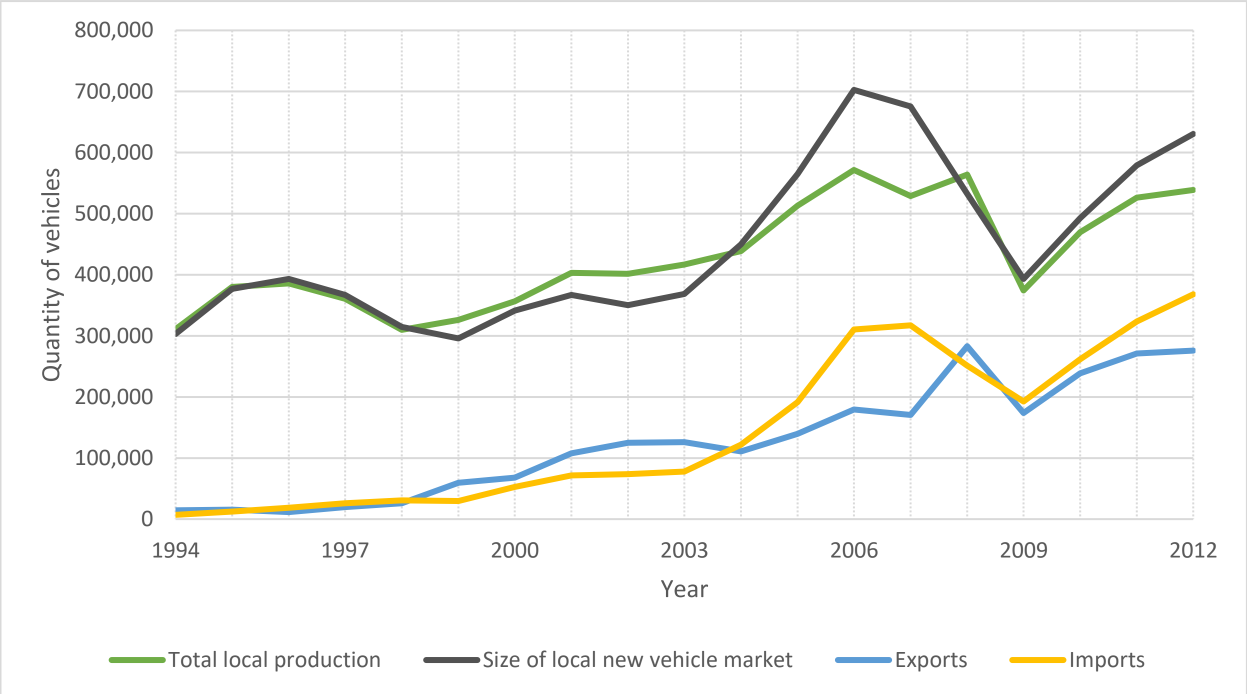
The Motor Industry and Development Programme was introduced in 1995 and it followed the governments pursuit of expanding export possibilities for OEMs and automotive component producers. The MIDP built upon Phase VI of the local content programme, extending the facilitation of exports and further reducing tariffs on light vehicles[3] and components. The MIDP removed local content requirements and allowed the duty-free import of components up to 27 percent of the wholesale value of the vehicle. A key feature of the MIDP was that it replaced excise duty rebates with Import Rebate Credit Certificates (IRCCs) designed to incentivise automotive exports. IRCCs could be earned through the export of vehicles and components and could be used as a credit to offset duties on imported vehicles and components (Black & Mitchell, 2002). This was a key incentive for driving export growth during the MIDP.

Increased trade liberalization, during the period of the MIDP, also opened significant opportunities for the South African automotive sector. Local firms gained greater access to important global logistics, manufacturing practices and R&D networks; especially as foreign

[3] Light vehicles consist of both passenger vehicles and light commercial vehicles.

ownership in local firms increased. This also led to higher levels of investment in local production capabilities. Furthermore, higher levels of foreign ownership also made it easier to access foreign markets and encouraged specialisation in certain vehicle models (Black, Barnes & Monaco, 2019). Under the MIDP, local content remained relatively stable despite the threat of increasing import competition.

Figure 4: Quantity of vehicles produced, exported and imported under the MIDP (1994-2012)



Source: Lightstone Auto (2020)

During the MIDP, the automotive industry experienced significant structural change. Figure 4 shows that the size of the domestic new vehicle market grew substantially in the period 1994 to 2012. This can be linked to broader economic prosperity at the time as well as the fact that vehicles became more affordable as import tariffs declined over this period. Figure 4 shows several key indicators that show the growth of South Africa's automotive industry under the MIDP. Total local vehicle production rose by 158 000 units from the start of the MIDP, in 1995, to 2012 – an increase of 42%. At its peak, before the 2008 Global Financial Crisis, total production rose to 571 552 vehicles. Under the MIDP imports and exports of both vehicles and components increased rapidly. Figure 4 shows that in 1994 South Africa only exported 15 764 vehicles. By the end of the MIDP, in 2012, total vehicle exports from South Africa reached 276 047 units, an increase of over 1 600%.

Over the same period imports of vehicles rose from 7 011 units to 367 990 units – an increase of over 5 100%. This growth in imports and exports was facilitated by increasing trade liberalization as well as the MIDP's system of export incentivisation. Under the MIDP South Africa's automotive industry blossomed into an outward focussed and leading export industry – moving away from its high levels of inefficiency and reliance on protection.

Overall, Figure 4 shows that South Africa's automotive sector saw rapid growth and development under the MIDP. This is further highlighted by the sector's quick recovery in the wake of the 2008 Global Financial Crisis. As a result, the MIDP has been correctly labelled a successful example of industrial policy for developing countries (Barnes & Morris, 2008; Barnes, Kaplinsky & Morris, 2004). However, the policy was not perfect and necessitated trade-offs, which led to worsening levels of local content and rising imports. Visible in Figure 4 is the acceleration of vehicle imports and its overtaking of vehicle exports. Black (2009) pointed out that these were the warning signs of looming complications for the industry.

3.2.2. Automotive Production and Development Programme

In 2013 the Automotive Production and Development Programme (APDP) became operational, replacing the MIDP. It was driven by two major concerns: compliance under the World Trade Organisation, and the correction of several distortions that had arisen under the MIDP. A key distortion that arose was the result of IRCCs, which made it too easy to import fully assembled vehicles and foreign automotive components. IRCCs were replaced by a new duty rebate system called Production Rebate Credit Certificates (PRCCs) which could be earned through value addition as opposed to export value. PRCCs were earned based on a new "market neutral" incentive system known as a Production Incentive (PI) (Barnes et al., 2017a). In 2018, the value of the PI was 50% of value addition within a qualifying automotive manufacturing operation and 65% for selected vulnerable components. The PI benefit was then paid in the form of a PRCC (International Trade Administration Commission of South Africa [ITAC], 2016; Automotive Production and Development Programme Regulations Act, no. 96 of 2013, as amended, 2017).

A second distinguishing feature of the APDP was the replacement of a 27% duty free allowance, on locally produced and sold vehicles, with a new duty rebate incentive for registered light vehicle manufacturers known as the Vehicle Assembly Allowance (VAA) (Automotive

Production and Development Programme Regulations Act, no. 96 of 2013, as amended, 2017). The VAA provided a duty rebate on imported OEM components to compensate for duties on components that were not produced locally and would otherwise harm the price competitiveness of locally produced vehicles (Barnes et al., 2017a). Excess VAA could also be carried over to the following year and if used on imported vehicles would be reduced by 20%. As can be seen in Table 1, the VAA is determined according to scale of production and is the percentage of a locally produced vehicle's wholesale price that can be rebated on import duties (ITAC, 2018; Barnes et al., 2017a). In the case of a vehicle assembly operation producing between 10 000 and 14 999 vehicles they would qualify for a rebate on import duties worth 10% of the vehicle wholesale price. Likewise, an operation producing 50 000 vehicles or more would qualify for a VAA of 18%.

Table 1: Value of VAA based on vehicle production as determined by ITAC in 2016

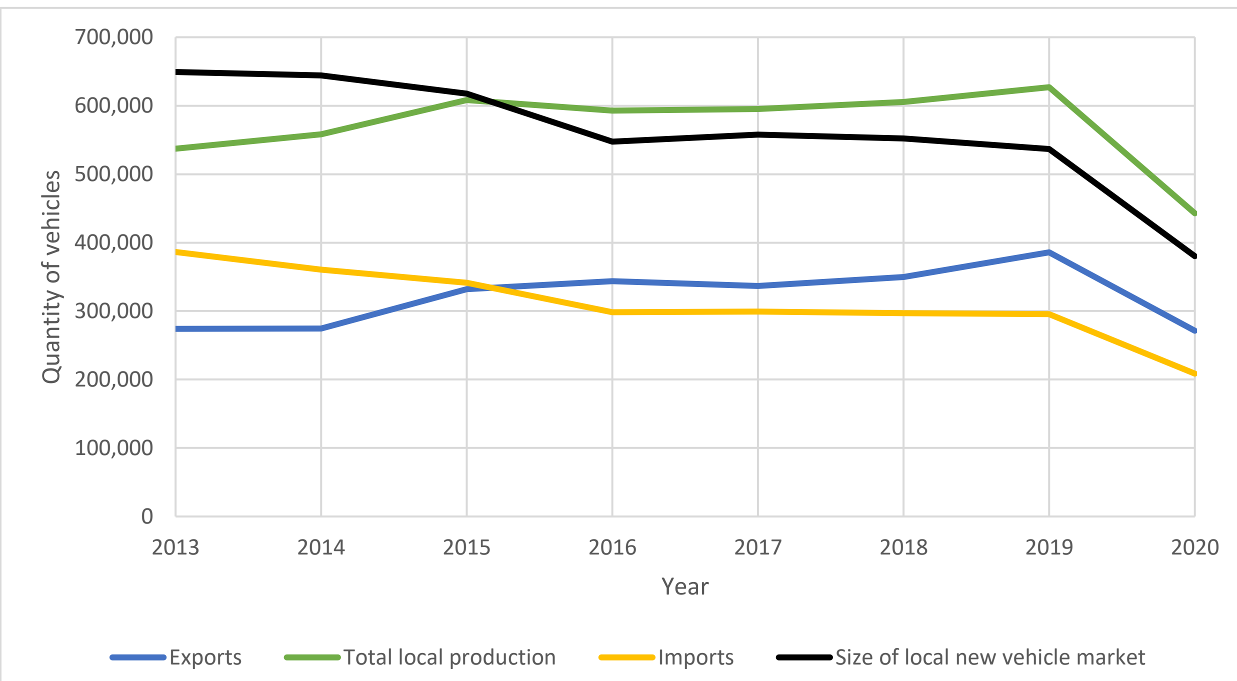
Volume Assembly Allowance	Number of vehicles
10%	10 000
11%	15 000
12%	20 000
13%	25 000
14%	30 000
15%	35 000
16%	40 000
17%	45 000
18%	50 000

Source: ITAC (2018)

The third distinguishing feature of the APDP was the replacement of the Productive Asset Allowance with a grant-based investment scheme known as the Automotive Investment Scheme (AIS). The AIS benefitted all OEM and automotive component suppliers, not just OEMs and first tier firms like its predecessor. The AIS supports light vehicle manufacturers that have or will achieve: an annual production of 50 000 units; 25% of total entity turnover or R10 million within the first full year of production; and component manufacturers within OEM supply chains. The AIS provides a non-taxable cash grant between 20% and 35% of the value of a qualifying investment that increases productive capabilities (Barnes et al., 2017a).

The APDP consisted of four primary objectives: increase vehicle production to 1.2 million units by 2020; increase local content; improve the country's automotive trade balance; and increase employment (Barnes et al., 2017a). Unfortunately, the APDP fell short in reaching these optimistic objectives and was only partially successful in correcting the distortions that emerged under the MIDP (Black, Barnes & Monaco, 2019). The APDP did not ease the pressure on local component producers in the face of rising imports and saw local content levels fall below 39% in 2015. Furthermore, export growth of CBUs had significantly slowed compared to the first decade of the century, meaning that many local component producers could no longer rely on increasing market size to stay afloat. Increasing component imports under the APDP have further added to the "hollowing out" of the local automotive components sector, especially at the 2nd and 3rd tier level, and have maintained a large automotive trade deficit. In particular, Production Rebate Credit Certificates (PRCCs) have again made the importation of fully assembled vehicles and components too easy – effectively reducing tariffs further on imported components and vehicles. A key example of this has been the earning of PRCCs on exports of catalytic converters to offset duties on imports of higher value-added products.

Figure 5: Quantity of vehicles produced, exported and imported under the APDP (2013-2020)



Source: Lightstone Auto (2020)

Performance of the automotive industry under the APDP has been significantly hampered by an underperforming economy. Figure 5 shows very little growth in total vehicle production – only increasing by 17% from 2013 to 2019. The industry reached a record high of 627 013 vehicles produced in 2019, however this was far short of the 1.2-million-unit target initially set under the policy. COVID-19 has reversed the upward trend that began in 2018. South Africa's bleak political and economic climate in recent years has also affected the industry and this is reflected by the decline in the local vehicle market size seen in Figure 5. Positively we can see that vehicle exports have increased by 41% under the APDP from 274 241 units to 385 843 units. The scale of vehicle imports has also declined during the period of the APDP, but this is likely the result of a shrinking local vehicle market given the similar patterns for both indicators in Figure 5. The figure shows mixed results under the APDP, performance of the industry has certainly fallen far short of the expectations that were set at the inception of the industrial policy. This is worrying given the fact that local content levels declined during the APDP, as shown in the next section.

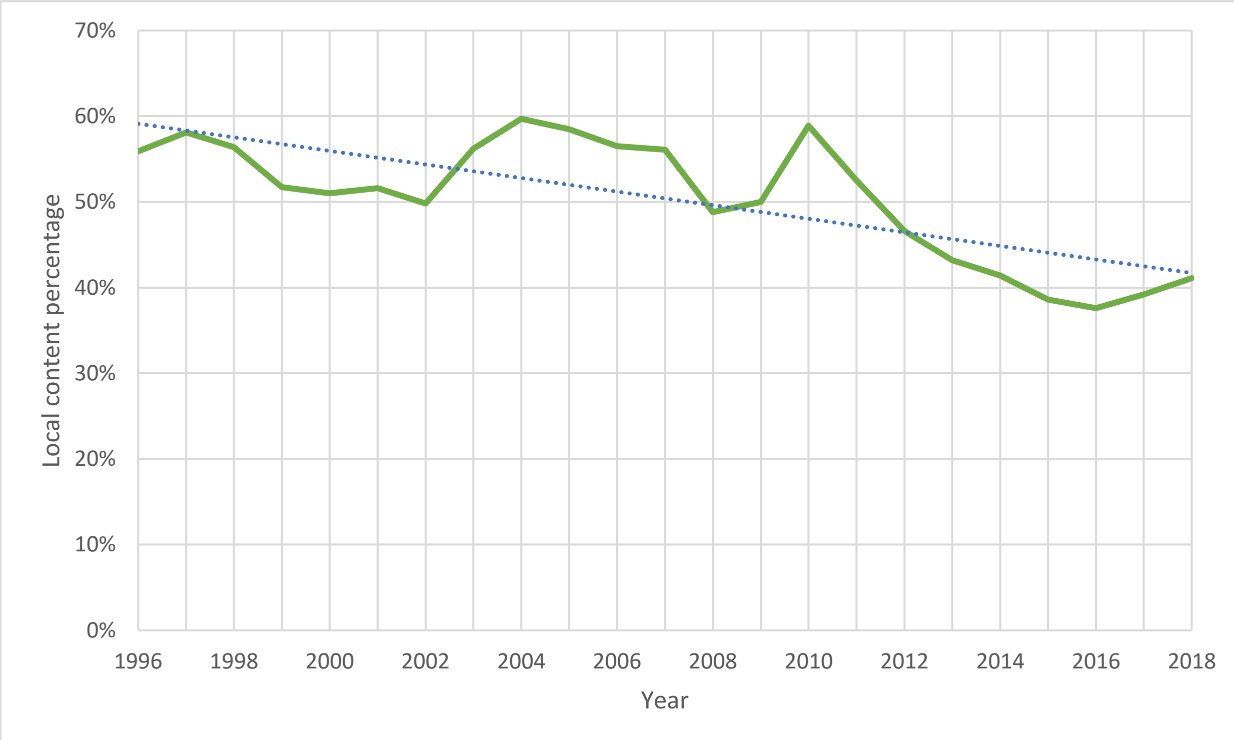
3.3. Development of Local Supply Chain

The decline of local content in South African assembled vehicles represents a weakening of the country's automotive supply chain (Nyakabawo, 2017). This has worrying implications for capturing benefits commonly associated with automotive manufacturing-led industrialisation such as: job creation, materials beneficiation, skills development, industrial and technological spill overs, and balance of payments contributions.

3.3.1. State of Localisation

Figure 6 shows the declining trend of local content levels for South African made new vehicles between 1996 and 2018. The figure shows local content has dropped from its highest point of 60% in 2004 to only 41% in 2018. The period 2010 to 2016 saw a sustained decline in local content which indicates deeper structural damage to the components industry when compared to fluctuations seen from 1996 to 2010. Key determinants of this have been the aftereffects of the Global Financial Crisis, low economic growth and the impact of the APDP. This has paved the way for a massive and sustained raise in component imports since 2009 – displacing local component producers.

Figure 6: Local content levels in South African made vehicles (1996-2018)

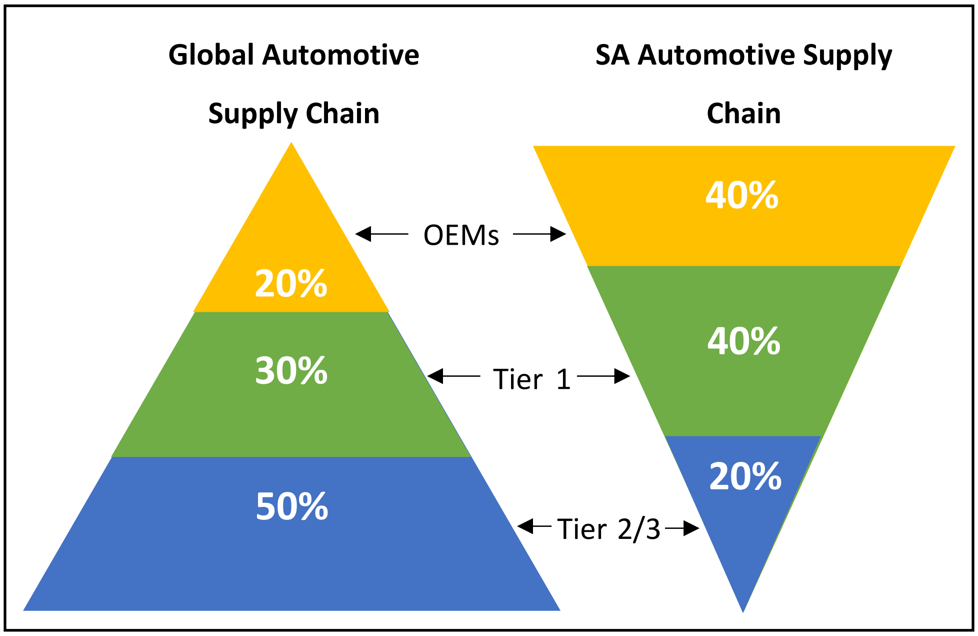


Source: Higuchi et al. (2021)

Figure 7 further illustrates the relatively weak position of local component manufacturing in South Africa. The figure shows that, globally, 2nd and 3rd tier firms account for the largest share of value addition in the automotive value chain at 50%, with OEMs and 1st tier firms only accounting for 20% and 30% of value addition respectively. As witnessed in other successful automotive producing countries, 2nd and 3rd tier manufacturers are responsible for most of employment creation and other developmental benefits or spill overs within this value chain (Higuchi et al., 2021). Therefore, the large share of tier 2 and 3 firms in value addition is pivotal in ensuring that the automotive industry acts as a driver for wider economic development.

Conversely, Figure 7 shows that South Africa's 2nd and 3rd tier manufacturers only account for 20% of value addition while OEMs and tier 1 suppliers account for a combined 80% of value addition. This demonstrates the industry's inability to develop deeper dynamic capabilities within the local economy. Figure 7 shows the extent to which OEMs and tier 1 suppliers effectively operate as islands of higher productivity in the South African automotive value chain. This has serious implications for achieving positive economic spill overs, deepening the local value chain, and unlocking higher levels of local content. OEMs and 1st tier suppliers are becoming increasingly isolated – inducing very little activity further upstream and throughout the rest of the economy. If the industry continues along this trajectory it will fail in its role as an engine for manufacturing-led industrialisation. This is of concern given the significant levels of support afforded to the industry.[4]

Figure 7: Breakdown of Value Addition: South Africa versus the world



Source: Black, Barnes and Monaco (2018: 27)

3.3.2. Determinants of Worsening Local Content

The underdevelopment of South Africa's automotive supply chain is a manifestation of several factors. Firstly, as explained earlier, the legacy of weight-based local content measurement from 1961 to 1989 led to specialisation in heavier, lower value-added components. Secondly, the nature in which automotive assembly evolved under the MIDP and APDP is also important. The incentivisation of CBU and component exports combined with aggressive reductions in import duties exposed component firms to significant competition from abroad, displacing several large component manufacturers in the process (Barnes, Black & Monaco, 2021; Black, Barnes &

[4] In 2018, Treasury calculated that support afforded to the automotive industry amounted to R27 billion rand – far higher than support to any other sector or even the rest of the manufacturing community combined (Kaplan, 2019).

Monaco, 2018). Moreover, upstream capabilities within the local value chain were significantly reduced with the sale of major South African materials suppliers, such as Iscor, to multinational corporations with limited interest and experience in supplying to the automotive industry. Key materials used in the automotive value chain require a minimum grade or level of quality and as a result, local OEMs and component firms were forced to import key materials, greatly reducing local sourcing (Black, Barnes & Monaco, 2018).

More recently, the volatility of the South African exchange rate since 2008 will have had some effect on the relative value of local components compared to imported components and will have certainly impacted exports (Fowkes, Loewald & Marinkov, 2016). Furthermore, while there have been significant investments in first tier component firms, these firms assemble components using large amounts of imported sub-components. Therefore, despite investment in local firms this has not necessarily "trickled down" to local 2nd and 3rd tier firms and may have led to an increase in imports (Black, Barnes & Monaco, 2019). Moreover, South African component production has been increasingly dominated by "commodity products that constitute declining shares of automotive value addition" (Black, Barnes & Monaco, 2018). In other words, the share of lower value-added components such as metal pressings and plastic moulded parts is far higher than more complicated components that would contribute a greater value to local content levels and other associated benefits.

In short, increasing localisation is imperative if the automotive industry is to act as a catalyst for greater manufacturing activity, job creation and skills upgrading. Given the level of state support afforded to the industry it would be a devastating blow to the country if the erosion of local content were to continue. Positively, local content has remained a key consideration under the new South African Automotive Masterplan and South Africa's OEMs are also engaging in various projects to strengthen local supply chain capabilities. Moreover, programmes such as the Automotive Industry Development Centre (AIDC), the Automotive Supply Chain Competitiveness Initiative (ASCCI), and the Toyota Wessels Institute for Manufacturing Studies (TWIMS) have been established with mandates that encompass the strengthening of local content. As a second-tier automotive producer, South Africa has the potential to reach 60% local content (Black, Barnes & Monaco, 2018). However, the accelerating transition to electric vehicles and their associated technologies will force the industry to relook at localisation opportunities. Chief among which will be the localisation of lithium-ion batteries which account for 40% to 50% of the total cost of an electric vehicle (Montmasson-Clair, Moshikaro & Monaisa, 2021).

3.4. 2021 and Beyond: Industrial Policy and Incentives

3.4.1. South African Automotive Masterplan

In April 2016 the Department of Trade and Industry (dti) commissioned the development of a South African Automotive Masterplan (SAAM) project. The project consisted of several reports, workshops and industry engagements designed to produce an aspirational and shared vision for the future of South Africa's automotive industry that would guide government policy and incentives through to 2035. With amendments to the APDP taking place in 2021, the intention of the SAAM was to create a context in which future policy amendments could be discussed and measured in accordance with its objectives and vision for the automotive sector (Barnes et al., 2017b). The SAAM laid out six overarching development objectives for the year 2035: (1) achieve 1% of global vehicle production; (2) increase local content to 60%; (3) double employment in the local value chain to 240 000; (4) improve competitiveness levels to that of leading international competitors; (5) achieve industry transformation across the value chain; and (6) deepen value addition (Davies, 2018).

A comprehensive industry Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was conducted amongst industry stakeholders during the SAAM process. It revealed critical weaknesses and threats to the development of the industry. Identified weaknesses included high transport and logistics costs (especially rail and port costs), high factor cost variability, low skill levels amongst the local workforce, poor labour relations and labour instability, increasing currency volatility, diminishing interest in localisation from OEMs, Broad Based Black Economic Empowerment (BBBEE) pressures on firm ownership, and political instability (Barnes et al., 2017a). Furthermore, it identified several threats to the industry such as rising low-cost competition, increasingly expensive industrial infrastructure, labour relations instability, rising political uncertainty, and declining interest in South Africa and Sub-Saharan Africa from multi-national firms (Barnes et al., 2017a). There were four major strategic challenges that were consistently mentioned during the SWOT analysis, namely, the weak Sub-Saharan African market; the requirements associated with BBBEE compliance; localisation deficiencies; and increasing reluctance to invest in South Africa due to higher risk premiums (Barnes et al., 2017a).

The SWOT analysis also indicated several strengths and positive aspects for the automotive environment in South Africa. Strengths included: strong support from national government, a competitive advantage in the way of established OEMs with significant assets in sunk capital, proven production capability across several vehicle and component categories, competitive in-factory costs such as labour and other overheads, pre-existing and functioning industrial infrastructure, and competitive access to foreign markets through preferential trade agreements such as AGOA and the EU-SA FTA (Barnes et al., 2017a). Furthermore, several opportunities were identified that could unlock greater capabilities and competitiveness for the local automotive sector in the long run. Firstly, stimulating the local economy would open significant avenues for the sector. Secondly, there is significant potential for market growth in Sub-Saharan Africa which will open up possibilities for greater economies of scale. Thirdly, the improvement of logistics costs will go a long way to increasing the cost competitiveness of South African automotive exports. Fourthly, it is clear that focus on skills development and education will be important to upgrading the workforce and improving labour productivity. And finally, the prospect of increased localisation and product specialisation will have profound effects on the scale and value addition of local production (Barnes et al., 2017a; Barnes et al., 2017b).

3.4.2. APDP 2

Phase 2 of the APDP, or APDP 2, was introduced in July 2021 after being delayed for a year and six months due to the impact of COVID-19 (Arnoldi, 2021; Furlonger, 2020). This section therefore examines the key changes of the APDP Phase 2 and provides brief commentary on whether these changes address the shortcomings of the APDP and the objectives outlined under the SAAM. It is important to note that commentary will not attempt to predict the success or failure of the policy but simply whether or not it is an attempt to address structural challenges facing the automotive sector in South Africa.

The core objective of the APDP Phase 2 is to support the vision of the SAAM and develop a "globally competitive and transformed automotive industry that actively contributes to the sustainable development of South Africa's productive economy, creating prosperity for industry stakeholders and broader society" (ITAC, 2021a). Therefore, in order to support the SAAM, changes under the APDP 2 should address issues such as local content, import competition, and industry competitiveness. To this extent the VAA and PRCCs have been replaced with new incentives, the Volume Assembly Localisation Allowance (VALA) and Production Rebate Certificates (PRC) respectively. On the surface, these amendments appear to be a positive response in addressing the structural challenges faced by the South African automotive sector.

Production Rebate Certificates

The calculation of the Production Incentive used in determining the value of duty rebates afforded to qualifying firms has remained the same. However, several important changes have been made which will affect the value and use of PRCs. Firstly, BBBEE requirements have been introduced for firms to qualify under the incentive scheme (ITAC, 2021b). These are shown in Table 2 and could have have negative implications for existing component manufacturers as well as encouraging the entrance of new firms into the industry. The implications of this are discussed in more detail in Chapters Five and Six.

Table 2: BBBEE requirements for firms to qualify under the PRC system

Year	Component Manufacturers	OEMs	New Entrants
2021	No requirement	Level 6	Level 8
2022	Level 6	Level 4	Level 6
2023	Level 4	Level 4	Level 4

Source: ITAC (2021b)

The cost of warranties has now been added to the list of non-production costs that are excluded from the PI calculation (ITAC, 2021a; ITAC, 2021b). This would likely mean a slight decrease in the value of PRCs compared to PRCCs, ceteris paribus. In terms of the Production Incentive and the value of PRCs awarded to different kinds of locally produced automotive products there have been several changes. On the surface, these changes have served to dramatically simplify the government's new incentive and will likely make it easier for manufacturers to understand and engage with the new policy. The PI factor for motor vehicles will remain at 50% under the APDP

2, meaning that local OEMs can continue to claim a 50% duty rebate through PRCs on qualifying imported goods.

Moreover, the provision of special incentives for vulnerable components and catalytic converters, which sat at 50% and 65% at the end of the APDP, have been altogether removed. Instead, Phase 2 does not distinguish between different kinds of components and applies a universal 62.5% incentive across all automotive components and automotive tooling until 2035 (ITAC, 2021a). With the exception of catalytic converters which will see a reduction in its PI factor of 2.5%, this means that all other component and tooling production will be able to claim 12.5% more on duty rebates. Establishing a common level of 62.5% is also likely to promote less fragmentation within component production as incentive disparity is no longer a reason to pursue production of higher incentive earning components such as catalytic converters. Equal incentives across component production are likely to minimise market distortions and encourage investment where there are opportunities for greater economies of scale rather than where firms can maximise duty rebates.

Under the first phase of the APDP the production incentive was reduced almost every year. In the case of vulnerable products, the PI factor began as high as 80% in 2013, this was reduced year on year by 5% until it reached 50% in 2020. High levels of support in the beginning of the APDP would presumably have been intended to help firms transition into the APDP environment while yearly reductions would have encouraged declining reliance on the government. In hindsight it is unclear why such a quick reduction from a high starting point would have been beneficial and likewise it is unclear why reductions specifically took place in 5% increments. In stark contrast, the implementation of PI factors for vehicles, components and tooling stay constant for the duration of the APDP 2. This consistency will likely assist manufacturers within the sector, who will benefit from greater policy certainty and easier long-term financial planning. With the exception of BBBEE requirements for component manufacturers and new entrants (this is discussed later in Section 6.4), it seems that amendments to the PI and provision of PRCs will have a positive effect on the sector and likely place the industry on a better trajectory.

Volume Assembly Localisation Allowance

A further amendment to Phase 1 of the APDP is the replacement of the VAA with a new Volume Assembly Localisation Allowance (VALA). The VALA is calculated by determining the Rand value of Local Value Addition (LVA) to which the VALA percentage in Table 3 is then applied. This is, then, the value of the rebate with which light vehicle manufacturers can offset import duties on imported OEM components. Briefly analysing the effect of this incentive, it means that light vehicle manufacturers pay less on imported components the higher their level of local value addition. This could incentivise a producer to expand LVA as they want to cheapen imports. However, greater LVA could be accompanied by greater imports, so it is hard to predict how this mechanism will affect the proportion of local value addition within locally produced light vehicles.

Rather than an incentive, the VALA could act as more of a reward for those light vehicle producers who already have higher levels of local value addition. This is because the replacement of imports with more affordable and equally reliable, locally produced, components is unlikely to take place in the short term. Therefore, it is unlikely that the VALA will directly incentivise light vehicle producers to drastically increase LVA by 2026. It's function then will remain similar to that of the VAA – to increase price competitiveness on locally produced vehicles by offsetting duties on imported OEM components that could not be produced locally either way. Firms will find a balance that maximises the benefits of the VALA whilst minimising costs, as such it is unclear whether this will result in greater levels of local value addition.

Table 3: Percentages applied in determining value of duty rebate under VALA

VALA Percentage	Year
40%	2021
39%	2022
38%	2023
37%	2024
36%	2025
35%	2026

Source: ITAC (2021a; 2021c) and South African Revenue Services [SARS] (2021a)

Like the VAA, excess VALA can be rolled over to the next quarter and be used to offset duties on imported light vehicles, but when doing so the value of the VALA is reduced by 20% (ITAC, 2021a; ITAC, 2021c). The continuation of this provision is surprising. Even though the VALA is reduced, this still results in imported vehicles being slightly cheaper. This makes locally produced vehicles less competitive in the domestic market, compounding the challenge of limited domestic market demand. Effectively, this provision makes it more difficult to use local demand as a driver for greater local vehicle production and to achieve better economies of scale. Furthermore, it is clear that the primary objective of the VALA is to offset duties on key components that cannot be produced in South Africa. Therefore, it is unclear why this would need to be extended to light vehicle imports in any capacity. The fact that there could be excess VALA suggests that the policy may be too generous and that it does not function exactly as intended.

Using explanations in ITAC (2018), ITAC (2021c), and SARS (2021b) it is possible to compare the net benefit under the VAA and VALA in a hypothetical situation. Box 1 provides simplified formulas for calculating the value of the duty rebate under both incentives (these formulas were compiled using information in the aforementioned documents). The Recommended Retail List Price (RRLP) is the selling price suggested by the OEM or manufacturer. The Company Specific Percentage (CSP) is simply an expression of the seller's mark-up relative to the RRLP. In other words, the CSP adjusts for price that did not stem from value added activities. The VAA% and VALA% refer to the percentages shown in Table 1 earlier and Table 3.

Box 1: Formulas for calculating VAA and VALA duty rebates

Formula 1 (calculation of duty rebate under VAA):

Duty Rebate = (RRLP (1 - CSP)) x (VAA%)

Formula 2 (calculation of duty rebate under VALA):

Duty Rebate = (RRLP (1 – CSP) – Imported Content) x (VALA %)

Source: derived from ITAC (2021a; 2021c; 2018) and SARS (2021a)

If we assume that a vehicle producer under the VALA sourced all materials and components locally (reducing "*Imported Content*" to zero) it allows us to directly compare the relative maximum benefit under both the VAA and VALA. Box 2 shows the value of duty rebate under conditions that would maximise both incentives. The maximum VAA percentage, as of 2016, attributed to light vehicle manufacturers producing at least 50 000 units per annum is used. The maximum VALA percentage, which will be applied in 2021 is also used. Assuming that the RRLP is equal to R100 000 and the CSP is equal to 10%, from table 3.3.2 we can see that the maximum duty rebate under the VALA, given the noted assumptions, is R36 000. The maximum duty rebate under the VAA, given the same assumptions is only R16 200. Therefore, there is greater potential for light vehicle producers to receive a greater incentive under the VALA.

Box 2: Comparison of maximum benefit under VAA and VALA

Assumptions:		
RRLP = R100 000	CSP = 10%	Imported content (IC) = R 0

VAA (maximum benefit)		
Rebate	=	(RRLP (1 - CSP)) x (VAA%)
Rebate	=	(100 000(1 - 10%)) x (18%)
Rebate	=	R 16 200

VALA (maximum benefit)		
Rebate	=	(RRLP (1 - CSP) – IC) x (VALA%)
Rebate	=	(100 000 (1 - 10%) - 0) x (40%)
Rebate	=	R 36 000

Source: based on formulas in Box 1

However, it is unrealistic to assume that there would be no imported content in South African vehicles. If we instead use the average percentage for imported content across all South African vehicles of 60.8% (this is based off 39.2% local content in 2017) it would provide a more accurate prediction of benefits under the VALA. With imported content at 60.8% of the RRLP (which we assumed earlier to be R100 000) the duty rebate awarded to a light vehicle producer would be R11 680 in 2021 – less than the VAA. Under this same scenario a light vehicle producer would need to limit imported content to 49.5% of the RRLP in order to match the duty rebate awarded to an operation producing over 50 000 vehicles per annum under the VAA. The scale of imported content in locally produced vehicles is unlikely to change drastically over the next few years, especially as the industry recovers from the effects of COVID-19. Therefore, those firms producing in excess of 50 000 vehicles per annum will likely see the value of duty rebates decrease under the VALA. Furthermore, the VAA used a sliding scale from 2016 onwards, where smaller light vehicle producers received a smaller benefit. This means that, ceteris paribus, smaller light vehicle producers would see a smaller decline in rebate value relative to larger producers under the VALA.

As shown earlier in Table 3 the VALA percentage will decrease year on year to 35% in 2026. This will see the value of duty rebates, ceteris paribus, under the VALA decrease over time. The VALA would appear to be a rolling back of rebates if local content levels in South African produced light vehicles continue to decline or remain stagnant. Despite the gradual rolling back of rebates, both as the VALA extends beyond 2021 and in transition from the VAA, an important mechanism within the VALA is that it introduces an incentive for producers to increase local value addition in order to earn greater rebates. In this regard, the amendment seems better aligned to address some of the structural challenges facing the industry, in particular low levels of local content.

3.5. Concluding Remarks

The legacy of South Africa's industrial policy prior to 1995 is an important factor in understanding structural issues that exacerbate low levels of local content in locally assembled vehicles today. Under the MIDP the industry blossomed into an open and export-oriented sector which saw rapid growth. However, the period under the APDP was marred by economic recession and industry stagnation which saw local content decline from a high of 59% in 2010 to 41% in 2018. Key to this has been the overexposure of the automotive supply chain to international competition. Rightly so, the SAAM was introduced as an overarching strategy to guide decision and policy making in the reversal of industry decline. To this end, the importance of the supply chain to job creation, economic growth and transformation was recognised – hence the creation of ambitious targets such as doubling employment and reaching 60% local content by 2035. Subsequently, the APDP 2 was introduced in 2021 as a means of carrying out the vision enshrined in the SAAM. With the exception of BBBEE requirements on component firms and new entrants, the APDP 2 introduces positive amendments that are a step towards increasing local content, reducing import competition for key components manufactured locally, and aiding improved industry competitiveness. However, it seems unlikely that these amendments will be enough to overcome the challenges facing South Africa's automotive value chain without broader government policy cohesion beyond industrial policy.

Government policy must target those key automotive product offerings and market segments around which there are opportunities for achieving significant economies of scale. With this in mind, Chapter Four identifies those areas with competitiveness opportunities for South African firms within the automotive industry.

Chapter 4 – Identifying Areas of Competitiveness: Scale and Trade

4.1. Scale

In 2019 South Africa's automotive industry assembled a record 631 983 vehicles. The country is known as a "second tier" automotive producer on the global stage with Table 4 showing that it only accounted for 0.7% of the global market for all vehicle types. While passenger vehicles accounted for the largest output of South African made vehicles, this segment only counted for 0.5% of the global passenger vehicle market. Table 4 also shows that locally produced light commercial vehicles (LCVs) account for a much more significant share of the global LCV market at 1.3%. Combined with the high share of local demand for locally produced LCVs, it shows that there is strong potential for local market depth to drive economies of scale in LCV production.

Table 4: South African output and share in respective global vehicle markets (2019)

Vehicle market	Export (units)	Local (units)	Total (units)	Global share
Passenger	260 057	88 608	348 665	0.5%
Light commercial	125 080	129 338	254 418	1.3%
Medium commercial	71	5 369	5 440	
Heavy commercial	141	4 848	4 989	0.7%
Extra heavy commercial	426	12 306	12 732	
Busses	68	701	769	0.4%
Total	**385 843**	**241 170**	**627 013**	**0.7%**

Source: derived from Lightstone Auto (2020) and OICA (2021)

Table 5 shows those vehicle models approaching roughly 100 000 units per annum – what is considered to be the minimum for "world scale". At around 100 000 units per annum it is possible for assemblers and component producers within a value chain for a specific vehicle model to unlock sufficient economies of scale that allow for competitive unit costs (Black, Barnes & Monaco, 2019). Producing below this level has proven to be uneconomic for achieving higher levels of local content. The table shows that two vehicle models, the VW Polo/Polo Vivo and

Toyota Hilux/Fortuner, are already above this minimum threshold, with the Ford Ranger/Everest very close. While the Mercedes C-Class and BMW X3 are below 100 000 units per annum by 20 and 30 thousand units respectively, both OEMs have announced investment plans to expand their operations in South Africa (Creamer Media Reporter, 2021; BMW Group, 2017). In short, the vehicle models shown in Table 5 represent South Africa's key production chains around which it is possible to build local supplier and component manufacturing capabilities. Increasing local content around these vehicle models is possible and is fundamental to achieving the development objectives laid out under the SAAM. Crucially, these vehicle models also represent the best opportunities for localising electric vehicle technologies at scale.

Table 5: Volume and percentage share of vehicle models approaching world scale (2019)

Vehicle type	Vehicles produced	% of total local production
VW Polo/Polo Vivo	157 504	25.1%
Toyota Hilux/Fortuner	104 330	16.6%
Ford Ranger/Everest	94 693	15.1%
Mercedes C-Class	79 372	12.7%
BMW X3	69 490	11.1%
Total	**627 013**	-

Source: derived from Lightstone Auto (2020)

4.2. Vehicle Trade

4.2.1. Vehicle Exports

2019 saw a continued rise in the quantity of South African vehicle exports, despite continued challenges facing the domestic market. Exports rose by 10.3% from 2018, reaching a total of 385 843 units to 109 countries around the world (Lightstone Auto, 2020). South African automotive production remains export-oriented with exports accounting for 61.5% of total production (Lightstone Auto, 2020). This is crucial to fostering sufficient economies of scale and improving the international competitiveness of the South African automotive industry. In 2019, there were 5 major OEM exporters that, together, accounted for 97.3% of all new vehicle exports: Toyota, Ford, BMW, Mercedes and Volkswagen. Each manufacturer exported in excess of 50 000 units with Volkswagen being the only manufacturer to exceed 100 000 units (Lightstone Auto, 2020).

South Africa's automotive export-oriented production benefits from preferential trade agreements with the European Union, United States, Mercosur and its Southern African neighbours. Automotive exports to the United States are no longer as substantial, having dropped to 12 437 units in 2019 (Lightstone Auto, 2020). Despite preferential access to Mercosur, exports to the South American region have, historically, been small. The African continent accounted for the third highest share in exports, after Asia, and while regional integration remains limited the continent still shows potential for South African automotive exports in the medium and long-term (AIEC, 2020). Exports to Europe are greatly assisted by South Africa's FTA with the European Union. As such the region accounted for 73.8% of total vehicle exports in 2019 (prior to Brexit) and is South Africa's most important automotive export market (AIEC, 2020).

Table 6: Destination and quantity of locally produced vehicles (2019)

Rank	Country	Units	% Share
	Total	**385 843**	**100%**
1	United Kingdom	101 401	26.3%
2	Germany	37 152	9.6%
3	Japan	33 435	8.7%
4	France	25 629	6.6%
5	Australia	16 284	4.2%
6	Italy	14 624	3.8%
7	Austria	12 675	3.3%
8	United States of America	12 437	3.2%
9	Netherlands	12 146	3.1%
10	Belgium	11 379	2.9%
11-105	Other	108 681	28.2%

Source: Lightstone Auto (2020)

Table 6 shows that South Africa's largest single export destination is the United Kingdom which accounts for 26.3% of total vehicle exports. While there were uncertainties regarding Brexit and the UK's new trade agreement with the EU, Ismail and Grunder (2020) explain that the same treatment of South African goods will be afforded by the UK after it leaves the EU. Other important single markets for South African vehicle exports are Germany, Japan and France with each accounting for shares greater than 5% of total vehicle exports.

Table 7: Share of vehicle markets in South African automotive vehicle exports (2019)

Vehicle Market	Units	% Share
Total	**385 843**	-
Passenger	260 057	67.40%
Light commercial	125 080	32.42%
Extra heavy commercial	426	0.11%
Heavy commercial	141	0.04%
Medium commercial	71	0.02%
Busses	68	0.02%

Source: Lightstone Auto (2020)

Table 7 shows that light vehicles (passenger and light commercial) dominate South African vehicle exports, accounting for 67.4% and 32.4% of total vehicle exports respectively. Light vehicle exports were largely destined for developed countries, highlighting South Africa's dependence on preferential trade access to large, developed economies. Exports of extra heavy commercial vehicles, heavy commercial vehicles, medium commercial vehicles and busses only accounted for a combined 0.19% of total exports. However, the destinations of such vehicle exports were almost exclusively made up of neighbouring African countries (AIEC, 2020).

4.2.2. Vehicle Imports

South Africa has one of the most competitive new vehicle trading environments in the world. Despite a relatively small consumer market in international terms, there are at least 46 car brands and 2507 model derivatives in the country (AIEC, 2020). This is the result of extensive trade liberalisation over the last 30 years as well as the system of import rebates that allows for the easier importation of foreign manufactured vehicles. 295 000 vehicles were imported into South Africa in 2019 at a value of R64 billion rand. Table 8 shows the top 10 countries of origin for imported vehicles into South Africa in 2019, with India accounting for more than a third of vehicle imports.

Table 9 shows that passenger vehicles account for 90.3% of vehicle imports into South Africa. This presents a significant obstacle to unlocking greater demand for locally produced passenger vehicles in South Africa and achieving better economies of scale for localisation within the segment. Light commercial vehicle imports only accounted for 23 883 units. Given the high levels of locally produced light commercial vehicles for the domestic market and the production volumes for the Toyota Hilux/Fortuner and Ford Ranger/Everest this shows clear potential for achieving greater economies of scale within the vehicle segment.

Table 8: Top 10 origins of imported vehicles into South Africa (2019)

Rank	Country	Units	% Share
	Total	**295 441**	**-**
1	India	106 418	36.0%
2	Germany	37 571	12.7%
3	Japan	34 441	11.7%
4	South Korea	27 044	9.2%
5	Spain	12 100	4.1%
6	China	11 608	3.9%
7	Thailand	10 748	3.6%
8	United Kingdom	8 125	2.8%
9	Indonesia	7 882	2.7%
10	Romania	6 077	2.1%
11-27	Other	33 427	11.3%

Source: Lightstone Auto (2020)

Table 9: Breakdown of imported vehicles according to market type (2019)

Vehicle Market	Units	% Share
Total	**295 441**	**-**
Passenger	266 770	90.30%
Light commercial	23 883	8.08%
Medium commercial	3 321	1.12%
Extra heavy commercial	1 044	0.35%
Busses	227	0.08%
Heavy commercial	196	0.07%

Source: Lightstone Auto (2020)

4.3. Component Trade

4.3.1. Component Exports

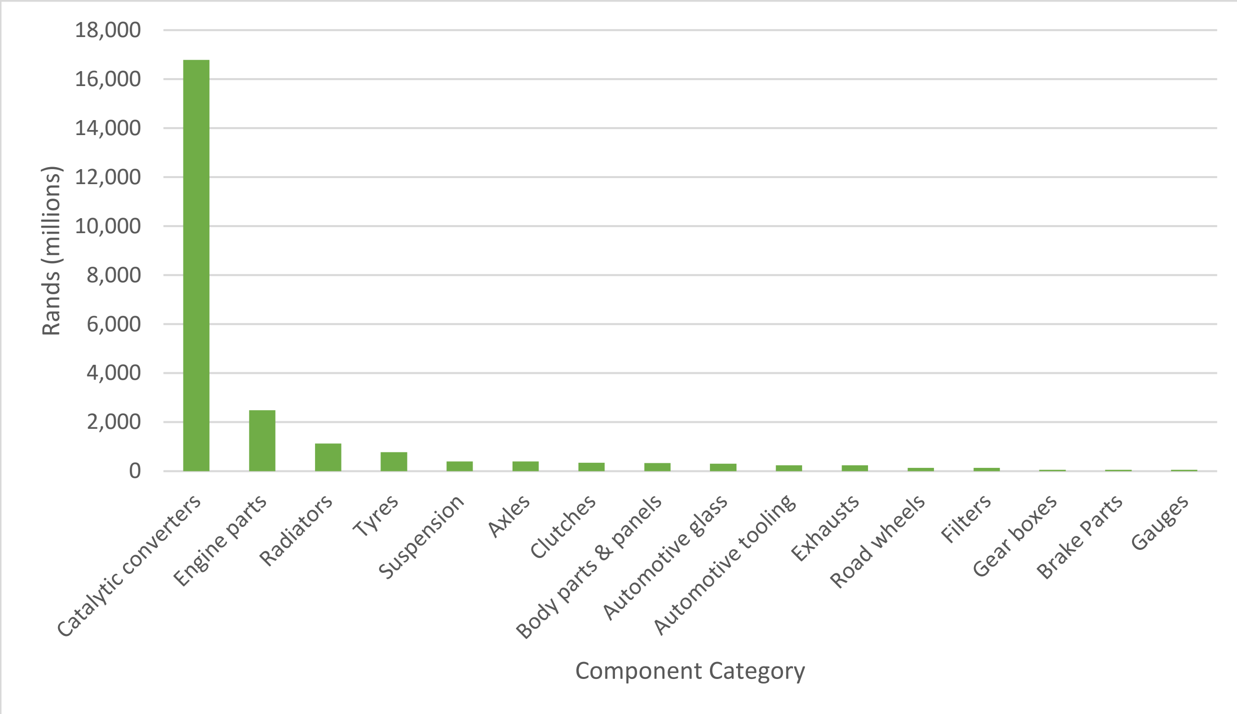
Table 10 shows South Africa's top 20 automotive component export partners, by value, for 2019. Germany is South Africa's largest component export destination by a significant margin, followed by the USA and the Czech Republic, with exports to the latter rising over 200% since 2012. Developed countries account for the largest share in value of South African component exports, with developing countries accounting for a smaller but still sizable share in value. South Africa's major component export regions are Europe, Sub-Saharan Africa and major automotive producing countries in Asia and North America. Unlike the export of vehicles to Sub-Saharan Africa, it is clear in Table 10 that South Africa is far more regionally integrated with its neighbouring countries when it comes to component production and sales. This shows the importance of the African market to the future development of the South African automotive components industry.

Table 10: Top 20 export destinations for automotive components in 2019 (R millions)

Rank	Country	Value (Rm)
1	Germany	14 145
2	USA	4 814
3	Czech Republic	3 467
4	Thailand	2 728
5	Namibia	2 468
6	UK	2 105
7	Spain	2 065
8	Botswana	2 015
9	Zambia	1 598
10	India	1 596
11	Japan	1 562
12	Mozambique	1 250
13	DRC	1 111
14	Zimbabwe	1 108
15	Belgium	992
16	Argentina	903
17	eSwatini (Swaziland)	711
18	China	631
19	Mexico	608
20	Turkey	544
-	Rest of World	7 248

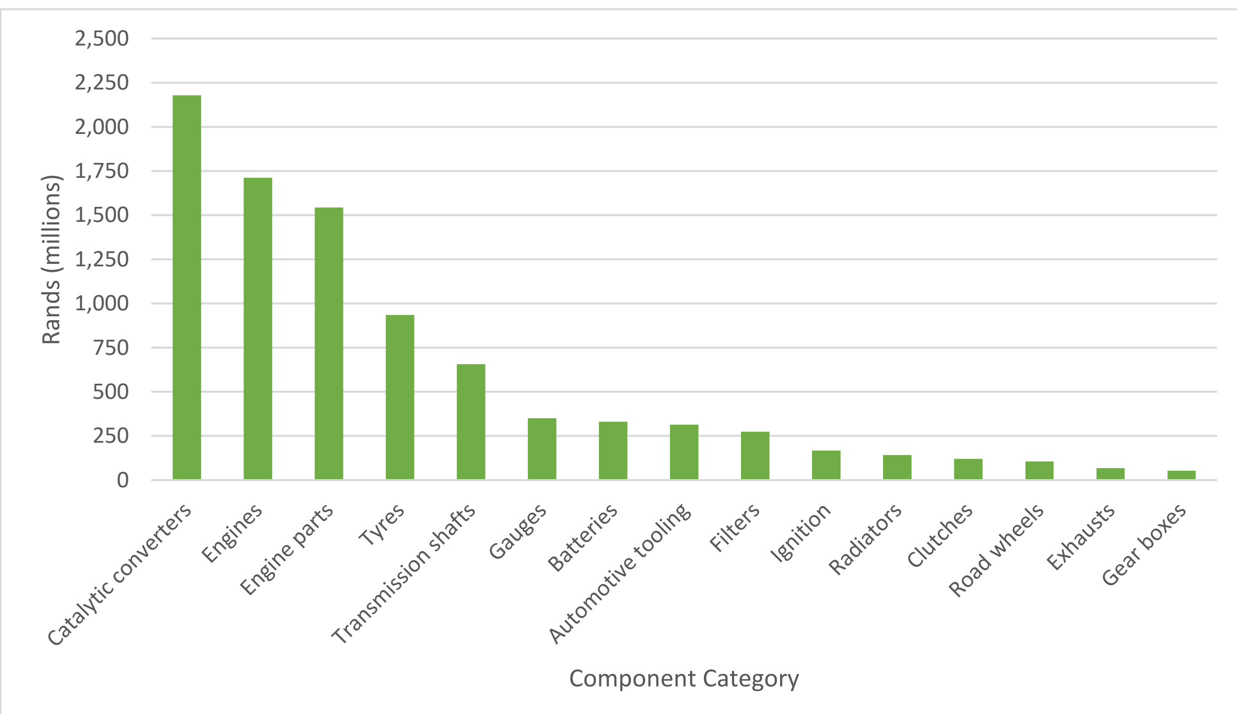
Source: AIEC (2020)

Figure 8: Composition of automotive components to ***developed*** *countries in Table 10*



Source: derived from AIEC (2020)

Figure 9: Composition of automotive components to ***developing*** *countries in Table 10*



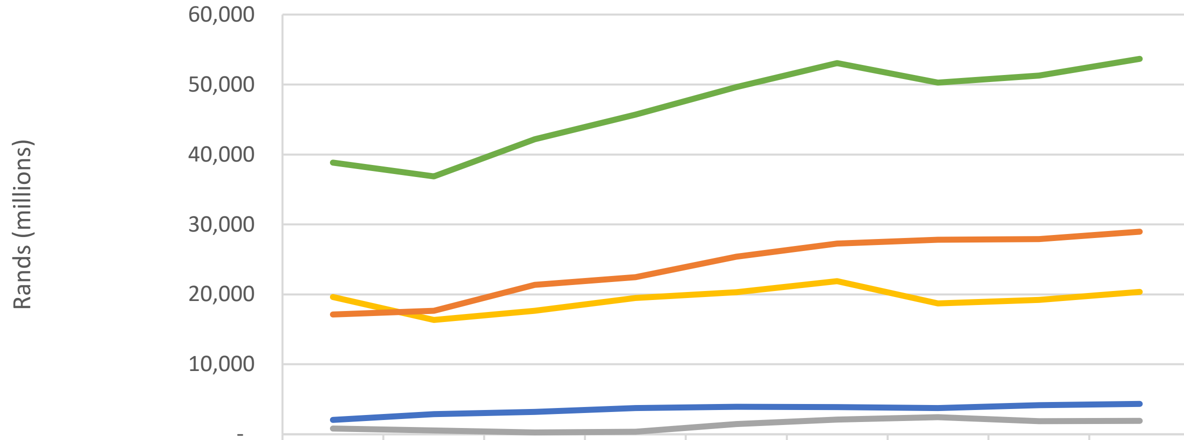
Source: derived from AIEC (2020)

Figure 8 and Figure 9 show the composition of automotive components that are exported to developed and developing countries in Table 10. From a methodological point of view, countries were categorised according to their commonly accepted status of developed or developing and component categories with total values below R50 million were excluded since they did not aid in the visual comparison between the two graphs. We cannot directly compare the value or size of the same components from Figure 8 and Figure 9 since the graphs are a different scale. However, we can draw insights from the relative scale of components within their own categories and infer telling conclusions on the distribution and diversity of exports to developed and developing countries.

What is immediately apparent when looking at Figure 8 and Figure 9 is the vastly different distribution of automotive component exports. In Figure 8 we can see that catalytic converters completely dominate the composition of exports to developed countries, with other component categories accounting for relatively insignificant shares in value. Worryingly, within this composition of exports, above R50 million rand, there are no high value-added components such as powertrains or telematics. Figure 9 immediately shows a far more diverse distribution of component exports to developing countries with other component categories being far closer to catalytic converters in total value. Furthermore, engines account for the second largest share in component exports to developing countries at just over R1.7 billion. In contrast, the export of engines to developed countries was excluded in Figure 8 because it didn’t exceed R50 million. This visual analysis highlights the different nature of value addition South Africa serves for developed and developing markets. While these differences are also the result of aftermarket sales to developing countries it highlights the potential benefits of a stronger Sub-Saharan African automotive value chain as echoed in Barnes et al. (2021).

Figure 10 shows the value of automotive component exports from 2011 to 2019. The period saw sizeable growth in total exports which rose by R14.9 billion. However, this growth was cut short in 2016. It is apparent that the shape of total component exports has been influenced by exports of catalytic converters. This is perhaps unsurprising given that catalytic converters accounted for close to 40% of total automotive component exports in 2019, which is far higher than any other component category. This dominance of one component category over the entire sector is a clear sign of the vulnerability that the South African automotive components industry faces.

Figure 10: Value of major automotive component exports (2011-2019)



	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	38,823	36,867	42,176	45,682	49,641	53,041	50,275	51,296	53,667
Catalytic converters	19,639	16,347	17,641	19,493	20,326	21,892	18,702	19,220	20,359
Engine parts	2,058	2,875	3,189	3,732	3,941	3,901	3,773	4,162	4,345
Engines	819	559	263	364	1,448	2,110	2,447	1,874	1,904
Other	17,126	17,645	21,346	22,457	25,374	27,248	27,800	27,914	28,963

Year

Source: derived from AIEC (2020; 2019; 2018; 2017; 2016; 2015; 2014)

Positively, we can see that growth in total exports since 2011 has been driven largely by the "other" components category. This is a positive indicator that the sector is slowly becoming less dominated by catalytic converters and that there has been sustained export value growth even when growth in catalytic converters stagnated from 2016. This shows that it is important to encourage the growth of other component manufacturing activities as it reduces the industry's reliance on one product – especially since catalytic converters will not be used in battery electric vehicles.[5] Finally, in Figure 10 we can see that although there has been growth in "engine parts" and "engines" this has come off of a low base, which is highly representative of the dominance of low value-added commodity type products that have dominated local automotive component production. The fact that there was some growth in these component categories is positive, but it exposes the need for greater

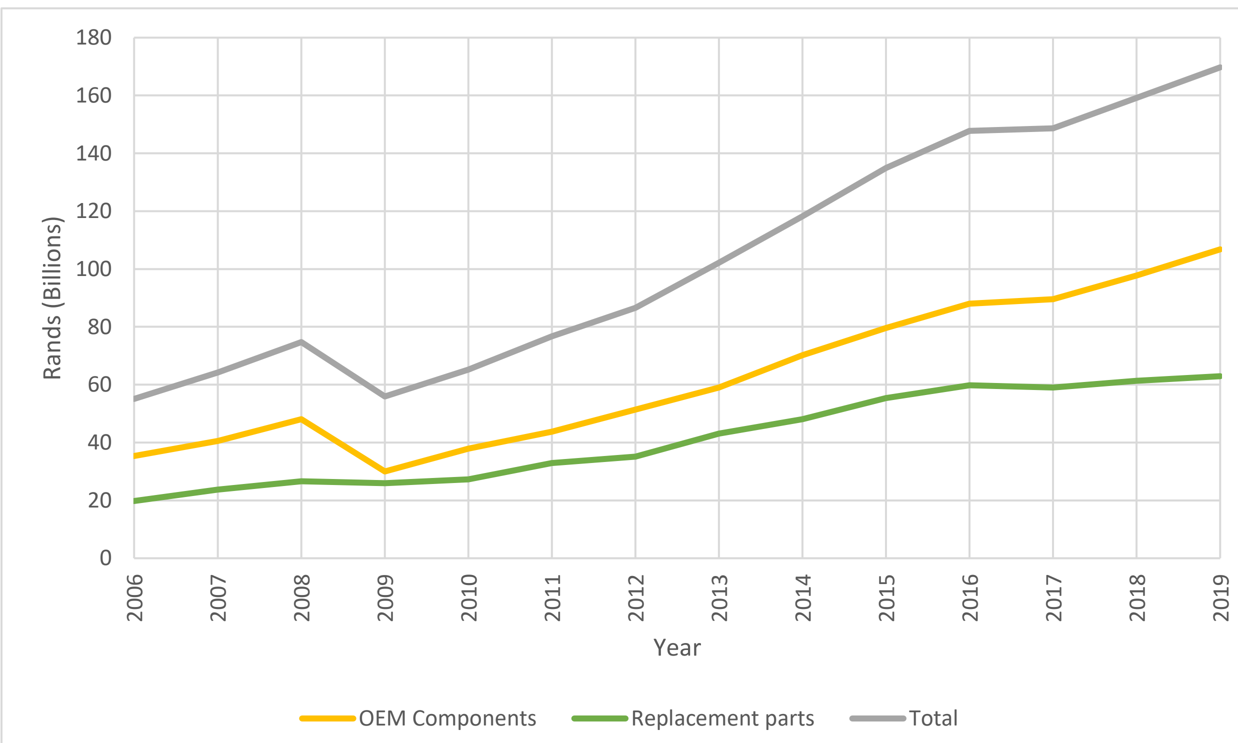
[5] Catalytic converters are an exhaust emission control device. While they would likely still be utilised in hybrid vehicles, they would no longer have a place in "zero-emissions" vehicles.

advancement in the production of higher valued added components that will create more jobs and higher revenue for the industry.

4.3.2. Component Imports

The import of automotive components into South Africa consists of components supplied to original equipment manufacturers that follow the global sourcing principles and standards of OEM's and replacement parts that supply the independent aftermarket. In 2019, total automotive component imports amounted to a considerable R169.7 billion – 2.7 times the value of imported vehicles and R116 billion more than the value of component exports from South Africa (AIEC, 2020). It is clear that South Africa is highly dependent on imports of automotive components. In Figure 11 we can see that imports of automotive components have risen at a consistently high rate over the period, with exceptions in 2008 and 2016 likely the result of the Global Financial Crisis and domestic economic and political issues respectively.

Figure 11: Value of imported automotive components (2006-2019)



Source: AIEC (2020; 2019; 2018; 2017; 2016; 2015; 2014; 2010)

The import of Original Equipment (OE) components was valued at R106.8 billion in 2019. These component imports are largely made up of high value, capital intensive components, such as powertrains and telematics which account for between 50% and 60% of the value within modern vehicles (AIEC, 2020). From Figure 11 we can see that OE components are the largest contributor to the rise in value of total imports. This makes sense given the high levels of imported content in locally produced vehicles. Furthermore, the rise in imports of replacement parts seen in Figure 11 has been driven by an expanding range of vehicle models in the South Africa national vehicle parc which reached 12.7 million vehicles in 2019. This has also been compounded by South Africa's economic recession which has forced many consumers to replace their vehicles at a slower rate (AIEC, 2020).

The majority of South Africa's OE component imports originate from other major automotive producing nations with Germany, Thailand and Japan accounting for 60% of imports in 2019. The origin of replacement part imports was largely the same except for China which accounted for a growing share of imports. South Africa is an importer of both high value-added and lower value-added components and sub-assemblies. However, the import of high value-added components such as engines, telematics, and drive train assemblies account for a significant proportion of the total value of component imports. The import of original equipment components from Germany, Japan and Thailand alone accounted for R64 billion in 2019.

4.4. Concluding Remarks

The VW Polo/Polo Vivo, Toyota Hilux/Fortuner, Ford Ranger/Everest, Mercedes-Benz C-Class, and BMW X3 were shown to be South Africa's key production lines around which there are economies of scale to increase local content. In particular, the production of LCVs was shown to have significant local demand and share in international demand that could further drive opportunities for the development of the local supply chain. In terms of export demand, Europe was shown to be South Africa's most important trading partner emphasizing the importance of preferential access to the EU and UK markets. However, the chapter also showed the particular importance of developing countries, in particular Sub-Saharan Africa to the diversification of South African automotive component production.

While Chapter Five discusses the benchmarking performance of the automotive supply chain, it is important to remember the competitiveness opportunities discussed in this chapter as one considers how and where efforts can be focussed to improve the performance of the local supply chain.

Chapter 5 – Benchmarking the Development of the Automotive Supply Chain

This chapter makes use of South African Automotive Benchmarking Club (SAABC) data provided through B&M Analysts. The data provides firm level insights into the various competitiveness, economic and value chain performance variables for a sample population of automotive supply firms. All three tiers of the supply chain are represented. Firms pay an annual subscription of R30 000 to be a member of the SAABC, this means that the sample firms are not a random selection and therefore may not be fully representative of all automotive component firms. If anything, the sample will be biased towards larger and better performing firms within the industry as smaller, poorly performing firms are less likely to warrant paying the annual subscription fee. However, Table 11 shows that the sampled firms reflect the diverse characteristics of the broader components sector, encompassing multinational and local firms, the significant automotive manufacturing provinces as well as many of the sectoral activities within the South African automotive supply chain. While there are some limitations, the SAABC data allows us to track the development of micro-level competitiveness capabilities, supply chain development, economic performance and infer evolutionary changes across the South African automotive component manufacturing sector.

The SAABC collects data on a range of economic, human resources, R&D, operational competitiveness, and value chain indicators. For the purposes of this study, data on individual firm responses for economic, value chain, human resources development and operational competitiveness were available. Section 5.2 makes use of key performance indicators for operational competitiveness. SAABC data for this section was available from 1999-2018. Key performance indicators for economic, value chain and human resources were made available for section 5.3. However, SAABC data was only available from 2010 until 2019 for these indicators.

Table 11: Breakdown of firm sample population in SAABC dataset

Ownership	Percentage of sample size
Multinational	43%
Locally owned	57%

Province	Percentage of sample size
KwaZulu-Natal	34%
Eastern Cape	35%
Gauteng	27%
Western Cape	4%

Sectoral activities of firms	Percentage of sample size
Trim	11%
Components	16%
Other (paint & rubber)	11%
Metal fabrication	14%
Harnesses	4%
Metal form/press	12%
Foundry/Forge	5%
Plastic moulding	7%
JIT Assembly	8%
Precision Machining	3%
Glass	2%
Heat Transfer	2%
Electronics	4%

**Sample size = 257*

Source: SAABC data (2020) accessed through B&M analysts

5.1. Methodology

Data capture within the SAABC is not compulsory. As a result, firms do not necessarily reply to all survey questions and may only reply periodically. Poorly performing firms may also stop reporting to the SAABC altogether – cancelling their membership if they can no longer justify the annual subscription fee. This creates an issue of sample selection since there is not a continuous stream of data for every participant over the entire duration of the study. To overcome the issue of sample selection, the data was aggregated into periods. This meant that it was not necessary for firms to have responded every single year as the average of their responses within in a period was used as the value for that period.

Two different SAABC datasets were used in this analysis. Section 5.2 analyses the dataset for operational competitiveness variables from 1999 to 2018. The data was aggregated into five four-year periods: 1999-2002, 2003-2006, 2007-2010, 2011-2014, and 2015-2018. Section 5.3 analyses the dataset with information on economic and supply chain indicators from 2010 to 2019. This data was aggregated into two five-year periods: 2010-2014 and 2015-2019. Much of this data was represented in Rand terms, as such all Rand values were adjusted for inflation using the Consumer Price Index (CPI); all Rand values are expressed in 2019 Rands. Each variable within the dataset was cleaned. All data outliers were thoroughly analysed and in cases where information appeared unrealistic or inauthentic the firm was removed so that its information did not skew the overall results. In cases where data cleaning had a significant effect on the overall results these are discussed alongside the results.

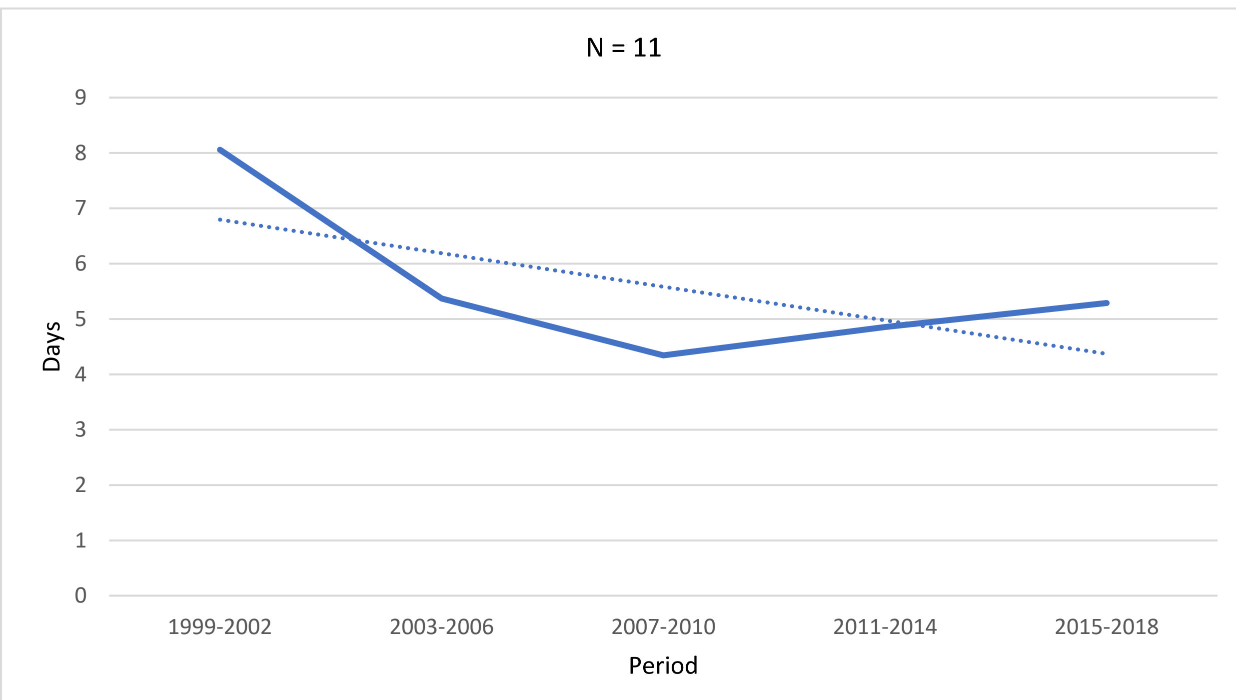
To further control for firms that closed down, left the SAABC, or joined the SAABC later on, the data was then filtered to only show those firms that had values in all of the aggregated periods. This meant that, when looking at the average performance of all firms for a specific variable, the average would not be skewed by the entrance of a well-performing firm or the exit of a poor performing firm. This is likely to have amplified the dataset's bias towards representing better performing firms, since only the more competitive firms will have survived and consistently reported data to the SAABC across the duration of the study. This is useful in that it likely establishes a benchmark for the most competitive firms within the supply chain and in cases where the sampled firms show relatively poor performance it likely infers even poorer performance of the broader supply chain.

5.2. Benchmarking Operational Competitiveness of Automotive Supply Chain: 1999-2018

5.2.1 Inventory and Cost Control

Chapter 2, discussing the development of lean production in the Toyota Motor Corporation, explained that controlling the scale of inventories is important to reducing unit costs. The more quickly sub-components move through the production process, the less time, storage, and other costs are incurred. As such the measure of inventories in units of time is an important means of understanding a firm's ability to control costs. Average Work-In-Progress (WIP) inventory holdings is an important indicator for measuring cost control since firms have more control over the scale of WIP inventories than other inventory measures. WIP refers to all unfinished goods that are in the production process. In short, if a firm has fewer days of average WIP inventory holdings it means that inputs are processed into final goods quicker and the more effective a firm is at controlling costs.

Figure 12: Average Work-In-Progress inventory holding (1999-2018)



Source: derived from SAABC data (2020) accessed through B&M Analysts

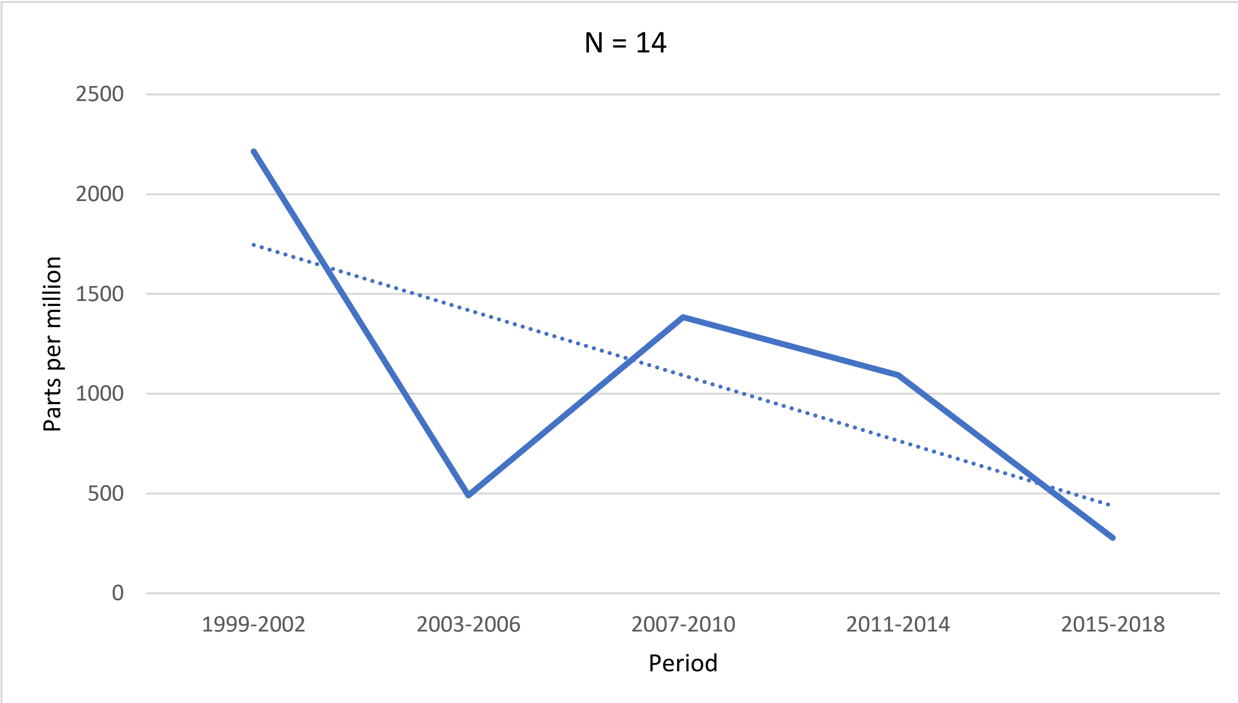
Figure 12 shows a declining trend in average WIP inventory holdings for the sample set of firms. Average WIP declined from an average of 8 days in the first period to 5 days in the last period. This is a positive sign and shows that the sample firms have made significant improvements in controlling costs. Although Figure 12 shows a decreasing trend, it is cause for concern that WIP worsened between 2007 and 2018. Given the sample set bias, this likely means that the rest of the industry has performed comparatively worse. Nevertheless, Figure 12 shows that firm-level cost control improvements have been achieved within the South African automotive components manufacturing sector.

5.2.2. Quality Control

Chapter 2 explained the pioneering of quality at source by Toyota and emphasized the importance of quality control as a means of improving customer satisfaction and reducing expensive reworking and scrap costs. Quality control is vital to competitiveness, both for firms and value chains, under World Class Manufacturing. This section looks at four key indicators for quality control (customer return rate, internal rework rate, internal scrap rate, and internal reject rate) in order to analyse the quality performance of firms within the South African automotive components industry.

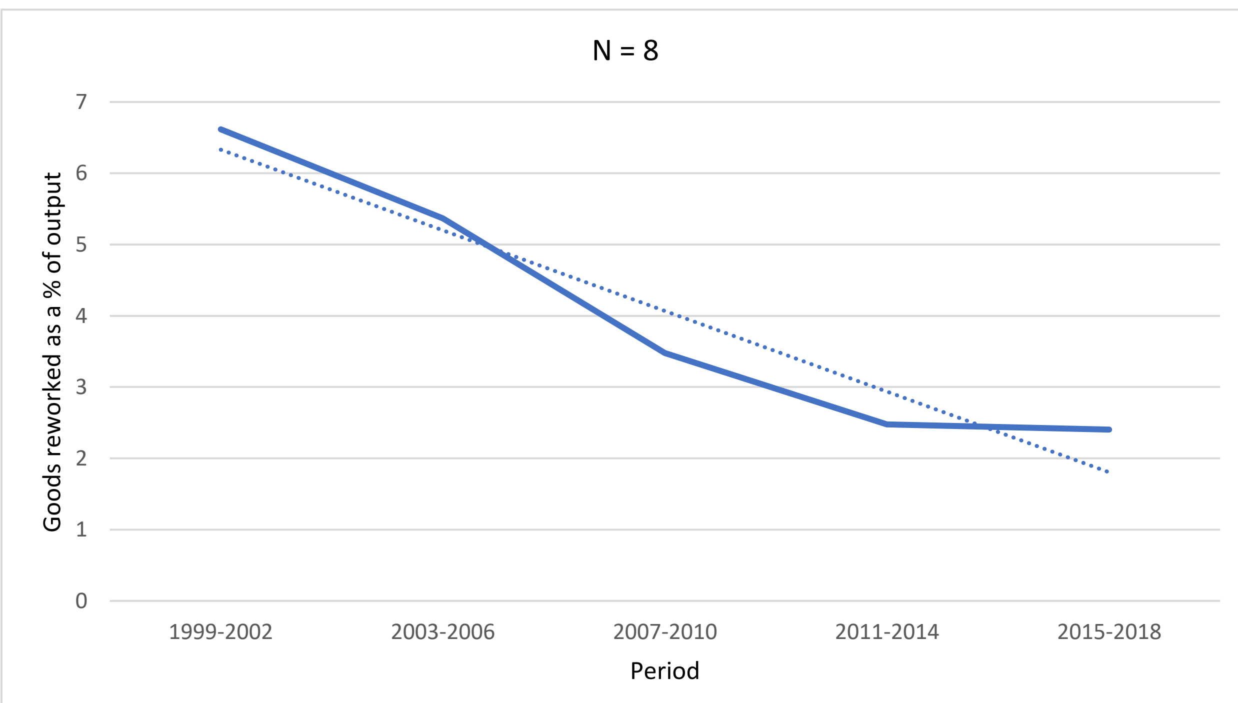
Figure 13 shows an overall decline in the customer return rate for the sampled firms. While there were some fluctuations between years, we can see that there is a steep downward trend over the period. Customer return rate is a critical measure of quality and shows good progress by the sampled firms. This is accompanied by Figure 14 which shows a consistent and steep decline in the internal rework rate of sampled firms. This is highly impressive and would have potentially led to large cost savings. The sharp and continuous decline in reworking rates could suggest the use of successful "quality at source" principles. Figure 13 and Figure 14 show impressive quality improvements that would likely have also led to important cost savings and overall competitiveness improvements. While the sample set is likely biased towards better performing firms, this shows that significant quality improvements are possible within the South African automotive supply chain.

Figure 13: Customer return rate (1999-2018)



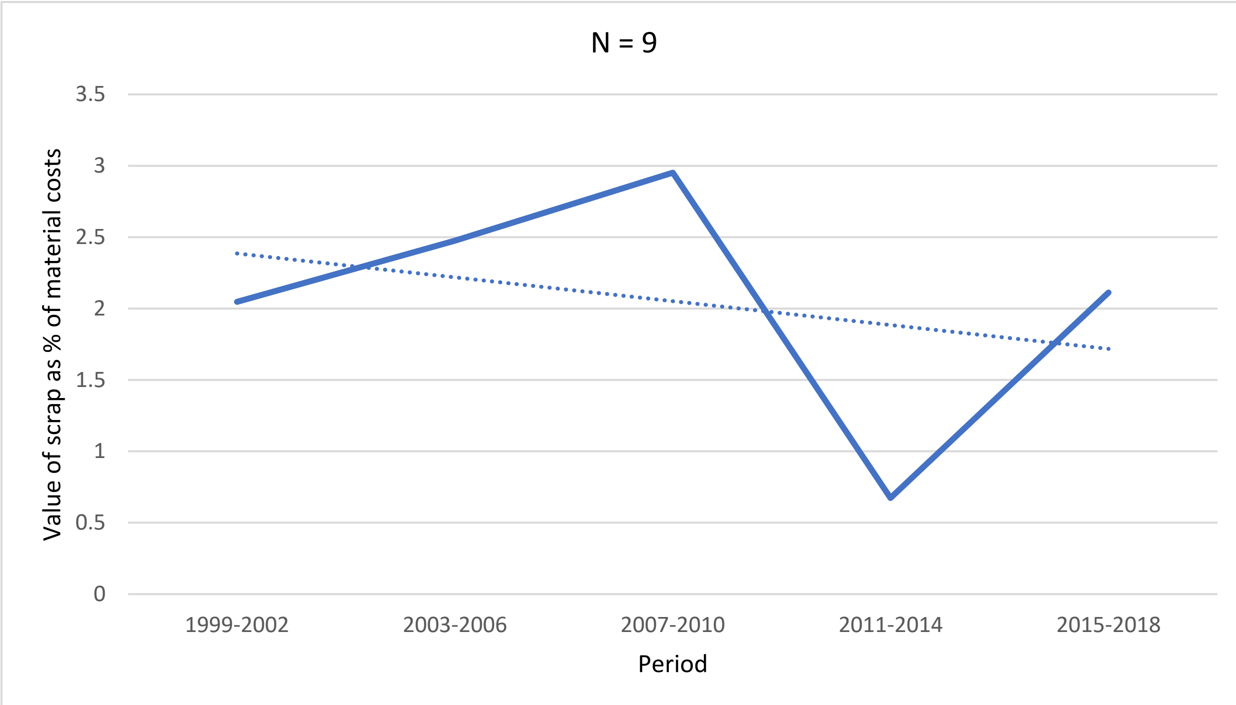
Source: derived from SAABC data (2020) accessed through B&M Analysts

Figure 14: Internal rework rate (1999-2018)



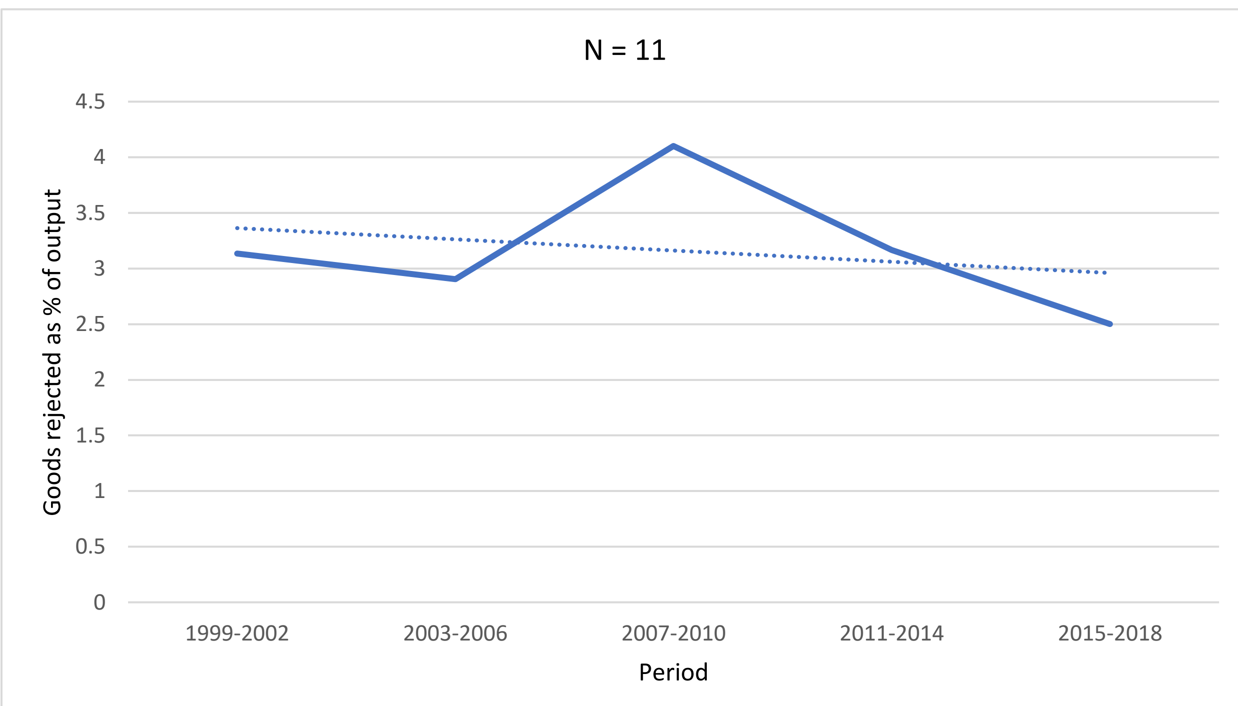
Source: derived from SAABC data (2020) accessed through B&M Analysts

Figure 15: Internal scrap rate (1999-2018)



Source: derived from SAABC (2020) accessed through B&M Analysts

Figure 16: Internal reject rate (1999-2018)



Source: derived from SAABC (2020) accessed through B&M Analysts

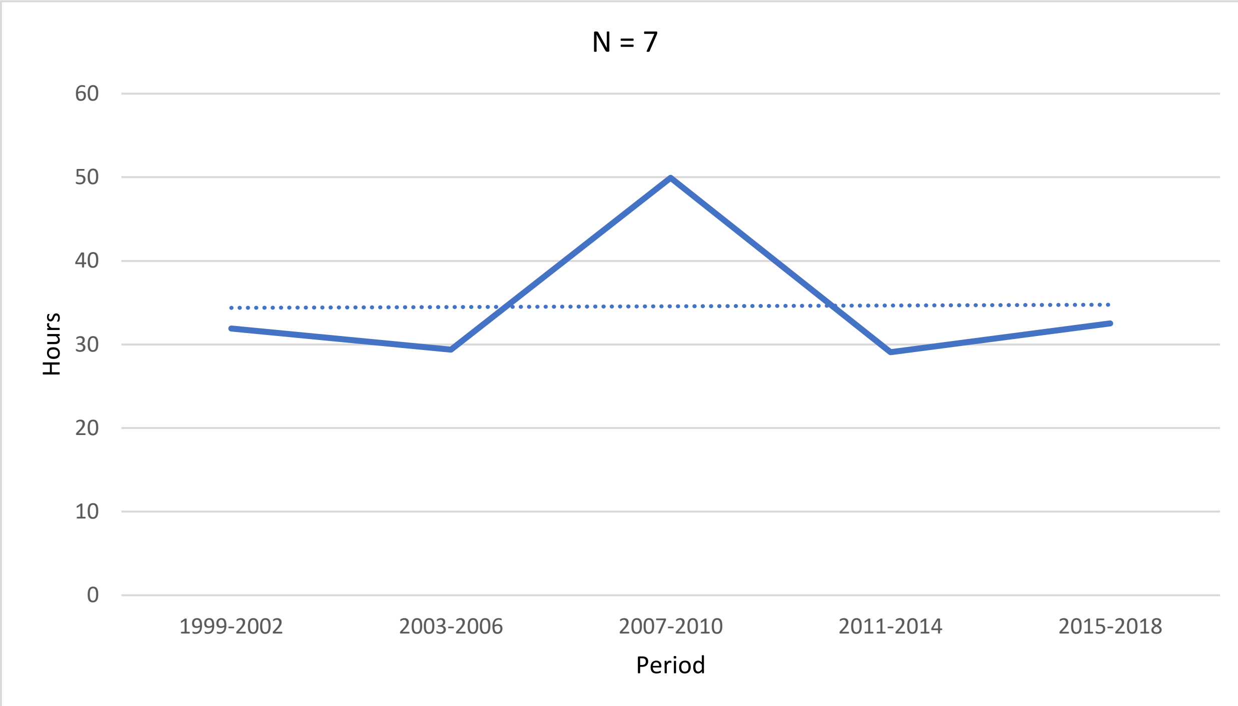
From Figure 15 we can see significant fluctuations in average scrap rates for the sampled firms. The graph shows an overall decline in average scrap rates over the five periods, but it is also apparent that scrap rates were marginally higher in 2015-2018 than they were in 1999-2002. As such it is difficult to say whether there has been any real improvement in this regard. Figure 16 shows a slight overall decline in the internal reject rate for the sampled firms. This further supports the quality improvements observed for internal rework and customer return rates. Overall, the data shows that there have been some quality improvements for the small set of sampled firms from 1999 to 2018. This shows that quality improvements in the domestic automotive supply chain have been achieved. However, this in no way guarantees quality improvements across the entire local supply chain given the small sample size.

5.2.3. Operational Flexibility

Average throughput time is an important indicator of operational flexibility. Throughput time refers to the period during which physical manufacturing or value adding activities take place – converting input materials into a final product. It excludes the time taken up by other activities that do not physically add value to the product, such as order processing or shipping. Average throughput time is, therefore, an important benchmark for monitoring firm level manufacturing competitiveness and efficiency.

Figure 17 shows that there has been no improvement in manufacturing throughput time for the seven automotive supply firms that provided data to the SAABC over the five aggregated periods. This could mean that the sample firms are operating close to their maximum level of efficiency given the resources at their disposal. However, this would seem unlikely given the technological, operational and human resource improvements that could have taken place over the 20-year period. Given that the sample selection is likely biased towards better performing firms, this then is a worrying indicator for the rest of the automotive supply chain. It is possible that firms outside the sample set have been able to take advantage of "low hanging fruit" that better-performing firms can no longer take advantage of to improve their own throughput times. However, it is a concerning sign for the overall competitiveness of the supply chain if industry leaders have been unable to improve flexibility and decrease throughput times over the last 20 years as the data suggests.

Figure 17: Average throughput time of firm's 5 most important products (1999-2018)



Source: derived from SAABC (2020) accessed through B&M Analysts

5.3. Supply Chain Development and Extent of Capabilities Deepening: 2010-2019

5.3.1. Economic and Factor Competitiveness Development

Table 12 summarises the economic indicators for firms that provided data to the SAABC from 2010 to 2019. Positively, the table shows that real average manufacturing sales increased by 10% for 53 sampled firms over the two five-year periods. The table also shows a 5% real increase in "other sales" over the same period. This reflects the sale of goods that were not manufactured by the responding firm or the sale of services. Therefore, this could include imported goods or goods that are produced by another domestic firm and are then resold by the responding firm. Survey responses to the "other sales" variable within the dataset proved less reliable than other variables, especially manufacturing sales, hence the sample size was reduced to only 14 firms as a result of limited responses and data cleaning. This makes it difficult to infer much from the "other sales" variable. However, the increase in average manufacturing sales over the period could suggest a greater level of manufacturing output on behalf of the sampled firms or simply an increase in revenue from manufacturing output.

Table 12: Real change in aggregated economic indicators for sample firms (2010-2019)

Economic indicators		2010-2014	2015-2019	% Change
Manufacturing sales (Rands)	Mean	269 036 981	294 853 697	10%
	N	53	53	-
Other sales (Rands)	Mean	9 478 894	20 402 544	5%
	N	14	14	-
Cost of sales – materials (Rands)	Mean	167 314 832	184 449 267	10%
	N	53	53	-
Cost of sales - direct labour (Rands)	Mean	24 581 979	30 082 794	22%
	N	52	52	-
Cost of sales - manufacturing overhead costs (Rands)	Mean	34 790 607	36 872 733	6%
	N	50	50	-
Total annual water costs (Rands)	Mean	159 440	198 386	24%
	N	22	22	-
Total annual electricity costs (Rands)	Mean	3 510 914	4 399 838	25%
	N	30	30	-
Total covered factory area (m^2)	Mean	5 695	5 931	4%
	N	13	13	-

**All Rand values were adjusted for inflation using CPI data – Rand values are in 2019 Rands.*
Source: derived from SAABC (2020) accessed through B&M Analysts

Barnes, Black and Techakanont (2017) explain that competitive factor costs relating to overheads, labour and materials are vitally important to the development of domestic and regional automotive value chains. Table 12 further shows that average material, labour and overhead cost of sales increased for sampled firms over the two aggregated periods. Materials cost of sales refers to the cost of material inputs that go into the manufacturing process. The data cannot explain why material costs increased by 10% over the two periods, this could represent an increase in the price of material inputs which would harm competitiveness, but it is also likely that this is the result of increased manufacturing output which would then be related to the increase in manufacturing sales.

Table 12 shows that direct labour as a cost of sales increased dramatically by 22%. To understand whether this was driven by an increase in employment among the sampled firms the variables for direct labour as a cost of sales and employment were further isolated to analyse only those firms that replied to both variables. This approach saw the sample size drop to 48 firms with growth in direct labour cost of sales staying relatively similar at 25%. It showed that employment among the 48 sampled firms grew by 12% over the two aggregated periods. This shows that increased employment was a driver of increased labour costs among the sampled firms. However, the fact that cost of labour increased by almost double the increase in employment suggests that the relationship between the two variables was not directly proportional and that other factors likely contributed to a real increase in the cost of labour.

Table 12 also shows a 6% increase in real manufacturing overhead costs over the two aggregated periods for 50 sampled firms. Manufacturing overhead costs include, among other things, water and electricity costs. Table 12 shows that real annual water and electricity costs increased by 24% and 25% respectively, over the two periods. Unfortunately, firms did not provide data on water and electricity usage, making it difficult to understand if this was simply a result of increased usage. Therefore, Table 13 shows the change in water and electricity expenditure as a percentage of manufacturing overhead costs in order to gain a better understanding of the real change in utility costs. The table shows that real annual water costs rose by just 0.05 percentage points in relation to manufacturing overhead costs. However, real annual electricity costs rose by a more significant 1.4 percentage points in relation to manufacturing overhead costs.

Table 13: Real cost of utilities as a proportion of manufacturing overhead cost of sales

Indicator		2010-2014	2015-2019
Annual **water** costs as a percentage of manufacturing COS	%	0.53%	0.58%
	N	20	20
Annual **electricity** costs as a percentage of manufacturing COS	%	11.4%	12.8%
	N	26	26

**Sample firms are only those that provided information for both variables in each row.*

**All Rand values were adjusted for inflation using CPI data.*

Source: derived from SAABC (2020) accessed through B&M Analysts

Finally, Table 12 showed a minor 4% increase in factory floor space over the two periods. However, only a small number of firms provided data on this variable hence the small sample size. To better understand how this may have impacted real utility costs the data was filtered to only show those firms that provided information on each of the variables. After doing so the data showed a 7% and 9% increase in real water and electricity costs for the sampled firms, further suggesting that increases in real utility costs were not necessarily just a result of increased consumption. Utility costs and in particular energy costs are vital to international manufacturing competitiveness. Importantly, Barnes, Black and Techakanont (2017) showed that Thailand had significant cost advantages in water and electricity rates compared to South Africa. They stated that electricity rates in South Africa had risen between 10% and 30% since 2009. In short, controlling utility costs – in particular the cost of electricity – remain key to ensuring the competitiveness of South Africa’s automotive supply chain.

5.3.2. Human Resources Development

Table 14 shows important indicators for the development of human resources within the sampled firms. We can see that from 2010 to 2019 the average number of total full time equivalent (FTE) employees for 62 sample firms remained almost unchanged. While employment across the broader manufacturing sector has decreased (Kaplan, 2019), this is still worrying and indicates that the automotive industry is making little progress toward the SAAM goal of doubling employment. Even more concerning, given the bias of the sample set towards better performing firms, the overall components industry employment average is likely to have performed worse, especially in the wake of COVID-19. As explained earlier, the development of the South African automotive supply chain is pivotal to job creation within the industry. The stagnation of employment among the sampled firms shows that despite improved economic performance and competitiveness gains this has not led to increasing employment. This suggests that increasing employment is unlikely to be achieved simply through the increased competitiveness of existing firms. Rather, employment will be more dependent on improving factor, logistics and overhead costs across the industry so that new firms may have the infrastructure and basic competitiveness requirements to warrant entering the industry.

Average absenteeism rates for the sampled firms shown in Table 14 have declined by an extremely small margin. The average overtime rate improved by a fairly small margin showing limited labour productivity and cost competitiveness improvements amongst the sample firms. Training as a percentage of remuneration also only increased by a small margin. Black, Barnes and Monaco (2019) highlight the labour skill deficiencies expressed by firms during the SAAM process. Given the importance of adequate skills training to improving labour productivity and unlocking greater competitive capabilities within the automotive supply chain, it is concerning that little progress has been made in this area.

Table 14: Change in average human resource indicators for component firms (2010-2019)

Human resources indicators		2010-2014	2015-2019
Total full time equivalent employees (incl. contract workers)	Mean	317.2	316.7
	N	62	62
Absenteeism (excl. annual and planned leave) rate	Mean	4%	3.8%
	N	56	56
Overtime rate	Mean	10.9%	9.4%
	N	38	38
Training as % of remuneration - wage and salary	Mean	1.4%	1.6%
	N	54	54
Verified BBBEE Status (Level)	Mean	5.2	5.5
	N	21	21

Source: derived from SAABC (2020) accessed through B&M Analysts

Table 14 shows that average BBBEE levels among the sampled firms worsened over the two periods. On top of this, there are 9 BBBEE levels with 1 being the best and 9 being the worst. Thus, not only did transformation levels worsen amongst the sample firms, but the firms already showed limited transformation achievement to begin with. This supports a survey conducted by NAACAM in 2018 which found only 26% of respondents within the components industry were fully BBBEE compliant and that there had been slow progress towards transformation (Black, Barnes & Monaco, 2018). This is further worrying given the BBBEE requirements placed on component manufacturers, as well as new firms entering the industry, to qualify for PRCs under the APDP 2 (see Table 2 in Section 3.4.2). Firms of either kind are given until 2023 to reach BBBEE level 4 otherwise they will not qualify for PRCs. This could serve as a disincentive for investors considering starting new firms in the industry and could be detriminetal to many component firms already in the industry.

The sampled firms showed little progress across all of the human resources indicators. Considering the sample set bias, this is a worrying sign for the rest of the sector. In a comparative study between Thai and South African component manufacturers, Barnes, Black and Techakanont (2017) found that staff and labour costs were approximately 70% cheaper in Thailand due to the comparatively superior skill levels of the Thai work force relative to wage rates. Black, Barnes and Monaco (2019) explain that there are human resources development challenges across the entire automotive sector. OEM's and first tier firms face challenges given their increased operating pressures, 2nd and 3rd tier firms face substantially larger challenges due to limited resources, low levels of technology and poor support for strategically aligned human resource development programmes. The industry faces key hurdles in the form of relatively low labour productivity, insufficient workforce leadership, a lack of effective human resources development programmes, the need for greater base operator skills amongst the workforce and a dire need for greater knowledge sharing and cohesion across the value chain, government agencies and other industry stakeholders.

5.3.3. Supply Chain Development

Table 15 summarises the value chain development indicators for sampled component manufacturers. The table shows that real materials purchasing from domestic suppliers declined by 18% over the two periods for 23 sampled firms. The table also shows that real materials purchasing from international suppliers declined by 21% for a smaller sample set of firms. This suggests that materials purchasing decreased all together, which seems unlikely given that manufacturing sales increased. Reasons for this are unclear and while every effort was made to clean and control for outliers in these variables, it is possible that issues could have arisen in the interpretation and calculation behind answering the survey questions for these variables on behalf of firms. Nevertheless, the significant decrease in local materials purchasing is cause for concern since it suggests weakening performance of domestic suppliers and has negative implications for localisation efforts and supply chain development.

Table 15 also shows that average lead times for both domestic and international customers worsened quite significantly. Figure 17 from section 5.2 indicated that average throughput times increased by 3.5 hours from 2011 to 2018. This suggests that the much larger increases in average lead times for both domestic and international customers was likely driven by non-value adding activities such as order processing, and delivery times. This shows worsening competitiveness levels in this particular aspect for the sampled firms. Positively, Table 15 also shows that domestic supplier lead time improved by almost 3 days over the two periods while international supplier lead time worsened by more than a day. This shows some upstream competitiveness improvement especially relative to international suppliers. Overall, the data showed worsening supply chain competitiveness from 2010 to 2019. This is a worrying sign for the rest of the components industry and suggests a regression in terms of supply chain development.

Table 15: Real change in average value chain indicators for component firms (2010-2019)

Value chain development indicators		2010-2014	2015-2019	% Change
Total materials purchasing: domestic suppliers (Rands)	**Mean**	70 056 886	57 465 098	-18%
	N	23	23	
Total materials purchasing: international suppliers (Rands)	**Mean**	58 389 417	46 387 952	-21%
	N	15	15	
Avg. domestic customer lead time (days)	**Mean**	2.2	3.5	55%
	N	27	27	
Avg. International customer lead time (days)	**Mean**	20.9	28.0	34%
	N	18	18	
Avg. domestic supplier lead time (days)	**Mean**	14.5	11.7	-19%
	N	37	37	
Avg. international supplier lead time (days)	**Mean**	61.0	62.4	2%
	N	32	32	

**All Rand values were adjusted for inflation using CPI data – Rand values are in 2019 Rands.*
Source: derived from SAABC (2020) accessed through B&M Analysts

5.4. Concluding Remarks

The sample firms saw overall improvements to operational competitiveness from 1999 to 2018. Inventory holding improved over the full period, however, average WIP showed a slight reversal in improvements from 2007 to 2018. Indicators for quality control demonstrated significant improvements while operational flexibility showed little change. From 2010 to 2019, the sample firms showed some economic improvement with real manufacturing sales increasing. However, the data showed real increases in materials costs and manufacturing overhead costs, and suggested that there were real increases in labour, and electricity costs. Overall, the sample firms performed poorly in terms of human resources development. No jobs were created from 2010 to 2019, with absenteeism rates increasing and transformation levels worsening. Worryingly, the sample firms showed a regression of supply chain development from 2010 to 2019. Indicators suggest a decrease in materials sourcing from local suppliers and showed significantly longer lead times for both international and local customers.

Overall, the sample representation shows worrying signs for the competitiveness and development of the South African automotive supply chain. The key challenges facing the supply chain and the improvement of localisation levels are discussed next, in Chapter Six.

Chapter 6 – Challenges Facing Industry Progression Toward 60% Localisation

The South African automotive industry is not poised to meet 60% localisation by 2035. Even before the COVID-19 pandemic, NAAMSA had already suggested that 50% localisation was a more achievable target for the industry (Black, Barnes & Monaco, 2019: 37). Black, Barnes and Monaco (2018) note South Africa's potential for reaching 60% localisation, however this would require greater macro-economic growth that creates a more conducive environment for automotive investment alongside industry-wide cooperation from all stakeholders (Black, Barnes & Monaco, 2019). Whilst there has been significant cooperation amongst industry stakeholders under the SAAM, the country has not experienced the required levels of economic growth and investment in deepening the local supply chain that would make 60% local content realisable in such a short time frame. As Chapter Five showed, domestic sourcing for materials inputs by the sampled automotive supply firms declined by 18% over the period 2010 to 2019. Furthermore, despite some competitiveness improvements among the sampled firms, indicators such as employment size and factory space showed little sign of expansion within the supply chain. No doubt this will have been further impacted by the effects of COVID-19.

At the most fundamental level, increasing local content requires a healthy national/regional "automotive space" in which there are improved factor costs associated with automotive production and a greater supply of technology and high-level skills (Black, Barnes & Monaco, 2018). Successful "automotive spaces" depend on the interaction of government and firm level strategies and the degree to which they complement one another (Lung & van Tulder, 2004). Therefore, government policy must be an enabler of greater firm-level competitiveness by: controlling factor costs; ensuring efficient infrastructure and logistics; encouraging the advancement of firm-level manufacturing capabilities; providing adequate skills training geared towards industry requirements; providing suitable protection from international competition; and preparing industry competitiveness for eventual liberalization (Barnes, Black & Techakanont, 2017; Humphrey & Oeter, 2000). Finally, it is imperative that this "automotive space" enable firms to achieve sufficient economies of scale around core automotive products. Without this, there is simply no business case for local production of upstream components as cost premiums would make such localisation attempts wholly uncompetitive with international firms (Barnes, Black & Techakanont, 2017; Black, 2009; Humphrey & Oeter, 2000).

In order to unpack the major challenges limiting greater localisation in the South African automotive industry this section discusses: South Africa's low growth economic trajectory; domestic market protections; the local automotive tax regime; the unintended consequences of Broad-Based Black Economic Empowerment; skills development, education and leadership; expensive logistics costs; and the effects of COVID-19.

6.1. South Africa's Low Growth Economic Trajectory

South Africa has had mixed success in developing a national automotive space. Not only is the domestic market too small to drive economies of scale on its own, but the country's general economic performance over the past several years has been a key constraint for industry progress. Bhorat, Cassim and Hirsch (2017; 2014); Luiz (2016); and Andreoni and Tregenna (2020) explain that South Africa's development trajectory is starkly representative of a middle-income country growth trap. Drivers behind this growth trap are incoherent policy coordination; a lack of clear politically supported industrial policy framework; and an implicit social contract between big business, government and labour that perpetuates low economic performance and limited economic growth. Bhorat, Cassim and Hirsch (2017; 2014) argue that this growth path, which favours capital-intensity over labour-intensity and heavy manufacturing over light manufacturing, is a trajectory that does not encourage economic redistribution and employment creation.

The SAAM represents a significant effort on behalf of all stakeholders to reverse this low-growth trajectory. However, it remains to be seen how this new "social compact"[6] between government, OEMs, supply firms and labour will play out in the long-run and whether this will be thwarted by external macro-economic and political inefficiencies. To this effect, it's clear that government policies outside of the respective industry policies and masterplans (i.e. the cumulative

[6] The DTIC has deployed, and is in the process of drafting, several industry masterplans. These masterplans represent a new "social compact" framework for industrial policy in South Africa that represents a shared vision between industry, government, and labour.

effect of the country's trade, tax and BBBEE policies) have an adverse effect on manufacturing competitiveness in South Africa.

6.2. Domestic Market Protections

From 1995 till 2012 South Africa rapidly reduced tariff rates and pursued aggressive liberalisation. Barnes et al. (2017c: 49) rank several automotive producing countries based on their level of domestic market protection, in which South Africa ranks reasonably highly relative to other countries. However, as Black, Barnes and Monaco (2018) explain, this protection has been significantly curtailed by the fact that tariffs can be rebated to 0% under the APDP and APDP 2. Through this mechanism the average applied rate of customs duties applied on all imported vehicles is close to 5%.[7] When accounting for this South Africa ranks as one of the least protected economies using the same metric (Black, Barnes & Monaco, 2018: 18-19).

While customs duties should help to make locally produced vehicles more competitive in the local market, the implications of import duty rebates have further unintended consequences. Like the APDP , the mechanism of the APDP 2 allows for PRCs to be traded from one firm to another. As such importers of non-local automotive brands (e.g. Hyundai, Kia, Renault, etc.), who have no local manufacturing operations, can purchase surplus PRCs from locally based automotive manufacturers with little direct product competition to offset their own customs duties. As a result, imported vehicles with absolutely no embedded local content can end up facing effective customs duty rates as low as 5%.

Table 16 shows that most of South Africa's tariffs on automotive goods are below their bound rates. Increasing the competitiveness of local component manufacturers cannot be achieved simply through raising tariffs as this would harm the competitiveness of finished vehicles which rely on large levels of imported content. However, it does show that there is room for finding a better balance between developing the local supply chain and ensuring the competitiveness of OEMs. Furthermore, Table 16 shows that there is potential for raising tariffs on strategic content where manufacturing can be localised to a greater extent. In particular, South Africa could reduce

[7] This was disclosed after extensive consultation with industry expert Justin Barnes. Barnes has helped formulate the automotive industry policy in South Africa for more than a decade and has been an adviser to the Minister for Trade and Industry and several other key stakeholders within the industry.

its automotive trade deficit that is hugely influenced by large levels of imported aftermarket/replacement components that largely originate from countries without preferential trade access such as China.

Table 16: South Africa's automotive tariffs and WTO bound rates

HS Code	Description	Applied MFN tariff	WTO Bound Rates
HS 8703	CBUs (passenger vehicles)	25%	50%
HS 8704	CBUs (commercial vehicles)	25%	50%
HS 8706	SKDs	20% – 25%	50%
HS 8707	CKD (OE components)	20%	30%
HS 870830	Brake pads (aftermarket)	30%	30%
HS 851240	Electric wipers (aftermarket)	15%	30%
HS 401110	Tyres (aftermarket)	30%	30%
HS 401120	Tyres (buses)	25%	30%
HS 870891	Radiators (aftermarket)	25%	30%
HS 700721	Windscreens (aftermarket)	15% – 30%	30%

Source: Barnes et al. (2017a)

6.3. South African Automotive Tax Regime

From extensive consultation with industry expert Justin Barnes, it was noted that the nature of South Africa's tax regime is potentially harmful to domestic automotive production. Table 17 shows the effect of VAT and Ad Valorem Excise Duties on a locally assembled vehicle using the bottom of the range and top of the range Toyota Hilux double cab as examples. The Figure shows that locally produced vehicles in South Africa with a recommended retail price at R449 200 and R868 100 have incurred a 22.1% and 29.4% effective tax rate. As the figure indicates, this does not take into account environmental levies charged on CO_2 emissions and tyres. Therefore, the real effective tax rate is even higher. This has a negative effect on local consumer demand for locally produced vehicles which further reduces the potential for domestic market driven economies of scale.

The nature of this tax regime is concerning on several levels. Ad valorem excise duties – a luxury tax that increases the higher the value of the product – are not aligned with the types of vehicles that are locally produced. Furthermore, while private vehicles can be luxurious their purpose as a form of mobility should not be considered a luxury in a country where public transport is severely limited, inefficient and often times unsafe (BusinessTech, 2021). The majority of those vehicles that are locally produced in South Africa (i.e. Toyota Hilux, Ford Ranger, Mercedes C-Class and BMW X3) are easily in excess of half a million rand. As a result, ad valorem duties do not necessarily incentivise consumers to make a more socio-economically beneficial purchase. Instead, they are simply being incentivised to buy a cheaper vehicle which is less likely to be locally produced. This has negative implications for using domestic demand to drive greater economies of scale. Furthermore, the nature of VAT means that this 15% tax is charged on the dutiable value of a newly produced motor vehicle (SARS, 2018: 5). This means that the consumer pays tax on the value of environmental levies and excise duties and is therefore paying tax on tax.

Table 17: Tax structure on locally produced vehicles within South Africa

Tax Effect		**Toyota Hilux (double cab)**	
		Bottom of the range	Top of the range
RRP (Rands): less VAT, less excise, less CSP (18%)		367 770	670 970
Ad Valorem Excise Duty	*Rate (on excisable value)*	8.6%	17.4%
	Value (Rands)	22 839	83 900
VAT	*Rate*	15%	15%
	Value (Rands)	58 591	113 230
Effective tax at price point	*Rate*	22.1%	29.4%
	Value (Rands)	81 430	197 130
RRP (Rands)		449 200	868 100

**Figure does not include environmental levies placed on new vehicles in South Africa*

Source: SARS (2019; 2018); Toyota South Africa Motors (2021)

In contrast to South Africa, Barnes, Black and Techakanont (2017) describe the successful differentiated tax structure that has intensified local demand for LCVs in Thailand. This has created a high degree of product rationalisation which encourages economies of scale and promotes localisation. The Thai government has used its tax structure to overcome limited domestic market size and protect its own market from nearby mass producers of light passenger vehicles. In Thailand, the tax structure complements industrial policy as opposed to being a separate entity and has allowed the country to carve out a significant niche as a producer and consumer of LCVs. Interestingly, a locally produced one-ton LCV valued at R200 000 would face an effective tax rate of 10.5% in Thailand – this could even be as low as 3.5% as such vehicles can be exempted from VAT (Barnes, Black & Techakanont, 2017: 42). In contrast a locally produced vehicle of the same kind and value in South Africa would face an effective tax rate of 18.6% (Barnes, Black & Techakanont, 2017).

Given South Africa's relatively small automotive market and limited economic growth over the past several years it is worrying that effective tax rates on locally produced vehicles could be as high as 30%. South Africa's automotive tax regime is therefore contradictory to the developmental objectives laid out under the SAAM and erodes those advantages that local firms would have over international competitors in the local market. This tax regime is unaligned with industrial policy and aggravates the challenges associated with a relatively small domestic automotive market, curtailing its ability to drive product rationalisation and create greater levels of localisation around key vehicle models.

6.4. Broad-Based Black Economic Empowerment

Several commentators have indicated the adverse effects resulting from the government's Broad-Based Black Economic Empowerment (BBBEE) framework. Pike, Puchert and Chinyamurindi (2018) reveal experiences of Small, Medium and Micro Enterprises (SMMEs) in interacting with BBBEE and find that it leads to corruption, increased administrative costs and financial difficulties. Acemoglu, Gelb and Robinson (2007) found that BBBEE had not led to greater levels of firm investment, labour productivity and profitability. In respect to the automotive industry BBBEE will have had varying effects on different stakeholders within the industry. South Africa's multinational OEMs are able to fulfil their BBBEE equity requirements through an Equity Equivalent programme in which they have committed to funding the Automotive Industry Transformation Fund rather than giving up ownership shares (Cokayne, 2019). While this may be more suited for the multinational OEMs, the challenges associated with BBBEE, specifically around equity, disproportionately affect the rest of the supply chain and the development of local content.

Chingwaru (2014) explains that BBBEE needs to become more investor friendly. The kind of investment that is crucial to developing local content does not just come from multinational OEMs, but also from multinational 1st tier firms. For these corporations, who face slimmer profit margins compared to OEMs, BBBEE's focus on equity serves as a disincentive for greater investment. With 1st tier firms looking to disinvest or limit future investment, this has knock on effects for 2nd and 3rd tier opportunities within the country (Barnes et al., 2017a). In a global industry where quality and safety standards are paramount and 2nd and 3rd tier firms need to abide by such standards, BBBEE does not necessarily incentivise the upgrading of black owned 2nd and 3rd tier capabilities. In reality, transformation across the automotive value chain and the proliferation of black owned manufacturers depends upon education and skills training. Within such a globalised industry core productivity capabilities need to be achieved and maintained.

Chapter Five showed BBBEE levels within the local supply chain to worsen from an average of 5.2 to 5.5 from 2010 to 2019. This is made all the more concerning given that component manufacturers are required to reach BBBEE level 4 by 2023 if they are to qualify for PRCs under the APDP 2 (see Table 2 in section 3.4.2.). While this would increase transformation levels in the industry, it will disincetivise new investment and very likely harm competitiveness of the supply chain. Therefore, the imposition of equity related transformation, instead of skills development transformation, within the local automotive supply chain goes against the SAAM objectives of doubling employment and increasing localisation.

6.5. Skills Development, Education and Leadership

The extent of skills development, education and leadership remain key challenges at all levels within South Africa's manufacturing environment. In particular, the automotive sector is let down by the lack and associated high cost of management and leadership skills across the manufacturing ecosystem as well as insufficient skills development and training at a component manufacturing and automotive supply level. A study conducted by Mohubetswane Mashilo (2019) covering 184 workers from 16 automotive component manufacturers in Gauteng showed that only 22.3% of workers had obtained Technical and Vocational college certificates. While tertiary education levels are low in South Africa, what is also worrying is the degree to which technical and vocational programmes meet the skill requirements of globally competitive manufacturing industries such as the automotive sector.

During the SAAM process a SWOT analysis revealed that automotive component manufacturers cited "employee skills" and "labour stability/relations" as frequent weaknesses. On the contrary OEMs cited "trained workforce" as a strength (Barnes et al., 2017a). The reason behind this comes down to the fact that OEMs have the capacity and operational necessity to train their employees in-house so that they are aware of the unique processes and global standards of their own firms. While some 1st tier firms may be able to do the same, the large majority of 2nd and 3rd tier automotive supply firms do not have this capacity and rely exclusively on public education, FET colleges, TVET colleges, and other public intermediaries such as the Sector Education Training Authorities (SETAs) to equip their employees with the necessary skills required by the industry.

The role of the SETAs is vital in bridging gaps between education institutions, public stakeholders, and the skill requirements of private firms. They collect valuable information on future skill requirements, channel funding towards training programmes, and are critical to upgrading the skills and technical proficiencies of South Africa's automotive workforce in line with industry demands (Laseinde & Kanakana, 2017; Petersen et al., 2016). Training within the automotive industry falls under the scope of the Manufacturing, Engineering and Related Services Sector Education Training Authority (merSETA). While the merSETA is regarded as being one of the most effective SETAs, it is still subject to some criticism. In particular, the merSETA has not been effective in aligning its training functions with the rapidly evolving technical demands of the automotive industry (Black, Barnes & Monaco, 2019).

Barnes, Black and Monaco (2021) explain that small firms showed the greatest levels of return on investment from skills training within the merSETA. However, only 24% of small firms participate within the merSETA compared to 92% of medium sized firms and 100% of large firms (Mandela Initiative Action Dialogue, 2016). This is a worrying sign given the technical and productivity demands required for 2nd and 3rd tier firms to be internationally competitive. Without a fairly rapid uptake of skills and productivity improvements at the 2nd and 3rd tier level it seems unlikely that local content could increase to 60% by 2035.

A major frustration expressed by South African industrialists, that points to broader shortcomings in the development of South Africa's national automotive space, is the lack and associated high cost of management skills to drive productivity improvements at all levels across the industry (Barnes, 2019). Barnes, Black and Techakanont (2017) in a benchmark assessment of generic Thai and South African automotive component manufacturers found that management costs are 2.7 times more expensive in South Africa. Combined with the country's supply and demand mismatch for high level skills this has significantly curtailed local firm level efforts to advance operating capabilities in the face of international competition. Not only have industrialists expressed this as a challenge within their own firms, but as a problem throughout the broader manufacturing ecosystem in which they operate. Firm level efforts to increase productivity are frequently let down by inefficient and expensive logistics, infrastructure, and government service providers (Barnes, Black & Monaco, 2021; Barnes, 2019; Black, Barnes & Monaco, 2018). These challenges are symptomatic of managerial leadership deficiencies as well as a lack of appreciation for the fundamental importance of manufacturing among government officials and managers within key government and public service providers (Barnes, 2019).

6.6. Logistics Services

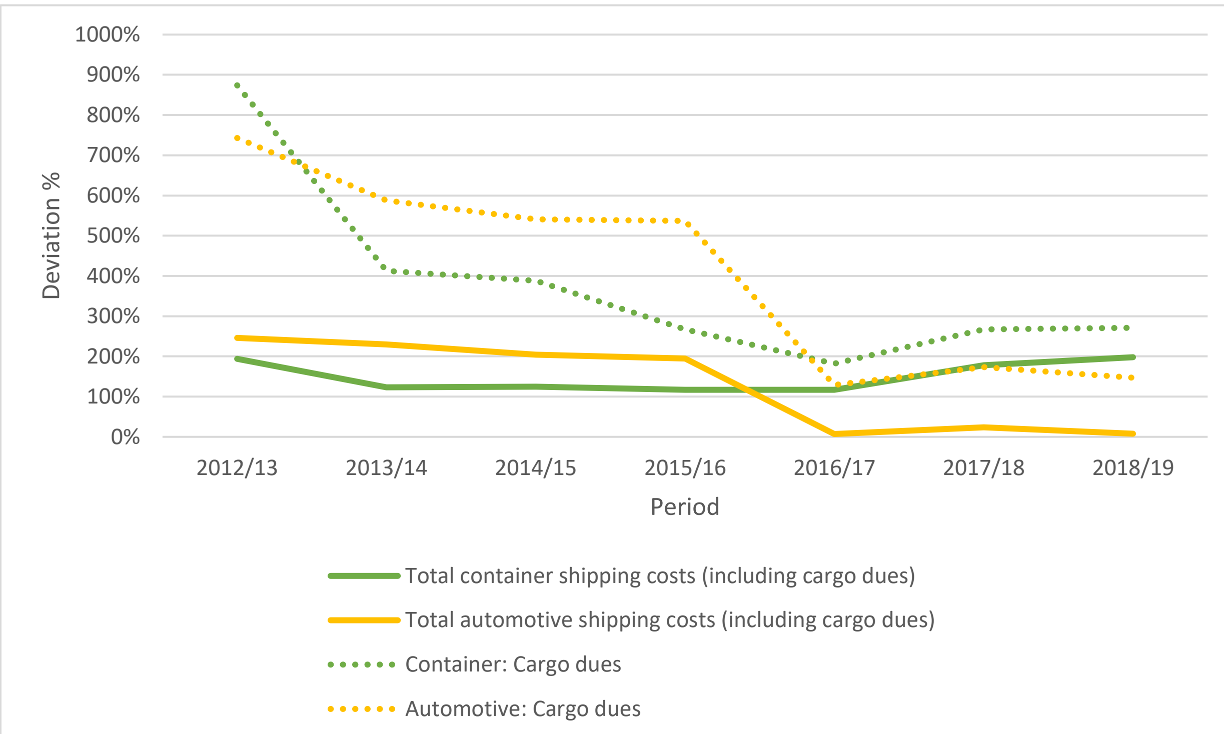
Historically, a major constraint for the competitiveness of the South African automotive industry and the broader manufacturing sector has been the high port tariffs and shipping costs charged by the National Ports Authority (NPA) – a division of Transnet. Recently, a World Bank report ranked four of South Africa's major ports (Cape Town, Port Elizabeth, Durban, and Ngqura) in the bottom five of 351 ports around the world (The World Bank, 2021). The country's ports are some of the most expensive in the world, comparable to those in Europe, the USA and Australia, and vastly more expensive than many ports in other developing countries (Ports Regulator of South Africa, 2018). This is contradictory to South Africa's industrial strategy and is the result of artificial tariffs or "cargo dues"[8] that are placed on shipping to cross subsidise other transport systems within the umbrella of Transnet, such as the country's railways.[9]

Figure 18 shows a benchmark assessment of the costs for container and automotive shipping across all South African ports relative to a sample set of international ports. One particular aspect of the graph shows the cost of "cargo dues" relative to other non-service-related tariffs at foreign ports for both automotive (roll-on/roll-off) and container shipping. Figure 18 shows just

[8] Cargo dues are essentially a tariff on shipping and are not associated to the rendering of a service on behalf of the NPA. This means that ships are charged separately for services rendered (i.e., handling services and marine service charges) and are charged a "cargo due" on top of this.
[9] A study on behalf of NEDLAC (Goode, 2008), explained that cargo dues amounting to 70% of the NPA's income were used to finance other non-port services which fall under the Transnet umbrella.

how expensive South African cargo dues are in relation to the sampled global average, with cargo dues for automotive and container shipping over 740% higher than the sampled global average in 2012. Cargo dues have decreased considerably over the full period, in line with the ongoing implementation of a new tariff strategy, enforced by the Ports Regulator and designed to better align the sector with the country's industrial objectives. While this shows some progress, the relative cost of cargo dues still increased for container shipping over the last two periods and cargo dues for both automotive and container shipping remain roughly 150% and 270% higher than the global sample average in the most recent period. This has a significant inflationary effect on South Africa's port costs and shows huge room for improvement.

Figure 18: Percentage deviation of South African port costs from international sample average



**Graph represents percentage deviation, therefore 0% deviation means cost parity.*

Source: Ports Regulator of South Africa (2018; 2016; 2015; 2014; 2013; 2012)

Figure 18 also shows the total cost for both automotive and container shipping relative to foreign ports (total cost includes all service-related expenses and non-service-related costs or "cargo dues"). The graph shows significant improvement in total cost of automotive shipping at South African ports. This declined from 195% higher than the sampled global average in 2015/16 to only 7% higher than the sampled global average in 2016/17. The primary reason for this has been the extension of the NPA's Automotive Industry Volume Discount to all importers and exporters of finished vehicles. This has benefitted the export strategies of locally based OEMs, while also making imported vehicles in South Africa more affordable.

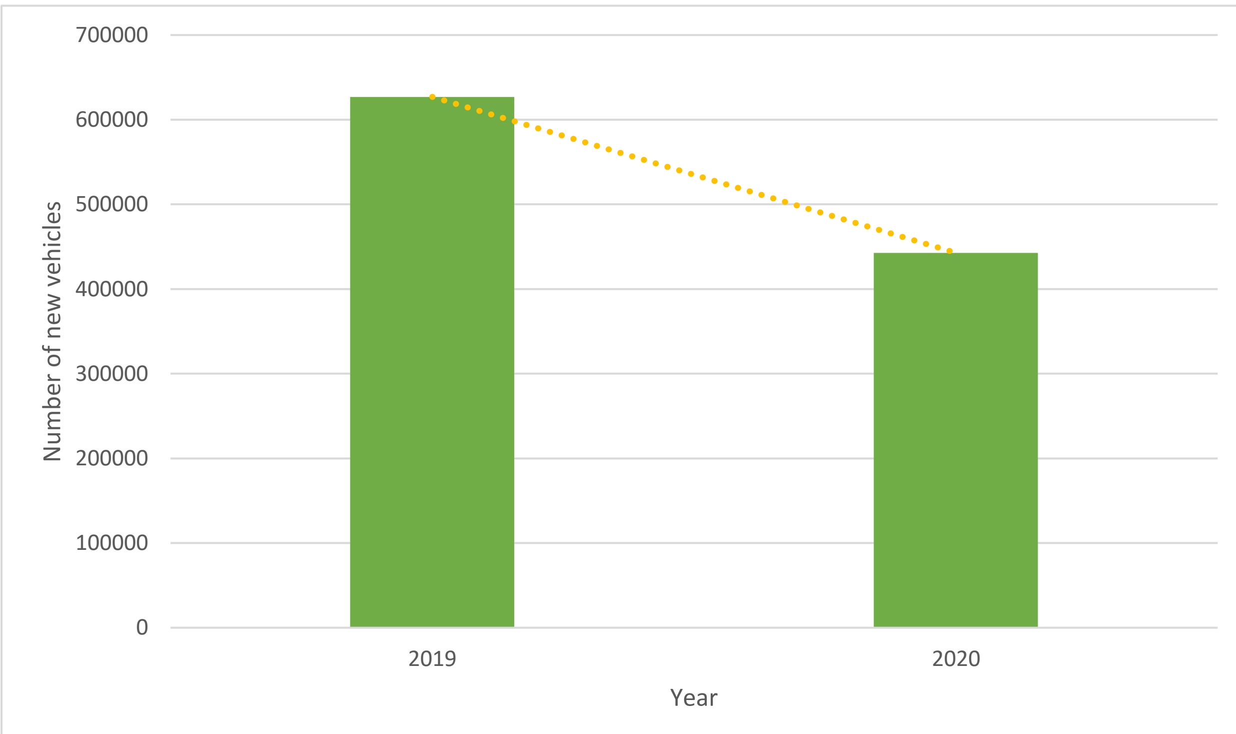
On the other hand, total costs for container shipping did not experience any such improvements. Total cost of container shipping in relation to the sampled global average increased over the last two periods and almost reached 200% higher than the sampled global average. This means that component manufacturers and the rest of the automotive supply chain, who rely on container shipping for stand-alone parts, have not enjoyed similar improvements to relative shipping costs as experienced by OEMs. This further exacerbates the challenges faced by automotive supply firms, worsening their levels of competitiveness, and making it harder to unlock the economies of scale that would allow for 60% localisation.

6.7. The Impacts of COVID-19

COVID-19 has had a major impact on the South African automotive industry. Figure 19 shows the dramatic decline in South African vehicle production over the course of 2020 – local vehicle production declined by 29% from 2019 levels. Furthermore, total automotive export revenue declined by R26 billion (12.9% from the R201.7 billion in 2019), vehicle exports declined by 115 804 units, and the automotive manufacturing sector's contribution to GDP shrank from 4% to 2.8%. In terms of job losses, Venter (2021) noted that 16 183 jobs were lost in the automotive retail and aftermarket sector between March and September in 2020. A further 3 524 jobs were lost across the vehicle and component manufacturing industry, with OEMs proving the most resilient in avoiding job shedding (AIEC, 2021). Furthermore, the introduction of amendments to the APDP were delayed by a year and six months (Arnoldi, 2021). COVID-19 has been the biggest disruption faced by the global automotive industry since World War Two and its effects on South Africa's own vehicle industry and its contribution to economic development will be felt for some time.

Industry commentators are hopeful that production and sales will improve over the course of 2021. The industry did find some stability in the fourth quarter of 2020, however it comes as no surprise that the industry remains incredibly vulnerable (Venter, 2021; Davies, M. & Vincent, 2020; Ori et al., 2020). New vehicle exports from South Africa are expected to grow during 2021 from the low base in 2020, with NAAMSA also anticipating new vehicle sales in the country to increase by 15% during the year. A 1.5% increase in automotive component exports, from 2019 levels, noted in AIEC (2021) also provides some hope for the industry. However, as shown in Table 18 this increase in exports was largely driven by a single component type – catalytic converters – which have limited levels of local value addition and materials beneficiation. Furthermore, this was largely attributed to a significant increase in component exports to a single trade partner – the Czech Republic.

Figure 19: Impact of COVID-19 on number of locally produced vehicles in 2020



Source: Lightstone Auto (2020)

The impact of COVID-19 disproportionately affected 2nd and 3rd tier firms within the South African automotive supply chain. A report from McKinsey and Company (Rajagopaul, Magwentshu & Kalidas, 2020) showed the various challenges facing small and medium enterprises (SMEs) – firms with an annual turnover of between R500 million and R5 million – in response to the national lockdown and COVID-19. The report showed significant cost saving measures and downsizing among SMEs. It is already clear that OEMs proved more resilient in avoiding job losses and 1st tier firms would also likely prove more resilient given their multinational ownership and access to greater resources. 2nd and 3rd tier firms are largely locally owned and operate on much smaller margins, thus will have faced the brunt of the crisis. Worryingly this does not bode well for increasing localisation, let alone reaching the target of 60% local content.

Table 18: Export performance of locally made components during COVID-19 (R millions)

Product	2019	2020	% Change
Body parts / panels	520	241	-54%
Stitched leather seats / parts	200	101	-50%
Engines	1 904	1 095	-42%
Road wheels / parts	382	243	-36%
Alarm systems	120	82	-32%
Lighting equipment / parts	268	206	-23%
Engine parts	4 345	3 340	-23%
Silencers / exhausts	405	313	-23%
Gauges / instruments / parts	657	514	-22%
Axles	529	432	-18%
Automotive tooling	943	783	-17%
Brake parts	315	263	-17%
Radiators / parts	1 536	1 284	-16%
Shock absorbers / suspension parts	569	492	-14%
Wiring harnesses	151	131	-13%
Other parts	13 620	11 926	-12%
Filters	587	561	-4%
Clutches / shaft couplings	608	588	-3%
Jacks	35	34	-3%
Ignition / starting equipment	290	283	-2%
Steering wheels / columns / boxes	59	59	0%
Seat belts	8	8	0%
Transmission shafts / cranks	1 152	1 182	3%
Tyres	2 619	2 697	3%
Automotive glass	513	532	4%
Batteries	411	440	7%
Gear boxes	229	257	12%
Air conditioners	62	70	13%
Gaskets	159	186	17%
Catalytic converters	20 359	25 978	28%
Springs	50	68	36%
Seats	43	59	37%
Car radios	19	28	47%

Source: derived from AIEC (2021)

Therefore, the increase in automotive component exports is deceptive. Using export performance as an indicator for industry health, Table 18 shows the performance of various automotive component sectors during COVID-19. The 5 most negatively affected industries were: body parts/panels, stitched leather seats/parts, engines, road wheels/parts, and alarm systems (each experiencing declines greater than 30%). Worryingly the table shows a greater proportion of higher value-added products on the worse performing end of the spectrum. Again, this has implications for increasing localisation and reaching the target of 60% local content by 2035.

6.8. Concluding Remarks

The South African automotive industry is therefore not poised to meet 60% local content without addressing some of the challenges outlined in the section above. Furthermore, the setbacks incurred due to COVID-19 make this goal highly improbable within the time frame of 2035. Unfortunately, none of these challenges are particularly easy to address. It is not so simple to just reverse South Africa's economic misfortunes, fix education, or rewrite government legislation. However, what is clear is that addressing any of these challenges would have significant benefits for local firms and their potential to increase local content, employment and economic growth.

The importance of manufacturing-led industrialisation is clear and the potential for the automotive sector to drive such growth has been demonstrated time and again in numerous other developing countries. While overcoming the challenges mentioned in the previous section are difficult and would involve the coordinated efforts of numerous government departments, public enterprises and governmental organisations it would not be in vain. There are real benefits to be gained – especially from an economic development perspective – by creating an "automotive space" that is an enabler of business development across the entire automotive value chain.

Overcoming South Africa's low growth economic trajectory; limited domestic market protections; regressive automotive tax structure; unintended consequences of Broad-Based Black Economic Empowerment; skills development, education and leadership shortcomings; and expensive and inefficient logistics operations are made all the more difficult in the aftermath of COVID-19 and in the build up to transitioning to electric vehicles. However, one could argue that it casts new light on the necessity of addressing these challenges and mobilising the resources to fix them.

Chapter 7 – Summary and Conclusion

7.1. Summary

The core finding of this thesis is that South Africa's automotive industry is not poised to meet the target of 60% local content by 2035. As discussed in Chapter Six, the industry faces significant obstacles in the way of unlocking deeper levels of local value addition within the local supply chain. Given the nature of many of these obstacles, there is no quick fix and it will likely take decades to address systemic issues such as education and skills development. On top of this, the industry has faced unprecedented disruptions in the wake of COVID-19 that will certainly have weakened the automotive supply base. Furthermore, the industry is on the eve of significant technological disruption associated with the transition to electric vehicles. These disruptions have and will continue to reorganise global value chains, creating high levels of uncertainty that are not necessarily conducive to developing deeper dynamic capabilities within the local value chain.

This research began, in Chapter Two, by looking at trends in global automotive manufacturing. It laid down a brief history of craft production, mass production and lean production in order to highlight the importance of benchmarking and working to "world class" standards within an internationally competitive industry. The Chapter also discussed the key conditions for developing successful automotive industries in the context of globalisation and regionalisation. Key conditions included: (1) the protection and establishment of a national or regional automotive space with sufficient market size to achieve economies of scale; (2) the use of government policy and resources to ensure competitiveness at a sectoral level (i.e., providing efficient infrastructure, logistics, and education, etc.); and (3) concerted efforts, on behalf of firms and/or government, to upgrade firm level capabilities within value chains.

To answer the primary research question and comment on industry progress towards achieving 60% localisation, it was necessary to discuss the evolution of South Africa's automotive industry and its development trajectory in Chapter Three. The industry saw the proliferation of automotive assemblers and different vehicle models for much of the 20th century. In the decades prior to 1994, little was done to promote rationalisation and secure economies of scale around fewer vehicle models. Of particular importance were the series of weight-based local content programmes that ran from 1961 to 1989. The legacy of which meant that the local components industry was built around heavier components that typically involve lower levels of value addition and technology.

Under the Motor Industry Development Programme (MIDP), introduced in 1995, the sector blossomed into an open and export-oriented industry. Production volumes rose dramatically, and greater economies of scale were achieved. However, the industry was over liberalised and local component manufacturers faced increasing pressures from foreign imports as the growth in vehicle production slowed towards the end of the programme. The MIDP was replaced by the Automotive Production and Development Programme (APDP) in 2013. During the period of the APDP, the country entered a recession, the local automotive market contracted, and automotive assemblers saw limited growth. Most worryingly, the industry witnessed its most sustained decline in local content – dropping from 59% in 2010 to 41% in 2018.

The performance of the industry, in the context of broader economic woes, necessitated a new framework for mapping and measuring the development of the automotive industry. This gave birth to the South African Automotive Masterplan (SAAM) which subsequently led to the introduction of the APDP 2 in 2021. Importantly, this laid bold new objectives for the industry and established a greater degree of interaction between business, labour and government in building the future of the industry. Six key objectives for the year 2035 were laid out under the SAAM, among which the target of achieving 60% local content was set. While provisions under the APDP 2 are a positive step toward achieving these goals, broader government policy and structural change are needed to reverse industry decline.

Chapter Four built on previous chapters by looking at scale and trade within vehicle and component production to identify areas of competitiveness. The VW Polo/Polo Vivo, Toyota Hilux/Fortuner, Ford Ranger/Everest, Mercedes C-Class and BMW X3 were identified as having significant volumes around which there are opportunities for local component manufacturers to unlock sufficient economies of scale and increase local content. In particular, production and export performance showed clear opportunities for greater localisation around LCVs. Lastly, analysis of component export data showed the importance of developing countries and the development of a Sub-Saharan African automotive value chain to the diversification of component production into higher value-added products for South Africa.

Chapter Five used panel data collected by the South African Automotive Benchmarking Club to benchmark the development and operational performance of the local automotive supply chain in relation to the objectives under the SAAM. The data, which is skewed towards better performing firms due to selection bias, showed mixed results for the sampled firms. Sampled firms showed some improvement to operational competitiveness from 1999 to 2018. In terms of economic performance and factor competitiveness, sampled firms showed improvements in key areas such as real manufacturing sales. However, real increases in utility costs and labour costs were also shown. Worryingly, the data showed no growth in total employment for the sampled firms from 2010 to 2019. Moreover, the data showed that BBBEE levels worsened among the sampled firms pointing at significant implications for industry transformation. Lastly, a significant decrease in local materials purchasing was visible, highlighting the deterioration of the local value chain. Given the sample set bias, the results shown in Chapter Five suggest that the automotive supply chain, as a whole, will have been worse off compared to the sampled firms. This supported the central hypothesis that the industry is not poised to meet 60% localisation by 2035.

Chapter Six further answered the primary research question by demonstrating the opportunities and preconditions for reversing the erosion of local content in South Africa. Key challenges such as the country's low growth economic trajectory, its limited market size, limited domestic market protection and the impact of COVID-19 were reemphasized. Furthermore, it showed the harmful effects of high taxes on new locally produced vehicles in the local market, the negative effects of BBBEE on small and medium firms within the automotive supply chain, the critical need for better aligned skills development with industry requirements, and the harmful effects of expensive logistics services provided at South African ports. Without clear progress in many or at least some of these areas the industry will never reach 60% local content, let alone by 2035.

7.2. Policy Recommendations and the Transition to Electric Vehicle Technologies

Since the SAAM was released in 2018 the global automotive industry is increasingly coming under pressure from new technologies, climate challenges and other global forces that are revolutionising manufacturing and mobility. Chapter Six discussed the effects of COVID-19 on the South African automotive industry, and the unfolding of the pandemic more generally has shown the vulnerabilities of modern-day consumerism. The world around our industries, and us as individuals, is quickly changing. The rise of Industry 4.0 technologies and the need to fight climate change have huge implications for automotive value chains.[10] This has clear and obvious implications for industrial policy which must be forward thinking if it is to protect hard earned jobs, create new ones and contribute to the upliftment of society. At a fundamental level the SAAM is an overarching strategy document intended to guide policy making within the automotive industry. However, it is already in need of modernizing and, perhaps, should be made more flexible than its current format allows.

The acceleration of bans on Internal Combustion Engines (ICEs) in key automotive export markets such as the UK and EU have serious implications for the South African automotive industry. The UK – South Africa's largest automotive export market – has brought forward its ban on ICEs and hybrid vehicles to 2030 and 2035 respectively (Griffiths, 2020). At present, none of South Africa's OEMs have publicly stated when they might introduce fully electric vehicles into local production lines. Toyota South Africa has announced the local production of a hybrid vehicle starting in September of 2021 (Kirby, 2021). This is an important first step for the local industry, however, it will need to incorporate battery electric and/or fuel cell electric vehicles within 14 years if it is to continue exporting to the UK and other markets whose ICE and hybrid bans follow soon after. In keeping with the central concern of this thesis – local content – the transition to electric vehicles will be a watershed moment for localisation opportunities in South Africa. This thesis has outlined the key challenges facing 2nd and 3rd tier component manufacturers in South Africa and it has demonstrated the erosion of such capabilities. Therefore, industrial policy will be

[10] Automotive brands are already beginning to rebrand themselves as mobility providers instead of automotive manufacturers and are considering alternative business models to conventional vehicle ownership.

pivotal in attracting foreign capital investment and technology diffusions associated with electric vehicles and their components.

Policy discussions around electric vehicles are underway in South Africa, albeit at an early stage. The APDP does include both electric vehicles and ICE vehicles under its incentive programmes. However, given the declining development trajectory of the domestic industry, policy makers will need to be innovative as they attempt to onshore new technologies and production processes. In this regard, government policy is needed for the support of key technologies such as battery technology, hydrogen fuel cell technology and green energy technologies (Bowden, 2021). As global automotive value chains are restructured by these disruptive forces it makes sense that multinational OEMs and 1st tier firms will invest in those markets that have large consumer demand and where there is a competitiveness advantage in new technologies. If the government and other industry stakeholders remain committed to the objectives and ideals laid out under the SAAM, it is imperative that policy promotes the localisation of technologies such as lithium-ion batteries which account for between 40% and 50% of the total cost of an electric vehicle (Montmasson-Clair, Moshikaro & Monaisa, 2021). Local incorporation of such technologies will be vital in growing local content towards 60%, increasing employment and ensuring that the automotive sector remains a driver for manufacturing-led industrialisation.

Finally, the advancement of the African Continental Free Trade Agreement and the steps taken towards a Sub-Saharan Africa Auto Pact are hugely important as South Africa navigates these looming technological disruptions. Through the restriction of imported second-hand vehicles and the anticipated growth of the region's middle class; Barnes, Erwin and Ismail (2019) show the potential for increasing new vehicle demand by 460 000 units in 2035. The growth of automotive producers within the region would also be a driver for rationalisation and could promote improved economies of scale around key vehicle models. In short, the development of a sub-continental automotive pact is not only hugely beneficial to South Africa's automotive industry under the status quo, but also vital in navigating technological disruptions and attracting the localisation of electric vehicles and their components. Therefore, the continued pursuit of such opportunities is paramount to future industrial policy for the automotive industry in South Africa.

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