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# Supply chain resilience - South African automotive localisation benefits, post Covid-19

**Cholo, Choene Jerry**

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# Supply chain resilience - South African automotive localisation benefits, post Covid-19.

**Student name: Choene Jerry, Cholo**

**Student Number: 0700044P**

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

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(Version February 2018)

# DECLARATION

I, **_Choene Jerry, Cholo____**, declare that this research article is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Choene Jerry, Cholo

Signed at …MIDRAND, GP-ZA……

On the ……21$^{ST}$ .. day of …FEBRUARY…… 2023…..

# DEDICATION

[Optional]

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# List of Abbreviations

| *Abbreviation* | *Definition* |
|---|---|
| *ACM* | *Automotive Component Manufacturers* |
| *APDP* | *Automotive Production and Development Programme* |
| *B2B* | *Business-to-Business* |
| *B2C* | *Business-to-Consumer* |
| *CBA* | *Cost-Benefit Analysis* |
| *COVID-19* | *Novel Coronavirus Pandemic 2019* |
| *CT/CNT* | *Complementarity / Complementary Needs Theory* |
| *GVC* | *Global value chain* |
| *ICT* | *Information and Communications Technology* |
| *IT* | *Institutional Theoretical* |
| *JIT* | *Just-In-Time* |

| | |
|---|---|
| *NAACAM* | *National Association of Automotive Component and Allied Manufacturers* |
| *NAAMSA* | *National Association of Automobile Manufacturers of South Africa* |
| *OEM* | *Original Equipment Manufacturer* |
| *PI* | *Production Incentive* |
| *POPIA (POPI Act)* | *Protection of Personal Information Act* |
| *PPE* | *Personal protective equipment* |
| *RBV* | *Resource-Based View* |
| *SC/ SCs* | *Supply Chain(s)* |
| *SCM* | *Supply Chain Management* |
| *SCRE / SCRES* | *Supply Chain Resilience* |
| *SCRM* | *Supply Chain Risk Management* |
| *TCE/ TCT* | *Transactional Cost Economics (Theory)* |

| | |
|---|---|
| *Tier1* | *First Tier Supplier* |
| *VAA* | *Volume Assembly Allowance* |
| *VUCA* | *Volatility, Uncertainty, Complexity, and Ambiguity* |

# ABSTRACT

Purpose: The supply chain (SC) literature has made extensive use of localization and its variants, nearshoring and reshoring, which all involve moving (a supply or supplier) from one location to one that is closer to the primary manufacturer. Although the subject is only marginally present, it receives significant attention whenever a significant global event that has the potential to disrupt supply chains, such as a tsunami, an earthquake, or an outbreak of Ebola, occurs. It should come as no surprise that the literature that developed in the wake of the COVID-19 nation lockdown periods extensively covered the subject. Additionally, this played a sizable role in exercise. Older literature primarily looked at it from a financial standpoint. Although some claim that the decision-making process involved in localizing an imported supply has many complexities and could initially be expensive, current literature suggests it has the potential to mitigate against risks of supply chain disruptions. Localization (nearness of supply) can be a method to lessen reliance on global sourcing (heavily distributed SCs) and improve resilience in light of the COVID-19-imposed shutdowns of many areas of the economy. This study sought to determine whether the pandemic is influencing localization choices and whether, looking ahead, the pandemic will truly influence businesses' decisions to localize or nearshore some of their material supplies in an effort to reduce the risk of SC disruptions. The aim of this paper was to ascertain whether the COVID-19 pandemic is influencing localization decisions, particularly for the future (in the event of a recurrence or the emergence of a new SC disturber, whether natural or man-made), and whether this will in fact cause businesses to localize or near-shore some of their production materials in an effort to reduce the risks of SC disruptions.

Design/methodology/approach: The literature on supply chain risks, resilience, and localization/nearshoring was examined in this essay. As the industry continues to reevaluate their decision-making around SC risk responses, post COVID-19 and into the future, the authors used a qualitative approach and critically engaged with senior level personnel of the local car manufacturing concerns. They used a combination of in-person and virtual methods to perform semi-structured interviews with senior employees from South Africa's automotive industry who represented one OEM and Tier 1 suppliers. Additionally, the author quizzed the speakers during a webinar on "How localization affects investments" about their research on the topic. Secondary data was

compiled using information from business reports, policy manuals, and other online resources. Then, a thorough literature review of respected journals was added to the task.

Findings: As a potential solution to the post-COVID-19 induced SC networks halts, localization (nearshoring) has been actively considered by numerous manufacturing sectors of the economy, both locally and internationally. Prior to the pandemic, neither companies nor university researchers gave localization or nearshoring of supplies much thought. Companies have begun diversifying their supply bases away from the major usual players like China, Southeast Asia, and other low-cost jurisdictions in reaction to the US-China tariff and the Russia-Ukraine wars, for example, but only through the creation of alternative global sources (basically substituting import with another import) (Hedwall, 2020). Companies currently use a wide range of cutting-edge supply chain risk management tools, like supplier collaborations, which primarily operate in the short- and medium-term. It should be understood that because localization has so many facets, making decisions about it is a difficult process that takes time for planning, decision-making, and execution.

Keywords: localisation, nearshoring, supply chain risk management, supply chain resilience

# INTRODUCTION

In terms of the "turbulent times" that businesses are constantly facing, even before the shock of the novel Coronavirus pandemic (COVID-19) outbreak and the resulting halted supply chain networks, Christopher's (2018) work ring true. He created the following picture:
“One of the biggest changes to the business landscape over the last twenty years or so has been *the significant increase in the level of risk confronting supply chains*. We have moved from a world of relative stability - and hence predictability - *to an environment which is characterized by turbulence and uncertainty with a consequently heightened potential for disruption to business activity*. Supply chains are *increasingly being impacted upon by external events such as natural disasters and changes in the geopolitical arena as well as through events within the supply chain*. Whilst natural disasters, seemingly on the increase and attract much attention, *often the greatest risk to business continuity is systemic, i.e., risk is embedded in the supply chain because of managerial decisions concerning the design* of the supply/demand network. One of the distinguishing characteristics of modern supply chains is that *they operate in an environment of heightened uncertainty and business risk.* Supply chains today *are possibly more vulnerable to disruption than has been the case for many years*. Recent events have *highlighted once again how vulnerable to disruption are our increasingly global supply chains*. *Natural disasters such as earthquakes, hurricanes and floods often have tragic consequences* and thus capture significant media attention. It is also evident that *events such as these can have considerable impacts on supply chains*. The

effects of the 2011 Japanese earthquake and tsunami were felt in a multitude of companies around the world as a result of disruption to supply arrangements" (Christopher, 2018).

This study will concentrate on efforts aimed at mitigating against supply chain disruption risks, particularly for the South African automotive sector, in light of the surrounding circumstances. The goal of this study was to gather and assess data from the automotive industry in South Africa regarding supply chain disruptions brought on by pandemics and disasters (the COVID-19 pandemic-induced global mobility restrictions of people and goods being an example in recent memory), as well as the coping and recovery strategies or resources used to overcome the challenges and localisation (or nearshoring) as a countermeasure in response to similar scenarios, should any occur again in the future.

Indeed, the one thing the whole world has learned from the COVID-19 pandemic, is that supply chains are extraordinarily susceptible to disruptions from external factors, such as fires, floods, fuel shortages, port congestions - and in the South African context, unruly public boycotts such as one termed the 'July 2021 Unrest' and the electricity crises. These are some of the biggest challenges that the supply chains must contend with on a regular basis (Africa, Gumbi & Sokupa, 2021; Jonathan, Mafini & Bhadury 2020; Makoni, 2021). The main emphasis was on the effects of supply chain disruptions and how they affected (and continue to affect) the health of the nation's automotive manufacturing industry. The article also considers how peer countries with sufficiently localized supply chains for automotive components due to government localization policy enforcement has performed over time. The justification for selecting this particular research subject is demonstrated in this chapter.

There is often confusion regarding the nature of supply chain risk, resilience, localization (and consequently, nearshoring), which may be a risk mitigant for these risks. As a result, the remainder of the paper pragmatically describes how to mitigate supply chain risk through localisation. This chapter defines supply chain resilience (SCRes) and localization in detail. This chapter kicks off with brief overviews of the following: Background of the study, Research problem, Purpose of the study, Theoretical framework, Research design and methodology, Population and sampling, Significance of the study, Ethical considerations, Research scope and limitations, Demarcation of the study, with each being further explored in detail in the succeeding chapters.

## Background to the Study

Companies are required to invest in efficient and effective supply chain networks that'll ensure non-failure to deliver on customer service, especially in light of tough competitor landscape. This is due to customer heterogeneity of needs, ever-changing preferences, and increasing inability to wait an inch longer for their goods (or services), and urgency to satisfy those needs (Henrich, Li, Mazuera, & Perez, 2022).

The background data is important because it speaks to a supply chain's performance and because it serves as the foundation for decision-making by supply chain managers, concerning creation of customer value by SCs, which is the "core driver of the entire supply chain operations" (Min, Zacharia & Smith, 2019, p.49). According to Raj, Mukherjee, de Sousa Jabbour & Srivastava (2022), businesses must strike a balance between the time it takes to acquire materials, manufacture, and eventually distribute end products to customers and those customers' willingness to wait. This is because the loss of customers, particularly Business-to-Business (B2B) production customers due to poor product (materials and components) availability is a major challenge faced by businesses worldwide (Raj et al.,2022, p.1129).

Regarding future-proofing the supply chains, resilience has emerged as one of the new objectives, according to Henrich et al. (2022). This means that the need for a firm's adaptability and ability to respond to supply chain disruptions of any kind has arisen recently, including unforeseen occurrences like the COVID-19-induced suspension of supplies of many goods and services (Mafabi et al., 2013, as cited in Orlando, Tortora, Pezzi, & Bitbol-Saba, 2022; Ponomarov & Holcomb, 2009; Henrich et al.,2022).

By successfully redesigning their supply chains to effectively react to disruptions, rather than adhering to the traditional view of supply chain management, businesses can stay ahead of competitors, remain sustainable, and stay abreast of changing dynamics in supply chains (Pu, Li & Bai, 2023). Therefore, businesses must implement supply chain strategies that fulfill and effectively address customer requirements, whether they are for consumers (B2C) or businesses (B2B) (B2B).

## Rationale for venturing into this topic

A mass of facts show that effective supply chain management (SCM) is a crucial component of the business and global value chains (GVC), and that interruptions to SCMs will inevitably doom customer satisfaction and could be hurtful even to human lives. The COVID-19, a global pandemic, first discovered towards the end of December 2019 in Wuhan, in Central China’s Hubei province (Piret & Boivin, 2021; Wu, Chen & Chan, 2020) brought with it a global shock. It led to a formidable pandemic outbreak in many cities in China and at bullet speed spread globally, with more than 74 million infections worldwide and more than 1.6 million deaths by 2020, mid-December as highlighted in (Piret & Boivin, 2021). The spread of this virus has not only affected the global population and the healthcare sector, but has also severely affected trade, economies, and supply chains and the entire GVC (Meyer, Walter & Seuring, 2021).

It consequently exposed severe vulnerabilities of global manufacturing companies (including automotive sector) and risks to their supply chains and operating activities, demonstrating “that major companies underestimate the need for sustainable and resilient operations” (Eldem, Kluczek, & Bagiński, 2022, p.1). Research suggests that “scholars should carefully evaluate the meaning of efficiency in a value chain” (Kano & Oh, 2020; Leite et al., 2020; Bryce, et al., 2020, as cited in Pujawan & Bah, 2022) and manufacturers to do away with “overreliance on JIT and lean” (Sarkis et al.2020, as cited in Pujawan & Bah, 2022) as this “creates vulnerability in SCs under disruption” (Pujawan & Bah, 2022). This is due to the fact that Just-in-Time (JIT) requires

businesses to wait until customers have placed orders, which results in low or no inventory and a high risk of the firm's manufacturing processes coming to an abrupt halt under volatile conditions, especially if the supplier is based abroad and there appears to be a supply interruption (Christopher, 2018). Accordingly, it was discovered that lean/JIT practices are overexposed to such worldwide disruptions (McMaster, Nettleton, Tom, Xu, Cao & Qiao, 2020).

The risks associated with countries' heavy inter-dependability and inter-linkages in as far as services and goods supplies are concerned were also exposed, thus highlighting the "need for some level of economic self-reliance" (Kituyi, Durant & Owoko, 2020, p.31) at country level, particularly for "developing countries" (Kituyi et al., 2020, p.9). This saw European Union leaders seeking to intensify their country specific "strategic autonomy and intending to reduce their product supply risk by creating greater self-reliance" indicates (Kituyi et al., 2020, p.31).

Wuhan, the "motor city", which had been the epicentre of COVID-19 pandemic, is a major hub of transportation and industry for central China (Huifeng, 2020), it houses a number of car-component manufacturing concerns which supply critical parts to some of the major global car manufacturers (Collie, Lang, Xu, Rose, McAdoo, Ge & Medicina, 2020; He & Huang, 2020). The prevalence of the virus saw China imposing country shutdowns (lockdowns), with other countries subsequently following suit with their own forms of shutdowns (OECD, 2021). This resulted in ports of entry and exit (sea, air and intermodal transportation) shutting down to both inbound and outbound traffic of goods, components, and materials, save the foodstuffs, essential medical supplies, and personal protective equipment (PPE) necessary for curbing the spread of the sickness (Wen, Yang, Zhou & Gao, 2021).

Consequently, the lockdowns caused production and transportation stoppages globally (Brenton, Ferrantino & Maliszewska, 2022). The situation worsened from March 2020 when "most of the global companies that have offices and production facilities in China were impacted first by the pandemic" (Eldem et al., 2022.p.3), because of the "total lockdown of companies from halted production to supply and demand issues" (Eldem et al., 2022. p.1). The impact of this economic shutdown can be evidenced in the subsequent shortage of microchip processors (semiconductors) (Frieske & Stieler, 2022) for example, a product used in many facets of the economy (Information and Communications Technology/ ICT, healthcare, consumer electronics, automotive sectors etc.), the shortage of which is still hurting automotive manufacturing, a major consumer of the commodity (Rapp, Möbert, Schneider, & AG, 2022). Wu, Zhang and Du (2021, p.3) indicate that the chips shortage "may become a fatal rope "sticking" the development neck" and "may continue to repeat for a long time" in the automotive sector (Wu et al.,2021, p.3).

The disruptions to SCs brought on by the COVID-19 outbreak have demonstrated that pandemics can and will continue to have devastating impacts on global SCs, according to (Pujawan & Bah, 2022). The risk of disruption has been present in supply chains throughout history due to factors like "increased complexities due to geographically spread operations, vulnerabilities of supplier failures, natural and man-made disasters coupled with shorter product life-cycles, rapidly changing requirements of customers

have made risk of disruption inherent to a supply chain" (Agarwal & Seth, 2021, p. 759).

Accordingly, Hofstätter, Krawina, Mühlreiter, Pöhler and Tschiesner (2020) indicates that the “disruptions in the auto industry will result in billions lost, with recovery years away”. To this, the COVID-19 outbreak was salt on the wound of the South African automotive industry, which after the dawn of democracy faced insurmountable challenges of its own (Maharaj, Chisoro & Karodia, 2016), the debating on government’s policies which seek to increase localization of materials, components manufacturing, and sourcing & supply (Intellidex, 2021), thus reducing the “product supply risk by creating greater self-reliance” (Kituyi et al., 2020, p.31).

# Research Problem

According to Szuster and Lotko (2022), there are a number of operational shocks that each firm is susceptible to in the normal course of business. Some examples include "disruption at a supplier, demand disruption (a buyer requesting to cancel an already placed order), and disruption of the transportation service (i.e., broken inbound and/or outbound transportation links)" (Gurbuz, Yurt , Ozdemir, Sena & Yu, 2023).

However, the recent COVID-19 pandemic-induced shutdowns of persons’ mobility, international transportation of goods, shipping and logistics have caused substantial supply chain disruptions across numerous sectors of the economy and markets, proving that businesses need to be prepared for more than just the usual b2b disruptions such as labour boycotts at the one end. Throughout history, there’s been other unpopular global events, such as the Icelandic volcano, tsunami, earthquake, as well as the recent geopolitical risks seen during the USA-China trade and tariff war, as well as the sanctioning and export control measures imposed by Western countries upon Russia’s invasion of Ukraine (Allam, Bibri & Sharpe, 2022; Maihold, 2022; Wolf & Kalish, 2021).

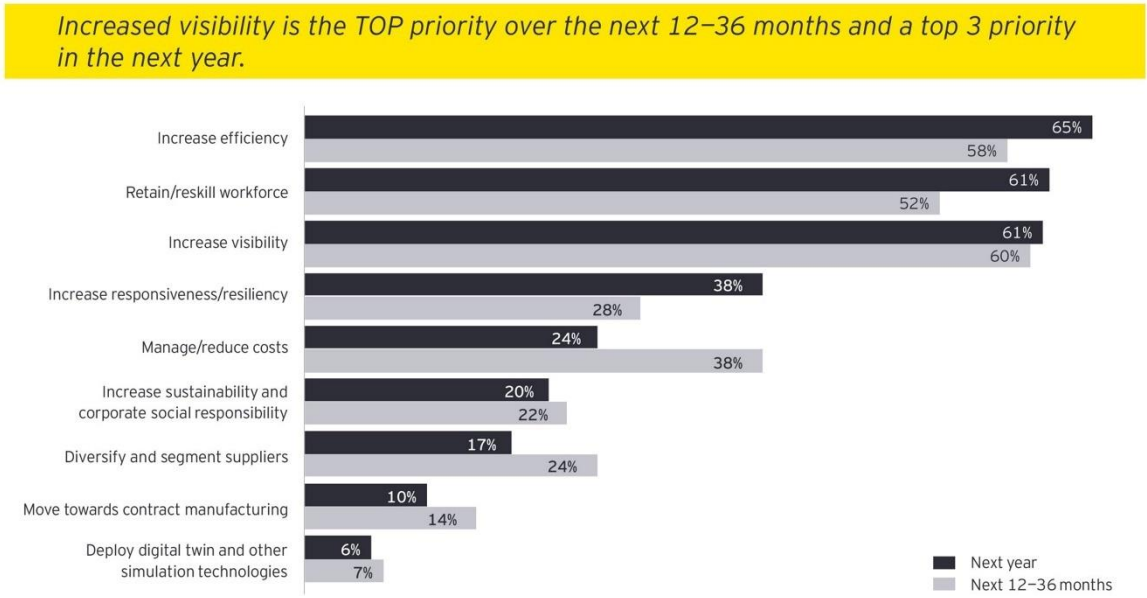
All these severely disrupts commercial activities worldwide due to the high level of global interdependency (Kituyi et al., 2022), in particular production operations, logistics, transportation and supply chain networks are heavily interdependent (Eriksson, Dubois & Hulthén, 2022).
The ongoing Ukraine-Russia war has "dimmed prospects of a post-pandemic economic recovery for emerging and developing economies in the Europe and Central Asia region" (Chand & Stilwell, 2022), in part because of the significant disruptions to global logistics, connectivity, and transportation that Russia's war on Ukraine has caused (Jacobs, 2022; OECD, 2022).

Raj et al. (2022) argue that although businesses have sought out and implemented a variety of short-term logistics and supply chain response strategies to lessen the effects of COVID-19 disruptions, long-term "mitigation strategies are largely missing from the current debate on global supply chains" (Raj et al., 2022). Although, the impact of the Ukraine-Russian war on supply chain disruption is still a topic of ongoing scrutiny, a

survey of 200 senior-level supply chain executives conducted by Ernst & Young LLP (EY US) in late 2020 revealed that "efficiency" in supply chains was among the top priorities moving forward, as can be seen in Figure 1.

Figure 1: Supply chain priorities since COVID-19.

**Figure 1: Supply chain priorities since COVID-19**




Source: Harapko (2021).

According to (Negi, 2020), "Efficiency" in relation to supply chain is "a requirement for organizations as it is one of the key measures for supply chain performance and positively influences the firm's overall performance and financial success, and.....can play a major role in supply chain development and create competitive advantages" (Lu et al., 2019; Brandenburg, 2016; Ellinger et al., 2012; Ellinger et al., 2011; Aramyan et al., 2007; Nikfarjam et al., 2015, as cited in Negi, 2020).

According to Minnich and Maier (2006), whether directly or indirectly, "Efficiency" of the supply chain is in turn closely connected to, interrelated with, or coexists with "Responsiveness". Given the scenario of disturbed supply chain, (Talluri, Kull, Yildiz & Yoon, 2013) found "that the more efficient strategies focus on flexibility rather than on redundancy for supply chain failures" (Talluri et al., 2013). The authors recognize that despite the vast amount of literature on risk management currently in circulation, which offers numerous "tools and techniques for effectively evaluating and managing supply chain risks, comprehensive assessment of the efficiencies of alternative risk mitigation strategies has not been addressed in the literature" (Talluri et al., 2013).

Therefore, there is a need for more comprehensive and integrated research on alternative risk mitigation strategies, with a particular emphasis on the recovery through localization (nearshoring) and its impact on the performance of the supply chain, as well as how to manage disruptions in the short- and long-term for the survival of businesses.

Even so, where networks are lengthy and complex, "realistic timeframes for reconfiguring supply chains are largely incompatible with the rapid responses anticipated by political decision-makers" (Maihold, 2022).

## Purpose of the Study

In the context of the South African automotive industry, this research aims to ascertain the extent to which localization (and/or nearshoring) is currently used and might be in the future as a means of mitigating supply chain risk of disruptions, such as those experienced during COVID-19 (or that could be caused by things like natural disasters or geopolitical tensions). In contrast to global material sourcing, which is prone to disruptions due in part to the interdependencies in logistics, transportation, and supply chain networks, it seeks to find effective ways of enhancing supply chain risk management through localization.

## Research Questions and Objectives

This study's primary objective is to compile supply chain experiences from the RSA's automotive sector, analyze the effects of COVID-19 production material supply disruptions on local automakers, and consider localizing such materials and/or components as a defense against future pandemics and/or natural disasters in South Africa. The supply chain resilience topic is receiving more and more attention in academia, the media, commentary, consulting, and in practice. It is being discussed across a variety of industries, primarily in connection to their SCMs (Katsaliaki, Galetsi & Kumar, 2022; Stone & Rahimifard, 2018).

"Research on SC resilience has concentrated on the antecedents for developing SC resilience, recovery through resilience in crisis, and the relationship between resilience and organizational performance," according to Rha (2020). According to Chopra and Sodhi (2014), researchers and practitioners tend to focus on the obvious effects of failed supply chains such financial losses to corporates, "after all, financial performance is what pays the bills," (Chopra & Sodhi, 2014), and the impact that high levels of disruptions have on trade and prices is another focus area (Attinasi, Balatti, Mancini & Metelli, 2021), researchers and practitioners hardly focus on the mitigating nature of localising (nearshoring) the supply instead of heavily relying on imports.

Literature on "de-risking the supply chain," which "includes the need to balance worldwide sourcing with nearshore and local sourcing," is needed, according to (Van Hoek, 2020). Katsaliaki et al. (2022) posit that research into "disease outbreaks from the humanitarian logistics aspect" is aplenty with much needed knowledge, and it's still "growing fast", but there's still a need for research with a special focus on "SC disruptions caused due to pandemics, such as COVID-19" (Katsaliaki et al., 2022), which calls for urgent understanding and evaluation of how "changing regulations for lockdowns, transport guidelines and employees' working conditions impact on SCs and

identification of appropriate ways to react and adapt with the minimum possible distraction" (Katsaliaki et al., 2022).

According to Andersson and Segerdahl (2012), while there are numerous studies on supply chain management, "few are focused on localization and at the same time covering all supply chain and related functions including manufacturing, logistics, purchasing, and R&D" (Andersson & Segerdahl, 2012), with only a few "focusing on the future" (Andersson & Segerdahl, 2012). Researchers claim that most studies typically analyze "the question of localization, general behavioral changes, and the rebuilding of SC as an opportunity for sustainability," and that this is why localization gained momentum when researchers began to pay much attention to the topic of "sustainability" (Fischedick & Schneidewind, 2020; Lopes de Sousa Jabbour et al., 2020; Sarkis et al., 2020, as cited in Meyer et al.,2021, p.18).

## Research Objectives.

Research objectives establish who should participate in the study, what inquiries should be asked of them, and what the research hopes to achieve (Sue & Ritter, 2012). They serve to focus the study by providing an overview of the project's methodology and goals. In order to comprehend the economic effects that disruptions have on the nation's automotive sector, which is highly dependent on global sourcing (import driven) rather than local sourcing of components, the research is conducting this subject on localization benefits. Thus, the objectives of this research paper are as follows:

- To explore the impact of supply chain disruptions on the automotive manufacturing industry from an economic and monetary perspectives;
- To examine the role that sector localisation of components plays on the industry; and
- To determine how companies deal with the disruptions in their supply chains, and the extent to which nearshoring mitigates against such risks.

## Research Questions.

Research questions are specific inquiries which the study attempts to provide a response to. They are at the center of systematic inquiry and aid in defining a clear course for the research procedure. Any research project typically starts with them. It is hoped that by identifying the effects of supply chain disruptions and comprehending the problems faced by businesses, the information gathered will be used to inspire research into services that will aid the automotive industry in coping with such disruptions and increase their chances of quickly resuming normal operations after SC disruptions. However, despite not intending to, the financial aspects of disruptions (such as capex, profitability, etc.) unavoidably came up in discussions of the different themes selected from the interviewees. The following research questions were anticipated to be answered by this study:

- *RQ1:* How has supply disruptions impacted on car manufacturers during and post COVID-19?
- *RQ2:* What supply alternatives did car manufacturers adapt to cope with the disruptions? (*NB: the ease and timeliness of materials/components supply from local suppliers vs importing*)
- RQ3: What's the feeling about government's localisation efforts and policies since COVID-19 supply disruptions? (*NB: the lockdowns saw closure to international ports of entry/exit, thus no supply chains, except for essentials, which impacted industries even months after the ban*)

# Theoretical Framework

One of the most crucial elements of the research process is the theoretical frameworks (Grant & Osanloo, 2014, p.12). By concentrating on particular variables and defining the particular viewpoint (framework) that the researcher will take in analysing and interpreting the data to be collected, it is used to restrict the scope of the relevant data. It is an overview of fundamental ideas that act as a guide for creating the arguments that researchers will employ in their own work.
Theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge, within the limits of the critical bounding assumptions. A theoretical framework "serves as the structure and support for the rationale of the research, problem statement, purpose, meaning, and research questions" (Rudasill et al.,2017; Sontag, 1996; as cited in Nhan, 2020)

As a result, a number of theoretical frameworks were researched and quickly summarized in light of this study. Placing the study "within the context of the existing literature" (Lederman & Lederman, 2015) allows the researcher's own justifications to be "more complete and more precise" (Hiebert, Cai, Hwang, Morris & Hohensee, 2023), and serves to help clarify and comprehend the problem under investigation (Grant & Osanloo, 2014).
Four theoretical frameworks were reviewed in order to adequately understand and explain the research problem at hand, including the Resource-based view (RBV), transactional cost economics (TCE), which is closely related to Cost-Benefit Analysis (CBA), and institutional theoretical (IT). Complementarity theory (CT) and/or complementary needs theory were then considered (CNT)

The Resource-based View (RBV), which is frequently used in SCM studies and various other economics topics, contends that a firm's "sustained competitive advantage is based on its valuable, rare, inimitable, and non-substitutable resources" (Barney, 1991, as cited in Madhani, 2009 and Zhao & Morgan, 2017), and that such a firm should purposefully choose and develop those "resources that are valuable, rare, costly to imitate, or exploitable by the organization" (Dul & Neumann, 2008, p.14; Ruan, 2019).

Transaction cost economics (TCE) "uses the concept of transaction costs to explain the organization of firms and the method of their interactions along a supply chain by providing a conceptual framework for investigating some of the organizational

challenges and economic risks that firms face" (Garfamy, 2012). TCE is "one of the most widely referenced organization theories in operations and supply chain management research" (Ketokivi & Mahoney, 2020). Last but not least, it asserts that a company's competitive success is "dependent on the reduction of transaction costs" (Costa, 2004).
Institutional theory (IT) contends that "organizations implement business practices because doing so improves their legitimacy" and "focuses on the roles of social, political, and economic systems in which companies operate and acquire their legitimacy" (Debroux, 2010; DiMaggio & Powell, 1983, as cited in Kauppi, 2013). This theory, according to (Kauppi, 2013) offers “important insights to adoption of tools and practices within OM and supply chain management (SCM)” (Kauppi, 2013). It can also “offer a much broader take on management behaviour by suggesting that managers act the way they do in order to achieve legitimacy in their overall organisational environments (Eisenhardt, 1988, as cited in Liao, Kwaramba & Kros, 2020). According to Alam (2022), supply networks conform to organizational fields because they are defined by interorganizational processes, which is a key idea in new institutional theory.

Finally, Robert Winch created the complementary needs theory (CNT), also known as the complementarity theory (CT), in the middle of the 1950s. This theory applies “when a person selects a mate whose opposing traits compliment their traits in order to receive the highest satisfaction of needs possible” (Winch, Ktsanes & Ktsanes, 1954). According to Winch (1952), "spouses tend to resemble each other in many sociodemographic characteristics, and among those with these similar characteristics, field of "eligibles," an individual selects a mate who complements his or her need patterns and from whom he or she sees the greatest promise of providing himself or herself with maximum need gratification" (Winch, 1952, as cited in Brubaker, 2016). Of course, in this instance, it speaks primarily to juristic persons, which are businesses.

According to Halldórsson, Hsuan, and Kotzab (2015), CT is used in the context of supply chains to "underline the broad and complex nature of SCM; it requires theory to be understood, and cannot be dealt with by one particular theory alone." It seeks stimulate knowledge as to whether the most “prevalent inter-organizational theories used to theorize SCM (i.e. TCA, RBV, PAT and NT) continue to grow and whether they are being used as complementary theories” (Halldórsson et al., 2015). The use of existing theories will deepen the sophistication and efforts on theorizing SCM” (Halldórsson et al., 2015).

In order to better understand and explain variables that may have an effect on localization (nearshoring) advocacy in SCs, the methodology for this study was therefore governed by the complementarity theory (CT) framework. This is particularly because in academia and practice, the “perception that a ‘one-size-fits-all’ approach to SCM seems to be inadequate” according to (Christopher et al.,2006, as cited in Beck, Hofmann & Stölzle, 2012). And also, because “companies applying a differentiated SCM approach are more successful than their competitors that use a ‘one-size-fits-all’ approach” as stated by (Mayer et al.,2009, as cited in Beck et al.,2012). With reference to the aims presented, the above-mentioned research questions will guide the study.
Therefore, the CT/CNT theory explains how various theories and SC components actually work together to impact decisions.

# Research Design and Method

## Design and Methodology.

A research paradigm is defined as “the set of common beliefs and agreements shared between scientists about how problems should be understood and addressed” (Kuhn, 1962, as cited in Vinodkumar & Anoop, 2020). To ensure that participants were involved throughout the entire research process, an interpretivism or interpretivist paradigm that permits the deliberate selection of research participants was chosen for this article (Collis & Hussey, 2014, p.131, as cited in Ramsberg, 2018).
This paradigm aided the researcher see the world through participants' lived professional experiences and perceptions (Blaxter et al.,2010, p.170; Collis & Hussey, 2014, p.132, as cited in Ramsberg, 2018). Because it permitted the collection of non-numerical data while trying to interpret meaning through an iterative process with the targeted population, the research adopted a qualitative strategy (Aspers & Corte, 2019; Crossman, 2020).

The study used a phenomenological research design. Phenomenological studies (or in this case Descriptive Phenomenology) examines lived human experiences through the descriptions provided by the people involved. It is where the researcher asks, “What is this experience like?’, ‘What does this experience mean?’ or ‘How does this ‘lived experience’ present itself to the participant?” (Deakin University, 2022). Grossoehme (2014) posits that the most user-friendly “qualitative research approach is phenomenology, because it is all about the search for meaning” (Grossoehme, 2014). This as a “philosophical approach, aims to produce an account of lived experience in its own terms rather than one prescribed by pre-existing theoretical preconceptions” (Smith & Osborn, 2015). With phenomenological research approach, researchers seek deep understanding/meaning in events and in human interactions (Neubauer, Witkop & Varpio, 2019), and try to get a sense of the meaning participants give to their unique situations, i.e. “they are more preoccupied with the quality of experience” (Pietkiewicz & Smith, 2014).

Thus, primary information was collected through interviews, in conjunction with secondary data, clarifying key elements within the scope of the research objectives (Sakuramoto, Di Serio & Bittar 2019; Yin,1994). Qualitative research also involves “the systematic collection of data about a phenomenon, using standardized measures and statistical analysis” (Hammarberg, Kirkman, & de Lacey, 2016). Deduction or induction are two methods used in qualitative research; in the latter, data are gathered by beginning with particular observations and measurements relevant to a particular field of study. The researcher then starts to identify patterns and regularities in the data, develops various concepts and theories to create some tentative hypotheses that can be investigated, and eventually arrives at some general conclusions or theories (Moser & Korstjens, 2018).

Since a qualitative approach allows for greater capacity to gain more depth and meaning based on people's experiences of working within disrupted supply chains in their firms, it was decided that it would be more appropriate to use it for this study. In qualitative research, there are many different methods for gathering data, such as observations, textual or visual analysis (from books or films), and interviews (such as from individuals or focus groups). Having said that, focus groups and interviews are typically the most used techniques (Sargeant, 2012). To guarantee reliability and validity, data from interview transcripts, field notes from interviewer observations, historical records, and memos were subjected to rigorous and ongoing analysis (Cypress, 2017).

The processes of data collection, coding, and analysis were combined throughout the research (Strauss, 1987). According to DeJonckheere and Vaughn (2019), this approach "typically consists of a dialogue between researcher and participant" and "allows greater spontaneity and adaptation of the interaction between the researcher and the study participant" (Mack, Woodsong, Macqueen, Guest & Namey, 2005). Flexibility is crucial for the qualitative researcher because it allows them to switch up their line of inquiry and probes as more data and better understanding become available (DeJonckheere & Vaughn, 2019; Busetto, Wick & Gumbinger, 2020).

As a result, the study investigated the COVID-19-imposed supply chain disruptions, made observations of analogous historic patterns, and evaluated the SCRes of the OEMs and first tier suppliers in the automotive industry. By taking a variety of perspectives and taking into account what is occurring in other developing nations, the researcher was able to gain an overview of the effects of the COVID-19-imposed disruptions on the automotive industry and solutions to them. To compile a representative sample of the key supply chain levels, the focus was on the OEMs and the first-tier suppliers in the South African automotive supply chain as the core subjects.

## Population and Sampling

Although Vasileiou, Barnett, Thorpe, and Young (2018) acknowledged that "choosing a suitable sample size in qualitative research is an area of conceptual debate and practical uncertainty," various researchers also noted that qualitative researchers can successfully select their samples from the target population using general sampling methods (probability or nonprobability) depending on the size, complexity, and willingness to participate of the target population (Casteel & Bridier, 2021). In order to ensure that only eligible and willing candidates are included, Asiamah, Mensah, and Oteng-Abayie (2017) state that "it is incumbent on the researcher to identify any individuals who are unwilling to participate in the study or will not be available at the time of data collection" (Asiamah et al., 2017).

### Target Population and Sample.

A distinction between the general and target populations is made by (Asiamah et al., 2017). They emphasize that "the general population is characteristically crude in that it

frequently includes subjects whose participation in the study would be in conflict with the research goal" (Asiamah et al.,2017). Casteel and Bridier's study from 2021 examines the idea of "population of interest for the study," which they contend should consist of "individuals, dyads, groups, organizations, or other entities one seeks to understand and to whom or to which the study results may be generalized or transferred and is the principal group about which the research is concerned" (Casteel & Bridier, 2021).

The target population is the portion “of the general population left after its refinement, which is defined as the group of people or participants with the particular attributes of interest and relevance," according to (Bartlett et al., 2001; Creswell, 2003, as cited in Asiamah et al., 2017). A sample, according to Martnez-Mesa, González-Chica, Duquia, Bonamigo & Bastos (2016), is "a finite portion or subset of participants drawn from the target population", and it represents the population of interest (Gravetter & Wallnau, 2017, as cited in Casteel & Bridier, 2021). Sampling is important because it ensures that time and complexity constraints that are typically associated with various population sizes are kept to a minimum and makes research more cost-effective to perform (Sharma, 2018, Taherdoost, 2016).

Because COVID-19 disruptions had been in place for about two years prior to the study's commencement, non-probability purposive and convenience samplings were used. This was because the research participants had pertinent data that was easily accessible and available at that time (Palinkas, Horwitz, Green, Wisdom, Duan & Hoagwood, 2015). The choice of an appropriate sample size in qualitative research is a topic of conceptual debate and actual uncertainty, according to Vasileiou et al. (2018). However, they also state that "sample size principles, guidelines, and tools have been developed" in order to guarantee the "quality of the qualitative study" and to support its acceptability (Vasileiou et al.,2018).

As a result, the research used seven (7) sample elements; this is covered in more detail in the following chapters. However, it should be recognized that using purposive sampling is likely to cause sampling bias, which will likely lead to limited research findings that may not be generalizable (Andrade, 2021; Nikolopoulou, 2022). Data analysis is the process of inspecting, cleaning, coding, changing or transforming, and processing raw data with the aim of highlighting useful information, suggesting conclusions and supporting decision-making (producing meaning). This can be achieved manually, through the use of spread sheets or by computer aided software such as NVIVO, MAXQDA for example (Xiao & Watson, 2019).

The use of ATLAS.ti software was made possible by its capacity to handle large quantities of data and ease of use for researchers from the beginning of a project to its conclusion (Rambaree, 2013). Additionally, the software aids in managing data sets, coding, and the compilation of flowcharts to illustrate relationships between generated codes (Givon & Court, 2010, as cited in Suter, 2012), enabling the researcher to make their own decisions about themes and carry out thematic data analysis (Nowell, Norris, White, & Moules, 2017). A single OEM and Tier1 suppliers' senior managers, supply chain executives, logistics managers, and marketing managers were chosen for this research.

## Significance of the Study

### Implications on Future Research.

As a subfield of SC risk management, it is envisioned that this research will add to the body of knowledge already available on the topics of localization (nearshoring) of manufacturing components and supply chains.

### Managerial Implications.

Benefits of localization (nearshoring) for the automotive industry are emphasized; as a result, management may be encouraged to adopt and implement decisions that allow businesses to interact actively with stakeholders, which has the potential to facilitate localization. Therefore, in actuality, management may be persuaded to adopt/implement localization (nearshoring) strategies.

### Policy Implications.

The Automotive Production and Development Programme (APDP) in South Africa is an incentive program for the industry aimed at increasing production volumes locally. It includes a Volume Assembly Allowance (VAA) for vehicle producers (OEMs) and a Production Incentive (PI) for OEMs and component manufacturers (including Tier 1 suppliers). Governments have already developed incentive programs for a number of industries, including the automotive industry (Barnes, Black & Monaco, 2021). Therefore, the impact of this study on policy may not be very great.

## Ethical Considerations

Participants received assurances regarding the confidentiality of their information, including guarantees that their identities and companies would not be disclosed and that all information would be safely stored on a cloud-based device without public access. When a signed written consent or an email response was received in reaction to an invitation to participate, the research could begin. Additionally, the research was approved by the University Human Research Ethics Committee (Non-Medical) and the Wits Business School Ethics Committee at the University of the Witwatersrand. The committee gave an official, university-signed Ethical Clearance Certificate.

## Scope and Limitations

"Clear Is Kind. Unclear Is Unkind," explains Brené Brown (Brown, 2018). According to Ross and Bibler Zaidi (2019), all studies have limitations, regardless of the format of the research report or the subject matter. Researchers have a responsibility to the academic community to always disclose the real limitations of their studies. Additionally, in order to prevent scope creep, research studies must, according to Creswell (2011), explicitly define their scopes and establish their boundaries.

### Scope and delimitations of study.

The study's sole area of interest is the use of localisation (nearshoring) of the automotive component supply needed to construct or assemble cars locally. Localization (nearshoring) is a strategy used in other regions to prevent supply chain disruptions brought on by unforeseen events, as was the case during the COVID-19 closures of the networks for logistics, transportation, and supply chains, as well as more recently, the geopolitics of the conflict between the Ukraine and Russia.
Numerous additional risk-reduction measures might have been taken into account in this research, but they might have broadened its scope. As a result, other supply chain risk mitigants were not taken into account, thereby defining the study's focus (delineation).

### Limitations to the study.

The research had three limitations: (1) a small sample size of seven [7] interviewees, which could have been overcome; this limitation is further discussed in the sampling section. This restriction would have been lessened if a different research approach had been followed. (2) Because only one OEM and its Tier 1 suppliers were examined, there is a chance that the results cannot be readily applied to other OEMs in the country. The results would have been simple to generalize if several OEMs and Tier 1 suppliers had been investigated. Also covered in more detail in the parts that follow. (3) Face-to-face interview meetings were difficult due to the study's start-up period, but this was overcome by using a virtual alternative (the MS Teams meeting platform). However, if the times had occurred before COVID-19 periods, a larger sample size might have consented to the interview, partially addressing limitations (1) & (2). The structure of the upcoming chapters and divisions is shown below.

## Structure and demarcation of the Study

The paper is made of six chapters, thus;
*Chapter One (i):* A brief description of the theoretical framework, research design and methodology, population and sampling, study significance, ethics, and finally scope and limitations are provided in Chapter One. This chapter also provides background information and an introduction to the research topic (including the problem, purpose, objectives, and questions).

*Chapter two (ii)* provides a detailed discussion of the theoretical framework. The Complementarity/ Complementary Needs (CT/CNT) framework is discussed in detail, with its justification for this study.

*Chapter three (iii)* reviews literature of relevant academic sources on supply chain resilience, risk mitigation and localization (nearshoring).

*Chapter four (iv)*, looks at research model and design followed in this research, considering the process followed for gathering, analysis, and interpretation of data.

*Chapter five (v)*, through thematic data analyses, results from the themes are presented and discussed in Chapter 5 (v).

*Chapter six (vi)* concludes the study with a summary of all the preceding chapters, recommendations, and implications of the study. Finally, references/bibliography and appendices follow at the foot of this sixth chapter.

## Chapter Summary

The context and background of supply chain vulnerabilities to risks have been given in this chapter, with a focus on the problem statement of supply disruptions, which frequently pose challenges to the geographically dispersed supply of automotive components. Chapter (ii) discusses the theoretical frameworks used in this research.

# THEORETICAL FRAMEWORK

## Introduction

Studies in supply chain management (SCM) practice has grown in scope and complexity in recent years. Sandberg, Oghazi, Chirumalla and Patel (2022) indicate that challenges for research in the field is to create value for both academics and practitioners. This shows that there can’t be a single one-size-fits-all Supply Chain Framework that could address all SCM, SCRM, SCRes related issues holistically (Beck et al.,2012).

Identifying connections between hundreds of theoretical framework "subfactors" is a very difficult task, according to (Boyer & Swink 2008, p.339, as cited in Pettit, Croxton & Fiksel, 2013), to the point where even the Editors of the Journal of Operations Management recently stated that they firmly believed "that multiple approaches are required to develop a holistic understanding of operations and supply chain management phenomena" (Boyer & Swink 2008,p.339, as cited in Pettit et al.,2013)

This chapter compares different theoretical models and explains why one is thought to be the best fit for this research. Katsaliaki et al. (2022) note that "among the publications, numerous theoretical developments as well as review studies can be found exploring certain aspects of SC disruptions" in their discussion of SC disruptions. To strengthen the rationale for carrying out this research, the application and relevance of each of these theoretical works are discussed. This study's purpose is furthered by a discussion of the history, significance, and applications of each of these theoretical works.

## Purpose of Theoretical Frameworks

Grant and Osanloo (2014) indicate that “a research plan that contains a theoretical framework allows the dissertation study to be strong and structured with an organized flow from one chapter to the next” (Grant & Osanloo, 2014, p.13). Thus, a theoretical framework is one of the most important aspects in the research process, as such, accordingly Sarter (2005) “contends that a study without a justifiable theoretical base is of limited usefulness of findings and conclusions" (Grant & Osanloo, 2014; Sarter, 2005, as cited in Nhan, 2020).

According to Collins and Stockton (2018), in the main, “theoretical frameworks provide four dimensions of insight for qualitative research that include: (1) provide focus and organization to the study, (2) expose and obstruct meaning, (3) connect the study to existing scholarship and terms, and (4) identify strengths and weaknesses”. This is because “the importance of theory-driven thinking and acting is emphasized in relation to the selection of a topic, the development of research questions, the conceptualization of the literature review, the design approach, and the analysis plan for the dissertation study” (Grant & Osanloo, 2014, p.12)

Theoretical frameworks are crucial because they coordinate all project elements, incorporate prior research into the study's justification, explain why the study is essential, and keep the various study components together from its inception to its conclusion (Hiebert et al., 2023). Additionally, academics employ theoretical frameworks to clarify issues encircling a field of study and interpret the results (Hiebert et al.,2023). Theoretical frameworks give scholars the ability to test and broaden their body of knowledge. They express the core “values of the researcher(s) and provide a clearly articulated signpost or lens for how the study will process new knowledge," according to (Collins & Stockton, 2018). The fact that theoretical models introduce researchers to a wider body of literature is a further lesson.

This study looked at the resource-based view (RBV) perspective, as one most frequently used in SC studies, which posits that a firm “attempts to reach sustained competitive advantage by choosing and developing resources that are valuable, rare, costly to imitate, and exploitable by the organization” (Dul & Neumann, 2008, p.14). This theory "argues that a firm’s sustained competitive advantage is based on its valuable, rare, inimitable, and non-substitutable resources" (Barney, 1991). "Firms acquire an advantage by controlling those scarce and valuable-ideally, inimitable-assets," (Ruan, 2019)’s argument shows. With platforms, the assets that are hard to copy are the

community and the resources its members own and contribute, be they rooms or cars or ideas and information. In other words, the network of products and consumers is the chief asset" (Ruan, 2019).

In contrast, the transaction cost economics (TCE)/transaction cost theory (TCT) framework, which "uses the concept of transaction costs to explain the organization of firms and the method of their interactions along a supply chain by providing a conceptual framework for investigating some of the organizational challenges and economic risks that firms face," are used in the studies of various supply chain management topics (Garfamy, 2012).
As quality standards have increased globally and marketplaces have become more uncertain, competitive success has increasingly depended on the reduction of transaction costs. Assuming that there is a high danger of opportunism in the "governance" of relationships, traditional transaction costs theory has neglected the importance of trust. But as many people have realized, trust is a component of every transaction that can be explained by either prior knowledge or the absence of contradictory proof, according to (Costa, 2004).

The Institutional Theory (IT), on the other hand, "focuses on the roles of social, political, and economic systems in which companies operate and gain their legitimacy" (Debroux, 2010). In accordance with the institutional theory, organizations implement business practices because doing so increases their credibility. This theory can provide crucial insights into how OM and supply chain management (SCM) tools and practices are adopted, highlights (DiMaggio & Powell, 1983, as cited in Kauppi, 2013).
According to Pettit et al. (2013), "multiple approaches are required to develop a holistic understanding of operations and supply chain management phenomena" (Boyer & Swink 2008, p. 339, as cited in Pettit et al., 2013), the complementarity theory (CT)/ complementary needs theory (CNT) is then considered in the research because "SCM suffers as well as benefits from a conceptual slack" (Halldórsson et al.,2015 ) in which the "presumption is that SCM borrows from other fields, that this entails complementarity (i.e. theories selected must have explanatory relevance to some of the dimensions of SCM), and finally, this implies theories (in plural) to capture the multiple nature of SCM." (Halldórsson et al.,2015).

By conducting "an evaluation of literature and purposes at mapping using theories within the discipline of SCM,...comparing the associated topics of SCM research, searching in more records at famous theories, and endorse possible avenues for the area to develop," Akhter, Uddin, and Jahan (2018) contrasted various theoretical perspectives frequently used in the study of SCM-related topics (Akhter et al.,2018). Their main conclusion was that "theory-building efforts in SCM persist scarce, with the predominance of a few famous imported macro theories having implications at the conceptualization of SCM and the subjects researched to this point" (Akhter et al.,2018). Table 1 below provides a summary of their conclusions.

Table 1. Comparison of SCM theories and their applications.

**Table 1: Comparison of SCM theories & their applications (Akhter et al.,2018).**

| Characteristics | Resource-Based View (RBV) | Institutional Theory (IT) | Transaction Cost Theory (TCT) |
|---|---|---|---|
| Behavioral assumptions | Bounded rationality Trust | Bounded rationality Legitimacy | Bounded rationality Opportunism |
| Problem Orientation | Internal competence development | Legitimate governance structure | Efficient governance structure |
| Time dimension | Static/dynamic | Static | Static |
| Primary focus of analysis | Resource Attributes | Institutional Attributes | Transaction Attributes |
| Function of Relationships | Access to cementary resources | Institutional Pressure | Market failure |
| Primary domain of interest | Production of firm resource/ capability | Social recognition and survival | Exchange and Transaction |
| **Justification for Application** | Tangible and intangible resources influence the creation, sustainability, and competitive advantage of the firm | Monitoring environment for collaborative opportunities Following best practice | Reducing cost generated through asset specify and uncertainty. Vertical Integration |

Source: Adapted from (Miri-Lavassani & Movahedi (2010); Halldorsson et al.(2007) as cite in Akhter et al.,2018).

The writers draw the following conclusion: "There may be a want for researchers to interact in more theory building. Suitable theories are probably to emerge from innovative and original studies techniques that offer particular insights into the practical problems within the subject" (Akhter et al.,2018). It is for this reason that this report argues that complementarity theory is best suited for studies on SC related topics because SC cut across the broader economic spectrum. CT/CNT is briefly discussed below, and the above discussed theories are not exhaustive as there's a myriad of concepts which have been conceptualized leading to framing of some of the applicable Supply Chain Management theories such as the Knowledge-Based View (KBV) theory,

Strategic Choice Theory (SCT), Agency Theory (AT), Systems Theory (ST) which of course falls outside the scope of this text (StudyCorgi, 2020).

## Complementarity/ Complementary Needs (CT/CNT) - application

This section discusses the theoretical background of this study, which is complementarity theory (CT) perspective. Kochan and Nowicki (2018) found that the resource-based view (RBV) was the most common theoretical lens used in explaining SC/ SCM/ SCRes topics. Although Beamish and Chakravarty (2021) note that RBV is a widely used theory to try to understand "the sources of firm-level sustained competitive advantage (SCA)," it was noted in the preceding sections that no single theory can completely explain all SC/SCM studies or practice on its own.

For this reason, complementarity needs theory (CT/CNT), also known as complementarity theory, was chosen for this research. The psychological theory of complementary needs, which is credited to Winch (1955), puts forth the idea that two things are drawn together because of their distinctive differences, which, when combined, will complement one another. The majority of theories used in supply chain studies are complementary to one another, so none can be singled out as the best or worst or even adequately handle all SC topics when viewed separately. As a result, according to Halldórsson et al. (2015), "borrowing from complementary theories has become an important part of theorizing SCM" and using multiple “complementary theories in combination provides for a longitudinal approach to decision making in SCM." (Halldórsson et al., 2015). Due to the fact that each theoretical framework contributes to the subjects being addressed in this research study, Complementarity Theory (CT/CNT) is essentially being used in this situation.

## Chapter Summary

In this chapter, the operation of theoretical frameworks was covered. It was also shown that it is very challenging to properly explain concepts using just one theoretical method when dealing with SC topics. As there is no "one size fits all" solution for SC discussions, it was decided that CT/CNT is a good fit. This part provided justification for the CNT/CT election. The next part focuses on a review of the literature on supply chain risk/resilience, localization, and the various approaches to localizing component supply.

# REVIEW OF LITERATURE

## Introduction

According to Gopaldas (2015), a literature review in any research paper introduces "the reader to the theoretical conversation about the phenomenon," "creates a firm foundation for advancing knowledge," (Webster & Watson, 2002), as such "a successful literature review facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed." (Webster & Watson, 2002), and there's abundance of approaches to literature review.

Various theoretical works were reviewed in the chapter before. It has been demonstrated that none of the commonly used frameworks for explaining supply chains—RBV, TCE, IT, or even Cost-Benefit Analysis—can adequately explain these concepts on their own. As a result, through complementarity (CT/CNT), all of these frameworks have contributed to a better understanding of how decision-makers in the automotive industry behave when adopting unpopular localization (nearshoring) as a supply chain risk mitigation strategy.

The literature on localization, supply chain risk reduction, nearshoring, and supply chain resilience is reviewed in this chapter. First, a summary of the SCRes literature is given, then reviews of localization and/or nearshoring. It will look at the crucial part that localization plays in the industry's survival and the survival of specific businesses both during and after supply chain disruptions (such as the recent COVID-19). Finally, it will look at the financial and economic effects of disruptions and show various theories that have been developed about how these disruptions affect SCRes and how businesses respond to them. Sub-themes of the literature reviewed for this study are listed below.

## Supply Chain Management

Making effective supply chain management (SCM) a C-suite strategic priority is one of the best methods for companies to provide excellent customer service. Companies gain a competitive edge by excelling in this area, particularly in today's fiercely competitive global market (Alicke et al.,2020 & Ashby et al.,2012, as cited in Sarkar, Ismail & Tkachev, 2022). Improvements in supply chain management (SCM) are now required in management of businesses. Additionally, even though SCM field has reviewed a number of meanings from the literature. In order to control, manage, and improve the flow of goods and materials as well as information from suppliers to end users, Christopher (2011) noted that SC entailed "a network of connected and interdependent organisations mutually and cooperatively working together to control, manage and improve the flow of goods and materials and information from suppliers to end users" (Christopher, 2011, p. 4). The ultimate objective is to produce finished goods or provide finished services to customers.

Although "supply chain" (SC) starts "with the delivery of raw materials from a supplier to a manufacturer and ends with the delivery of the finished product or service to the end consumer," (Fernandez, James, and Kvilhaug, 2022) SCM manages everything in between through "the linkage of stages in a process" (Zsidisin & Ritchie, 2009). According to Sabir and Irfan (2014), "integrated global supply chains" are "essential to global commerce," emphasizing how geographically dispersed supply chains can be. Although a large body of literature recognizes SCM as "the management of key business processes across the network of organisations that comprise the supply chain," Croxton, Garcia-Dastugue, Lambert, and Rogers (2001) contend still that this is not the case as “most are vague about what processes are to be considered, what sub-processes and activities are contained in each process, and how the processes interact with each other and with the traditional functional silos” (Croxton et al., 2001), however, SCMs are geared to deliver a product or service from its raw form until final/end consumer product.

However, Shishodia, Sharma, Rajesh, and Munim (2021) point out that "risks are inevitable, and therefore, risk management responses assume significance" and that there is a " need for a proactive system to avoid the hazardous effects of SC risks and disruption" (Shishodia et al.,2021). Ivanov (2022), in addition, states that SCs had to learn "a great deal about how to act in line with nature and societal interests (i.e., become sustainable), how to strengthen their resilience during disruptions triggered by severe natural or man-made disasters, how to recover and manage the ripple effects" (Ivanov, 2022). Following this is a review of the literature on supply chain risk and response.

## Supply Risk and Resilience

Shishodia et al. (2021) shows that risks to the supply chain management are inevitable, thus risk management responses have become extremely crucial. These risks associated with supply chains can involve both “internal and external uncertainties” as indicated in (Brandon-Jones et al.,2014; Durach et al.,2015; Tang & Musa, 2011, as cited in Sarkar et al.,2022). Gianesello, Ivanov and Battini (2017) posits that “risk management and resilience in SCs become more and more important in research and practice”.

Supply chain risk management (SCRM) has become increasingly popular in recent years, both from the standpoint of practitioners and as a study area (Colicchia and Strozzi, 2012), especially in light of COVID-19. According to Meyer et al. (2021) and a significant body of literature, global SC risk management (SCRM) frequently takes into account "the identification, assessment, controlling, and monitoring of SC risks" (Wieland & Wallenburg, 2012, p.2, as cited in Meyer et al.,2021), as well as "implementation of appropriate strategies with the aim of reducing one or more of the risk dimensions" (Manuj & Mentzer, 2008, p.14, as cited in Meyer et al.,2021).

Simbizi, Benabbou, and Urli (2021) demonstrate how significant and pervasive the COVID-19 pandemic's effects were in the recent past, especially the disruptions to

supply chain networks around the world. In order to analyze the pre- and post-COVID-19 research agendas, literature in the fields of supply chain risk (SCR), supply chain risk management (SCRM), and supply chain resilience (SCRes) was examined (Free & Hecimovic, 2020; Queiroz et al.,2020; Van Hoek, 2020).

Despite the fact that hazards and disasters happen more frequently, the COVID-19 pandemic has forced supply chain networks to reevaluate their resilience. This has put decades of supply chain resilience study, discussion, and planning to the test (McKinnon, Kueppers, Basso & Colombo in 2022; Farooq, Hussain, Masood & Habib in 2021). The authors also believe that practitioners and academics have turned their attention to survivability, which is currently the most pressing issue, as a result of the disruptions that disasters have caused to business operations and global supply chains (SC) (Farooq et al., 2021). To this end, (Chopra & Sodhi, 2014) argued that it was crucial for business executives to "carefully stress test their supply chains to understand where there are risks of disruption" (Chopra & Sodhi, 2014). By doing so, companies will be better equipped to manage the risks of disruption in their supply chains.

This research presented the authors' synthesized definitions after thoroughly reviewing recent literature on resilient supply chain networks (SCRes) from the past "10+" years. To assess the body of literature, a systematic literature review (SLR) approach was used. The associated fundamental components and characteristics of writers are included in the synthesized definitions, as a result. Therefore, the purpose of this section is to obtain insight into how, from the viewpoint of the scientific community, the definitions of "risk" and "resilience" in supply chains have changed over time.

In order to adopt SCRes strategies and evaluate and comprehend supply chain risk, the paper conducted a literature review. As a result, Table 2 provides an example of current and historical literature with regard to various dimensions and factors, with some definitions following afterwards. This demonstrates how SCRes strategies are being used across numerous sectors and supply networks. A sample due to Suryawanshi and Dutta's (2022) discovery that SCRes has grown in importance over the past ten years and emerged as a subfield in the literature on SCRM, with their research locating over 3672 articles as an example.

Table 2. Recent literature review on SCRes' various dimensions/ factors.

**Table 2: Recent literature review on supply chain risk and resilience's various dimensions and factors**

| Author and year | Research objective | Findings |
|---|---|---|
| Ambulkar, Blackhurst & Grawe (2015) | Figuring out what makes a company resilient in the face of supply chain delays. | Demonstrated that there are significant mediating and synergistic relationships that need to be taken into consideration and that supply chain disruption orientation is not the |

| Author and year | Research objective | Findings |
|---|---|---|
| | | only factor that determines firm resilience to supply chain disruptions. developed, implemented, and validated a firm resilience measurement scale; shown that a supply chain disruption orientation had no direct impact on firm resilience in high-impact disruptions; and emphasized the significance of putting in place a risk management infrastructure for managing low impact supply chain disruptions. |
| Szuster & Lotko (2022) | An examination of the shortcomings of the methods currently being used for risk management during the COVID-19 epidemic. In light of earlier (pre-pandemic) theoretical thoughts, an evaluation of the practices used in businesses is provided. | Risk management issues have been ignored for years, despite numerous literature papers to the contrary. The majority of supply networks were not ready for disruptions like COVID-19, according to data. To reduce the danger of supply chain disruption in pandemic conditions, other policies may need to be taken into account. |
| Pettit, Croxton, & Fiksel. (2019) | Considers the implications of our 2010 paper and looks ahead to potential opportunities for resilience advancements that will enhance both ongoing company continuity and long-term sustainability. | Argued that rather than replacing risk management, supply chain resilience is a complement to it. It is anticipated that resilience analytics, like the SCRAM™ methodology, will complement the widely used way of quantifying risks based on the likelihood that an event will occur and the gravity of its effects. It allows managers to assess vulnerabilities and compare them to the capabilities of their supply chain. |
| Pettit et al.,(2013) | The creation of the Supply Chain Resilience Assessment and Management (SCRAM™) measurement instrument. 7 global manufacturing and service companies' data was gathered, and it was used to verify SCRAM™ using qualitative methods with 1369 empirical items from focus groups looking at 14 recent disruptions. | The SCRAM™ tool initially demonstrated promise for assessing the resilience of businesses. There has been excellent feedback regarding the depth of the Supply Chain Resilience Framework and the capability of the SCRAM™ tool to precisely measure the sources of change confronting firms as well as firm's strengths and weaknesses. The greatest risks to businesses are connectivity and external pressures. Change management is crucial. It can be very expensive to not be ready for change and to not design and manage a supply chain that can respond and adjust quickly. |
| Sarkar et al.,(2022) | Critical requirements exist in all business sectors. In order to restructure their business and create a dependable, economical, and sustainable supply network, they must overcome numerous obstacles. aiming to explore the supply chain-related research and practice gaps. | Combining supply chain viability and resilience measures will increase the supply chain's capacity to survive. To the best of the authors' knowledge, this is the first research that establishes a theory to explain how five crucial supply chain concepts—flexibility, robustness, resilience, viability, and sustainability—interact to manage supply chain risk. Their paradigm assists practitioners in putting into practice the crucial tactics at the operational, tactical, and strategic levels that improve supply chain maturity. |

| Author and year | Research objective | Findings |
|---|---|---|
| Ali & Golgeci (2019) | The paper sought to synthesize new research domains to progress theory while algorithmically and impartially examining the prior supply chain literature. | The literature on SCR has grown exponentially over the past ten years in a variety of fields and areas of study, including drivers, barriers, theories, moderators, mediators, and research techniques related to SCR. Additionally, it was discovered and considered that there is still a sizable empirical study gap on numerous topics pertaining to SCR phenomena. |
| Blessley & Mudambi (2022) | Supply and demand shocks from the COVID-19 pandemic felt in many business-to-business and business-to-consumer supply chains are examined in relation to how the U.S. trade war impacted supply chain resilience. | Having the ability to anticipate things like how fast products delivered through the supply chain might change. Capabilities for adapting and responding by collaborating and communicating more effectively with direct suppliers about possible supply issues further upstream. Recovery and learning capabilities, such as the ability to leverage and strengthen social connections with upstream and downstream supply chain partners in order to recover from simultaneous inbound and outbound supply chain disruptions. |
| Chen, Das and Ivanov (2019) | Examining corporate post-disruption processes, looking into unknown variables, and incorporating them using corporate experiences in a larger post-disruption management framework. | A comprehensive list of elements and guidelines to help businesses and decision-makers create their post-disruption process. Investing in IT tools and data analytics, for instance, training employees and conducting practice runs, collaborating closely with clients, suppliers, and backup suppliers, streamlining verification processes, and running pilot experiments with substitute materials and designs are just a few examples. |
| Katsaliaki et al. (2022) | Examining the literature on supply chain disruptions that has appeared in significant journals over the past 20 years, with a focus on the most recent advancements in the field, with the goal of combining knowledge on supply chain disruptions that is crucial and timely as the frequency and impact of disruptions increase. | Regardless of what caused the disruption, it is impossible to fully prevent disruption, so attention should also be brought to the recovery procedures. To alter SC plans, inventory policies, and schedules in order to achieve the desired performance, which is a requirement for stability and robustness, human-driven adaptation followed by computer-driven adaptation is required. |
| Gunasekaran, Subramanian & Rahman (2015) | Introduction to the relationship between complexity and proactive management practices in supply chain resilience, specifically due to global sourcing (GS) strategies: (i) to explain the various aspects of GS rather than reporting the trends and implications described in the literature; (ii) to view GS in terms of complexity theory; and (iii) to investigate the resilience of supply chain due to GS complexity and suggest strategies to overcome complexity. | Presented and suggested the GS resilience paradigm, which links complexity and tactics to a range of outcomes. |

This part focused on the most recent advancements in the field as it investigated the literature published in significant journals on supply chain risks of disruption and

resilience, which has grown exponentially in the last "10+" years. Important studies have been found and analyzed based on a review process. The studies' content analysis compiled material on the different disruption types, their effects on supply chains, resilience techniques for supply chain design, and recovery strategies suggested by the studies and supported by various theories as discussed in chapter 2.

## Supply Chain Resilience (SCRes).

According to a 2018 study by Ribeiro and Barbosa-Povoa, "SCM became a main organizational concern targeting a continuous process of increasing SC efficiency where more complex SC structures need to be optimized for maximum profit under normal circumstances" (Ribeiro & Barbosa-Povoa, 2018). A number of " companies have outsourced and extended many productions and SC activities resulting in a great dependency on global suppliers and complexity, which makes them especially vulnerable to SC disruptions," according to (Bozarth & Handfield, 2016, p.226 as cited in Meyer et al.,2021,p.2)

Ivanov (2022) demonstrates that the "resilience, and sustainability of SCs" were seriously tested in the year 2020. According to Shishodia et al. (2021) research on SCRes has "developed its roots and later developed into a branch of SC management with indispensable effects" since the idea of resilience was introduced in early 2000 through the work of other eminent academics (Christopher & Peck, 2004; Hamel & Valikangas 2003; Rice & Caniato , 2003; Sheffi & Rice, 2005, as cited in Shishodia et al.,2021).

According to Alfarsi, Lemke, and Yang (2019), Supply chain resilience (SCRes) promises to be a risk mitigation strategy since the last ten years, and it has now become an important research subject that has attracted much attention in literature (Alfarsi et al.,2019). There are a number of reasons for the increased interest in SCRes in academia and practice, but the main one is that supply chains for businesses are becoming more vulnerable to risks, especially as their SC networks have grown longer (more tiers, see Figure 1), larger (more depth), and more complex (multisource both domestically and internationally) (Alfarsi et al.,2019).

These vulnerabilities have been exposed over time in a variety of situations, such as the well-documented disruptions brought on by natural catastrophes (earthquakes, hurricane, floods, fire, etc.) (Szuster & Lotko, 2022; Sheffi & Rice, 2005). In more recent times, "the COVID-19 outbreak has emphatically highlighted the vulnerabilities of global supply chains and led to widespread questioning of their future" (Free & Hecimovic, 2020, p.59). The potential of "man-made triggers" (terrorist attacks, accidents involving ships, trucks, trains, or airplanes, supplier or other business partner bankruptcy, etc.) is also mentioned by Szuster and Lotko (2022), as well as geopolitical issues like the recent conflict between Russia and Ukraine (Chand & Stilwell, 2022).

The 2011 earthquake and tsunami in Japan are two more instances where the effects "were felt in a multitude of companies around the world as a result of disruption to supply arrangements," according to the study (Christopher, 2018). For example,

COVID-19 caused shortages in the supply of semiconductors, a product used in many sectors of the global economy, including the automotive industry, which still laments the era to this day (Frieske & Stieler, 2022). Resilience is related to supply chain risk and vulnerability in the literature on supply chains, according to (Alfarsi et al., 2019), with the idea that not all supply chain risks can be recognized or prevented of course (Alfarsi et al.,2019).

There are many definitions of SCRes in academia, but two that are frequently cited are those by Christopher and Peck (2004) and Ponomarov and Holcomb (2009). According to Christopher and Peck (2004), SCRes is "the ability of a system to return to its original state or move to a new, more desirable state after being disturbed" (Christopher & Peck, 2004, p. 4). It involves "the adaptive capability of the supply chain to prepare for unexpected events, respond to disruptions, and recover from them by keeping continuity of operations at the desired degree of connectedness and control over structure and function," according to one from (Ponomarov & Holcomb, 2009, p.131), upon which many subsequent definitions followed, for example, a follow through by (Fiksel et al., 2015, as cited in Gunasekaran et al.,2015) thus resilience is “the capacity for an enterprise or set of business entities to survive, adapt, and grow in the face of turbulent change” (Fiksel et al.2015, as cited in Gunasekaran et al.,2015).
Since the idea of supply chain risk management (SCRM) was first introduced, there has been much misunderstanding regarding what it entails and the most effective ways for businesses to manage such risks.

Although there hasn't been a widely accepted meaning of the term for the past 20 years or so, suffice it to say that the common denominators of supply chain risk management (SCRM) are "identification of risk + tools to manage risks" (Shahbaz, Rasi, Bin Ahmad & Rehman, 2017). In a nutshell, supply chain risk management (SCRM) can be defined as "the process of creating and taking strategic steps and working towards identifying, assessing, and mitigating the risks in the business' end-to-end supply chain" out of the many meanings.

The following stages of "risk identification/analysis, risk assessment, risk treatment and management, risk monitoring, incident handling, and contingency planning" should be included as common elements of such a strategic procedure (Norrman, & Wieland, 2020). Although supply networks that span the globe can be provided with great efficiency, they also contain hidden vulnerabilities and risks, according to Lund et al. (2020), who cited a number of recent events that have demonstrated this. For instance, Baldwin and Evenett (2020) argue that "instead of trying to reopen trade as in 2009, a more nationalist group of leaders are arguing that supply chains are too vulnerable to disruption and not sufficiently resilient" following the swine flu H1N1 epidemic of 2009, which led to what is referred to as the "Great Trade Collapse" of 2009.

According to Ribeiro and Barbosa-Povoa (2018), " disturbances need to be handled in the right way, compelling the use of tools that can support resilient supply chain decisions" (Ribeiro & Barbosa-Povoa, 2018). They also highlight that " resilience is currently an increasing concern in supply chain (SC), caused by their globalization, which is subject to diverse types of disturbances " (Ribeiro & Barbosa-Povoa, 2018). When disruption is likely to have a significant effect, vulnerability is at its highest

(Sheffi & Rice, 2005). As outlined by the factors in Table 3 below, supply chain vulnerability is described as " an exposure to serious disturbance, arising from risks within the supply chain as well as risks external to the supply chain" (Christopher & Peck, 2004).

Table 3. Supply Chain Vulnerability Factors.

**Table 3: Vulnerability Factors (Pettit et al., 2013)**

| Vulnerability Factor | Definition | Subfactors |
|---|---|---|
| Turbulence | Environment characterized by frequent changes in external factors beyond your control | Natural disasters, Geopolitical disruptions, Unpredictability of demand, Fluctuations in currencies and prices, Technology failures, Pandemic |
| Deliberate Threats | Intentional attacks aimed at disrupting operations or causing human or financial harm | Theft, Terrorism/sabotage, Labor disputes, Espionage, Special interest groups, Product liability |
| External Pressures | Influences, not specifically targeting the firm, that create business constraints or barriers | Competitive innovation, Social/Cultural change, Political/Regulatory change, Price pressures, Corporate responsibility, Environmental change |
| Resource Limits | Constraints on output based on availability of the factors of production | Supplier, Production and Distribution capacity, Raw material and Utilities availability, Human resources |
| Sensitivity | Importance of carefully controlled conditions for product and process integrity | Complexity, Product purity, Restricted materials, Fragility, Reliability of equipment, Safety hazards, Visibility to stakeholders, Symbolic profile of brand, Concentration of capacity |
| Connectivity | Degree of interdependence and reliance on outside entities | Scale of network, Reliance upon information, Degree of outsourcing, Import and Export channels, Reliance upon specialty sources |
| Supplier/Customer Disruptions | Susceptibility of suppliers and customers to external forces or disruptions | Supplier reliability, Customer disruptions |

Source: Pettit et al., (2013)

Risk is further described as the likelihood that an incident connected with inbound supply from individual supplier failure or the supply market will occur, with its outcomes causing the purchasing firm to be unable to satisfy customer demand or posing threats to the life and safety of customers (Zsidisin & Ritchie, 2009).

Additionally, it can be "thought of as the probability that an undesirable event will occur during a certain period in a supply chain and the associated consequences of this event that affect the performance of the supply chain" (Son, 2018).

Risk has always been present in business and network design, according to Zsidisin and Henke (2019), "well before the words supply chain and supply chain management became part of our lexicon" (Zsidisin & Henke, 2019). Risk management is a hotly contested subject in the field of supply chain management and has a lengthy history among academics and practitioners. Several industry trends currently in force give the subject its significance, including market globalization, rising outsourcing, shorter product lifecycles, unpredictable demand, uncertain supply, and pressure for lean production (Felea & Albastroiu, 2013).

Early in the 2000s, following the World Trade Center terrorist attacks in September 2001, the SARS epidemic in South-East Asia in 2003, and the natural catastrophe of Hurricane Katrina in 2005, the management of risk in supply chains became a well-established practice and study area (Wagner & Bode, 2006). The global supply chain has been severely disrupted as a result of "the 2011 Japanese earthquake and tsunami" (Christoper, 2011) and more recently, COVID-19. According to Panwar, Pinkse, and De Marchi (2022), "the global research community and the media have been consumed by conjecturing what life will look like in what has been dubbed a post-COVID world" (Panwar et al.,2022), which “are characterized by a very strong and immediate impact on the SC network design structure since some factories, suppliers and DCs, and transportation links become temporarily unavailable” (Ivanov, 2020).

The study by Pettit et al. (2013) demonstrates that "conventional risk management approaches designed to deal with traditional incidents such as floods or management crises, are not always effective when a company is faced with unexpected disruptions". According to Ribeiro and Barbosa-Povoa (2018), "managing supply chains has more than ever become an increasing concern for companies of all sizes and across a wide range of industries" because "shocks, disruptions, and exposure to industry value chains have grown in frequency and severity in the recent memory" (Ribeiro & Barbosa-Povoa, 2018). Ribeiro and Barbosa-Povoa (2018) go on to say that it's critical to increase "awareness and knowledge regarding SC Risk Management and SC Resilience," in particular because "disruptions, even with low likelihood of happening, can, if occurring, cause significant impacts on businesses" (Ribeiro & Barbosa-Povoa, 2018).

However, as demonstrated by Cardoso, Barbosa-Póvoa, Relvas and Novais (2015), designing and planning resilient supply chains has proven to be a significant task because of the growing complexity of these systems, which function in a global market and are thus susceptible to disruptions. Although there are many meanings of supply chain resilience, according to a quick Google search, "about 109 000 000 results were returned in just 0.43 seconds," the majority of them tend to include at most "the ability to adjust, react, or respond to risks and withstand a disruption."

Christopher and Peck (2004, p. 4) gave the first structured description of the SCRes as the ability “of a system to return to its original state or move to a new more desirable

state after being disturbed." In order to develop future definitions and future SCRes research, this study shows recent trends in SCRes reviews and provides an updated state of knowledge about the SCRes elements outlined in academics and practice for the past "decade+."

## Systematic Literature Review (SLR) analysis methodology.

According to Transfield et al. 2003, as cited in Kraus, Breier, and Dasí-Rodríguez (2020), an SLR is a type of study that deals with already-published materials and employs a systematic methodology for syncing data from previously-published sources. A more or less systematic method of gathering and synthesizing earlier research can be generally characterized as a literature review (Baumeister & Leary, 1997; Tranfield, Denyer, & Smart, 2003, as cited in Snyder, 2019).

In this research, the literature was analyzed and categorized using both content analysis and a systematic review of the literature. The definition of a rigorous systematic review of the literature is "a research method and process for identifying and critically evaluating pertinent research, as well as for gathering and analyzing data from said research" (Liberati et al.,2009, as cited Snyder, 2019). Systematic literature searches enable transparency of the data collection and analysis procedures so that the research can be readily replicated by others (Gligor, Bozkurt, Russo, & Omar, 2019).

This section is based on a systematic literature review by searching "Google Scholar", and a multitude of reputable “Databases” such as Science Direct, Emerald etc, accessed mainly through "Wits Library Online at https://libguides.wits.ac.za/c.php?g=226934", by searching terms such as "Supply Chain", “Supply Chain Management”, “Supply Chain Resilience”, “Supply Chain Risk”, “Supply Chain Disruptions” and "COVID-19" related terms linked to Supply Chain Disruptions in general to provide the reader with comprehensive and useful information on the areas of application and influence on the SC. Also, EBSCOHost, accessed through Wits Library Online as it allows multiple combinations of words, example Figure 2. This type of search leads to articles available in various other databases.

## Figure 2. Example EBSCOHost Word-Combo Search.

**Figure 2: Example EBSCOHost Word-Combo Search**



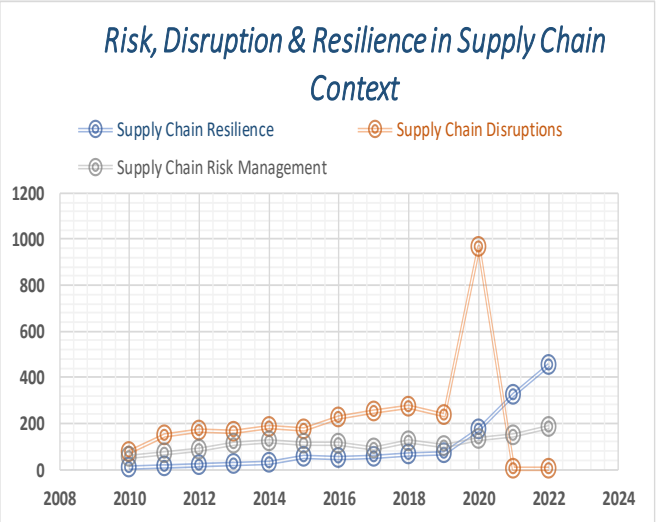

Source: Wits Library/ Wits LibGuides (2023)

The databases that were searched for SCRes using EBSCOHost confirm that there has been a steady rise in SCRes subjects published since the start of the twenty-first century, and that trend has only accelerated with the introduction of COVID-19. Figure 3 shows a "2010–2022" snapshot of this expanding trend and reveals that it began to gain popularity in the year 2016; by 2020, records were skyrocketing. Due to the abundance of search results, the boundaries to limit the study's time span to the years 2010 to 2022 were deemed appropriate and practical. By limiting the number of studies returned by a literature search, this practice aids researchers in focusing “literature searching to specific study designs or by other markers, such as by date" (Cooper & Booth, 2018).

Figure 3. Risk, Disruption & Resilience in SC Publications.

**Figure 3: Risk, Disruption & Resilience in SC Publications**

| EBSCOHost Publication Period | Supply Chain Resilience | Supply Chain Disruptions | Supply Chain Risk Management |
|---|---|---|---|
| **2010** | 7 | 73 | 53 |
| **2011** | 12 | 148 | 72 |
| **2012** | 18 | 171 | 87 |
| **2013** | 24 | 162 | 111 |
| **2014** | 29 | 183 | 121 |
| **2015** | 54 | 172 | 113 |
| **2016** | 49 | 226 | 114 |
| **2017** | 57 | 253 | 90 |
| **2018** | 64 | 271 | 121 |
| **2019** | 72 | 235 | 99 |
| **2020** | 172 | 968 | 131 |
| **2021** | 326 | 1,815 | 150 |
| **2022** | 452 | 3,636 | 184 |



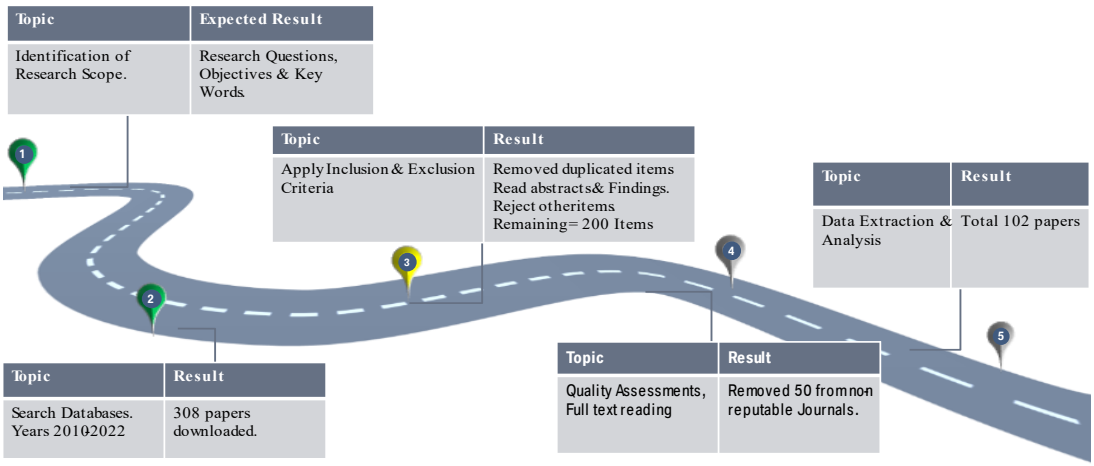

Source: Author constructed.

For instance, a search on EBSCOHost for "COVID-19 related SC disruptions" from 2020–2022 returns approximately 16 669 816 documents. Regardless of how many study findings there are, it's critical that they clearly synthesize existing definitions and contribute to the development of new knowledge. Figure 3 also supports the literature review on the subject of SCRes from (Ribeiro & Barbosa-Povoa, 2018; Rahman, Paul, Shukla, Agarwal, & Taghikhah, 2022), which noted a steady stream of SCRes articles from 2012 until 2020, the year COVID-19-induced disruptions began. This is in line with the analysis by (Suryawanshi & Dutta, 2022). Prior to the startling 2020 figure, a high number for "supply chain disruption" in 2016 that more than twice the 2010 figure is shown (just 6 years before).

This rise is related to the closure of factories making car electronic components as a result of the earthquake and tsunami that struck Japan. This review was conducted using the streamlined steps listed in Mengist, Soromessa, and Legese (2020) as follows: "search" (define searching string and types of databases), "appraisal" (pre-defined literature inclusion and exclusion, and quality assessment criteria), "synthesis" (extract and categorize the data), and "analysis" (narrate the result and finally reach into conclusion) (SALSA). The outcome is shown in Figure 4 below.

Figure 4. Systematic Literature Review mapping.

**Figure 4: Systematic Literature Review mapping**




Source: By Author with adaptations from (Carrera-Rivera, Larrinaga & Lasa, 2022).

**Search: steps 1-2.**
According to the research's goals and inquiries, words like "supply chain", "resilience", "resilience", "risk", "disruption", "COVID-19", "COVID-19 disruptions," and "systematic literature review" were used to search for articles with titles, keywords, or journal summaries containing any of the following terms: supply chain, resilience, risk, disruption, supply chain literature review, and systematic literature review.

The Wits Library Online was used to gain access to reliable databases like EBSCOHost, which connects to others like Emerald, Taylor & Francis Journals, SAGE Journals Online, ScienceDirect, and others. These databases gave access to a wide-ranging, comprehensive collection of academic publications that were chosen, compiled, and evaluated using Boolean search operators (AND/OR). The search was done at different time intervals, begin in mid-2022 in preparation for research proposal. It should also be noted however, that Google Scholar was also used, mainly due to the fact that COVID-19 saw a heavy escalation of various urgent research topics, including supply chain related, such as ‘disruptions, risks, mitigations, resilience etc.’ which were urgently needed, making Open Access (OA) even more urgent, precisely because this period was seen as an opportunity to bring brains together for the betterment of societies across the globe, thus research outcomes needed to be made FAIR (Findable, Accessible, Interoperable and Reusable) as highlighted in (Arrizabalaga, Otaegui, Vergara, Arrizabalaga & Méndez, 2020).
**Appraisal: steps 3 -4**, removed and rejected the unwanted articles that would otherwise not have added any value.
**Analysis: step 5**. Extracted and used data from acceptable articles.

## Localisation / Nearshoring

Supply chain risk and resilience definitions and applications, particularly in older literature, hardly considered the concept of localization or nearshoring as possible strategies to mitigate against supply disturbances. Localization of components/materials supply is widely regarded as a cost-saving method and a strategy that increases supply chain flexibility in businesses. It is "a process by which the company develops its strategic plans and decides on its competitive strategy" (Fernández-Miguel, Riccardi, Veglio, García-Muiña, del Hoyo & Settembre-Blundo, 2022).

Supply chain localization refers to sourcing, manufacturing, and distributing goods locally, such as Just-In-Time (JIT) components supply to a car making assembly line in the automotive industry. In short, localization in relation to manufacturing, is a strategy based on buying raw materials and components closest to where they're needed for production purposes. "Localization of activities such as purchasing, manufacturing, and R&D are of great importance for companies to be able to remain competitive and prosper," state (Andersson & Segerdahl, 2012).

Additionally, it is stated that the debate on reshoring has intensified over the past few years, especially in view of developments in the international business and management literature. According to Kinkel and Maloca (2009), Gray et al. (2013), Arlbjrn and Mikkelsen (2014), and Fratocchi et al. (2014), as cited in Raza, Grumiller, Grohs, Essletzbichler & Pintar 2021): "In general, reshoring refers to the processes of bringing industries and value-creating activities 'home' to a specific location". This demonstrates that, among other reasons, because of the growing concept of responsible sourcing and environmental concerns, there was already an awareness of this trend, even before the COVID19 pandemic. Localization, however, gives the supply chain more resilience in the event that globalization falters as a result of disturbances (Hawkins, 2022).

Del Vecchio (n.d) highlights localisation of supply chains as one of the strategies to ensure businesses have everything needed for continuity, and to operate smoothly, and at full capacity. The concept of localisation can refer to different kinds of government policies, essentially seeking to divert demand away from imported goods, and place reliance on local made substitutes (Altbeker & Bernstein, 2021). According to Chopra and Sodhi (2014), firms use locations closest to their operations in efforts to mitigate against supply chain risks of disruption, which results in near-impossible to deliver any services or products to end customers, referred to as localization or nearshoring, as could be seen with COVID-19. Incorporating localization strategies into the value chain also aims to satisfy other business needs like energy resilience and climate change strategies while adding value for consumers (Burke, Mahto, Bowman & Cotteleer, 2021).
This is precisely because when a firm sources locally (localisation) or nearer (nearshoring), they often work with companies in the same time zone, which makes communication easier and faster, thus supply faster (Masters & Edgecliffe-Johnson, 2021). Once more, this aids the business in remaining aware of regional patterns that pose a threat to supply and in being adequately ready for unforeseeable events. Reviewing current literature on the prevalence and factors typically taken into account

when discussing localization or nearshoring of components and materials is the goal of this subsection.

## Literature Review – component/material sourcing.

In order to conduct the literature search, it was first necessary to study the topic of interest in order to gain the required foundational knowledge. This included utilizing different article databases for supply chain and operations management, which were also available through EBSCOHost on the Wits Library Online.
Utilizing multiple databases may be time-consuming and labor-intensive, but it's crucial because one database is unlikely to have all the information or perspectives required for the subject at hand (Bramer, Rethlefsen, Kleijnen & Franco, 2017).

## Prevalence of component/material supply localisation.

This section's goal is to review academic papers on the localization of the supply of materials and components and the variables that influence it. In an effort to reduce the risks of supply chain disruptions, potential future research in the connected field of localization will also be highlighted. As mentioned in Andersson and Segerdahl (2012), some studies have been done in the past on supply chain localization strategies, such as an examination of "the potential trade-offs between greater localization and supply chain costs" (Nicholson et al.,2011, as cited in Matopoulos, Barros & van der Vorst, 2015).

The world has actually been moving toward globalization, internationalization of supply chains, and a rise in competition over the past few decades (Bayo-Moriones, Bello-Pintado & Merino-Díaz-de-Cerio, 2011). This would entail a multinational enterprise (MNE) manufacturer having its headquarters in one location (Apple Inc. in the United States, for example) but having its products assembled elsewhere (in China, for example), with the goal of lowering the overall cost of production through the use of lower-cost labor, the purchase of less expensive raw materials, the reduction of production, and, ultimately, the timing of the supply of the final product (Panwar et al.,2022).

Del Vecchio (n.d) further posits that by localizing the supply chain, firms “don’t have to send and receive products all over the world and store them in warehouses until they’re ready to go to another supplier or the final customer”. IMD (2020) also indicates that “global trade has led to supply chains becoming more localized”, this is precisely because “trying to produce and ship locally will ensure less disruption in case of limited movement of people and goods” (IMD, 2020) . In addition, firms have invested heavily in this form or geographically distributed supply chain networks, in efforts to differentiate themselves and for the sake of competitiveness, with the highest quality products at the center (Panwar et al.,2022).
However, literature shows that, disasters in the past have prompted companies to bring production components closest to their production facilities in their location, (example of Toyota’s “business continuity plan (BCP) that required suppliers to stockpile

anywhere from two to six months' worth of chips (semiconductors)" (Shirouzu, 2021), this practice also ensured the company was "largely unscathed by a global shortage of semiconductors following a surge in demand for electrical goods under coronavirus lockdowns" (Shirouzu, 2021). Localization of component and material supply is a strategic activity within Supply Chain Management (SCM), with the intend of having suppliers closest to main producer of the end-product.

Localization, then, has a strategic position within the SCM framework. According to Andersson and Segerdahl (2012), a localization strategy is "solely dependent on internal and external factors" and is "part of a supply chain strategy, which in turn is a subset of the corporate strategy of a firm" (Andersson & Segerdahl, 2012). Some academics have referred to nearshoring as "reshoring," which refers to returning manufacturing operations to the firm's main location, which would be the nation where its parent company is located, in a very reactive manner and frequently in response to some supply disruption (Ellram, 2013).
Moving to a location in the firm's region or at least nearby to its manufacturing operations is said to be another variation of nearshoring. However, this relocation need not necessarily take place in the host nation of the firm (Foerstl, Kirchoff & Bals, 2016).

The key case from Foerstl et al. (2016) is as follows;
*"… the firm Katjes Fassin, who reported quality, lead time and capacity problems as drivers for their recent reshoring initiative, which in fact encompassed both the reintegration of formerly outsourced production (insourcing) and the reallocation of order volumes to geographically closer suppliers (reshoring)*" (Klein, 2013, as cited in Foerstl et al.,2016).

Another concept which is a small variation to localisation is nearshoring, which has "been considered as a good way to improve the functioning of supply chains" (Ahonen, 2022). A typical nearshoring is simply 'RSA OEM sourcing out of Botswana, replacing sourcing out of China'. Ahonen (2022) further contests that nearshoring is good sourcing option and reduce risk and because the supply chain distance between producer and material sourcing location is shorter then "the less prone it is to disruption" (Ahonen, 2022).

Localization, which has emerged in the midst of the globalization trend, is viewed by many businesses as a chance to reduce costs by increasing the share of local offerings. Additionally, increasing the proportion of locally sourced materials makes the supply chain more adaptable and resilient to shocks and uncertainties brought on by natural disasters like hurricanes and tsunamis, economic issues like the US-China trade war, geopolitical issues like the conflict between Russia and Ukraine, and pandemics like the COVID-19 pandemic.
Localization has also been cited to have other possible benefits, such as empowering local small-to-medium size (SMEs) businesses, employment and upskilling and empowering of local talents (Mashilo & Moothilal, 2022). In South Africa for example, "localisation policies came into fruition in 2002 when the government enacted the Preferential Procurement Policy Framework Act (PPPFA) to advance enterprises owned by historically disadvantaged people" (Intellidex, 2021).

This is in addition to enabling foreign businesses to invest in the host nations, design products in line with regional requirements, and increase exports. On the other hand, using local suppliers results in low-cost materials because international freight and logistics-related costs are reduced, although there are undoubtedly some concerns about the end product's performance and quality, for example, ‘would a 100% South African BMW or Mercedes Benz still be considered a German Machine?’ if it had a 100% locally engineered engine? The love for German cars?

This raises concerns about quality issues and the value of being close to certain markets or end consumers (Sullivan, 2018, Raza et al., 2021). Wouldn't this undermine the notion of the good old "German Engineering"? The degree of localization "may differ depending on the nature of the parts and components involved," according to Kuroiwa, Techakanont, and Keola (2021). Kano, Narula and Surdu (2022) indicate that the COVID-19 pandemic and other macro-level trends such as geopolitical tensions and renewed protectionism have created significant supply and demand disruptions, thus elevated the need to de-globalize, with supply chains now more likely to be localized, not just for competitiveness, but also for continuity of business operations (Kano et al.,2022).

According to Pollio and Rubini (2021), the idea of localization in Thailand, for instance, dates back to "the end of the 1960s," when there was "an attempt to promote the localization in the country of further production phases" (Pollio & Rubini, 2021). Of course, this effort was hampered by "the constant political turmoil," which was made worse by the nation's "selective policies, conflicting economic and social forces, which arose as a result (Pollio & Rubini, 2021).

As was the case with SCRes, literature review on localization commenced with searching of strings, with key words such as “component/material supply localization”, "nearshoring", "localization of automotive components/materials", "supplier localization", and “localization literature review”, this was also done through accessing reputable databases through Wits Library Online services. Wu and Jia (2018) shows that as an example, “studies on localization have largely dealt with market entry decisions; they consider firms and country-level institutional characteristics” (Berry et al., 2010; Cantwell, 2009; Rugman and Verbeke, 2004, as cited in Wu & Jia, 2018).

Research literature, according to Thekkoote (2022), "lacks an understanding of localization, agility, and digitalization (LAD) factors that add to supply chain resilience and, thus, can successfully cope with change" (Thekkoote, 2022). Economic considerations alone, according to Andersson and Segerdahl (2012), "cannot explain localization strategies, but other factors such as product complexity influence the decision" (Andersson & Segerdahl, 2012).
The supply networks "are, on average, robust to localized disruptions, in which the disruption does not spread too far beyond the country in which it originated,... the main components of those networks remain largely intact when the geographic shutdown is limited," according to Sytch, Kim and Page (2022)'s framework for "supply chain network robustness to localized and global disruptions diffusing through adjacent land borders" (Sytch et al., 2022). When faced with localized disruptions, the network's primary component typically maintains 97.7% to 99.7% of the participating companies

(Sytch et al.,2022). Additionally, as can be seen in the next subsection, the literature that is currently available suggests that the numerous macro and micro factors influencing such a strategy are the focus of many localization studies.

## Sample factors affection adoption of localisation/neashoring.

Samson (2020) shows that “decisions within supply chain design such as transport mode, facility size and location,… are impacted by macroeconomic forces and political changes”. One of the important issues MNE’s consider regarding the choice of suitable location, is the several internal and external factors that affect localization of components/material supply. In order to select an optimum location, the enterprise must carefully study the impact of the following non-exhaustive list of factors as highlighted in literature:

**Macro-factors:**

**Government Policy.**

At macro level, there’s in the first instance the “influence of government policy and policy space” as indicated in (Kuroiwa et al., 2021). Bam, De Bruyne and Laing (2021) shows that “industrial policy has historically played a significant role in shaping international business patterns” (Bam et al.,2021). According to AIEC (2022) “localisation promotes growth, industrialisation and employment and has been highlighted by government as a key policy aim during the recovery of the economy from the COVID-19 crisis”. The Automotive Export Manual (2020) also indicated that the success of the automotive sector in South Africa has been largely due to a “supportive automotive industrial policy framework that has been sustained over nearly three decades”. They further assert that the government's automotive policy regime, whereby manufacturers earn duty credits with which they can efficiently import other vehicles, is the direct cause of the increase in variety of vehicles manufacturing in South Africa (Automotive Export Manual, 2020).

Speaking of Thai automotive sector, Srikongsri (2017) said that “in the early days of the automotive parts industry (1970’s), the government attempted to develop and protect the industry, which is mainly driven by Thai manufacturers, by imposing a localization policy; requiring automotive manufacturers to use locally produced parts. The localization policy contributed to the development of Thai suppliers in terms of increasing quality whilst maintaining cost competitiveness” (Srikongsri, 2017).

**Transport and Communication Infrastructure.**

According to Kuroiwa et al. (2021) a strategic infrastructure development project, specifically the Eastern Seaboard Development Project (ESDP), inaugurated in the 1990s, has been complementary in promoting the dynamic growth and vibrant productive capacity which emerged after 2000, played a crucial role in establishing the large automobile sector that Thailand is today. (Kuroiwa et al., 2021). Additionally, they say that projects to develop the region's infrastructure, “such as seaports, industrial estates, and road networks, together with regional development aimed at the eastern region, were both significant factors pushing the industry to agglomerate within the region" (Kuroiwa et al.,2021). The Automotive Export Manual (2020), which also demonstrated that "growth in the South African economy is reliant on a successful

transport industry," echoes Kuroiwa et al. (2021). The economy will function more efficiently the better the road network is maintained, the more successful the transportation provision, and the more advanced the distribution systems are (Automotive Export Manual, 2020).

**Power and Fuel.**

The Automotive Export Manual (2020) demonstrates once more how infrastructure initiatives like the Brazilian "The Rota (Route) 2030 - Mobility and Logistics Program/Inovar-Auto-programme," which sought to provide Brazilian consumers with safer and more efficient vehicles, ensured the country's auto industry was more competitive. With South Africa battling energy crisis, and many other crises, Barnes et al. (2021) indicated that to repurpose the country's success endeavours in terms of increased localisation, would require "a concerted commitment of all the stakeholders involved in the sector" (Barnes et al.,2021).

**External Economies.**

PTI (2020) also highlights the issue of external factors such as Toyota's focus on "localisation to de-risk biz from supply chain challenges and forex fluctuations", these are some of the externalities confronting localization.

**Micro-factors:**

**Labour Supply.**

Adequate engineering skills are the order of the day in automotive sector. In developing countries such as South Africa, Bolaji-Adio, Alborno, Noronha and Green (2021) argues that "skills mismatches are frequently highlighted as a challenge by businesses in the region, and the lack of full labour force participation of certain groups, particularly women, has been detrimental for productivity" (Bolaji-Adio et al.,2021).

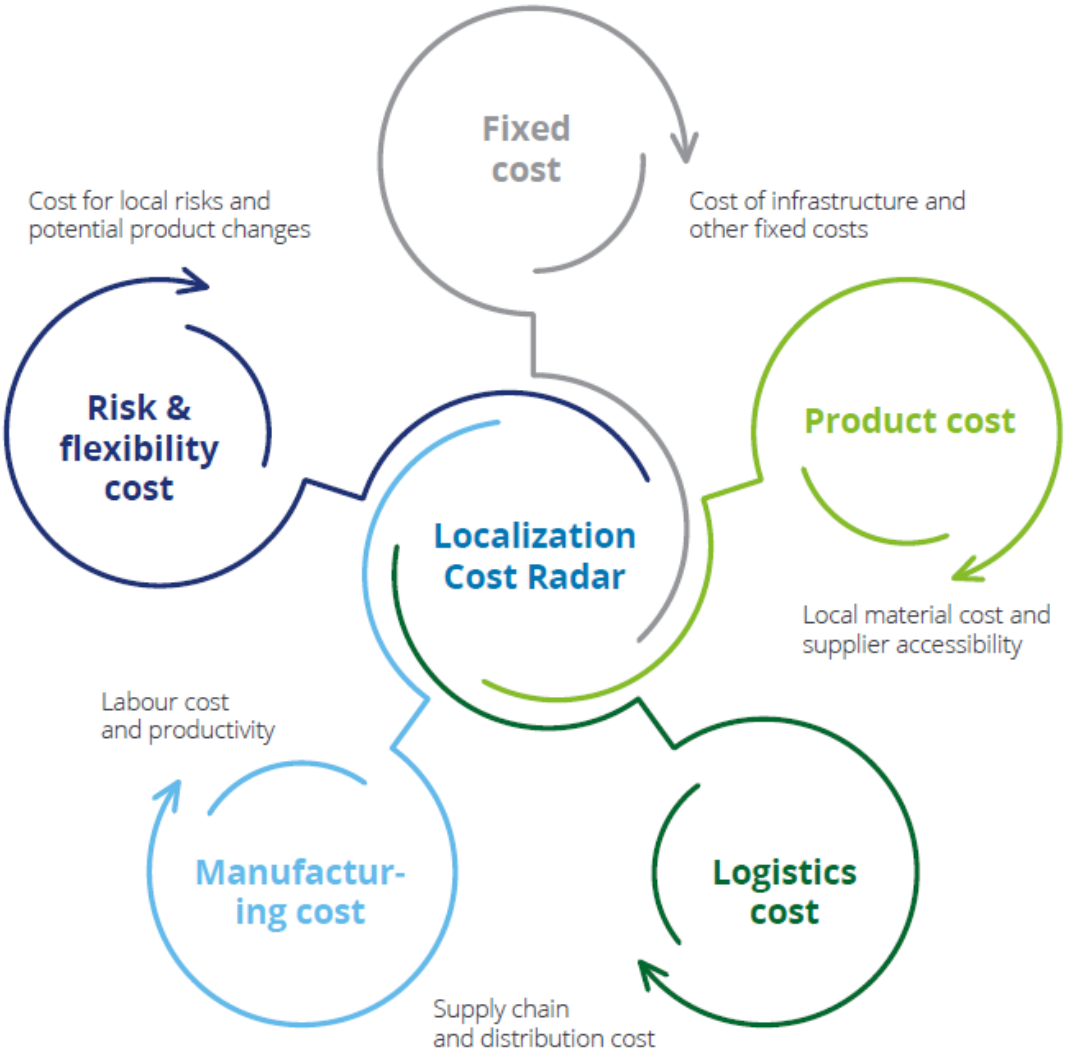
**Proximity to the Market.**

"When it comes to localization, the market plays a significant role" (Thekkoote, 2022). This is consistent with what study participants who were interviewed said, as shown in the forthcoming chapters and sections.

Synthesized by the various definitions is that localization is a possible risk mitigant, particularly in terms of time savings, and supply chain risks of disruptions. Vitale and Schiller (2017) came up with localization "Cost Radar" (Figure 5) which depicts cost considerations for localization.

Figure 5. Localisation Cost Radar.

**Figure 5: Localization Cost Radar Vitale and Schiller (2017).**




Source: Vitale and Schiller (2017).

## Chapter Summary

This chapter's primary goal was to evaluate and summarize the current state of research on risk, vulnerability, and resilience in the context of supply chain resilience on the one hand, and localization (nearshoring) on the other, as well as factors affecting them—in particular, external factors.

While localization has not been as prominent in the field of supply chain studies as firms and industries have been preoccupied with globalization efforts, SCRes has been for decades. In earlier literature, localization was only ever seen as a means to cut costs rather than anything else (Kohl et al., 2022). However, recent literature, particularly in the last 2-3 years (COVI-19 years), has shown a rapid increase in interest in the topic, examples are (*Zhu et al. (2020), Belhadi et al. (2020), Sarkis et al. (2020), Guo et al. (2020), Gurbuz and Ozkan (2020), Ishida (2020), Hobbs (2020), Siebert et al. (2020),*

*Cai and Luo (2020), Remko (2020), Sharma et al. (2020a), Xu et al. (2020), Ivanov (2020), Deshmukh and Haleem (2020), Moutray (2020), Strange (2020), Liu et al. (2020), Gereffi (2020), Fonseca and Azevedo (2020), Sarkis (2020), Sheng et al. (2020)*" who discussed the topic throughout the COVID-19 lockdowns as they suggested backup and alternative suppliers in reaction to supply disruptions, with the most common suggestion revolving around the recommendation of localization, regionalization, and reshoring (Kohl et al., 2022). Next chapter addresses research methodology for this study.

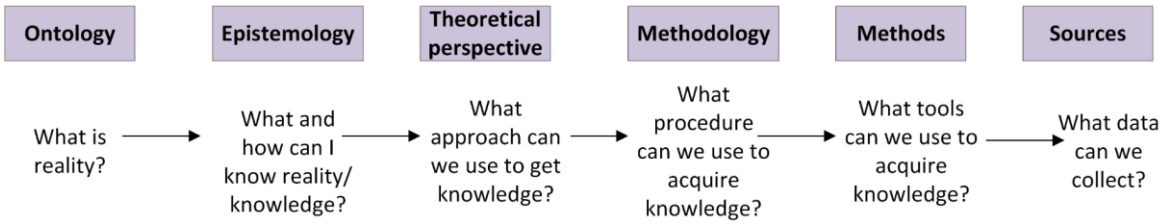
# RESEARCH MODEL AND DESIGN

## Introduction

The literature on the fundamental ideas of supply chain risk and resilience as well as localization (nearshoring) was examined in chapter (iii). As a pre-structured systematic research plan outlines the goals and objectives, the researcher's justification for carrying out the work, the resources used, and what the researcher anticipates producing as a result of having completed the work, it is crucial to clearly articulate it so that potential readers can understand the processes and procedures used to arrive at the findings and be persuaded of its value (Pickton 2013; Vinodkumar & Anoop, 2020).
Additionally, the researcher discusses the research design from the viewpoints of the research methodology, ontology, and epistemology, the connection between which is schematically depicted in figure 6. This chapter discusses the components of sampling, data collection, data analysis, and results presentation. This chapter also covers the topics of scope, limitations, and ethical concerns.

Figure 6. Relationship of components of research paradigm.

**Figure 6: Relationship of components of research paradigm (Patel, 2015)**




Source: Adapted from (Crotty 1998; Hay, 2002 p.64, as cited in Patel, 2015).

This paper aims to analyse supply chain resilience in South Africa's automotive sector, i.e. to determine the impact of a disruptive situation such as the COVID-19 pandemic

on the component supply, companies' supply chain vulnerabilities and the impact of value chain resilience in the face of these situations.

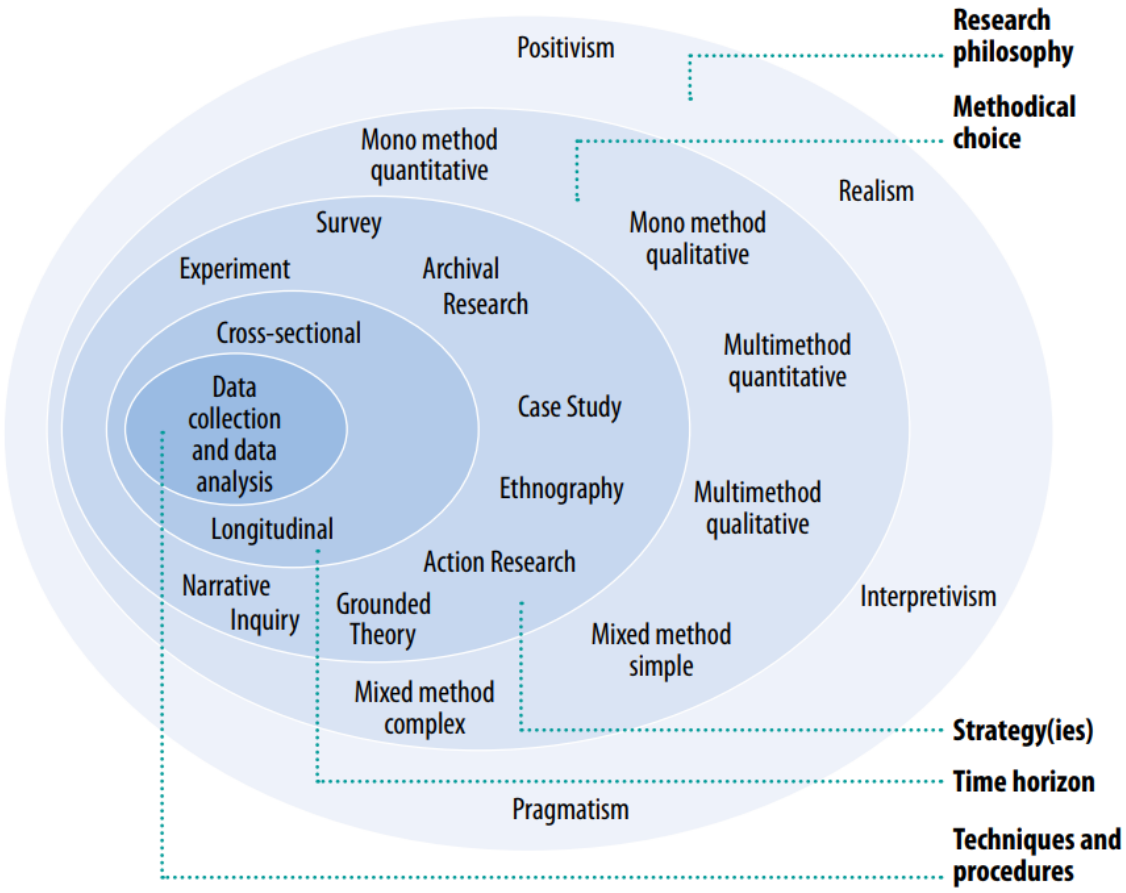
## Research Paradigm and Philosophy

According to Žukauskas, Vveinhardt & Andriukaitienė (2018), a research paradigm is a "method which, when applied, allows the scientists to generate ideas into knowledge in the context of research". It refers to "the set of common beliefs and agreements shared between scientists about how problems should be understood and addressed" (Kuhn, 1962, cited in Vinodkumar & Anoop, 2020).
In this research, the Research Onion created by Saunders et al. (2011, 2009, p.108, as cited in Al-Zefeiti & Mohammad, 2015) is used, shown in Figure 7. The Research Onion's outermost layer, known as a Research Philosophy, represents a variety of ideologies and theories, including positivism, critical realism, interpretivism, and pragmatism (Al-Zefeiti & Mohammad, 2015; Liyanage, 2022).

To enable for careful data analysis, to ensure that subjects' worldview, feelings, and personal experiences stay intact, an interpretivist paradigm based on the ontological, epistemological, and methodological perspectives was employed. This is also since "qualitative approaches are typically associated with an interpretivist position." (Fugard & Potts, 2015).

Figure 7. Research Onion.

**Figure 7: Research Onion (Saunders et al.,2009; 2011)**




Source: Saunders et al.,(2011).

The "onion" metaphor, which is demonstrated in Figure 7, "illustrates how the so-called "core" of a piece of research (i.e., data collection and data analysis) can only be coherent when it is based on an understanding of the other essential elements of a research design: namely, the research philosophy, approaches, strategies, methodological choice, and time horizon." (Bullet-Proofreading, 2019). The logic of Figure 7 represents the fact that successful research processes entail removing several onion layers, beginning from the outside and working inside (Saunders et al., 2011).
By proving that the "techniques and procedures you used in your study are reasonable, credible, coherent, and - perhaps most importantly - not arbitrary" posits (Bullet-Proofreading, 2019), the Research Onion is used to strengthen research and persuade potential users of its value (Pickton, 2013), lest the work be of little or no value to others.

## Research Approach

Selecting the appropriate research strategy, or the second layer to be removed from Figure 7's onion, is the second stage in designing research (Bullet-Proofreading, 2019; Melnikovas, 2018). The most common approaches, according to Saunders et al. (2009), "divide research strategy into the deductive approach and the inductive approach" (Saunders et al., 2009, as cited in Al-Zefeiti & Mohammad, 2015; Kennedy, 2018).

Due to the qualitative nature of the project, interpretivism, which is "flexible and emergent in design," was selected in this case (Cypress, 2017). The use of inductive logic or bottom-up thinking, whose goal "is to generalize," is made (Rashid, Rashid, Warraich, Sabir & Waseem, 2019). To draw inferences from experiences, patterns, resemblances, and regularities in this study, the researcher used inductive reasoning. The ideas that inductive reasoning generates in contrast to other methods are what made it different. To draw inferences from experiences, patterns, resemblances, and regularities in this study, the researcher used inductive reasoning (Saunders et al., 2016).
Furthermore, according to Suter (2012), qualitative data analysis frequently adopts a general inductive strategy, in that explicit theories are not imposed on the data in a test of a particular hypothesis. Instead, the emergence of conceptual categories and descriptive themes allows the data to talk for themselves (Suter, 2012).

# Research Method

According to (Suter, 2012) "Many research questions can be adequately answered with a mono-method approach". Some of the variables that affect the choice of a research method include the research philosophy, the research questions, and the research objectives (Creswell & Creswell, 2018; Žukauskas et al., 2017). The report discusses the qualitative research technique in the following subsection.

## A Qualitative Research Approach.

The suggested research methodology for this study was a qualitative research strategy. An interpretivist theory served as the foundation for the study, so a qualitative research methodology was essential to support it. It was crucial to employ the qualitative technique in order to derive meaning from the data set gathered (Suter, 2012; Ngulube, 2010). Tenny, Brannan and Brannan (2022) claims that exploratory research problems are adequately addressed using qualitative research because it offers greater insights into practical issues. As a result, the problem under investigation was better understood thanks to this research approach. The researcher relied on the first-hand impressions and perspectives of people in their professional activities. Due to this, the research was able to comprehend events in greater depth as they happened in participants' normal working environments. According to the subject and issue under investigation, which needed to be questioned through interactions with participants to better understand, the qualitative research method was used. The “information collected in interviews was used in conjunction with secondary data, clarifying key elements within the scope of the

research objectives" (Guercini & Runfola, 2008; Minger & Gill, 1999; Yin, 1994, as cited in Sakuramoto et al., 2019).

The process of research involved "the systematic collection of data about a phenomenon, using standardized measures and statistical analysis" (Hammarberg et al., 2016). Deduction or induction are two methods used in qualitative research. Using data gathered from specific observations and measurements related to a particular field of study, the latter method enables the researcher to identify patterns and regularities, develop various concepts and theories to create some tentative hypotheses that can be tested, and ultimately come to some general conclusions or theories (Moser & Korstjens, 2018). Since a qualitative method allows for greater capacity to gain more depth and meaning based on firms' experiences of working within disrupted supply chains, it was thought more appropriate to use it for this study.

The most user-friendly "qualitative research approach is phenomenology, because it is all about the search for meaning" (Grossoehme, 2014). This as a "philosophical approach, aims to produce an account of lived experience in its own terms rather than one prescribed by pre-existing theoretical preconceptions" (Smith & Osborn, 2015). With the phenomenological research method, researchers look for a deeper understanding of events and human interactions, as well as the meaning that others assign to their own circumstances (Neubauer et al., 2019).
According to Pietkiewicz and Smith (2014), researchers using the phenomenological research method "are more preoccupied with the quality of experience" as they look for profound understanding and meaning in events and human interactions (Neubauer et al. 2019).
In qualitative research, there are many different methods for gathering data, such as observations, textual or visual analysis (from books or films), and interviews (such as from individuals or focus groups). Having said that, focus groups and interviews are primarily used as techniques. Here, the information gathered contains more than just words because attitudes, feelings, and other behaviors are also taken into account. Transcripts of interviews, field notes from the researcher's observations, historical records, and memos were all used to gather data, which underwent thorough and ongoing analysis.

The three processes of data collection, coding, and analysis were combined throughout the research (Strauss, 1987). This approach usually entails a conversation between the researcher and the participant, and it promotes the kind of adaptability that is crucial for qualitative researchers to be able to switch up their line of questions, probes, and comments as they gather more data and develop a better understanding of what data is relevant (DeJonckheere & Vaughn, 2019; Busetto et al., 2020).
As a result, the study examined the disruptions brought about by COVID-19 and evaluated the SCRes of the automotive sector based on OEMs and first-tier suppliers. The researcher was able to gain a varied perspective and get an overview of the effects of the COVID-19 imposed disruptions on the automotive industry, as well as responses to them, by taking into account what is occurring in other developing countries. The emphasis was on the OEMs and the first-tier suppliers in the automotive supply chain as the main subjects in order to compile a representative sample of the important supply chain levels.

# Research Design

Research designs are described in literature as "plans that hold together various research concepts into one unique unit for the purpose of addressing research questions" and "for collecting data to answer their questions" (Suter, 2012). The "logic that links data to be collected (and the conclusions to be drawn) to the initial questions of the study" is known as a qualitative research design (Suter, 2012).
An exploratory research approach was used to enhance the "effectiveness, efficiency, and equity (3e's)" (Hinrichs-Krapels & Grant, 2016) of the research process (Romm & Ngulube, 2015). Ranganathan and Aggarwal (2018) point out that a number of choices the researcher made regarding the research methods, the nature of the question, and the availability of resources led to the design of a study that was used to address a specific research question. Because there was no evidence that the issue had previously been examined in this way, an exploratory research design allowed the researcher to fully explain and comprehend the issue (Thomas & Lawal, 2020). Instead of providing precise measurement, an exploratory research design offered qualitative data and gave a greater understanding of a problem (Ngulube, 2010).

## A Non-Case Study Research Design.

According to Suter (2012), qualitative studies can be designed in a variety of ways. For instance, the five major categories are "case study, phenomenological, ethnographic, narrative, and mixed techniques" (Suter, 2012). Before going into population and sampling, it would be worthwhile to quickly describe two or three of these designs.

This study focused on a single (1) automotive OEM & seven (7) of its Tier 1 suppliers. Thus, the study may appear to fit the description of a Single Case Study design, which naturally talks to “a collective term for an in-depth analysis of a small non-random sample” (Hunziker & Blankenagel, 2021), which can be ideal for both quantitative and qualitative studies. The case study approach is one that naturally “allows in-depth, multi-faceted explorations of complex issues in their real-life settings” as hinted in (Crowe, Cresswell, Robertson, Huby, Avery & Sheikh, 2011). The authors also highlight how case studies enable researchers to look into the issue in a real-world setting (Crowe, et al. 2011). Additionally, case studies make it possible for researchers to gather information that is particular to a topic they are studying even when they are short on time.

Despite the fact that "qualitative case study methodology enables researchers to conduct an in-depth exploration of intricate phenomena within some specific context" (Rashid et al., 2019), it frequently presents difficulties because the researcher may have trouble extrapolating findings to a larger population and there is a chance that the case study may be influenced by the researcher's emotions (Firestone, 1993, Mintzberg, 2005, as cited in Wikfeldt, 2016; Yin, 2012). It should be made clear, though, that this study was neither meant to be a single case study, nor is it one. The setup of South Africa's

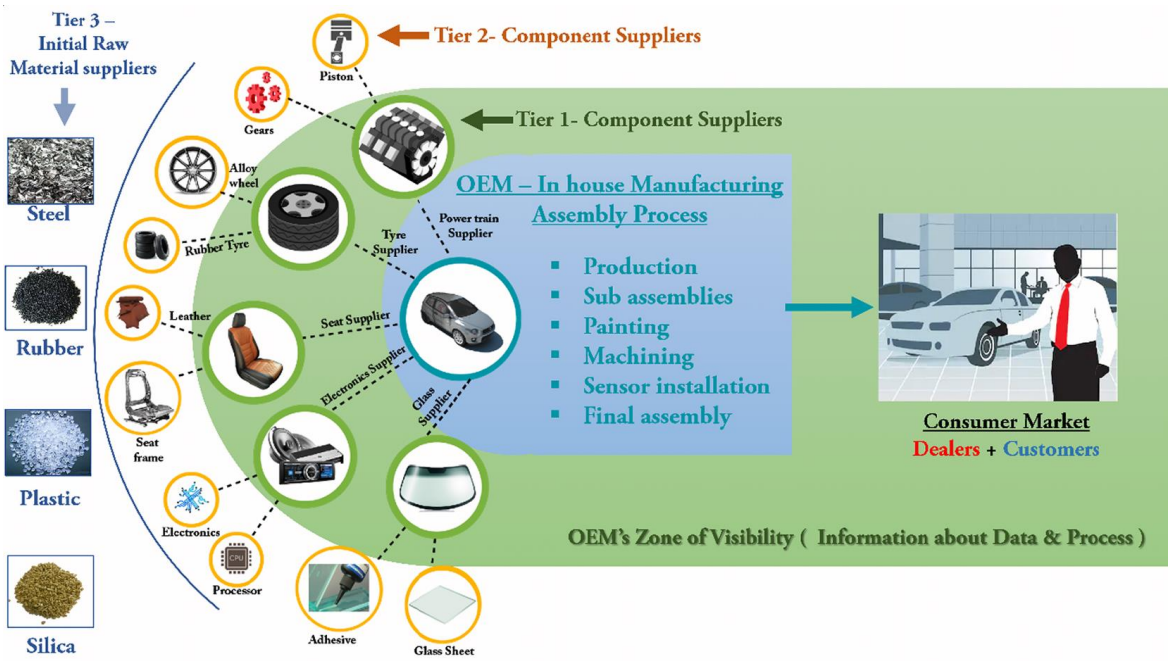
automotive industry and its supply network, which is briefly covered below, is the cause of the small sample.

## South Africa's automotive sector supply chain context.

"Firstly, all original equipment manufacturers with production operations in South Africa and 75 per cent of first-tier suppliers are foreign-controlled transnational corporations (TNCs)" as highlighted in (Mashilo, 2019). The country's automotive sector has a multi-tiered supply chain arrangement, in which most of the seven (7) OEMs are supplied by same suppliers locally, some even have same import suppliers, as can be seen in Figure 8 & Figure 9 below. Thus, the chosen sample, is quite representative of the population whole, and shouldn't be misconstrued a Single Case design. Discussion of the population dynamics and sampling are clarified in the next section and sub-sections.

## Figure 8. Typical Automotive Supply Chain.

**Figure 8: Typical Automotive Supply Chain.**




Source: Reddy, Gunasekaran, Kalpana, Sreedharan, and Kumar (2021)

It should also be noted that most of the bigger components are imported, with "the main automotive imports from the United States to South Africa OE components; engine parts; engines; transmission shafts/cranks; gauges/instruments; axles; tires; and automotive tooling" (Export.gov, 2019).

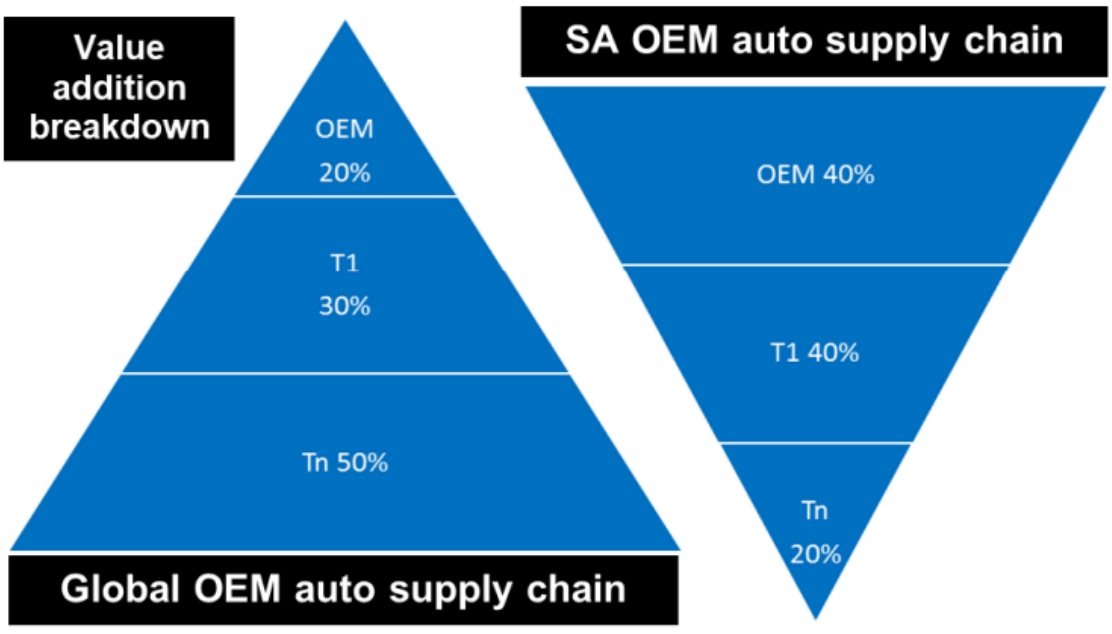
However, there are strides to localise some of the big components. For example, the EA111 engine for the VW Polo and Polo Vivo is made in South Africa, demonstrating

the nation's manufacturing capabilities. Ford has also invested an additional R600 million in its engine plant to support the launch of a new 3.0L V6 turbodiesel engine and upgrades to the existing assembly line for the 2.0L Single Turbo and 2.0L Bi-Turbo diesel engines, among other initiatives (Automotive Export Manual, 2022).

According to the Automotive Export Manual (2022), "imports of OE components by the seven OEMs in South Africa increased by a significant R27,8 billion, or 33,8%, to R110,1 billion in 2021, from the R82,3 billion in 2020, in line with the 11,8% year-over-year increase in vehicle production in 2021, as well as to accommodate the introduction of new domestically produced models." The high-value componentry, such as the powertrain and telematics, which jointly account for about 50% to 60% of the value in a modern vehicle, are primarily imported into South Africa when a new model is first introduced. In cases where the original equipment manufacturer (OE) component is not produced in South Africa, imports are required in accordance with global sourcing standards. The fact that the remaining components and engines produced by two OEMs are obtained from the domestic market speaks volumes about the nation's manufacturing capabilities. Under the SAAM 2035, expanding and deepening the nation's component-supplier base is a key focus because it will lower the risks connected with exchange rate fluctuations and logistics costs."

Figure 9. South African Automotive Supply Chain vs Global.

**Figure 9: South African Automotive Supply Chain compared to Global SC**



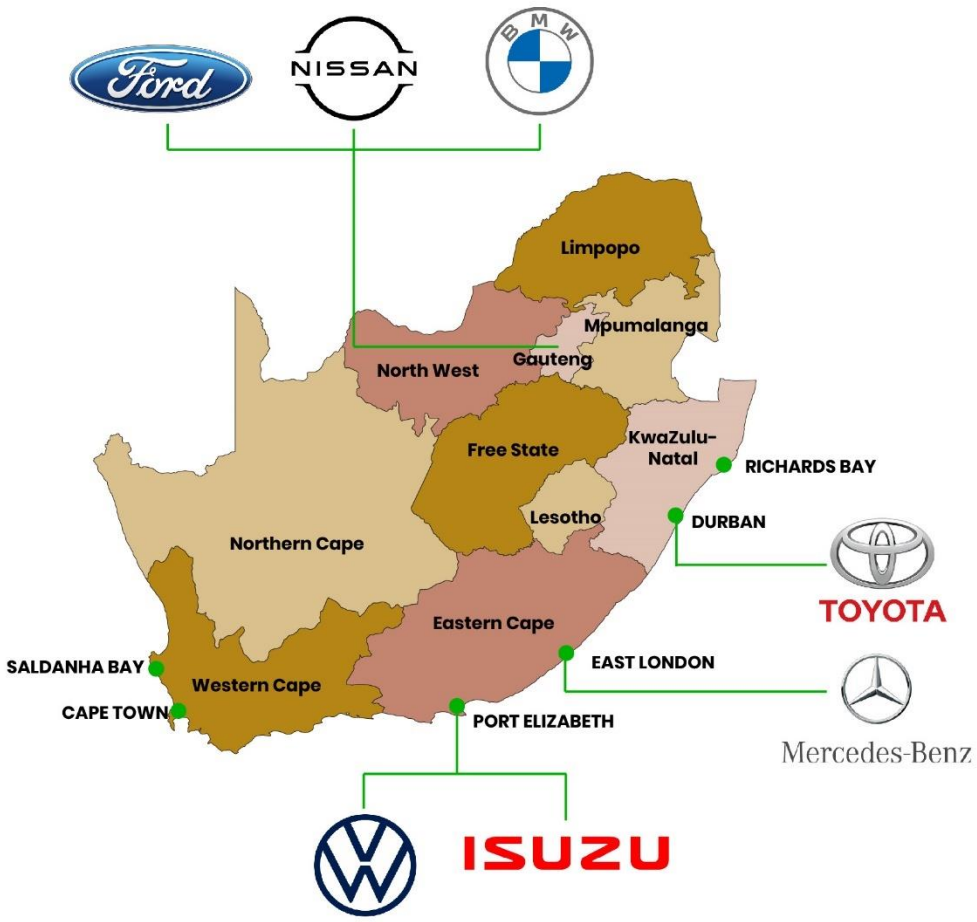

Source: Monaco, Barnes and Black (2020)

Figure 9 indicates that in the country "the OEM is responsible for 40% of the value addition, with Tier 1 suppliers also at 40%, and the remaining tiers at 20%" (Venter, 2018, Monaco, Bell & Nyamwena, 2019). This indicates there's a lot of potential at

'Tier 2+' level, where MNEs could leverage already existing industry players, and invest.

Figure 10. Local Manufacturing OEM Plants.

**Figure 10: Local Manufacturing OEM Plants by Region**




Source: (Automotive Export Manual, 2020).

## Target Population

The target population of a study is the broad group of people that researchers are examining. This means the group of people researchers think might benefit from a particular intervention or experiment, and from which such intervention intends to conduct research (study) in and draw conclusions from (Zhao, Tian, Cai, Claggett & Wei, 2013; Barnsbee, Barnett, Halton, & Nghiem, 2018)

Hu (2014) further draws from the target population what is termed a study population, which is defined as “a subset of the target population from which the sample is actually selected” (Hu, 2014). (Bartlett et al., 2001; Creswell, 2003, as cited in Asiamah et al., 2017) also emphasizes the need to narrow a population by excluding " all individuals (i.e., from the general population) whose involvement in the study violates the research goal, assumption or context " in order to stay within the target population, which is defined as the group of individuals or participants with the specific attributes of interest and relevance (Bartlett et al., 2001; Creswell, 2003, as cited in Asiamah et al.,2017). The target population is more specialized than the general population due to the absence of any attributes that cast doubt on a research hypothesis, context, or objective (Asiamah et al.,2017). Senior managers were therefore chosen based on their ability to make choices and establish policies, or at the very least participate in the firm's strategic decision-making processes. These people could provide in-depth responses when clarification was needed.

## Sampling.

Sampling as defined by Martínez-Mesa et al.,(2016) is that “finite part or subset of participants drawn from the target population”, representing the population.

## Non-Probability Sampling.

The sampling method helps the researcher choose a representative sample and offers recommendations on how big the sample should be to guarantee the level of confidence sought for conclusions and generalizability. In contrast to random selection, non-probability sampling techniques employ a method where the sample is chosen based on the researcher's subjective opinion (Elfil & Negida, 2017, as cited in Berndt, 2020). Quota sampling, selective sampling, self-selection sampling, and snowball sampling are examples of common non-probability sampling techniques (Berndt, 2020). Also, quantitative research questions can be answered using either probability or non-probability sampling methods, whereas non-probability sampling methods are the only option for qualitative research questions (Berndt, 2020). The non-probability sampling method used in this study requires the researcher to use discretion or judgment when choosing sample components. According to Saunders et al. (2016), sample components are chosen using human judgment when non-probability sampling is used. In this study, convenience and purposeful non-probability samplings were used because the sample components were chosen for having the pertinent data needed to answer the research questions. By their very nature, non-probability sampling techniques are not representative of the study's population, or at the very least, not all population members have an equal chance of taking part.

## Methods for sampling for the Study.

It is evident from the discussion above that non-probability sampling techniques were used in this research. According to Babbie (2010), convenience sampling is used when

the study's sample components are easily accessible and available at the moment of the study's execution.
Contrarily, when a researcher finds and chooses participants who have the data needed to solve a research issue, they are using purposeful sampling. A single research may employ convenience and purposive sampling strategies. The parameters were predetermined. For instance, the researcher pre-set selection criteria that were used in the sample selection procedure, such as working experience and seniority. Additionally, the non-probability convenience sampling method gave special consideration to the participants who were easily accessible (Saunders et al, 2019).

## Sample Size.

According to Gill (2020), the techniques used in qualitative sampling are, in general, different from those used in quantitative sampling. Thus, in order to create high-quality research, a researcher's understanding of sampling techniques is crucial (Berndt, 2020). Choosing an appropriate “sample size in qualitative research is ultimately a matter of judgement and experience in evaluating the quality of the information collected against the uses to which it will be put, the particular research method and sampling strategy employed, and the research product intended" (Sandelowski, 1995, p.183, as cited in Gill, 2020).

## Issues & critiques of qualitative sampling.

Qualitative researchers have been heavily criticized for not justifying sufficient sample size decisions in their research. This section addresses some of the issues encountered when choosing and deciding on sample sizes, their applicability and validity within different approaches to qualitative research, through some citations of some of the conundrums on the topic.

Blaikie (2018) summarizes thus;
The issue of how to choose a sample size for "qualitative" study has drawn the attention of social scientists from a variety of disciplines over the past 20 years, and especially in the last five, for example, according to (Galvin, 2015; Guest, Morse, 2000; Sandelowski, 1995, as cited in Blaikie, 2018), who also demonstrates that "the growing scrutiny of social research by various committees - for proposal approval, funding applications and ethical clearance - seems to have led to an increased concern with sample size” (Hammersley, 2015, as cited in Blaikie, 2018).
Again, researchers face a real challenge when attempting to support sample sizes to funding agencies or ethical review committees, especially those working at the interpretive end of the qualitative research spectrum. However, it is a bad idea to respond to this challenge by turning to predictions or estimates that are based on dubious hypotheses or that borrow improper methodological or statistical principles from quantitative research (Sim et al., 2018, as cited in Blaikie, 2018).

Once more, choosing an appropriate sample size in qualitative research is a conceptually contentious and practically ambiguous task (Vasileiou et al., 2018).

"Sample sizes justification must always endeavour to bring an equilibrium with that of other components of data collection, to reduce the dominance of size over other important cogitations such as complexity of the topic and broadness or narrowness of research scope and questions as well as the quality of fieldwork" according to the Statistical Analysis of Variance (SAV) manual (Morse, 2000; Roy et al., 2015, as cited in Sebele-Mpofu, 2021).

The choice of an appropriate sample size is crucial because using excessively large or small groups has ethical repercussions, according to (Francis et al., 2010), as cited in Sebele-Mpofu 2021). Therefore, sampling should be limited until data saturation is reached in qualitative research. Data saturation is the process of gathering qualitative data to the point where closure is reached because additional data will only produce redundant information (Polit & Beck, 2017, as cited in Moser & Korstjens 2018). A "seemingly popular, approach to sample size employs numerical guidelines derived from empirical investigation" is one of the numerous techniques for sampling for qualitative research (Sim, Saunders, Waterfield & Kingstone, 2018).

## Sample size determination and decision for this study.

Research further indicates that; “Qualitative inquiry is rife with ambiguities” (Patton 2002, as cited in Marshall et al., 2013, p.12).
Additionally, these authors state the following in their study, which was also selected for the purpose of this study: "We present the number of interviews per study broken down by journal, institution region, and number of authors," though they also acknowledge that "some journals contained articles with far more interviews per study" in general (Marshall et al., 2013, p.17), Table 4 refers, indicating that sample size can be either large or smaller, yet have an adequate impact.

## Table 4. Number of Interviews per study journal, region and authors.

**Table 4: Number of Interviews per Study by Journal, Region, and Authors (Marshall et al.,2013)**

| | Under 10 | | 11 to 20 | | 21 to 30 | | 31 to 40 | | 41 to 50 | | 51 to 100 | | over 100 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Journal*** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** |
| CACM | 2 | 15% | 0 | 0% | 7 | 54% | 2 | 15% | 0 | 0% | 2 | 15% | 0 | 0% |
| ISJ | 5 | 23% | 7 | 32% | 3 | 14% | 2 | 9% | 4 | 18% | 0 | 0% | 1 | 5% |
| ISR | 0 | 0% | 2 | 33% | 2 | 33% | 1 | 17% | 0 | 0% | 1 | 17% | 0 | 0% |
| JMIS | 3 | 13% | 7 | 30% | 3 | 13% | 2 | 9% | 3 | 13% | 4 | 17% | 1 | 4% |
| MISQ | 1 | 6% | 3 | 19% | 2 | 13% | 2 | 13% | 2 | 13% | 5 | 31% | 1 | 6% |
| **Institution Region** | | | | | | | | | | | | | | |
| USA/CA | 4 | 8% | 10 | 20% | 11 | 22% | 8 | 16% | 3 | 6% | 11 | 22% | 2 | 4% |
| Europe | 6 | 27% | 8 | 36% | 3 | 14% | 0 | 0% | 3 | 14% | 1 | 5% | 1 | 5% |
| Asia | 1 | 14% | 1 | 14% | 3 | 43% | 0 | 0% | 2 | 29% | 0 | 0% | 0 | 0% |
| **Number of Authors** | | | | | | | | | | | | | | |
| 1 | 1 | 6% | 6 | 35% | 1 | 6% | 3 | 18% | 3 | 18% | 2 | 12% | 1 | 6% |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 5 | 13% | 5 | 13% | 10 | 26% | 3 | 8% | 5 | 13% | 8 | 21% | 2 | 5% |
| 3+ | 5 | 20% | 8 | 32% | 6 | 24% | 3 | 12% | 1 | 4% | 2 | 8% | 0 | 0% |

Sourced from: Marshall et al., (2013)

The automotive population in South Africa is thus small, when considering suppliers who supply a production line of a single OEM (locally based car manufacturer), thus a sample of 7 participants does suffice for the purpose of this study.

## Participant qualifications – who to include in sample.

Purposive sampling is the technique the researcher uses to choose the sample of participants. This type of sampling is primarily strategic and requires the choice of "participants based on the researchers' judgement about what potential participants will be most informative" (Polit & Beck, 2017, as cited in Moser & Korstjens, 2018, p.10). To put it another way, "choosing of participants led by the researcher's personal judgment, considering the informative nature or information power of study participants" (Sebele-Mpofu, 2021). Experience, expertise, institutional memory, participant knowledge, relevance to the study, study purpose, and research question are typically factors that influence the decision (Moser & Korstjens, 2018; Sebele-Mpofu 2020; as cited in Sebele-Mpofu, 2021).

Participants had to have worked in the automotive industry and, at the very least, in supply chain-related positions between the years 2020 and 2021 in order to meet the inclusion criteria. Because they would have been most exposed to the supply risks and disruptions caused by lockdowns linked to COVID-19, the researcher decided to speak with people who work primarily in supply chain management roles for this study. Additionally, by creating a more cohesive group through this minimum requirement, real experiences became more significant.

Through the researcher's personal connections with Manufacturers and ACMs, participants were found. Since the goal of this project was to research these OEMs and ACMs with South African bases in relation to their supply chain side and factors affecting the kind of suppliers they work with. When contacted to conduct interview sessions, a convenience sample of no more than 10 industry participants were told about the study and invited to participate; 7 of them were able to do so. Before taking part, each individual who consented to being interviewed was required to read and sign an informed consent form. They were also informed of the law's requirements under the POPI Act, which included a guarantee of their total anonymity.

"Sampling strategies should be chosen in such a way that they yield rich information and are consistent with the methodological approach used" (Moser & Korstjens, 2018, p.9). As such, the researcher chose purposive sampling as it is suitable for qualitative studies where researchers seek to recruit participants who can provide in-depth and detailed information about the phenomenon under investigation. Additionally, it permits the selection of cases for both people and corporations based on such criteria, as well as cases with a lot of information (Palinkas et al.,2015).

Two sampling criterion that participating firms (through their representative participants) needed to meet in order to be considered for the research. Firstly, the focus was on the South African automotive industry (OEMs & Tier 1 suppliers in particular), these are organizations actively manufacturing in South Africa, thus 100% importers are eliminated. Players in the two categories are mainly organised within associations. The National Association of Automotive Component and Allied Manufacturers (NAACAM) is the voice of the South African automotive component industry both domestically and internationally, whilst the National Association of Automobile Manufacturers of South Africa (NAAMSA) represents 7 automotive manufacturing OEMs; 31 retailing OEMs, and 15 heavy commercial OEMs in South Africa. Within the NAAMSA, the priority was on all 7 OEM car manufacturers, and 32 component manufacturer and suppliers in as far as NAACAM is concerned.
Second, the targeted companies are OEMs and the first-tier suppliers in the automotive supply chain. Consequently, avoiding other companies that concentrated on other aspects of automotive engineering, such as those involved in tuning and modifications, and enhancements and additional information technology related services. Participants were contacted via E-Mails, to request interview opportunity (Appendix 1), with introduction of researcher, the purpose of the interview request, their rights to data privacy and protection and interview guide (Appendix 1-3).

## Collection of Data

Data was mainly gathered through interviews, aided by archival data, webinars, journals, and audio recordings. These are effective methods for gathering data that will yield fruitful ideas. Face-to-face semi-structured interviews were used in this research to collect data, and secondary data was provided by archival data. Semi-structured in-depth interviews were conducted. Alternative settings were considered where face-to-face was impractical, i.e. (virtual through MS teams). A semi-structured in-depth interview is one in which the interviewer has a checklist of topic areas or questions to get the participants to communicate in their terms (Jamshed, 2014). An interview protocol was developed to assist the process of data collection and was used in interviews that lasted on average 00:29:07, the shortest taking 00:19:47 and longest 00:45:49 per session. A recording device was used to record all conversations.

For this study, an interview guide was developed outlining the topics with interviewees for the qualitative data collection purposes. The purpose of the interviews was to get the views of not more than 10 key industry workers/experts in the automotive sector in determining the automotive component manufacturer's challenges and strategic imperatives of localization adoption based on the VUCA environment goods supplies operated in, during COVID-19 induced disruptions.

### Face-to-Face Interviews.

Face-to-face interviews require careful planning, especially in terms of the technical elements of that interview, as this is typically a differentiator between a great interview

and a flop, according to (DeJonckheere & Vaughn, 2019). They emphasize the need for thorough planning once more, saying that it's crucial to determine the most effective methods of contacting potential interviewees, obtaining informed consent, scheduling interviews at times and places convenient for both participant and researcher, and testing recording equipment (DeJonckheere & Vaughn, 2019).

This was particularly vital, especially given the circumstances since the dawn of COVID-19, where the common traditional face-to-face interviews had potential to be deterred, and given the energy supply conditions in South Africa, which more often result in complete mayhem to commuting. The use of innovative communication technologies, such as Skype (MS Teams), Zoom, Google Meets have facilitated new modes of communication, thus need proper checking and testing. MS Teams was al alternative to face-to-face in this instance.

Semi-structured in-depth interviews are commonly used in qualitative research and are the most frequent qualitative data source. Such interviews present “an opportunity to observe social and non-verbal cues of the interviewee,… in the form of voice, body language, gestures and intonation, and can supplement the interviewee’s verbal response and can give clues to the interviewer about the process of the interview” (DeJonckheere & Vaughn, 2019), thus, “the face-to-face interview has become somewhat of a ‘gold standard’ in terms of validity and rigour (McCoyd & Kerson, 2006:390, as cited in Deakin & Wakefield 2014), as they “have long been the norm for conducting qualitative interviews in healthcare research” (Saarija¨rvi & Bratt, 2021).

The most frequent source of qualitative data for qualitative study is semi-structured in-depth interviews. Such interviews offer "an opportunity to observe social and non-verbal cues of the interviewee,… in the form of voice, body language, gestures and intonation, and can supplement the interviewee’s verbal response and can give clues to the interviewer about the process of the interview" (DeJonckheere & Vaughn, 2019). The research work was conducted using semi-structured interviews. This is due to the fact that they enable participants to expand, resulting in greater flexibility, scope, and the capacity to extract more information from the participant. DeJonckheere and Vaughn (2019) posits that “semi structured interviews are an effective method for data collection when the researcher wants: (1) to collect qualitative, open-ended data; (2) to explore participant thoughts, feelings and beliefs about a particular topic; and (3) to delve deeply into personal and sometimes sensitive issues”.

Semi-structured interviews give participants more freedom to respond to questions how they see fit than would be possible in a standardized interview while still maintaining a framework that is comparable to that of focused interviews. As the interviewer has the chance to prepare a participant before posing sensitive questions and to directly explain complex questions to them, interviews are thought to be the most effective method for researching sensitive and complex topics. Although conducting interviews is a useful method for gathering detailed and rich data, it can also be costly and time-consuming. Because every interview is different and because the caliber of the responses obtained from various interviews can differ considerably, so can the way the interviewer and the participant interact.

The expertise, abilities, and dedication of the interviewer also has an impact on the quality of the data produced. According to Mack et al. (2005) “the core skills required to establish positive interviewer/participant dynamics are rapport-building, emphasizing the participant’s perspective, and accommodating different personalities and emotional states” (Mack et al., 2005). Additionally, there is a chance of study bias. Additionally, if there are few participants, it may be challenging to collect reliable data about the research topic, as opposed to the quantitative approach, which includes more participants and, as a result, may provide more conclusive results and reliable data results in some cases.

### Secondary Archival Data.

In order to gather secondary data on supply chain risk, resilience, and sustainability as well as the adoption and application of different SCRes strategies, archival data from industry organizations and various policy documentation of different states were used. These documents were accessed online because they are in the public domain, and thankfully many reports are accessible on "Open Access" platforms. This is especially true considering that COVID-19 identified a critical need for research and information sharing across the globe, which has led to a significant amount of freely accessible scholarly material. Industry annual reports by bodies such as NAAMSA were viewed to complement in-depth face-to-face interviews.

Secondary data is information that has already been gathered and is easily accessible from other sources. Secondary data is typically much less expensive and more readily available than main data. Usually, secondary data is gathered through desk-based study. The researcher then needs to look at the validity and trustworthiness of the secondary data. Therefore, the researcher ought to take into account supplementary data that are extremely reliable and well-cited in scholarly works. The secondary data in this included, personal sources, journals, newspapers, websites, government records and policy copies, published sources, blogs and sources from associations (e.g., NAACAM, NAAMSA), literature reviews of research articles, which are readily available compared to that of primary data, which was obtained through the interviews.

## Data Analysis and Presentation

According to Sharma (2018) “data analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data”. After data collection, there is a procedure that involves giving meaning to abstract facts. Cleaning, coding, and rational inference on bare facts are all steps in the data analysis process that result in meaning.

Although there are various methods of analysing data, including MS Excel or manually, Saarija¨rvi and Bratt (2021) posits that “analysis of interview data is preferably carried out with computer-assisted qualitative data analysis software, such as NVivo. Face-to-

face interviews have long been the norm for conducting qualitative interviews" in research studies.

The data was analyzed through thematic analysis, which according to Braun and Clarke (2006), "is a method for identifying, analysing and reporting patterns (themes) within data. It minimally organises and describes your data in (rich) detail. However, frequently it goes further than this, and interprets various aspects of the research topic". In other words, thematic analysis is a general approach for analysing qualitative data, and it involves identifying themes and/or reporting patterns in the data.

All interview transcripts were imported into a software for analyzing qualitative data. Software tools NVivo 12 and ATLAS.ti 22 were used to help with planning, managing, and analysis, which involves working with a lot of data (DeJonckheere & Vaughn, 2019). Programs for coding and grouping emerging themes, such as NVivo and Atlas.ti, enable the researcher to conduct thematic data analysis (Braun & Clarke, 2006). In this case, audio conversations were converted into a word document using NVivo, and analysis was done using Atlas.ti. According to Ngulube and Ngulube (2017), research is becoming more complicated and calls for the use of tools and software like NVivo, ATLAS.ti 22, MAXQDA, Dedoose, and others to extract rich data sets (DeJonckheere & Vaughn, 2019). When qualitative research is conducted, data is presented through expressions, and answers are occasionally cited verbatim. Subsections of the study objectives were presented as emerging themes.

### Secondary Data Analysis.

Following O'Leary (2020)'s "Steps in Secondary Data Analysis," secondary data was analyzed as follows: 1) Determine the study question - which means one should know specifically what they're looking for, 2) Finding data - figuring out what is available and whether one can obtain it. A quick Internet search will turn up a ton of possibilities. Considering the data's original purpose, when it was gathered, population, sampling strategy/sample, data collection procedures, operationalization of concepts, questions posed, and form/shape of the data, among other factors, when evaluating relevance of the data, 4) Determining the consistency of the data with data from other sources, assessing the credentials of the initial researchers, looking for a thorough explanation of the methods, looking for evidence that the data have been used in any reliable published research, and so on. & The fifth step is analysis, which typically entails a number of analytic procedures (O'Leary, 2020).

## Validity and Reliability of Qualitative Research

To ensure rigor, in their seminal work in the 1980s, Guba and Lincoln introduced the concept of trustworthiness, covering four aspects of credibility, transferability, dependability, and confirmability (Guba & Lincoln, 1981; Lincoln & Guba, 1985; Guba & Lincoln, 1982, as cited in Morse, Barrett, Mayan, Olson, & Spiers, 2002). In this report, the researcher ensured that the verbatim transcription from audio-recordings of participants accurately captured their own words ensuring data trustworthiness, this was

achieved by using reliable software NVIVO, then ensure a line-by-line listening and making minor corrections where the software has missed the exact wording (Cypress, 2017; Nusbaum, Douglas, Damus, Paasche-Orlow, & Estrella-Luna, 2017).

## Credibility.

Credibility refers to the "accurate and truthful depiction of a participant's lived experience" (Cypress, 2017), and it is "achieved in this study through prolonged engagement and persistent observation to learn the context of the phenomenon in which it is embedded and to minimize distortions that might creep into the data" (Cypress, 2017). This was accomplished by the researcher taking full ownership of the research process and making sure that all project-related tasks were effectively finished. There was no possibility of improper behavior regarding some of the associated activities because this research was not assigned to any third parties. According to Van Wijk and Harrison (2013), credibility entails cultivating confidence, upholding confidentiality, and ensuring participants' safety. Another important aspect of "credibility indictor relates to the degree of externality with which emerging themes and findings were scrutinised" (McLeod, 2015).

## Dependability.

"Dependability refers to the consistency and reliability of the research findings and the degree to which research procedures are documented, allowing someone outside the research to follow, audit, and critique the research process" (Polit et al.2006; Sandelowski 1986, Streubert 2007, as cited in Moon, Brewer, Januchowski-Hartley & Blackman, 2016). In this study, the researcher followed the university's recommended logical, traceable, and well-documented research procedure. For future use, all audio and transcriptions were kept private and stored in a secure cloud.

## Conformability.

"Conformability of findings means that the data accurately represent the information that the participants provided and the interpretations of those data are not invented by the inquirer" (Polit & Beck, 2012, as cited in Elo, Kääriäinen, Kanste, Pölkki, Utriainen & Kyngäs, 2014). In order to achieve conformability, the researcher collected data from participants and linked it to industry reports and other documentation to show that the data was accurate and not the product of the researcher's imagination. The researcher also avoided adding personal opinions to the participant's responses to eliminate bias (Nyirenda et al.,2020). All of the study's findings were compiled from participant answers and pertinent sources used during the research.

## Transferability.

“Transferability (generalisability) is applicability of findings to other contexts and achieved through thorough description of study context and assumptions” (Trochim, 2006, as cited Nyirenda et al.,2020; Zitomer & Goodwin, 2014). Additionally, transferability in qualitative research refers to the capability of using the research tool in a different situation or context but under the same guidelines. In this instance, the researcher did a thorough job of explaining the research context and the assumptions that were key to the research in order to increase transferability. The outcomes demonstrated that this study could be applied in other settings under circumstances comparable to those of this project.

### Authenticity.

To uphold the standards of qualitative research, analysis and interpretations in this study include an honest and accurate depiction of the participants' voices and harmony (e.g., allowing their voices to outweigh and overpower researchers') (Lyons et al.,2013). By giving the same interview lengths to all participants, with the exception of situations where the interviewee prolonged the responding, the researcher made sure that everyone was treated equally and with respect. Participants were informed of the study's findings and confirmed that they accurately reflected their views.

## Elimination of Bias

Bhandari (2022) and Wiśniowski, Sakshaug, Ruiz and Blom (2020) show that probability sampling methods are favored in research because they lessen the likelihood of bias and unfairness, which are characteristics of non-probability sampling. In order to show that the results are an accurate reflection of original data and eliminate any possibility of bias, the researcher did not express personal views or opinions during the interviews (Lyons et al, 2013, Nyirenda et al.,2020). Participants had the confidence to speak freely because they were made aware that this was academic study and that their comments wouldn't be used elsewhere.

## Ethical Considerations

The Encyclopedia (2022) defines research ethics as “the application of moral rules and professional codes of conduct to the collection, analysis, reporting, and publication of information about research subjects, in particular active acceptance of subjects' right to privacy, confidentiality, and informed consent”. They are “norms for conduct that distinguish between acceptable and unacceptable behaviour” in research (Resnik, 2020).

In the first instance, a research proposal was submitted to the University of the Witwatersrand’s Wits Business School’s and presented before the research panel for approval. Ethics application was approved, and a valid clearance certification issued. All participants were politely asked to sign a consent form stating that they are willing to participate in the interview, while also ensuring confidentiality and anonymity

throughout the process (see appendices). Again, participants were informed of their freedom to withdraw at any time had they no longer wished to continue participating in this research project. All interviews were recorded with the consent of participants and were anonymized and transcribed. Anonymous interviews are stored on a password-protected device for later analysis. All these will be in accordance with the Protection of Personal Information Act (POPI Act), (Adams et al., 2021).

Participants received guarantees that their data, including their real identities, wouldn't be disclosed to outside parties and that everything would be stored securely in a cloud-based device with no public access. The researcher was in charge of overseeing the entire study procedure, which included checking the results with participants before publishing them. The University of the Witwatersrand's Wits Business School's Ethics Committee, constituted under the University Human Research Ethics Committee (Non-Medical) gave its approval to this research. A valid Ethical Clearance Certificate was issued by the committee. In order to avoid including irrelevant talks, the researcher established some criteria for what topics to and shouldn't discuss when conducting this study. When activities unrelated to the study are included in a research project, scope creep happens. This is bad for the project's success because it causes delays, higher costs, and a decline in the study's quality (Ahmed, & Jawad, 2022; Larson & Larson, 2009).

## Chapter Summary

The issues surrounding research methodology and approach, data collection, and data analysis were the major takeaways from this chapter. The chapter's goal was to demonstrate that, when done well, qualitative research can provide answers to particular research issues that may not be sufficiently addressed by quantitative designs. It should be noted at this point that sampling for qualitative research has been heavily criticized for a number of years due to its many flaws. The results from primary (data from interviews) and secondary (data from archival sources) data are combined in the following chapter, followed by suggestions.

# EMPIRICAL RESULTS

## Introduction

The study strategy used for this paper was the main topic of the previous chapter. This study's research questions and goals are discussed in relation to the empirical findings, which are presented and discussed in the penultimate chapter. The chapter starts off by talking about participant demographics, then moves on to a discussion of thematic data analysis that is in accordance with the interview questions. Discussions are used to back the presentation of the results, and the chapter is then finished. On how to enhance or

lower the risk of supply chain interruptions through localizing or nearshoring component supply, appropriate recommendations would be given. The demographics of the participants are covered in the following section, which is crucial in proving that the research gave different groups an equal chance to participate.

## Demographics of Participants

According to Lee and Schuele (2010), "the term demographics refers to particular characteristics of a population. The word is derived from the Greek words for people (demos) and picture (graphy). Examples of demographic characteristics include age, race, gender, ethnicity, religion, income, education, home ownership, sexual orientation, marital status, family size, health and disability status, and psychiatric diagnosis". Because of this, Shea et al. (2022) assert that including diversity in a study is essential and should be taken into account in order to reduce bias, which is frequently linked with qualitative research.

The definition of bias according to Shah (2019) is " as the inclination or prejudice for or against one person or group, especially in a way considered to be unfair", additionally, it says that it " can be extremely detrimental to scientific progress as it can lead to the distortion of reality and thereby affect the validity and reliability of research findings" (Shah, 2019).

To ensure inclusivity, the researcher worked hard to choose sample participants from all races and genders who held various higher-ranking positions within departments engaged in supply chains from both OEM and Tier1 suppliers. However, by default, almost all of the participants were white men. This is primarily because white men hold the majority of managerial positions in the country's business private sector, specifically the automotive sector (Dibobo, Ngonyama-Ndou & Mncwabe, 2022; Mashilo, 2019). The participants' standings and time spent with their groups were of utmost significance. The seniority of the job was linked to a specific kind of knowledge that would not typically be held by junior employees. Regarding the extract, the demographics were as presented in Table 5.

Table 5. Summary of Demographics of Participants.

**Table 5: Demographics of Participants**

| Participant nom de plume | Station | Gender | Race | Position occupied |
|---|---|---|---|---|
| PN | Tier 1 | Male | Indian | Finance / Government Incentives Schemes Manager |

| Participant nom de plume | Station | Gender | Race | Position occupied |
|---|---|---|---|---|
| PL | OEM | Male | White | General Manager Purchasing |
| JO | Tier 1 | Male | White | Director of Marketing and Finance |
| DV | Tier 1 | Male | Coloured | Account Financial Manager |
| DS | Tier 1 | Male | White | Commercial Manager |
| DM | Industry Policy Expert | Male | White | CEO |
| AW | Tier 1 | Male | White | Commercial Director SA |

The average industry experience was 20,83 years, lowest being 10 years, and highest being 35 years and these were from Manger to Director levels in terms of occupation.

# Presentation of Findings

Themes fell into three major groups as follows: "Navigating through Supply Disruptions, e.g. COVID-19 lockdowns," "Price/Costs to the automotive MNE (OEM or Tier 1)" for the purpose of producing in South Africa," and " Mitigating Risks through Localisation" NB: The **means that fictional identities have been used in place of real names of businesses and/or people.

## Navigating through supply disruptions (e.g. COVID-19 induced).

The study sought to understand the performance of supply, responses to disruptions, benefits, or drawbacks that are derived from reshaping the SCRes to include localization, in response to disruptions of many kinds happening throughout the world, including disasters, man-made, and geopolitical. The study focused on the automotive

supply chain performance during and after COVID-19 induced lockdowns. Below is a presentation of the topics.

***Theme 1: Supply & delivery performance***

Participants indicated that their local supplies performed the best as opposed to components they source from global regions, which they'd normally either deliver to OEMs operating in South Africa as they are upon importation, while some imported components will undergo further processing/conversion/modifications before getting delivered to local OEMs. The responses to some of the participants were thus;

*"They were definitely strained,…, we saw the shipping in particular where we're importing a lot of parts. So, importation was definitely extended due to global logistics issues. I think the local suppliers did their best to manage the situation and keep their customers their customers running. So, from a local perspective, I think the guys performed well. But anybody that was importing material or components, subcomponents from anywhere globally had to extend their lead times and put more material into the supply chain because of these extended lead times caused by the shipping lines" [Participant AW]*

*"So, I would basically say that obviously our logistics was impacted in terms of supply, especially because most of our parts coming from overseas, from the U.S., yeah, also from Mexico, and our Chinese suppliers because they were also on a hard lockdown. Yeah, it was quite difficult for us, but obviously we had, we have an agreement with **OEM1 to have certain amount of days' inventory on hand. That helped us. So yeah, on some parts we were overstocked and some we weren't. So, for those ones, obviously, we had an agreement with **OEM1. I know **OEM1 also had issues in the U.S., they flew the chartered flight from certain of their suppliers with parts that were needed to come to South Africa" [Participant DV]*

*"Yes, significant delays. I think the biggest challenges we had were where vessels were not calling to ports. Container shortages, significant increase in rates because I got the feeling that the person that screamed the loudest or had the most amount of money kind of got their place on the vessel or the container or up on a plane if needs be. So yeah, these were challenges I think faced across I think any industry, if anything, if you think of it, so because of the limited amount of opportunity, or, all logistics available, the supply chain logistics. Yeah, your containers, your vessels, your planes, you were very, very limited in terms of that" [Participant PN]*

There's consensus among the participants that it was severely difficult for the automotive sector in South Africa, especially on importations because the country is more import intensive. These consensus ties in with Raj et al. (2022) who recommended that manufacturers should, "wherever possible, explore local suppliers closer to the manufacturing facility in place of distant/cross border suppliers to cater to demand spikes" (Raj et al., 2022)…, "focus on being shifted from globalized to localized supply chain in such times" (Choi et al., 2021, as cited in Raj et al., 2022). Also, developing global supply chain risk mitigation strategies has unexpectedly become a top priority for many businesses in the wake of the COVID-19 outbreak, according to (de Sousa

Jabbour et al., 2020; Ivanov & Dolgui, 2020; Yu et al.,2019, as cited in Gurbuz et al.,2023).

Also, literature suggests that businesses should devise a long-term "Business Continuity Plan (BCP)" strategy, and periodically revisit it (Queiroz et al.,2020, as cited in Raj et al., 2022). This strategic plan, they posit "should include risk mitigation strategies, typically aimed toward setting up alternate suppliers closer to the parent organization's manufacturing facility to avert inconsistency in supply of raw material and critical components" (Belhadia et al.,2020, as cited in Raj et al., 2022), "with a view to maintain constant supply of material, the focal firms ought to indulge in tailored sourcing strategies which primarily requires having two sourcing channels" (Raj et al., 2022).
According to the research by Belhadi, Kamble, Jabbour, Gunasekaran, Ndubisi, and Venkatesh (2021) "the automobile industry perceived that the best strategies to mitigate risks related to COVID-19, were to develop localized supply sources and use advanced industry 4.0 (I4.0) technologies" (Belhadi et al.,2021).

## Price/Costs to the Automotive MNE (OEM/Tier 1).

The purpose of this question was to better comprehend the logistics of establishing an automotive component supplier in the nation. In this case, clarification was sought to understand the terminology surrounding the establishment of Tier 1 suppliers in South Africa that would serve local OEMs and address localization issues, i.e., would potential Tier 1 suppliers need to look at the capital structure to determine how much money they need to outlay as capital? (Or even Tier 1 vendors who are already in place looking to grow). investing in manufacturing facilities to offer whatever component they desire? Or, would they assert that government benefits adequately meet the need for capital set-up costs?.

***Theme 1: Product costs is against competitiveness***
What came here is that OEMs have competing plants globally, i.e. before deciding which production plant is suited to produce which car models, they weigh cost against benefit, and look at what government support structure is in place.

Participant had a diversity of views,
*"Our business model here in South Africa is an export model. 96 percent of our product is exported. So, our market is not South Africa. And so, if you're looking from a company perspective, from a **OEM1 perspective, our business model here is to do things as cost effectively as possible to be able to make and export our cars to markets that we can sell in. And what is absolutely critical for us to do that effectively because we're not in competition with **OEM2 in South Africa, we're not in competition with **OEM3 or **OEM4 down the road. We're in competition with other **OEM1 plants, one in **USA, the new one in Hungary, another in China and the other **OEM1 plants. So, we have to be from a company perspective, I'll come on to the country perspective, but from a company perspective, for us to compete, we need to compete with the US or wherever. And that means we have to do things more cost effectively than somewhere else. So, if we localize the part and it costs more money, we are*

*damaging the business case for **OEM1 South Africa against another **OEM1 location. So that's the company view. And that's how we as a company deal with our business case, we come into the decision making. That's how we think*" *[Participant PL]* on company's perspective.

*[Participant PL]* continuing country perspective. "*Now, if you look at the perspective of the government, the government sees it differently. They say that they're supporting the industry. That it's a sound strategy. We should be heading towards 60 percent and so forth. And sometimes because the market is not so big here in South Africa. If you localize something and you localize it more expensively than the government support that comes with that, that's actually damaging for the long term, for the industry, for South Africa because you can have 60 percent localized industry, but your product is not sellable because it's too expensive in the market. And you, all of a sudden you've got no volume because it's cheaper to import that same **car model from the States to Europe, and even though that transaction has to pay 10 percent duty, whereas as a free trade agreement from South Africa to Europe, your negative effect from economies of scale and technology and all the problems you know we have and challenges that we have in South Africa becomes more expensive to make a car in South Africa compared to the U.S. So the localization policy has many facets to it, and the key one in my mind foremost has to be the competitiveness of your product. If we can localize it competitively, we do benefit, but if we blindly localize everything and it costs too much money, our product will be so expensive that we won't get any value (volume). And that is the dilemma that we find ourselves*" *[Participant PL]*

*[Participant PN]'s feedback was thus;*
*"No, I think, for me, and this is my view, I mean, working with various global companies, you know, it's about, it comes down to costs. And the one question you ask yourself is: How will Capex influence the decision to get to South Africa, as an example, because I mean, obviously, we've looked at many studies on that. But when you look at a multinational, the first question is why should the business go to South Africa? And the key driver is costs and we look at costs over there and you start factoring the incentives that government offers. It makes it lucrative because then you automatically know either benchmark you or you are now competitive against global companies out there. And so I see capex is definitely something that has to be considered. It's crucial in terms of growth in the industry. I know it's always from your experience also, probably you know that it's always difficult to get more capex or be awarded capex in a global environment. But the question that that one has to ask is where's the benefits? And once you stop associating government incentives with that, it makes it lucrative. Yeah, the one question I always ask myself, and this goes back to my SARS days, is that when you look at a world map and you ask yourself, why does it make sense to make cars right to the bottom of the southernmost tip of Africa? I mean, is it really the place that you want to be? And in short, my experience in the industry says, Yes, there's huge growth in South Africa and in the rest of Africa, as well as we are seen as being a stable automotive sector. And we can provide export volumes. I mean, that's, we've seen the growth now, and we know there's potential out there. It's a long, long lead time, but we can do it. And I think we are a globally competitive or cost competitive country" [Participant PN].*

[Participant PN]’s argument is summed in Monczka et al.,(2015) when saying "localization has different objectives depending on companies’ sourcing strategy which includes, generally, cost reduction opportunities, supply chain designs considering location of the supplier and risk issues" (Monczka et al., 2015). The advantage of localization for a business, according to Bolaji-Adio et al. (2021), " lies in its ability to enhance responsiveness to consumers and operational competitiveness in the face of changing market dynamics". They also assert that local content policies (government at the macro level), businesses prioritizing agility and resilience (micro level factors), and advancements in the enabling environment, particularly logistics and technologies (infrastructure at the macro level) are key drivers of supply chain localization (Bolaji-Adio et al.,2021).

***Theme 2: Costs of capital investments***

Again, cost of capital is weighed against government support in each country before setting up.

*“I think we received government incentives for setting up this locally owned company. We’re 100% South African company. Yeah, so we received incentives to purchase equipment from DTI. OK. Things like that, so to assist us with doing the changes to the buildings, but like 30 per cent Assistance on cost, so we did receive things, but if you compare the Assistance from government versus the cost of capital in South Africa, the assistance disappear, because we pay because there's loans on equipments, of these small South African companies. Yeah, we pay 12 percent interest. If you're in Germany, you pay two or three percent interest. And so the difference of interest just completely absorb the benefit the government gives you via the grants. So in the end you’re competing, actually, it helps you to compete, at least head on with International companies, that's all” [Participant JO]*

The participants sentiments were captured in Thekkoote (2022), thus, “when it comes to costs, companies' localization strategies have a significant impact: transportation costs and risks rise as distances increase, labor costs differ widely around the world, and tariffs account for a substantial portion of product costs when trading across national and regional borders” (Reza-Gharehbagha et al.,2020, as cited in Thekkoote, 2022). Panwar, et al. (2022) indicates that at times the exercise “is not practical because a large-scale economic localization would require a radical overhaul - in fact, reversal - of the global economic system, which is a quixotic idea” (Panwar et al.,2022).

According to Thekkoote (2022), which summarized the participants' opinions, "companies' localization strategies have a significant impact: transportation costs and risks rise as distances increase, labor costs differ widely around the world, and tariffs account for a substantial portion of product costs when trading across national and regional borders" (Reza-Gharehbagha et al.,2020, as cited in Thekkoote, 2022).

According to Panwar et al. (2022) the exercise " is not feasible because a large-scale economic localization would require a radical overhaul - in fact, reversal - of the global economic system, which is a quixotic idea”.

## Mitigating risks through localisation/ nearshoring.

Here, a number of themes also developed. One participant who indicated that local suppliers hadn't suffered as much was asked the following interview question in order to elicit their opinions on the factors that promote greater localization of the automotive industry: "*So basically, you're saying you import a lot and that the local suppliers have done their best. So basically now if I was to ask when it comes to the issue of localization and nearshoring to make sure that goods are as close as possible to where they are needed, would you say that would be the ideal as opposed to, I mean, the pure importation, like you are sitting here in South Africa, I'm thinking, maybe you are getting your stuff out of China, out of the U.S., out of Europe, if they were…, all available locally and in... I mean, in line with the government's localization strategy, would you say that it would be the ideal*?" *[Interviewer]*

***Theme 1: Beneficial, but small market to can localize everything***

Participant's answer was as follows;

"*I would say it's definitely closer, closer to the ideal, I don't think we would be able to localize everything, but I think let's talk about *SteelCo1 as an example. We import all of the raw material we used for *OEM1 as an example. So I'll talk about *OEM1…., if we could localize carbon steel for all the OEMs (7 in total), it would make a significant difference not only to the local content , but also to the money that's tied up in the pipeline. So ideal, yes, localize as much carbon steel as possible. Some components, some castings and maybe some other types of components, rubber bushes and stuff - their volumes are just not here in South Africa to localize, and there's a very good example of that, *Rubber Bushings Co1 opened a plant in East London (RSA) to localize rubber bushings for Axles and sub-frames. The plant only opened about 18 months ago, and they've now closed it. And they're moving the volume to China. So, yes, from a steel perspective, that would be the ideal. Some other components, I think the volumes, the South African volumes just don't make sense for anybody to establish a new facility in South Africa to localize certain commodities*" *[Participant AW].*

*"It will be better because if you've got a shorter supply chain, your cost is lower. So purely out of cost, not out COVID. Because like I said, COVID stopped the whole supply chain from people requiring our stock right through from the supplier manufacturing it. And so, you know, even if it was a local company supplying the valves, they would also have closed" [Participant JO]*

*[Participant DS]* also agreed with *[Participant AW]* that it's a strategy that'd benefit the industry;

*"Look, I think, you know, I mean, it's always beneficial, I mean, in many aspects from a cost point of view, from a lead time point of view, from a financial point of view, you know, from a working capital point of view, from a quality point of view, it's always beneficial to have your supply chains, you know, close together or as close together as you can"*

***Theme 2: Financial and quality incentives***

*[Participant DS] and [Participant PL] highlighted some of the potential benefits of localisation to the equation;*

*"It's always beneficial, in many aspects from a cost point of view, from a lead time point of view, from a financial point of view, from a working capital point of view, from a*

*quality point of view, it's always beneficial to have your supply chains, close together or as close together as you can"*

*[Participant PL]*
*"Localisation, there's different motivations for localisation, the big one from the government - transformation, the theory being more business in South Africa, more jobs, more opportunity for black owned businesses, for example, which we fully support, other reasons to localize it could be a risk mitigation, for sure. If you've got parts coming out of, Mexico, one example we had this part coming out of Mexico and that part had no chance to be flown in. We got into difficulties, quality or whatever, you have to wait too long for vessel to arrive. Then you have to have to localize some from a risk mitigation perspective, especially if you can't fly the parts. So there's the second kind of motivation, It's a risk mitigation, if we're able to do it cheaper locally as a financial business case, regardless of the transformation that you've got a financial gain advantages as* *OEM1".

## Chapter Summary

Participants' perspectives were shared in Chapter 5. Themes from the interviews that were connected to localization literature and policy were emphasized. The study's result is in the following chapter.

# CONCLUSIONS

The study results were examined, analyzed, presented, and discussed in Chapter 5 in light of the research questions. The major results from both the face-to-face and virtual studies were discussed. The current chapter provides conclusions, implications, and suggestions in accordance with the discussions in the preceding chapter.

## Conclusions

The three main categories of topics that emerged from the interviews were, once again, (1) 'navigating through supply disruptions, e.g. COVID-19 lockdowns', (2) 'Price/Costs to the automotive MNE (OEM or Tier 1)' for the purpose of producing in South Africa, and (3) 'Mitigation risks through localization/nearshoring', each with its own subthemes. The subsections that follow provide the conclusions and discussions for each topic.

### Navigating through supply disruptions (e.g. COVID-19 induced).

The interviewed participants indicated that it was easy to source products locally, even after the global bans induced by COVID-19 on transportation, logistics and supply chain networks were lifted. They did concede that the closer the suppliers are to the manufacturers, the better it would be, and that was an ideal.

[Interviewer] "*Would you say that for future, you are sort of geared to handle things like these? Do you have some countermeasure in the event that something like this happens again?*"

[Participant PN] "*So some of the key takeaway points for me personally that I've seen in the industry is that most companies have started to increase buffer stock to ensure business continuity, but to meet customer demand the volumes, Uhm finding alternative backup suppliers in the event that there are further disruptions or future disruptions. I mean, we see so many, so many like you use the example of a tsunami. I mean, there's so much of uncertainty. I mean, in KZN, we have the looting incident. We've had the flooding. So yeah, huge impact in terms of that from where…, from a geographic location perspective. But I think I think if anything, COVID prepared us for, for what's to come and how we can work around it. I think one key point here is that the closer to home you are, the safer you are in a way. So I think key localisation initiatives are still.., are important and will drive the, will drive the economy in an upward trajectory. So, so yeah, I think that's that is to ensure a seamless, seamless manufacturing process*."

## Price/costs to the Automotive MNE (OEM/Tier 1).

The costs must outweigh the benefits for localization to be any feasible. The market volumes for suppliers will definitely be a hindrance, e.g., supplying only the local OEMs might not be sufficient or make a feasible business case at micro (company) level.

[Participant PL] "*So let's take **Tier1x…, Uhm that site is predominantly a **OEM1 site. So, when we didn't, when we don't work, when we had our four weeks off in the middle of the year, that was it, that was it for them, they didn't have anything else to keep them going. Whereas if you were in Europe and you've got one OEM going down, in one week a different one, next, these two, you've got some income as a business to keep going. Of course, the costs and more because you got a bigger set up, but to go from no turnover or turnover to no turnover is quite a financial shock*"

## Mitigating risks through localisation/ nearshoring.

The post COVID-19 literature is lit with suggestions around re-looking supply chains globally, to incorporate localization and nearshoring in the supply chain management practice and academia. Participants agree that localization will be a solution, but only to a certain extent, such as shortening material travels, which came to a halt when lockdowns started.

[Participant PL]

"*So where possible, we do local for local, uhm, in **Model Gx we're also doing what we call the Plan B, So where we have localized the parts let's say in US, um, South Africa and China, we would then enable ourselves to be able to use another location's parts should we have a problem here. So, for example, I don't know,… door casings, um, by the example door modules with **Tier 1y, we will enable ourselves that we can fly in the same part from the States should we have such an unexpected here, via hopefully, no natural disasters of flooding and earthquakes in **B. That's not the geolocation for those type of risks, but there could be a fire let's say and to keep this going, We would look to fly in parts from from **Tier 1y in the States. Just one example to desensitize the um the risk profile. We can't eliminate it 100 percent. But that would be one of the topics*"

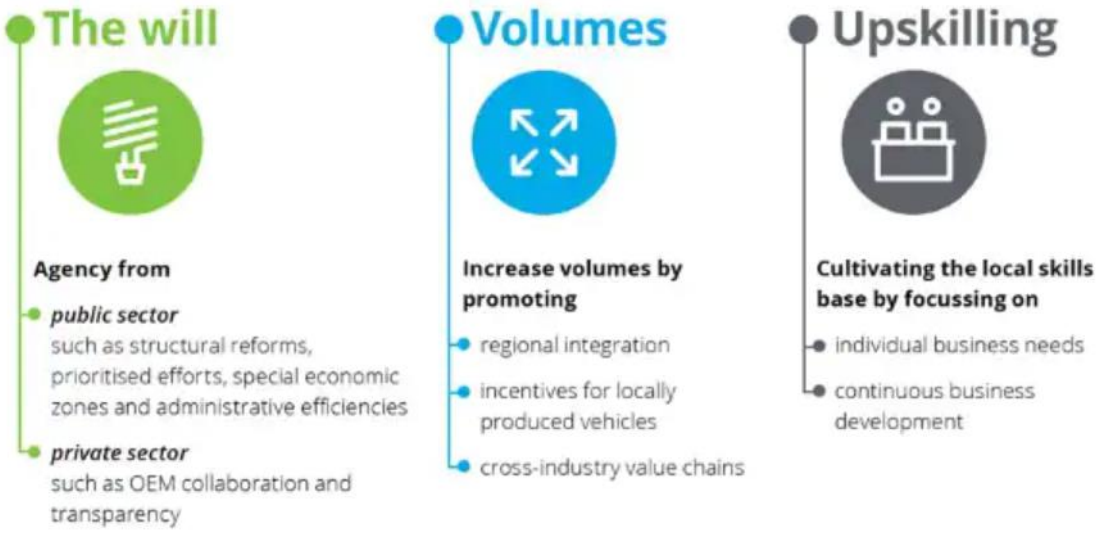
# Recommendations

Localisation is a risk mitigant, in as far as supply chain interruptions are concerned. However, government policies should not be structured in a way that'll force the industry to tackle it haphazardly. There's a need for both government and private sector to chat ways that would improve current inefficient structures in both the public and private sectors, including much-needed structural reforms, adequately incentivise the sector, lower administrative burdens, prioritisation and alignment of efforts and increased transparency from OEMs and tier 1 suppliers.

Secondly, concurring with interviewed participants, the current production volumes of around 631,921.000 (2019) vehicles (499,087.00 units in Dec 2021 & 499,087.00 units in Dec 2021) is one of the most pressing challenges facing the South African automotive industry (Thailand in contrast was 2,013,710.00 units in Dec 2019, 1,685,705.00 in Dec 2021, and 1,427,074.00 in Dec 2020) (CEIC Data, 2023; Automotive Export Manual, 2020). This will continue making things difficult for the country's automotive sector in respect to competitiveness. The industry and government need to find alternative methods to stimulate demand, both domestically and abroad, to increase volumes. The key enablers of automotive localisation is highlighted by Deloitte in Figure 11 below.

Figure 11. Key Localisation Enablers.

**Figure 11: Key Localisation Enablers (Davies et al, 2019)**

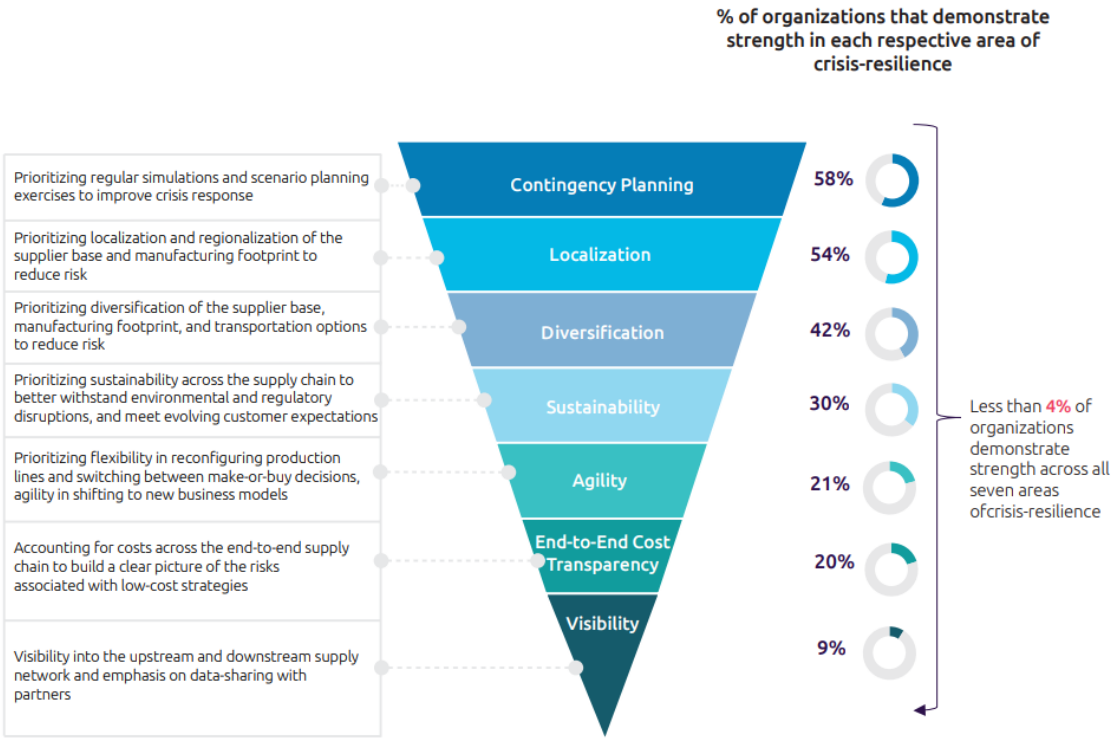



Source: Davies, Vincent, Sekgota and Nel (2019).

In addition to the Key Localization Enablers of figure 12, the FAST FORWARD report from the Capgemini Research Institute examined the steps that businesses were taking to modify their supply chains in response to the COVID-19 pandemic crisis. Additionally, they evaluated whether those measures were adequate in assisting businesses in creating supply networks that would be better able to withstand future disruptions, should one occur within the next three years. The assessment encompassed both planned actions and the current level of organizational preparedness in each of the seven core aspects of a crisis-resilient supply chain (Figure 13). Contingency Planning, Localization, Diversification, Sustainability, Agility, End-to-End Cost Transparency, and Visibility were the measures taken into account (Gya, Lago, Becker, Junghanns, Petit & Perea, 2020). Their study revealed a rise in regionalization and localisation interest among businesses. In order to lower risk and be nearer to their customers, as many as 65% of the 1,000 organizations surveyed were actively investing in localizing or regionalizing their supplier and manufacturing base (Gya et al., 2020).

Figure 13. Localisation preferred by 54% (out of 1000 corporates) as supply chain reduction strategy.

**Figure 12: The ability to withstand disruptions rests on building a range of capabilities (Gya et al.,2020)**




Source: Gya et al. (2020)

# Implications on academia, policy, practice, and skills

The results of this study have implications for how localization (nearshoring) is adopted and used in businesses, government, and academia.

## Future Studies.

A mass of literature written on supply chain related topics hardly regarded localization or nearshoring as a branch of the SC/SCM/SCRM. A few that covered the topic, only viewed it from cost saving lens and at most as a government policy fuss, and not from supply chain risk mitigation perspective. COVID-19 has brought with it a supply chain disruption almost compared to none. The shutdowns of factories, ports, transportation, and logistics facilities unearthed the many vulnerabilities and risks that can disarm globally dispersed supply chains at any given time. As can be seen, when firms were still striving to recover from the COVID-19 aftermath, geopolitical tensions arose in the form of Russian-Ukraine war, which equally disturbed supply chains. The COVID-19 period saw academia increasing a look at topics such as ‘nearshoring’, ‘friendshoring’, ‘regionalization’ which are all relatives to localization. From this paper, it is hoped that academia would consider this as a supply chain risk mitigant in future studies.

## Implications for Policy.

Davies et al. (2019) indicate that government policies are pivotal, however they need to be practical, simple, targeted and aligned. Government policies are usually geared towards serving the variety of objectives. Localization policies in both South Africa and many other developing nations is one mechanism to achieve that, this can be evidenced in the case of Thailand's automotive sector, wherein Pollio and Rubini (2021) discovered that the country's successful implementation of a number of policies helped in the sector's growth, putting Thailand on the map as one of the major players in the global automotive industry. However, they caution that such policy initiatives were unable to solve some of the country's major automotive industry problems (Pollio & Rubini, 2021, Kuroiwa et al., 2021).

According to Bolaji-Adio, et al. (2021) "to attract more productive investment, experts caution against economic nationalism under the guise of localisation, arguing instead that governments should focus on building an open business environment for both trade and FDI," (Bolaji-Adio et al., 2021), they also demonstrate that "this notion of bringing back production of critical supplies … there isn't a whole lot of evidence that it is really needed if we keep markets open, if we keep them predictable, and if the government helps firms to do what they're best at doing, which is responding to demand" (Bolaji-Adio et al., 2021).

Localization efforts, as stated earlier, heavily depend on political developments as well as the desire and ability of policymakers to promote reshoring via targeted policies (Raza et al.,2021). Davies et al. (2019) further highlighted that a meaningful localisation strategy for the South African automotive sector would be one "which both deepens and broadens local value chains, …aligning economic and social progress, …. requires a shift away from a compliance-driven approach, towards value beyond compliance thinking, which fosters innovation and productivity, … which involves developing successful strategies to develop and/or create sustainable local suppliers…" (Davies et al., 2019), this talks to practice also.

Natsuda, Thoburn, Blažek and Otsuka (2022) found that Thailand's automotive industrial policy instruments, and their implementations has overtime proven effectiveness, both before 2000 and after, under World Trade Organization (WTO)-imposed restrictions on trade-related policy measures. They also highlight the crucial role played by the states, wherein the "Thai policy having been backed by more effective and consistent implementation" (Natsuda et al.,2022) by the governing authorities.

## Implications for Practise.

In practice, localization polices reduces shipping distances, which in turn, has other benefits such as reductions in energy consumption and emissions, and curb damages to the environment. Also as indicated in prior chapters, localisation serves to de-risk businesses from supply chain challenges, and forex fluctuations (PTI, 2020).

In the Gulf Cooperation Council (GCC) and Levant regions of the Middle East, governments and businesses "have courted supply chain localisation through local content policies, investment promotion reforms to encourage foreign direct investment (FDI), and improvements to their logistics and technology infrastructure," according to (Bolaji-Adio et al.,2021).
Reviewing the Hungarian Automotive Component Suppliers' coping mechanisms and responses to the 2008-2009 economic crisis, Rugraff and Sass (2016) found that a mass of literature suggested that small local firms "often possessed the flexibility to adjust quickly in response to crises, a capability that is deemed crucial for survival" (Reid, 2007, as cited in Rugraff & Sass, 2016).

## Chapter Summary/ Conclusion

This study sought to place localization in the supply chain risk management of SC field. It specifically considered supply chain risks of disruption of the past, with COVID-19 being one in recent memories. It is evident that businesses and nations cannot shy away from such vulnerabilities to risks of disruptions. Other disasters and geopolitical events were proved to also pose severe risks to supply chains.
From the themes answered in this text, the interviewees did agree that localization and nearshoring their product supply would remedy some of the difficulties observed during the COVID-19-imposed shutdowns of transportation, logistics and the bulk of supply chain networks. However, it was also determined that localization policies typically have "*many facets to it, and the key one…, foremost has to be the competitiveness of the product. Thus, localization should be done competitively, but it's done blindly and on everything and it costs too much money, it would mean a product will be so expensive that it won't attract any value (volume). And that is that is the dilemma that the country, industry and companies find themselves in*" *[Participant PL paraphrased]*

Fully localized, regionalized, or nearshored production, according to Baldwin and Evenett (2020) and Raza et al. (2021) could not be advised for robustness as this could disrupt already established complex production systems and, ironically, result in decreased supply security. They claim that increasing local production concentration will be economically inefficient because it will result in higher prices for consumers due to higher production costs. Therefore, resilience is better served when geographic bottlenecks in production and supply are reduced through corporate plans for globally dispersed suppliers and production locations diversification.

ASCCI Quarterly (2015) highlighted the following key lessons that the South African automotive sector should draw from Thailand;

*There have been some noteworthy conclusions about market access, incentives, input prices, and operational performance, but the most important lesson may be how these conclusions relate to one another. A master plan, or strategic framework, has served as the direction for the growth of the automotive sector in Thailand. The Master Plan has been essential in positioning, coordinating, and aligning industry policy instruments and development interventions that cover the other major topics ever since it was first*

*implemented. With the goal of "becoming the car production base in Asia with strong domestic supplier base," the first Master Plan was approved in 2002. The strategy allowed for significant increase in investment, production, and exports, with vehicle production rising by 162.4% and exports by 208% during that time (2002 –2006). Following the first plan's success, the second (2007–2011) and third (2011–2016) Master Plans were approved, which have continued to support the Thai automotive industry's success* (ASCCI Quarterly, 2015).

## Disclosure statement

There are no conflicts of interest to declare.

## Data statement

Data are available and stored in cloud (interested parties may contact the authors).

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# Appendices

**List of Appendices**.
Appendix 1: Interview request
Appendix 2: Interview guidelines/ schedule
Appendix 3: POPI Act research Consent Form

Note: Appendices are attached separately with document name "[Final]_0700044P_Appendices" to allow easy readability of this report. They may be put together with the report as a single document upon final submission.