Reshoring UK-based automotive manufacturing supply chains: the underpinning motivational framework from a multi-case perspective.

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Reshoring UK-based automotive manufacturing supply chains: the underpinning motivational framework from a multi-case perspective.

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Abstract

Offshoring is a complex location strategy primarily the transfer of production, supply and R&D activities from the home country to an overseas location, initially to benefit from labour intensive processes in emerging economies and late for market seeking strategies. The UK automotive manufacturing industry have offshored extensively with development of complex global supply chains substantiating a global approach. Recent evidence authenticates a strategic change towards reshoring manufacturing and supply back to the home country with thirteen percent return rate. Comprehending the motives and drivers of UK manufacturing reshoring is emergent.

The thesis investigates why UK-based automotive manufacturing facilities are motivated to reshoring elements of their supply chain back to the UK. Adopting a qualitative multiple-case study approach within UK automotive manufacturing industry, the thesis finds a magnitude of motives, barriers, and location decision influencers.

Findings are thematically mapped to grasp the relationships and interconnectivity across themes. The moderation of analytical findings determined four moderated motives and two moderated barriers with interconnectivity across multiple disciplinary themes, pertinent to lean and agile theoretical concepts in automotive manufacturing.

The new dynamic framework encompasses a wholistic reshoring position developed from UK automotive manufacturing insights, and articulates the underpinning theory, six moderated motives and barriers driven by the theoretical concepts, five strategic decision influences and in consideration of changes to the dynamic external environment.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

BLC	Best Landed Cost
JIT	Just in Time
JIS	Just in Sequence
LEP	Local Enterprise Partnerships
KPI	Key Performance Indicators
OEM	Original Equipment Manufacturer
QCD	Quality Cost Deliver
RQ	Research Question
RO	Research Objectives
TDC	Total Delivered Cost
TCO	Total Cost of Ownership
VM	Vehicle Manufacturer

Dedication

….to my husband, Ian, and children, Isla-Grace and Harriet-Mae – thank you for your love, support and patience.

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Author's declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is entirely my own work. I also confirm that this work fully acknowledges opinions, ideas, and contributions from the work of others. Since interviews were conducted as part of this study, ethical clearance for the data and research presented in this thesis has approved. The approval was sought and granted by the Faculty Ethics Committee on September 04, 2014.

I declare that the word count of this Thesis is 87,872 words.

Name: Michelle Upton

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Date: 12th May 2023

Chapter 1: Introduction

1.1 Background to the Thesis

Research into offshoring and outsourcing practices has been widely discussed (Ferdows, 1997; Grossman and Rossi-Hansberg, 2008; Jensen and Pedersen, 2012; Silveira, 2014) with firms globally relocating their production facilities and manufacturing processes overseas, and typically to emerging economies. Market-seeking and cost-seeking advantages through the optimisation of low-cost labour are noted as key drivers for manufacturing offshoring (Dunning, 1980); however, more recent evidence identifies changes in location strategies with signs of manufacturing offshoring slowing (Bailey and De Propris, 2014) and evidence of production relocating back to domestic markets and near border locations (Arlbjorn and Mikkelsen, 2014; Baroncelli *et al., 2017;* Ellram *et al*., 2013; Fratocchi *et al*., 2014; Kinkel, 2014; Tate, 2014).

1.1.1 Evolution of Manufacturing Strategies

Outsourcing and offshoring of manufacturing activities, particularly from high-wage countries to emerging economies, have been active strategies since the late 1960s (Dunning and Lundan, 2008; Hatonen and Erikssion, 2009) initiated by the optimisation of labour intensive processed to low-cost economies such as the Mexico maquiladora (Moxon, 1975, Stopford and Wells, 1972); with a surge from early 1990s through 2000s for the externalisation of basic production practices and various administrative and technical activities available in developing countries (Ellram *et al*., 2013; Lewin and Couto, 2007; Lewin and Peeters, 2006; Gereffi and Lee, 2012; Tate et al., 2014).

Outsourcing and offshoring are often intertwined yet represent different organisational strategies and goals: outsourcing is referred to when a firm entrusts an external entity to

perform their in-house activity driven by efficiency gains related to agglomeration economies requiring geographical proximity (Bailey and De Propris, 2014). Production functions are identified and performed independently and linked through market transactions by way of cluster models. Whilst manufacturing offshoring is a complex location strategy (Bailey and De Propris, 2014), primarily the transfer of production, supply, and R&D activities from the home country to overseas locations (Larsen *et al.*, 2013; Manning *et al.*, 2008; da Silveira, 2014), and driven by the need to reduce transaction costs and gain access to resources (Nachum and Zaheer, 2005).

1.1.2 Offshoring Appraisal

Research from high wage countries suggests firms offshored to optimises the benefits of hiring labour from low-cost economies, particularly for labour-intensive activities (Dana *et al.*, 2007; Davis and Naghavi, 2011; Kinkel and Maloca, 2009; Michel and Rycx, 2012), often described as "efficiency-seeking international strategy" (Jensen and Pedersen, 2012) and justified through reduced in transaction costs (Crino, 2010; Jabbour, 2010). Whilst firms may seek highly skilled or specialist resources that may be unavailable locally (Lewin *et al.*, 2009; Li *et al.*, 2008; Manning *et al.*, 2008) or entry into new markets (Haleem, Farooq, Wæhrens and Boer, 2018), often termed "resource-seeking strategy" (Jensen and Pedersen, 2012); offshoring is predominantly associated with cost reduction objectives (Bailey and De Propris, 2014).

Offshoring research here is mainly discussed through transaction cost reduction or internationalisation theory; Silveira (2014) suggests firms focus their offshoring effort on cost and flexibility, with limited attention to aspects of delivery, and therefore cost driven organisation are more likely to offshore supply and design activities. Flexible or innovative products however can erode potential gains in supply and design costs due to

increased transportation and communication costs (Buckley and Cassons, 1998) through high-variety low-volume demand increasing logistics costs.

Arik (2013) highlights manufacturing as the number one industry for offshoring between 1989 - 2000, thereafter manufacturing dropped to 5th place after technological, banking and business service activities; whilst the first phase of offshoring saw the relocation of production activities to benefit from low-cost labour and resources; value creation and innovation through high quality skills and knowledge became incentives post 2000. This upgrade of knowledge–intensive roles and knowledge-seeking strategy was recognised as an important motive for offshoring of advanced tasks (Jensen and Pedersen, 2012; Kennedy and Sharma, 2009).

Offshore decisions are subject to change (Fratocchi *et al.*, 2014); changes in economic conditions, sustainability and increasing customer expectations in speed, flexibility and productivity have led firms to reconsider their business strategy (Bergmen and Ramachandran, 2010). Supply chains have become progressively riskier; as customer preferences become more varied so do the products variants manufactured, and thus, the increased level of supply chain uncertainty and complexity from offshoring practices are viewed by Thun and Hoenig (2009) as increasing supply chain vulnerability.

In the context of automotive manufacturing, original equipment manufacturers (OEMs) have dispersed many production activities to offshore locations, whilst high value-added innovation activities were retained in-house to retain control of the product and process, develop future capabilities and prevent knowledge access to automotive competitors (Slepniov *et al.*, 2014). Offshoring large proportions of UK manufacturing supply chains overseas has created fractures in value chains (Bailey and De Propris, 2014) with more than 60% of British firms having experienced vulnerability from overseas suppliers

during the 2008-2009 recession (EEF survey, 2009), with two-thirds of manufacturers having re-evaluated their supply chain location strategy (Fratocchi *et al.,* 2014).

Recent statistics by Lampon and Rivo-Lopez (2022) across multiple manufacturing industries with prior offshore activity showed on average, the frequency of manufacturing plants that had backshored was 13.1%, in a time frame of 9.4 years between offshoring and backshoring. The governance mode of these backshoring plants was 55.7% from external suppliers and 44.3% from the firm's own production network, suggesting slightly more uptake of supplier reshoring than that of the focal firm's own facilities. Geographically, the most significant origin of backshoring was unsurprisingly from China with 36.1%, with the United Kingdom leading the backshored destination with 18% against other European countries.

Manufacturing location decisions are complex, and many offshoring decisions have been criticised for poor misjudgement and location choice (Tate 2013; Kinkel and Maloca, 2009); impacting on a more recent phenomenon of reshoring *et al.,* born from the need to change strategic tact. Recent German manufacturing statistics show a 17% decline in offshoring whilst 2% of manufacturing companies have been actively backshoring from 2010-2012 (Kinkel and Zanker, 2013), demonstrating a gradual shift in location choice.

Outsourcing and offshoring of manufacturing activities have been widely discussed in academic literature in recent decades triggered by technological advancements, changes to political environments and global development in production and service activities and strategies (Hansen and Rasmussen, 2013). More recently a change strategy has with organisations relocating manufacturing and supply chains back to the home county.

Increasing complexity of original equipment manufacturers (OEMs) to sustain competitive advantage and support expanding market requirements have taken effect on

the upstream supply chain; with increased pressure to implement rapid changes to product definition, model and vehicle mix, the supply chain must be highly flexible and responsive to support the ever-growing demands of vehicle manufacturers. In recent decades' economic decline drove OEMs to review sourcing strategies to become more market responsive and where possible, components once locally sourced were offshored to low-cost countries to optimise the benefits of reduced transaction costs (McCarthy and Anagnostou, 2004) such as labour and production resources whilst leveraging supplier competencies (Collins *et al.,* 1997), which encouraged a reaction through the supply chain. More recently, a change in direction is beginning to emerge with one in six manufacturers reshoring operations to the UK (Groom, 2013; MAS, 2014) and a further one in six reshoring supply chains from low-cost economies (Harris, 2014); this relatively new phenomenon of returning product home is broadly defined as reshoring (Gray *et al.,* 2013).

1.1.3 Emerging Reshoring Phenomenon

Reshoring is considered an emerging trend by scholars and practitioners (Barbieri *et al.,* 2018; Elia, 2021; Fratocchi *et al.,* 2014; Wiesmann *et al.,* 2017) and whilst this phenomena is not developed to the extent of offshoring, the interest in industry has grown in recent years with Lampon and Rivo-Lopez (2022) acknowledging 13% return of previous offshored manufacturing. Geographically, the 'home country' is often considered the US (Ellram *et al.,* 2013; Gray *et al.,* 2013; Tate *et al.,* 2014); Germany (Kinkel and Maloca, 2009; Kinkel, 2012; 14; 2020); other European regions (*Barbieri et al*., 2018; Fratocchi *et al*., 2013; 2014); and the UK (Bailey and De Propris, 2014). This raised the question 'why are firm reshoring back to the home country?' amongst many evolving questions in a developing field.

The work of Barbieri *et al.*, (2018) suggests the drivers of manufacturing reshoring are heavily researched in existing literature; whilst motivations have certainly taken up interest in the academic field, many studies adopt a conceptual framework with analysis of secondary studies, or empirical frameworks based on an accumulation of different sectors within manufacturing industry or across multiple industries; research with concentrated focus in a leading industry sector is acknowledged as an area requiring scholarly investigation.

1.2 Research Purpose

1.2.1 Research Question

Reshoring studies have examined the phenomena from varied positions, industries, methodologies, and theories, thus far gaps in the literature remain evident to understand the change in strategy towards UK reshoring in a concentrated leading industry, prompting the following research question for this thesis:

> *RQ1: Why are UK-based automotive manufacturing facilities motivated to reshore elements of their supply chain to the UK?*

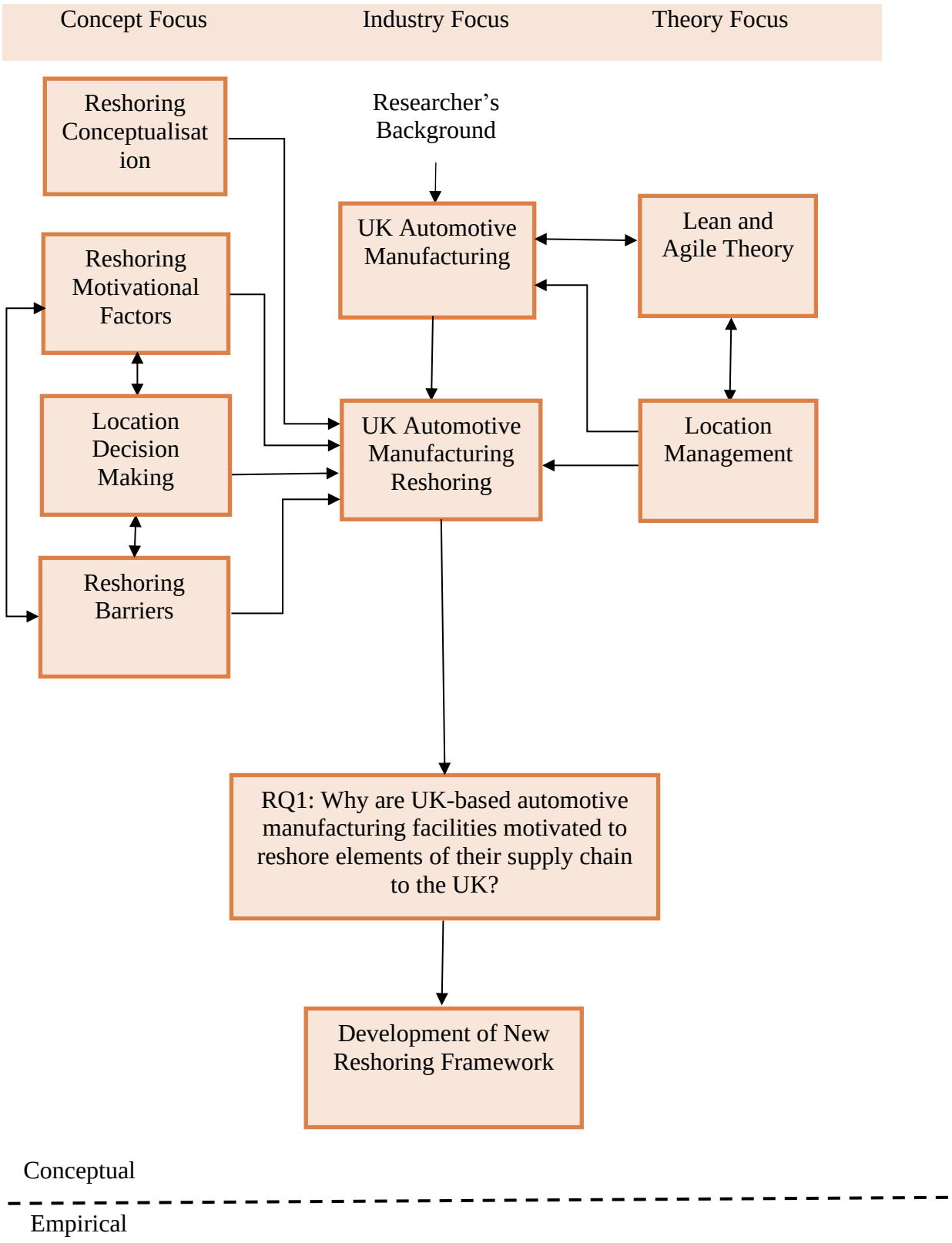
1.2.2 Research Framework

The positioning of this research takes into consideration the main outputs from the secondary literature, the industry in which the empirical research is collected, and the main theory incorporated into the research focus. The trajectory from Initial Research Position (1) to Evolved Research Position (2) flows through this thesis to demonstrate the evolution of the research topic.

Figure 1.1 Initial Research Position (1) illustrates the early focus of the research following a review of the reshoring literature; at the initial stage, two research were proposed and two theoretical lenses. However, as the research evolved it was acknowledged at the data analytical stage, the scope of the research was vast and therefore required a degree of realignment. Allowing the data to lead, clarity came from the strength of the empirical research positioned to address RQ1 and the underpinning theory aligned with RQ1. The alignment of the research focus is explained further in Chapter 5 and illustrated in Figure 5.1 Evolved Research Position (2).

A review of the existing body of literature (prior to the empirical data collection) unveiled the prominent reshoring concepts, as shown in Figure 1.1 Initial Research Position (1). Reshoring conceptualisation to clarify the characteristics of reshoring from the misinterpretations identified in the literature with confusion between outsourcing and offshoring, insourcing and reshoring. The most significant concept that commands comprehension is the motivation behind the UK supply chains actively seeking opportunities to reshore manufacturing from overseas locations to the UK, and in respect of these motives, a grasp of the barriers that pose limitations to the extent of reshoring strategies. Between understanding the concept of reshoring and the motivational factors, greater appreciation for location decision-making in respect to UK supply chain reshoring was determined.

Figure 1.1 Initial Research Position (1)



The motivation for the research topic was in partial, inspired by the professional background of this researcher, holding Senior Management remit in supply chain management in the automotive manufacturing industry. The researcher themselves play a fundamental role in this extensive doctoral process; it was hereby viewed that a topic of importance as well as interest to the researcher, was essential. The industry focus is unsurprisingly positioned in the automotive manufacturing industry with justification outlined in Chapter 3 Methodology.

1.2.3 Research Objectives

This research acknowledges gaps in the reshoring literature, encompassing the reshoring concepts and rationale behind the change in strategy; the incompleteness of clear industry perspective on reshoring due to investigations across varied industries and amalgamation of data; and the underpinning theory pertinent to the industry applications for meaningful interpretations and the academic concepts. Recognition of changes to the wider environment affecting performance of UK supply chains is narrowly identified and an opportunity to expand the body of knowledge. The researcher aims to develop a unique reshoring framework in contribution to the originality of this study. To address the RQ1 and fulfil the aims of this study, the following research objectives (RO) will be satisfied:

RO1: Conduct a literature review pertinent to the research topic to determine the research gaps in the existing reshoring literature and the focus of this research moving forward.

RO2: Design the most appropriate research methodology and method to collect rich viewpoints from participants with experience and knowledge of automotive manufacturing reshoring.

RO3. Critically evaluate the most appropriate analytical process to analyse the empirical data, present the findings and validate the results.

RO4: Critically evaluate the motives for UK automotive manufacturing supply chain reshoring, and in do so, the main barriers that impact UK reshoring.

RO5. Articulate a unique reshoring framework to underpin UK automotive manufacturing supply chain reshoring.

1.3 Structure of the Thesis

The remainder of this thesis is dispersed across six chapters and illustrated in Figure 1.2. Presented in Chapter 2 is a review of the reshoring literature. Analysis of the literature was used to appraise the position of reshoring and identification of several gaps in the body literature. A contemporaneous study, initially the gaps in knowledge were vast with calls for academic development in the subject area. The Illustrative Literature (Appendix A) and the Key Concepts Matrix (Appendix B) demonstrate the relevant reshoring literature building up to the data collection phase and shaping the interview guide. Throughout the duration of this study, the researcher kept abreast of the manufacturing reshoring literature with regular updates accordingly. The key findings from the literature review showed reshoring in its infancy at the early stages of investigation however, development in the academic field has continued to strengthen the main concepts initially identified whilst contemporary aspects were additionally considered.

Chapter 3 expands on the philosophical paradigm of this study and provides justification for decisions made in the method and methodology sections. In consideration of the research topic and industry setting, the contemporaneous and the methodological gaps in existing reshoring studies; clear justification is provided for a qualitative, case study

investigation to gain rich insights into the motivations of automotive manufacturing companies to reshore supply chains. Deployment of the method and analytical process is explained and leads into the empirical findings.

The purpose of Chapter 4 is to provide the reader with a clear understanding of the automotive industry tier structure which is paramount to the discussion of key findings. An explanation of the thirteen anonymised case studies in terms of position in the tier structure, commodities manufactured and supply conditions to the customer; and an introduction to the 19 anonymised individual participants to appreciate the significance of their roles and responsibilities in relation to automotive supply chain reshoring.

Presented in Chapter 5 and 6 are the empirical analysis and findings. The analytical framework follows that discussed in Chapter 3 and the Nvivo extracts provided in the Appendices. Following data analysis, it was clear the girth of the research was vast and required realigning to the prominent research focus, an explanation of this is provided in Chapter 5. The empirical findings cut across a multitude of themes and are illustrated in the Reshoring Analytical Map. The map provides clear visualisation of all the influential factors motivating reshoring and the interconnectivity between codes. Six moderating factors were identified from multidisciplinary themes, pertinent to addressing the research question and provide meaningful discussions in Chapter 6. Correspondence with the secondary research in Chapter 2 is discussed and a unique reshoring framework is presented.

Finally, Chapter 7 concludes the study with a review of the key outputs from each chapter, and explicitly addressed the five research objects. The research defends the position of this research with multiple contributions to enhance the body of knowledge, and propositions for future research.

Chapter 2: Literature Review

2.1 Introduction

The background to this research positions UK automotive manufacturing reshoring a viable and contemporary topic, with vast opportunities for further investigation. Chapter 1 outlines the motivation and research objectives (RO's) for this study, to comprehensively analyse, develop meaningful insights, and articulate contribution to the body of knowledge. This chapter addresses RO1 with a literature review pertinent to reshoring and more specifically automotive manufacturing reshoring. The secondary analytics enables the researcher to clearly identify gaps in the existing reshoring literature and articulate propositions to move forward for empirical investigation.

Reshoring is a contemporary phenomenon that has gradually evolved between 2014 and 2022. The early published work guided the researcher in establishing clear concepts and themes to move forward with the investigation and develop inroads to the appropriate methodological considerations. The researcher utilised Webster and Watson (2002) and Okoli and Schabram (2010) to identify, review and summarise the existing literature and opportunities for further study (Iden and Eikenrokk, 2013). Key words search began with "reshoring", "back-shoring", "back-reshoring", "home-shoring" and "near-shoring" with inclusive criteria of scholarly publications only and excluding trade publication, magazines, and other non-academic documentation or citation-only. The relevant initial outputs were compiled in the Illustrated Literature (Appendix A) and Key Concepts matrix (Appendix B) (Webster and Watson, 2002) to provide transparency and value in positioning the initial focus of this research. As the reshoring literature evolved, the advanced word-search captured the context of this research aligned to RQ1 with many reshoring(+) combinations (automotive, manufacturing, supply chains, location decision,

lean, agile, close proximity, motives, responsive supply chain, OEM influence, supply chain capability, barriers, global sourcing); and a continual review throughout the research. Thus, more recent literature utilised in the Reshoring Motives matrix will not appear in the Illustrative Literature table (Appendix A) that was developed to initially establish the position of this research.

The key concepts analysed in this chapter include the characterisation of reshoring and defining meaning around those key terms to avoid misinterpretation; location decision-making and location strategy; reshoring motivational factors pertinent to addressing RQ1; the barriers and limitations to reshoring that go together with reshoring motives; and the theoretical proposition of lean and agile methodologies in automotive supply chains. The iterative process of this research encourages movement back and forth to allow the new meaning to feedback into the body of knowledge. Thus, the empirically moderated reshoring motives and barriers verified in Chapter 6 Discussion, is linked back to this chapter to review the literature specifically coordinated with RQ1 and enable the researcher to conclude the contribution of the work in Chapter 7 beyond the existing knowledge.

2.2 Reshoring

2.2.1 Defining and Conceptualising Reshoring

Reshoring terminology and characterisation is debated across the academic literature based on the evolutionary conditions in which the phenomenon presents; regular misconceptions refer to insourcing where in fact the transition is reshoring or near-shoring. The same misunderstanding is present with offshoring, whereby reference is made to outsourcing when the movement is a location change; or in some circumstances

a combined international manufacturing strategy (Bals *et al*., 2016). Misconceptions from wider literature cross over geographical location decision making with strategic sourcing decisions (i.e. make or buy decisions) and hence the need to conceptualise and characterise reshoring terminology. The generic term reshoring spans different interpretations and characteristics under alternative expressions including backshoring, back-reshoring, near-shoring and home-shoring.

Backshoring or back-reshoring is the relocation of part of the owned company from a foreign location back to its original location Albjorn and Mikklesen (2014); whilst Fratocchi *et al*. (2014) characterises back-reshoring as the reverse decision with respect to a previous off-shoring process which may not necessarily involve the repatriation or closure of the whole company offshored and is essentially a decision to relocate irrespective of the ownership mode in the offshored country. Kinkel and Maloca (2009) determine back-shoring as the "re-concentration of parts of production from own foreign locations as well as from foreign suppliers to the domestic production site of the company" identifying ownership as a key factor. Kinkle (2012: 2020) classifies the 're-concentration of the firm's production capacities, trying to exploit the benefits if higher capacity utilisation and a superior relation of variable costs to fixed at their existing location". Dachs and Kinkle (2013) differentiate between high-income and low-income countries; and Kinkle and Zanker (2013) distinguish between the on-shore when relocation is within the firm's home country and back-shore when production activity is transferred from a foreign location. A more specific perspective of back-shoring focuses on the "the geographic relocation of a functional, value creating operation from a location abroad back to the domestic country of the company" Holz (2009), here operation value creation is intrinsic to its characteristic.

Re-shoring is the movement of manufacturing back to the home country of its parent company (Ellram, 2013), recognising ownership of the facility as engrained in the terminology. Gray *et al*. (2013) however, argues reshoring terminologies are agnostic as to whether the manufacturing activity being reshored is from a wholly owned facility once offshored or from an offshore supplier; essentially reshoring is a geographical location decision irrespective of prior offshore decisions. Back-reshoring suggests "a voluntary corporate strategy regarding the home-country's partial or total re-location of (in-sourced or out-sourced) production to serve the local, regional or global demands" (Fratocchi *et al*., 2014; Ancarani *et al*., 2015), acknowledging that the term 'reshoring' is aligned with a change of geographic location and 'back-reshoring' explicitly incorporates repatriation of former offshored production.

Home-shoring is the relocation of manufacturing activities back to the home country (Fratocchi *et al*., 2014), aligning with Ellram (2013) interpretation of re-shoring although not specific to the origin of the parent company; near-shoring is then suggested as the desire to move closer to customer markets (Fratocchi *et al*., 2014). Home-shoring and near-shoring are appropriate when the return location can offer established infrastructure, labour is readily available and the political environment is conductive to change Tate *et al*., (2014). Tate highlights effectively meeting the needs and expectations of existing customers and appealing to potential new customers is the right-shoring decision. Whilst Fratocchi *et al*. (2015) argue near-reshoring to be "production activities, previously off-shored in a relatively distant country, are relocated in a third country, belonging to the firm's home region".

Offshoring and reshoring are summarised as the transfer of production from one geographical location to another, either from the home country to another country 'offshoring' and return to the home country 'reshoring' (Gylling *et al.*, 2015). This

however does not concern the ownership of the facility or process being transferred. Outsourcing here is handing over all or part of production activities or processes to an external organisation; insourcing represents the reverse with the return of externalised activities brought back in-house. Offshore outsourcing is the "relocation of in-house activities or functions from another company's home country to an independent party in another country"; and insource reshoring is the "repatriation of activities or functions from another country to be carried out in-house by a company in its home country" (Gylling *et al*., 2015).

Table 2.1 provides a direct comparison of the theoretical considerations and characteristics from the various terms associated with reshoring.

Table 2.1 Comparison of theoretical reshoring considerations

Author	Theoretical Concept	Definition/Description	Unit of Analysis	Relocation to Home or Near Country	Offshore Repatriation (Yes/No)	Ownership or Supplier	Location Decision
Albjorn and Mikklesen (2014)	Backshoring; Back-reshoring	Relocation of part of the owned company from a foreign location back to its original location.	Overseas manufacturing activity	Home Country	Yes	Ownership	Yes
Ancarani *et al*. (2015)	Back-reshoring	"A voluntary corporate strategy regarding the home-country's partial or total relocation of production to serve the local, regional or global demands".	Manufacturing facility	Home Country	Yes	Ownership	Yes
Fratocchi *et al*. (2014)	Back-reshoring	Voluntary corporate strategy regarding the home-country's partial or total; re-location of (in-sourced or out-sourced) production to serve the local, regional or global demands.	Overseas manufacturing activity	Home Country	Yes	Ownership	Yes
Kinkel and Maloca (2009); Kinkel (2012;2014); Dachs and Kinkel (2013)	Backshoring	Re-concentration of parts of production from own foreign locations as well as from foreign suppliers to the domestic production site of the company.	Overseas manufacturing activity	Home Country	Yes	Ownership or Supplier	Yes
Holz (2009)	Back-shoring	Functional, value creating operation from a foreign location back to the home country of the company.	Overseas manufacturing activity	Home Country	No	Ownership or Supplier	Yes
Bals *et al*. (2016)	Outsourced Backshoring	Value creation activities previously delegated to suppliers is relocated to the same or alternative suppliers in the buying firm's home country.	Overseas manufacturing activity	Home Country	No	Supplier	Yes
Bals *et al*. (2016)	In-house Backshoring	Production transferred to a new facility next to the headquarters premises.	Overseas manufacturing activity	Home Country	No	Ownership	Yes
Ellram (2013)	Re-shoring	Moving manufacturing back to the home country of its parent company.	Overseas manufacturing activity	Home Country	Yes	Ownership	Yes
Wiesmann *et al.*, (2017)	Reshoring	Movement of offshored production back to its previous location where the firm's headquarters are located.	Overseas manufacturing activity	Home Country	Yes	Ownership	Yes
Gray *et el*. (2013)	Reshoring	Location decision agnostic to prior offshore activity, owned facility or offshore supplier.	Overseas manufacturing activity	Home or Near Country	No	Ownership or Supplier	Yes
Gylling (2015)	Reshoring	Transfer of production from one geographical location to the home country, agnostic of ownership.	Overseas manufacturing activity	Home Country	Yes	Ownership or Supplier	Yes
Frattocchi *et al*. (2014)	Home-shoring	Relocation of manufacturing activities back to the home country.	Overseas manufacturing activity	Home Country	Yes	Ownership	Yes
Ancarani *et al*. (2015)	Near-reshoring	Previously offshored production activities are relocated "in a foreign country in the same region of the firm's home country".	Overseas manufacturing activity	Near Country	Yes	Ownership	Yes
Frattocchi *et al*. (2014)	Near-shoring	Production activities, previously off-shored in a relatively distant country, are relocated in a third country, belonging to the firm's home region.	Overseas manufacturing activity	Near Country	Yes	Ownership	Yes
Bals *et al*. (2016)	Outsourced Nearshoring	Supplier value creation activities are relocated from offshore to a border state location of the buying company.	Overseas manufacturing activity	Near Country	No	Supplier	Yes
Bals *et al*. (2016)	In-house Nearshoring	Value creation activities transferred in order to produce closer to their headquarters.	Overseas manufacturing activity	Near Country	No	Ownership	Yes

Various definitions suggest manufacturing reshoring is predominantly based around location decision-making; taking the decision to move the manufacturing facility or activity from one location (overseas) to another (the home country or border country). The ownership characteristic either partial or total ownership of the manufacturing facility is apparent in each consideration, with broader inclusion of the supply chain in the reshoring term specifically identified by Gray *et al.,* (2013) and Bals *et al.,* (2016) where 'outsourced' and 'in-house' are engrained in the concept. A summary of the reshoring characteristics is presented in Table 2.2 with each theoretical concept determined by the type of location, facility, and decision.

Table 2.2 Summary of Reshoring Characteristics

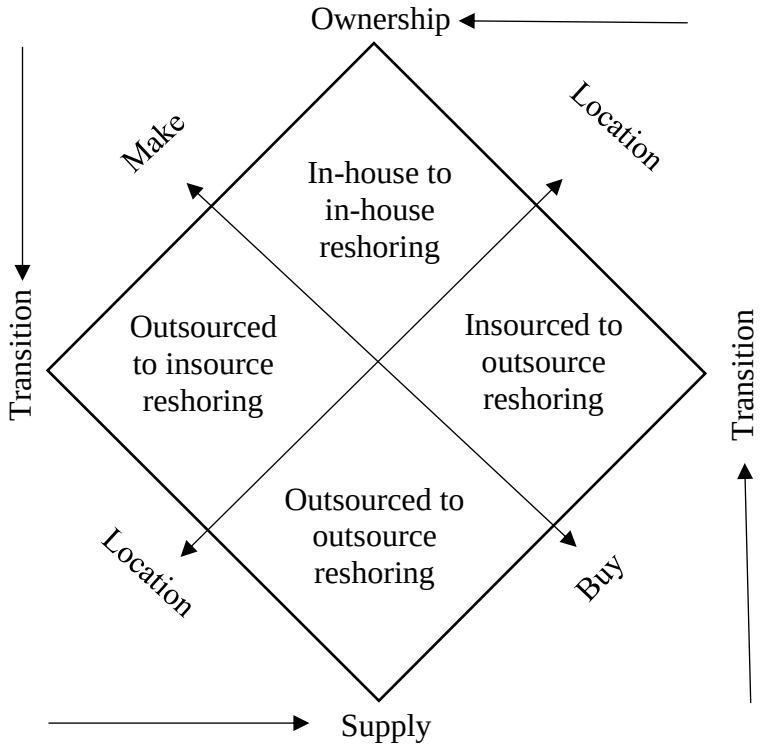
Concept	**Location**	**Facility**	**Decision**
Backshoring (including in-house & outsourced)	Home country	Ownership or supplier	Location decision
Back-reshoring	Home country	Ownership	Location decision
Reshoring	Home country	Ownership or supplier	Location decision
Home-shoring	Home country	Ownership	Location decision
Near-shoring (including in-house & outsourced)	Near country	Ownership or supplier	Location decision

Ambiguity surrounds the definitions for location and ownership contexts which impede clarity and restrict the considerations of reshoring and insourcing motivations and drivers of managerial decision making (Gray *et al*., 2013; Fratocchi *et al*, 2013). Foerstl *et al*., (2016) conceptualises outsourcing and offshoring, insourcing, and reshoring with the same two differentiating factors: ownership and location, suggesting the terms are not mutually exclusive and are often used as combined strategies (Bengtsson and Berggren, 2008). They determine insourcing and reshoring changes as "one dimensional" or

combined “two dimensional” with hybrid changes where firms relocate closer but not back to the home country or invests in a joint venture with established partnerships.

Ashby (2016) considers the possibilities of transitions between location decisions and ownership choices; Figure 1 adapts the principles of Ashby (2016) and Gray *et al.* (2013) in forming a two-dimensional reshoring consideration.

Figure 2.1 Reshoring Options



Options	Explanation
In-house to in-house reshoring	Internal facility overseas to internal facility home country
Outsourced to outsource reshoring	External supply overseas to external supply home country
Insourced to outsource reshoring	Internal process overseas to external supply home country
Outsourced to insource reshoring	External supply overseas to internal facility home country

(Adapted from Ashby, 2016; Gray *et al.*, 2013).

This two-dimensional model contemplates different facets of decision making with the consideration that firms may have offshored manufacturing facilities which they then decide to reshore for outsource supply; in addition, manufacturing may have been offshore outsourced, and a further decision taken to reshore and insource manufacturing

back in-house (Gray *et al*., 2013; Ashby, 2014). Breakdown of options (in Figure 2.1) explains this transition within the ownership dimension (Bals *et al.,* 2016; Foerstl *et al.,* 2016), moving from offshore ownership to reshore supply, and offshore outsourced to insourced reshoring. Equally, the considerations remain for one-dimensional choices with in-house-to-in-house reshoring and outsourced-to-outsource reshoring. On the contrary, re-insourcing has clear representation as a strategy to bring "*a formerly outsourced activity back in-house*" and should therefore not be confused with backsourcing as a direct reversal of a prior outsourcing decision with a prior outsourcing supplier; from a cost perspective it is easier to reverse outsourcing decisions than offshoring decisions, particularly supply chain reversals (Drauz, 2014).

2.2.2 Location Decisions

Reshoring is a complex location decision (Wiesmann *et al.*, 2017; Gray *et al*., 2013) with greater focus on knowledge creation and value capture (Gereffi and Lee, 2012) whilst controlling costs. Location decisions are too often based on hard cost comparisons such as labour rates with limited consideration given to 'dynamic' factor inputs (Kinkel and Maloca, 2009; Wiesmann *et al.,* 2017), with these softer and less quantifiable aspects more difficult to analyse, these can become excused from the location decision-making process. Location is often a neglected factor particularly in MNEs, with location decisions often having long-term impact on an organisation's profitability and competitive position in the market; despite the importance, such decisions are often based on limited knowledge and management information which is then simplified (Gylling *et al.*, 2015), and therefore fraught with business risks. Decisions are limited to the information manages have available, their cognitive limitations and time constraints for making such decisions; rationality is then applied after choices have been simplified.

Within global manufacturing MNE networks, decisions regarding network and factory issues are often independent of each other, and as such decisions regarding factory level activities are usually made by factory or production managers, whilst network level decisions regarding location and relocation are made by the highest level of management (Colotla *et al*., 2003); recognising that location decisions are often made by management outside the factory whilst the impact and effect of those location choices are dealt with and managed by management within the factory. The author therefore argues that there is insufficient factory-level knowledge taken into consideration when making location decisions. Companies overestimate the cost benefits of offshore outsourcing and lack sufficient attention to important factors such as the balancing of demand and supply, the cost of uncertainty in the supply chain, technology requirements and changing conditions (Gylling *et al*., 2015) which should all be considered in the location decision making process. De Treville and Trigeorgis (2010) recognise the discounted cash flow (DCF) model commonly used for making production location decisions undervalues the element of flexibility and the advantage of production located close to the market. As such, companies may find themselves with global supply chains which are lean and low cost in relatively normal conditions, yet very costly during high uncertainly and change situations. Therefore, production environments with high uncertainty require local production close to the market (da Silveira, 2014) and as a result near-shore production are becoming more competitive in many cases (Ferreira and Prokopets, 2009).

The predominant evaluation method used in industries such as automotive manufacturing is the cost comparison method, using a simple comparison of fixed and variable costs and with limited resources, notably the same method used for making outsourcing and re-insourcing, offshoring and onshoring decisions, with limited methodological change following the economic crisis (Drauz 2014). Here, no dynamic factor inputs (Kinkel,

2012) were incorporated as part of the cost comparison calculation, therefore a lack of inclusive costing for changeable environments and variable conditions. However, within the automotive manufacturing study, it is proposed that manufacturing strategic decisions are given more complex considerations by the vehicle manufacturer compared to tier 1 suppliers irrespective of project size (Drauz, 2014). In calculating strategic location decisions, responsibility lies with the manufacturing strategy department or in the absence of dedicated strategic responsibility, the purchasing or logistics department will make the calculations which may have input from financial controlling department; final decisions are made by the board of directors or plant manager level with approval from the board of directors on project size.

Within the automotive manufacturing context and the umbrella of lean manufacturing, OEMs have gradually deployed responsibility for assembly, modularisation (Bennett and Klug, 2012) and R&D to Tier-1 suppliers to reduce supply chain costs. This subsequently had an impact on supplier geographical location and close proximity to the OEM (Bailey and De Propris, 2014) however, the same principles were not replicated upstream and with limited attempt to source components locally. With a strategic shift towards local sourcing (Automotive Council, 2016), Drauz (2016) maintains it will take OEMs over three years to re-integrate outsourced projects due to the life cycle of the car model, yet less constraints apparent for Tier-1 suppliers who are not time restricted for the integration process: possibly as a result of retaining in-house capabilities, distinguishing different manufacturing strategies between the car manufacturer and automotive suppliers. We could therefore argue that projects which have previously offshored from the home country would have less difficultly re-integrating the reshoring project based on prior existence in the home country; recognising it is easier for suppliers to make and activate reshoring decisions compared to OEMs. Kinkel (2012) proposes that where organisations

have been successful in establishing customer-specific product and production process developments with their existing customers oversees those firms are more reluctant to backshore production to home markets of the parent company. Suppliers on the contrary have engaged more in backshoring production because of suppliers coming under pressure to follow investments or activities of their key customers (Kinkel *et al*., 2007); thus, as a result of the economic crisis many multinational organisations reduced foreign direct investment which has an influence within the supply network. It is argued here that large MNEs have leveraged their power within customer-supplier relationships (Salancik and Pfeffer, 1997) to encourage the relocation of supplier production overseas.

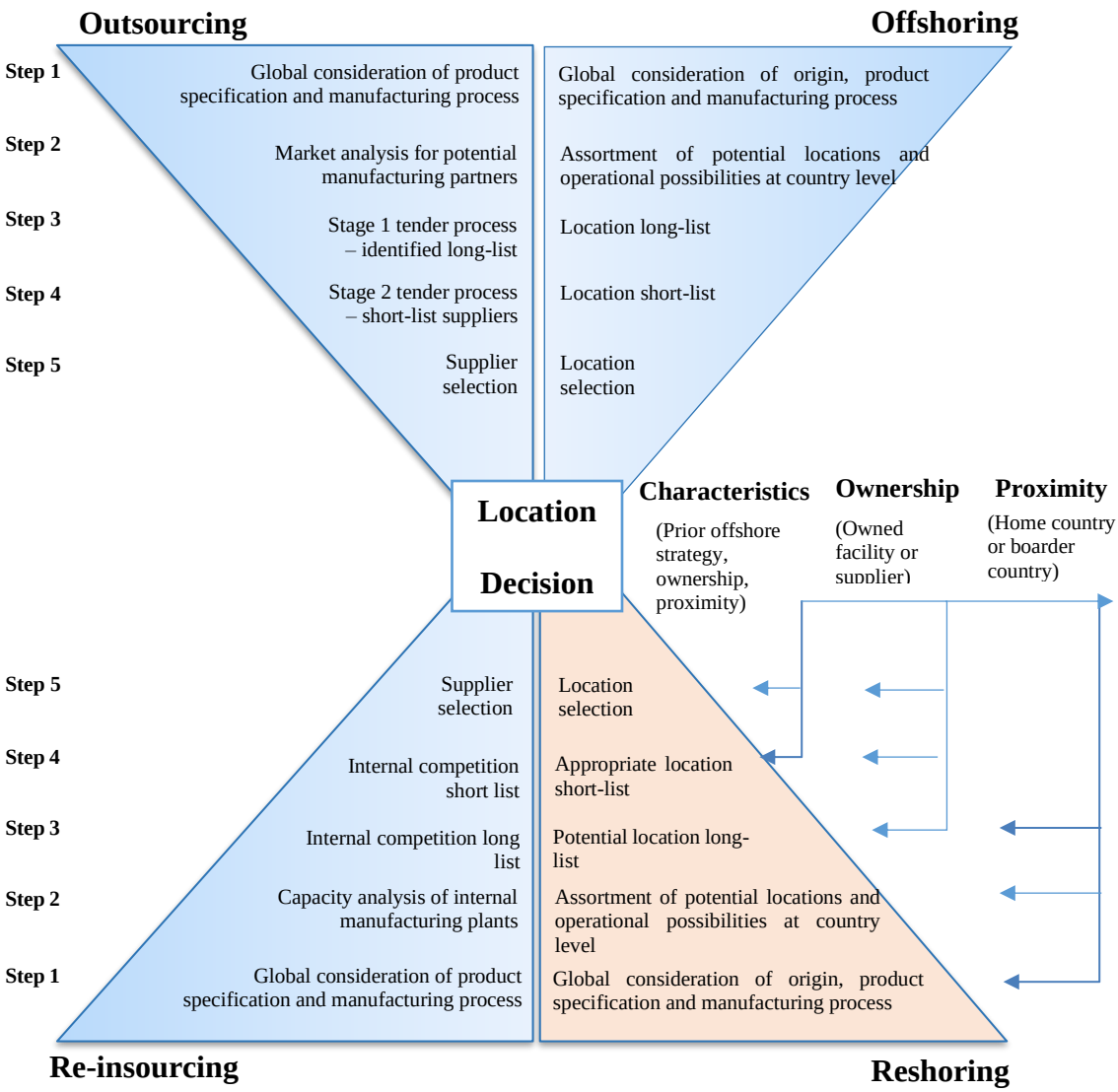
Location is a determined factor of reshoring however, it is also a neglected factor in the decision-making process with many MNEs failing to take a holistic view of the long-term impact of location decisions, highlighting a gap between network and factory level considerations (Gylling *et al.*, 2015). Simple cost comparison models are used to make location decisions, which neglect the importance and on-cost of dynamic factors (Kinkel, 2012), however evidence in Table 2.3 and Table 2.4 shows dynamic changes should be largely considered in a firm's long-term location strategy. The same limited methodical approach is used to make outsourcing and insourcing, offshoring, and reshoring decisions, which, highlights transparencies across the different strategies. However, replicating the same process in reverse (i.e., simply reversing the offshoring process) or focusing only on the latter stages of the location evaluation model proposed by Drauz (2014), shows a lack of attention to the specific characteristics embedded in reshoring and therefore narrows and simplifies the potential scope of reshoring location decisions. Overlooking the initial stages in the location evaluation model (steps 1, 2 and 3) will result in missed opportunities for the most appropriate reshoring or nearshoring solution and will therefore expose once again the use of limited and simplified knowledge (Gylling *et al.*, 2015).

Figure 2.2 Evaluation process for location decision-making expands on the work of Drauz (2014) with considerations of offshoring and outsourcing to incorporate the reshoring characteristics evidenced in Table 2.1 and Table 2.2. The adapted model (Figure 2.2) further identifies specific steps to each quadrant of location decision making with justification for each reshoring step.

Depicting the strategic evaluation and decision-making process for outsourcing and offshoring, Drauz (2014) recommends applying only the latter step 'supplier selection or 'location selection' in the decision-making process. However, in applying the same process to location decisions, variables in the reshoring terminology (see Table 2.1) extend beyond the one-dimensional process including, characterisation of reshoring definition; intended location proximity to the home market; and ownership of the reshoring facility or supply chain element.

Where reshoring terminologies (backshoring and back-reshoring) are depicted by offshoring repatriation (Albjorn and Mikklesen, 2014; Ancarani *et al*., 2015; Frattochi *et al*., 2014), Drauz's interpretation of applying only step 4 and 5 (Figure 2.2) is valid. However, the researcher identifies disputes of repatriation arguing location decisions are agnostic of prior offshoring practices with variables requiring wider considerations (Bals *et al*., 2016; Gray *et al*., 2013), therefore step 1 to 3 in Figure 2.2 are required.

Figure 2.2 Evaluation process for location decision-making (adapted from Drauz, 2014)



Further, Table 2.2 narrows down the characteristics of reshoring to ownership and location (Albjorn and Mikklesen, 2014; Ancarani *et al.*, 2015; Ellram *et al.*, 2013; Frattochi *et al.*, 2014; Kinkel and Maloca, 2009). Where internal reshoring is anticipated, a location long-list (step 3) is required, for MNEs with many relocation opportunities. Reshoring suppliers require greater contemplation (Gray *et al.*, 2013; Gylling *et al.*, 2015; Kinkel, 2012) with opportunity for large-scale competition at home or border countries, therefore stage 3 is the minimum starting point. The firms supply network strategy will

determine reshoring to the home country or nearshoring to border locations, whilst the type of component and level of component criticality are untested variables in the suitability for reshoring; with these wider factors for consideration, the author argues location proximity within the reshoring strategy require decision-making from a global perspective at step 1.

Unique two-dimensional model for location choices (Figure 2.1) goes beyond the work of Gray *et al*., (2013) and Ashby (2014), providing a new integrated framework of make or buy strategy combined with location decisions. This considers the opportunity for offshore manufacturing to be reshored for outsource supply and further, outsourced offshore supply can be reshored for in-house manufacture. This framework opens further research opportunities to combine strategies between insourced and outsourced offshoring to insourced and outsourced reshoring with the analysis of transition between strategies.

2.2.3 Location Strategy

Offshoring decisions have been hasty (Wiesmann *et al.*,2017) and too often addressed as simple financial matters when in reality, the impact of such decisions not only increase cost, but are also business critical affecting the survival of entire firms, industries and ultimately the economy (Denning, 2013). Ashby (2016) advocates moving away from the cost centred offshoring approach to selecting the most appropriate/suitable/right supplier and perhaps local supplier. In doing so firms need to reframe from the short-term transactional approach and adopt a long-term perspective investing in collaborative supplier relationships, developing a supply network built on "trust, reciprocity, and shared principles" for a sustainable supplier performance incorporating location decisions (Dunning, 1980). Complex location decisions require caution and balancing of strategic

benefits and risks which, is an area lacking detailed evaluation when assessing the production location (Lewin and Peeters, 2006).

Internationalisation is subject to dynamic changes in the home and foreign locations (Dachs and Kinkel, 2013; Kinkel and Maloca, 2009). Examples of dynamic changes are implications which are highly subject to change and changing environments, and are more difficult to quantify the cost aspect, such as lead-time, co-ordination costs, quality, and supply chain flexibility. Kinkel (2012) emphasises the need to consider dynamic changes in the location decision making process for the medium-term planning, using advanced scenario-based planning and dynamic decision model (Wiesmann *et al.*, 2017). However, in today's ever changing international environment, the need to be flexible and mobile is crucial for all manufacturing organisations and should be a priority in location decision making (Dachs and Kinkel, 2013). In following long-term offshoring strategies, Kinkel (2012) recommends maintaining a high level of flexibility and ability to deliver in the home country and overseas; establish clear quality guidelines and agreed quality standards in each location; and foresee the need to invest in management coordination cost. In doing so the firm should have the accommodate the dynamic international changes and adapt in a timely.

2.2.4 Location and Duration Analysis

Wider internationalisation theory supported by Dunning (1993) and Narula and Dunning (2000) identify four main categories of manufacturing location drivers; opportunities for cost reduction; cultural, political, legal, geographical, economic and infrastructural features of the host country; availability of resources; and proximity to customers and other network node. Whilst these drivers primarily exhibit location-specific advantages, Ancarini *et al*., (2015) recognise other authors focus on firm-specific and product-specific properties such as responsiveness, status of the product in the value chain (Meijboom and

Voordojk, 2003), degree of product customisation and standardisation (Vernon, 1996) and added value services influencing manufacturing location decisions.

Multiple industry, country and firm level characteristics have an impact on the offshore duration (Ancarani *et al.*, 2015), however strategic asset seeking motives such as quality and made-in effect significantly impact the motivation to reshore and the overseas duration. Costs identified as key drivers for reshoring (Gray *et al*., 2013) are not sufficient for quicker reshoring within industries such as automotive manufacturing; and those reshoring for cost motives had been offshore for longer periods. Electronics and automotive industries proved highly significant in the duration of offshoring returning earlier to the home country than other industries such as clothing and furniture. This position aligns with Kinkel and Zanker's (2013) description of the automotive and electronics industry as 'mobile' with high tendency to offshore and reshore.

Blair *et al*., (2014) ascertains relocation occurs in high labour cost countries particularly for the automotive and electronics industry due to increased product customisation and the subsequent need to be located close to product development. Significant lead times are a prevalent factor implying that relocating the manufacturing facility home or close to the home market could have significant effects on the responsiveness to OEMs needs and demands for flexibility in relation to increasing logistics costs (Simchi-Levi *et al*., 2012). This is consistent for high labour productivity as Western locations increase the degree of production process automation (Arlbjorn and Mikkelsen, 2014; Tate, 2014), another factor driving the timely reverse relative to the host country; with the offshore experience significantly lower in China and other Asian countries in comparison to other geographical locations.

The optimisation of local advantages in Asian against the US and Europe have diminished due to labour cost increase in China (Pearce, 2014) coupled with the alignment of exchange rates and appreciation of the Chinese yuan against the US dollar, and the increase in labour productivity in some home countries, realigning the unit cost per output (Sirkin *et al.,* 2012). Similar trends have also come to fruition in other Asian countries (Wu and Zhang, 2014).

China continues to grow as production relocation destinations however, backshoring from China is also now a quantifiable strategy; relocation to Eastern European countries has notably declined whilst the trend for production backshoring has increased (Kinkel, 2012). Wage inflation in Eastern European countries lend some explanation to the relocation changes given low-wage destinations are manufacturing for established European economies; however, wage differentials in the UK and Europe may not be as significant as it is in the US and therefore limit the extent of reshoring (Bailey and De Propris, 2014). At firm-level following the economic crisis, organisations with a primary objective on price competition and typically low skilled workers are more likely to relocate their production, and in particularly challenging times such companies aiming to benefit from low-cost labour advantages are even more likely to engage in further production relocation to sustain their primary competitive focus (Kinkel, 2012; Pearce, 2014).

Backshoring manufacturing processes is positively related to the level of export by the parent company (Kinkel, 2012), thus when faced with global economic recession, companies with high export sales concentrate production activities from the parent site of the company satisfying overseas customers via export. This re-concentration allows companies to benefit from maximising available capacity at the parent site whilst balancing variable and fixed costs, rather than part-production in low-wage economies.

Psychic distances influence a quicker return from Asian countries (Nordman and Tolstoy, 2014); approaches and coordination of work are detrimental to the behaviours and attitudes between partners, leading to "*under-estimating threats*" and "*over-estimating opportunities*" in relation to offshoring (Ancarani *et al*., 2015). Hence, the lack of knowledge and understanding of these foreign markets, and failure to invest in generating experiential knowledge of the environment is detrimental to the relationship between customer and supplier (Petersen *et al*., 2008). European companies display a shorter duration offshore, associated with different organisational archetypes. European companies give subordinates a higher degree of autonomy but are more sensitive to their financial performance, thus underperformance presents a higher risk of subordinate closure or relocation (Ancarani, *et al.*, 2015). The size of the organisation can have a significant effect on the offshore duration; SMEs are more vulnerable to environmental changes and prone to strategic mistakes and therefore prone to offshore reverse decision (Kinkel and Malcoa, 2009), whilst MNEs have robustness in size and competency, and capacity to absorb more environmental risk and uncertainty.

Quality and made-in effect motivations are associated with shorter durations of offshoring, where the need to transfer knowledge to problem solve quality issues show early experiences may result in firms adopting an exit strategy due to lack of control (Manning, 2014). Brand image from 'made-in' when sourcing or manufacturing from offshore locations is recognised for having a strategic impact and quicker reshoring for European countries than US firms; larger organisations experiencing shorter duration offshore with large firms are more subject to public scrutiny and established brand image (Ancarani *et al.*, 2015). Cost differentials in labour, property and rates are also discussed as factors encouraging manufacturing reshoring with emphasis on the role of governments and local authorities (Bailey and De Propris, 2014) to incentivise

"*automation and process innovation*" to reduce costs and narrow the gap between offshoring destinations and the home country, to further encourage manufacturing companies to return to their home country (Arlbjorn and Luthje, 2012). The same factors are highly regarded as reshoring barriers within the academic literature (Arlbjorn and Mikkelsen, 2014; Bailey and De Propris, 2014; Canham and Hamilton, 2013).

2.2.5 Reshoring Motivational Factors

To gain a clearer understanding as to why manufacturing reshoring activity is a growing phenomenon, a summary of relevant reshoring studies is presented in Table 2.3, with key motives and drivers acknowledged by 'x'.

Table 2.3 Reshoring Motives and Drivers

Study	Labour cost	Availability of Skills	Energy cost	Innovation & automation	Supplier speed & reliability	Management coordination cost	Supplier relationship & trust	Supply chain flexibility	Reduced lead-time to market	Product raw material & design	Currency exchange	Intellectual property theft	Logistics costs	Environmental changes & risk	Global Economic changes	Bandwagon effect	Firms strategic changes	Risk of supplier power	Misjudgement of benefits	Under-utilised capacity	Lack of knowledge	Made in effect	Improve customer service	Quality
Ancarani *et al.*, (2015)	X				X			X	X		X										X	X		X
Ashby (2016)		X					X	X																
Albjorn and Mikkelsen (2014)				X				X	X						X									X
Bailey and De Propris (2014)	X	X	X			X			X		X													X
Baroncelli *et al.* (2017)					X			X	X	X			X	X								X		X
Canham and Hamilton (2013)	X	X			X	X				X					X				X			X		X
Dach and Kinkel (2013)	X	X						X					X								X			X
Drauz (2014)		X		X				X										X	X	X	X			
Ellram *et al.*, (2013)								X	X															X
Fratocchi *et al.*, (2014)	X			X	X		X	X	X			X	X		X		X					X	X	X
Foerstl *et al.*, (2016)				X	X			X	X	X		X		X		X	X	X			X			
Gray *et al.*, (2013)	X		X			X			X		X	X		X							X			X
Gylling *et al.*, (2015)						X																		
Hutzel and Lippert (2014)	X			X				X	X		X	X									X			X
Kazmer (2014)	X											X												
Kinkel (2012)	X	X			X	X	X	X						X	X						X			X

Kinkel (2014)	X						X				X																		
Kinkel and Maloca (2009)	X		X		X		X	X			X	X																	X
Martinez-Mora and Merino (2014)						X			X	X	X	X				X		X		X									X
Pearce (2014)	X				X	X									X													X	
Tate *et al.*, (2014)	X										X			X	X		X	X											
Tate (2014)	X		X		X						X			X			X												X
White and Borchers (2016)	X											X		X															
Wu and Zhang (2014)	X																												
Lampon and Rivo-Lopez (2022)					X					X							X								X				
Barbieri *et al.*, (2018)	X		X				X					X							X			X		X				

2.2.5.1 Bandwagon Effect

The "*bandwagon effect*" (Foerstl *et al*., 2016; Barbieri *et.al.*, 2018) encouraged offshoring with firms replicating competitor's decisions to move production or supply overseas based on the perceived benefits to sustain competitive advantage and avoid losing market position. German statistics from the Innovation on Production Survey show a revision on the offshore decision within five years which, emphasises back-reshoring as a "*short-term correction to prior misjudgement*" rather than long-term strategic decisions based on developmental changes in local condition (Kinkel, 2014; Canham and Hamilton, 2013). German studies estimated 80% of reshoring decisions are a correction of prior management offshore decisions, with only 20% of companies recognising changes to local environments and reshoring to support their mid/long-term strategy.

Mistakes are made due to inadequate knowledge of the production environment leading to overestimation of acquired benefits of offshore outsourcing, and an underestimation of associated risks, costs, and sensitivity of location decisions (Gylling *et al*., 2015). However, evidence from the footwear industry rejects such argument suggesting weakening of the market, economic crisis and distribution changes were not forecastable by average firms, with the reshoring process likely to be a permanent relocation (Martinez-Mora and Merino, 2014). Firm size presents differentiating factors with some SME's adopting a local rather than global mentality with long-term strategies to create local supply networks; seizing opportunities to nearshore material supply and develop strong working relationships with UK suppliers with the expertise, knowledge, and skills to reshore the supply chain end-to-end (Ashby, 2016).

2.2.5.2 External Environment

Environmental uncertainty and volatility in the marketplace are strong drivers of reshoring and insourcing, particularly when unforeseen cost increased affect the business

model, in addition to raw material shortages, exchange rate volatility and growth projections (Ellram *et al*., 2013; Gray *et al*., 2013; Tate *et al*., 2014). Firms that offshore to emerging economies can profit higher that domestic manufacturing, but only when tariffs are low, for MNEs this can give a competitive advantage when the low-cost advantage from offshoring is substantial. If tariffs increase the competitive advantage diminishes and reshoring looks more favourable, balanced against the import and export tariffs (Yans, Ou and Chen, 2021). The implication from Brexit is considered a prime example of uncertainty and volatility with regards to tariffs and operational restrictions.

Labour cost (and stability) and switching cost are considered by White and Borchers (2016) as the most important aspect to firms when making their manufacturing location decisions; whilst input/product (including currency stability, raw material location and product weight) are regarded as the highest 'risk' dimension, with country risk insignificant in the overall risk factors. The important factors are also some of the riskiest for manufacturing relocation, recognised by industry leaders as important risks and alternatives considered in the decision-making process, conflicting the view of Dachs and Kinkel (2013) maintaining location decisions are made with insufficient knowledge and data of the production environment resulting in location misjudgements.

Analysis of reputational risk associated with the country of competition, the firm, and the sourcing location, is debunked by Nujen *et al.,* (2021) when making offshoring decisions. Whilst reputational risk is not a key consideration in the reshoring literature, perhaps due to some reassurance gained from returning manufacturing to the home country by which factors of reputation such as sustainability and ethical considerations (child labour, animal welfare and pollution) are more widely known (awareness); Nujen *et al.,* (2019) draws attention to reputation as a risk when considering reshoring also. Ellram *et al.,* (2013) views disruption to the global supply chain rather than country as the risk to reputations;

Lemke and Petersen (2018) argue reputation comes from perceptions and therefore an intangible asset, hence offshoring (or reshoring) to an external supplier does not exempt the risk of unethical or unsustainable practices (Benstead *et al.,* 2018; Busse *et al.,* 2017; Foerstl *et al.,* 2010) which spans beyond the product, to the reputation of the country and supplier location (Manello and Calabrese, 2019). The need to reduce production costs, source materials as reduced cost with the opportunity of low-cost labour, and enter new markets, are key motives highlighted for offshoring. Whilst reputation is the opinion of society, firms locating in countries with unethical practices can affect brand image; thus, the attractiveness of a location for competitive (economic) advantages, may be negated by location policies implicating the company's reputation (Nujen *et al.,* 2021). Given the extent of offshoring in the manufacturing sector, particularly to emerging economies for the optimisation of low-cost labour, it could be argued that reputational risk was not a priority over economic benefits at the point of making offshore strategic decisions. Changes to the external environment, policy, and opinion towards the importance of sustainable and ethical supply chains has increased significantly over the last 10-years, despite not identified as a key motive for reshoring and 'Made-in' effect having a low reshoring influence (refer to Table 2.4).

2.2.5.3 Uncertainty and Complexity

Supply chain uncertainty and complexity, including number of suppliers and tier structure, supply chain length and extent of geographical spread (Ellram *et al*., 2013); increases transport costs, increases management coordination and control costs, and negatively impacts the firms' cash flow due to excessive inventory in safety stock (Lewin *et al*., 2009). Handley and Benton Jr (2013) take an opportunistic view associating reshoring and insourcing as a result of increased coordination and control costs from offshoring which take priority over business relationships (Canham and Hamilton, 2013);

whilst Eastern European countries have encouraged backshoring and insourcing activities for the re-concentration of *"integrated value chains"* (Kinkel, 2012). A shift in relational power (Emerson, 1962; Salancik and Pfeffer, 1997) to the supplier is apparent when customers are dependent on suppliers for assets, resources and technology advancements and increases supplier opportunism for the customer. However, Ashby (2016) argues reshoring is a *"highly creative and innovative tool*" and not only a knee-jerk reaction to environmental and supply chain concerns, with Western manufacturers taking steps to reduce the length of their supply chain for improved performance (Lieb and Lieb (2009) and the re-concentration of integrated value chains (Kinkel, 2012).

2.2.5.4 Skills

Availability or scarcity of resources namely qualified/skilled labour and knowledge, drives an organisation to reconsider their location strategy to gain greater control over such resources with less dependency on upstream or downstream partners (Foerstl *et al*., 2016). Whilst important in the evaluation process, such resources are also considered barriers for reshoring to the home country, with acknowledgement of engineering skills shortages in the US and Western European countries resulting from the extensive offshoring strategy. (Bailey and De Propris, 2014).

2.2.5.5 Technology

Developments with innovation and technological advancements associated with the production and assembly of components, reduces the need for labour intensive processes, therefore low-cost labour in emerging economies become less of a driver for manufacturing offshoring, and has enabled reshoring to be viewed a more favourable consideration (Foerstl *et al*., 2016). Cost-orientated strategy are associated with low-technology industries (Lapon and Rivo-Lopez, 2022); motives are explained by country-specific cost advantages, and internal capabilities through improvement of labour

productivity, and adopt more of a lean focus for cost reduction (Marodin *et al.*,2017a). Reshoring process in these cases have meant returning production that was offshored outsourced to an external supplier, to the firm's own facility in the home country. Transportation and transaction costs are prominent in these industries.

Whilst innovation-orientated strategies are adopted in high-technology industries (Lapon and Rivo-Lopez, 2022), with the plant's capacity to innovate to advance the technology levels in their manufacturing processes. Reshoring motives are driven by the firm's internal capability to be operationally flexible within their own manufacturing network and adopt more of an agile focus for innovation-orientated strategies (Qamar and Hall, 2018).

For external supply chain consideration, motives to reducing the complexity and geographical distance between customer and supplier plants to prevent repeat of the relocation process due to changes in logistics costs and flexibility requirements. Barbieri *et al*., (2022) considers the interplay of Industry 4.0 in relocation decisions inferring companies that originally offshored to the host country for cost-saving advantages are more inclined to relocate to a third country engage further efficiency-seeking advantages. Whilst companies seeking market related advantages are more inclined to relocate to the home country due to market offerings or a shift in strategy, acknowledged by Di Mauro *et al.,* 2018).

In view of the rise in digitalisation in manufacturing industry, Bresnahan (2010) highlights the linkage between production and the dynamic competitive environment. Limited research positions Industry 4.0 as a behaviour of reshoring (Fratocchi and Di Stefano, 2020) although Bilbao-Ubillo (2023) warns caution in concluding such results pertaining further research development would benefit. In customisable manufacturing,

robotics is determined most beneficial due to rapid changes in demand and enabling new product development to be brought to market quicker than offshoring from suppliers in overseas locations and managing the uncertainty of quality, cost, and delivery (De Backer *et al.,* 2018). A study by Stentoft *et al.,* (2017) concluded "automation both discourages offshoring and encourages re-shoring". However, Raza *et al.,* (2021) suggests automation can support offshoring *to* "strengthen the productivity of production processes in emerging economies". Increased digitisation and the use of big data may enable companies to increase their ability to manage and coordinate operations at a greater proximity, and position further relocating to emerging-emerging economies potentially attractive (Ancarani and Di Mauro, 2018). However, reshoring decisions are positively influence by additive manufacturing technologies through localised value chains in close proximity to the customer (Ancarani and Di Mauro, 2018; Laplume *et al.,* 2016; Moradlou and Tate, 2018; Raza *et al.,* 2021) encouraged by reduction in lead-time, responsiveness to market changes, better communication, reduced inventory levels and more customisation (Moradlou and Tate, 2018).

Post-Covid pandemic and the fragmented supply chains resulting from the enormity of the global disruption, Panwar, Pinkse and De Marchi (2022) anticipate the utilisation in cloud platforms to provide advanced visibility of supply chain inventories using "RFID beyond second tier" recognising upstream supply chains are fraught with subcontracting. In doing so, requires supply chains to invest in machine leaning, to achieve end-to-end capability, complimenting the work of Barbberi *et al.,* (2022), and there rests the barrier in relation to supply chain capability. The use of "micro-supply chains" pertaining to the just-in-case scenarios evident during Covid and the aftermath of the pandemic is also forecast by Panwar, Pinkse and De Marchi (2022); these contemporary changes pose implications to supply chain locations in the future.

2.2.5.6 Cost Reduction

Cost reduction and efficiency seeking strategies are well appraised as far as reshoring literature extends and viewed at the most likely driver for reshoring (Wiesmann *et al*., 2017; Barbieri *et al*., 2018) moreover, in Western economies where sectors have engaged in contract manufacturing and offshoring over recent decades including clothing and footwear, electronics, mechanical, furniture and automotive (Fratocchi *et al*., 2015). Here reshoring motives are categorised into cost, logistics related elements, global crisis, host country, home country, entrepreneur/firm specific elements and sales and marketing elements. Emphasis is placed on the narrowing differentials in labour costs between the home and host country, namely Western European countries, and China for manufacturing industries; reduction in energy cost for the US; and focus on logistics costs particularly where firms have offshored to geographically distant locations (Fratocchi *et al*., 2015). Significant emphasis is also placed on supply chain coordination costs exaggerating beyond initial expectation.

The frequency and extent of product design changes require interconnectedness of supply chain functions and inflicts obligations for supply chain responsiveness and speed (Gylling *et al.,* 2015) inherently impacting cost. This greater change frequency and variety of product results in higher transaction costs for offshore supply (Buckley and Cassons, 1998; McIvor, 2009).

2.2.5.7 Low-cost Labour

Optimisation of low cost labour in emerging economies for labour intensive activities and access to skilled labour unavailable locally were key drivers for offshoring (Michel and Rycx, 2012; Davis and Naghavi, 2011; Dana *et al.,* 2007; Kinkel and Maloca, 2009; Lewin *et al.,* 2009; Manning *et al*., 2008; Li *et al*., 2008; however, narrowing differentials in labour costs between the home and host country remains one of the dominant motives

for the return of manufacturing to the home country (Kinkel, 2012; Tate, 2013; 2014; Bailey and De Propris, 2014; Pearce, 2014; Ancarani *et al*., 2015; Foerstl *et al*., 2015). The implementation of increased minimum wages and annual wage inflation across China specifically where wages have almost tripled to around 70% of those in weaker Eurozone countries according to Euromonitor International (Han, 2017), support the overestimation of labour cost as a key enabler for cost reduction strategies (Wiesmann *et al.*, 2017). However, hard factual consideration whilst representing direct impact on location decision making are not regarded as clear representation of the wider scenario; dynamic cost factors including proximity to key customers and access to international markets play a significant role in the desire to reshore production (Kinkel, 2012).

2.2.5.8 Lead-time

Increased delivery lead-time from offshore locations to customer destination is identified as a significant driver for reshoring (Tate *et al*., 2014; Gray *et al*., 2013; Albjorn and Mikkelsen, 2014), particularly emphasised in time-sensitivity industries (Fratocchi *et al*., 2015). Offshoring manufacturing activities to distant geographical locations has contributed to longer and more complex supply chains, placing increased pressure on transportation lead-times, higher inventory levels (Bailer and De Propris, 2014), longer planning horizons, challenges of implementing lean supply chain principles such as Just-in-Time, slower supplier response times and lack of supply chain flexibility (Fratocchi *et al*., 2015). The rigidity of offshore suppliers related to purchase orders, minimum order quantities and willingness to engage in small lot production is a significant factor, particularly in industries where lead-times are short and responsive supply chains are necessary (Ferreira and Prokopets, 2009; Martinez-Mora and Merino, 2014) making it difficult to exploit economies of scale. Speed and reliability for the improvement of

customer services are also important logistics factor which deteriorate as a result of geographically spread manufacturing and long supply chains (Frattochi *et al*., 2015).

2.2.5.9 Quality

Poor quality products from offshore manufacturing represents one of the most prominent drivers of reshoring (Baroncelli *et al.,* 2017; Canham and Hamilton, 2013; Gray *et al.,* 2013; Tate *et al*., 2014;) two-thirds of German companies identifying quality as the most important reason (Kinkel, 2012). Controlling the complete manufacturing process particularly for high-end products, to guarantee repeatable high-quality standards is difficult with offshore outsourced strategies (Martinez-Mora and Merino, 2014). Made-in affect is another growing trend (Baroncelli *et al.,* 2017), drawn by the perceived quality from its manufactured location (Ancarani *et al*., 2015; Pearce, 2014) and highly evident in the clothing industry; whilst risk of intellectual property theft would appear less of an important factor (Fratocchi *et al*., 2015).

2.2.5.10 Flexibility

Loss of flexibility in the production facility, and inflexibility and delivery capability in the supply network pays significant contribution to the encouragement of manufacturing reshoring (Bailey and De Propris, 2014; Pearce, 2014), with a diverse spread of production facilities making it more difficult to respond to customer changes quickly. Lack of supply chain flexibility is highlighted as a prominent factor in high-income European countries more than poor quality, due to the importance of proximity to key customers (Baroncelli *et al.,* 2017); also noting transportation costs and labour costs as key motives for reshoring in high-income regions. Whereby in low-income European countries, poor quality product and lack of skilled personnel were frequent motives, recognising quality as a particular concern from China and India (Dachs and Kinkel, 2013). However, evidence indicates flexibility played less of a significant role following

the economic crisis suggesting that when sales are decreasing it is easier to fulfil delivery and flexibility requirements of local or border customers (Kinkel, 2012).

Decision makers have limited choices due to the complexities and untested environment which restrict the boundary of knowledge (Foerstl *et al*., 2016); making it inherently difficult to foresee the possible eventualities of buyer-supplier relationships and all expected consequences (Cabral *et al.,* 2012; Lewin *et al*., 2009). This inability to predict potential performance outcomes and lack of knowledge transfer and dissemination particularly for value creation tasks result in higher transaction costs associated with offshoring decisions and therefore favour reshoring (Winter, 1998); high level of coordination and monitoring of problem suppliers, lack of dependent suppliers, and poor product quality. Such lack of control over suppliers who may act outside of their agreed contract can impose serious financial cost and negatively impact reputation associated with poor product quality and product recall (Gray *et al*., 2013; Fredriksson and Jonsson, 2009; Tate *et al*., 2009).

2.2.6 Strategic Changes Influencing Reshoring

Multi-back-reshoring decisions are associated with acquisition-led developments and result from complex post-merger re-organisations of the strategic and organisational structure (Fratocchi *et al*., 2015). A shift in strategic priorities due to management turnover also drives reshoring and insourcing decision with focus on different key performance indicators (Tate, 2014); supporting Colotla *et al*., (2003) suggestion that location decisions are often made at corporate level outside of the manufacturing plant and so the metrics and priorities will differ.

Correlations are drawn in automotive manufacturing between sourcing and location decision (shown in Figure 2.3) with variations in motivational factors highlighted

between the OEM and tier 1 supplier. Drauz (2014) identifies access to new technology and innovation, and internal restructuring as strong drivers for OEMs to outsource, whilst this is not apparent for tier-1 suppliers aiming to be innovative and progressive with new technology. Customer proximity and yardstick competition, leveraging pressure for efficiency gains, cost savings, loss of knowledge and access to qualified employees are all identified as common drivers at different positions within the tier structure, whilst cost savings through optimisation of low cost labour in emerging economies were key drivers for offshoring outsourcing (Dana *et al*., 2007; Davis and Naghavi, 2011; Manning *et al.*, 2008; Li *et a*l., 2008; Michel and Rycx, 2012; Lewin *et al*., 2009).

Underutilised capacity in automotive manufacturing is a major driver for re-insourcing post 2008 economic crisis, benefiting from low investment costs having retained the manufacturing capability (Drauz, 2014); recognising the decisions made are more tactical as a response to unanticipated environmental changes, than strategic decisions. Economies of scale and modular design are identified as important factors at the suppliers yet less of a priority at OEM level (Drauz, 2014), stressed by the need to outsource for innovation at Tier-1 level supporting modular design. Equally maximising economies of scale are less relevant for OEMs operating in a just-in-time or just-in-sequence method (Christopher and Peck, 2004).

Motives for re-insourcing prior to the 2008 economic crisis were higher flexibility, lower dependency, quality issues and core competencies with limited focus on cost advantages and economies of scale; post economic crisis, underutilised capacity as the dominant factor is identified in relation to flexibility motive. Motives identified by Drauz (2014) for re-insourcing are directly aligned to some of the key motives for reshoring, in particular lack of knowledge at the foreign environment, the need for flexibility within the supply chain to improve customer responsiveness, and quality concerns from the

oversees locations and the unanticipated cost of poor quality. These common factors are conceptualised as dynamic or hidden factors (Holweg *et al*., 2011; Kinkel and Maloca, 2009; Kinkel, 2012) which do not present hard or static cost considerations and are subject to environmental, situational, and contextual dynamic changes.

Comparisons of theoretical reshoring considerations (Table 2.1) shows different reshoring terms have a degree of variation in the characteristics that represent author definitions. Across the studies highlighted, evidence in Table 2.3 shows reshoring is a geographical location decision with representation in all definitions. Governance or ownership of the facility is another transparent characteristic, with some variation incorporating supply relocation; therefore, across the wider terminologies of reshoring the key characteristics are determined as ownership and location. Whilst the unit of analysis being overseas manufacturing activity is transparent in each study, the reshore destination is divided into two relocation sub-units; 'home country' being a relocation to the home country of the manufacturing facility prior to offshoring, or the home country of the parent company; and 'near country' being a relocation to a foreign county in the same region as the firm's home country. Theoretical concepts are aligned to the relocation sub-units based on their key characteristics; 'backshoring', 'back-reshoring', 'reshoring' and 'home-shoring' are categorised as a relocation to the home country; whilst 'near-shoring' and 'near-reshoring' are relocation to a near country. 94% of cases in Table 2.1 argue that prior offshoring activity of the facility is deemed a prominent factor in reshoring terms; an exception however is Gray *et al.,* (2013) arguing reshoring is simply a location or relocation decision agnostic to prior offshoring activity, and inclusive of supplier relocation; and is therefore be considered to have a broader perspective on reshoring in comparison to other studies.

Evidence from reshoring motives and driving factors is summarised by the level of influence against the 24 motives and displayed in Table 2.4; categorising motives into significant influence (motives identified in more than 10 studies), moderate influence (motives identifies in more than 5 studies) and low influence (motives identified in 5 or less studies), with an indication of static and dynamic factors.

Table 2.4. Influence level of reshoring motives

Influence Level by No. of Studies	**Number of Motives**	**Motives & Driving Factors**
Significant influence >10	4 (1 static; 3 dynamic)	Narrowing differential in labour costs Reduced lead-time to market Quality Supply chain flexibility
Moderate influence>5	8 (2 static; 6 dynamic)	Availability of skills Innovation and automation Supplier speed and reliability Management coordination costs Currency exchange Intellectual property theft Global economic crisis Lack of knowledge
Low influence <5	12 (5 static; 7 dynamic)	Energy costs Supplier relationship and trust Product raw material and design Logistics cost changes Environmental changes and risk Bandwagon effect Firm strategic changes Risk of supplier power Misjudgement of benefits Under-utilised capacity Made-in effect Improve customer service

Table 2.4 shows narrowing differentials in labour costs between the home and host country persists to be the most encouraging factor for manufacturing reshoring (16 studies), emphasising the low-cost labour link between offshore optimisation and reshore narrowing differentials. It opens the question for next-step labour changes; what is the actual labour cost tipping point to trigger future relocation and where would firms move to next? The exposure of dynamic logistics factors is highlighted as a result of labour changes in emerging markets, with reduced lead-time to market (14), quality (14) and

supply chain flexibility (13) significantly influencing reshoring decisions. Kinkel's argument persists that dynamic factor inputs are difficult to quantify and therefore often overlooked in the decision process (2012) yet remain at the forefront of the firms' ability to satisfying quality, cost, delivery performance indicators (Bailey and De Propris, 2014).

Moderate dynamic factors presented in Table 2.4 include supplier speed and reliability (9) and management coordination costs (7) whilst identified as separate influences are directly related to the significant logistics motives by way of the availability of product as a replenishment for poor quality in a reliable and timely fashion, or having the flexibility upstream to respond to changes in customer demand quickly requiring short lead-time, whilst the management and coordination of which comes at a cost. Lack of knowledge transfer of the product and manufacturing process (7) and availability of skills (8) in particularly engineering, whilst determined as moderate motivating factors in Table 4, also pose barriers for manufacturing reshoring with the offshoring of those skills over a long period and an inherent skills shortage in home countries requiring regeneration (Bailey and De Propris, 2014).

2.2.7 Barriers to Reshoring

Studies focusing on UK reshoring, particularly Bailey and De Propris (2014; 2016) with the inclusion of automotive manufacturing in the UK; emphasise constraints related to bottlenecks and policy impacting on reshoring to the UK. The availability of skilled labour is a widely regarded a barrier to reshoring, with emphasis on engineering skills following decades of offshore strategies resulting in labour moving overseas.

Ashby (2016) argues UK government and policy makers need to facilitate "coordinated reshoring" through initiatives for firms to reshore and connect with local suppliers, to re-

harness and reintegrate the development of skills, knowledge and expertise depleted with manufacturing offshoring.

The intensity of offshoring has resulted in some manufacturing processes almost disappeared, which may cause issues sourcing suppliers in the home county with the required skilled labour and expertise (Martinez-Mora and Merino, 2014).

Shih (2014) highlighted challenges faced by large US firms during repatriation, in particular General Electric and Google Motorola Mobility had a difficult task hiring skilled and experienced personnel in precision manufacturing, and the sourcing and development of local supply chains which had been "hollowed out" (Bailey and De Propris, 2016). Muro (2014) suggests the benefits of reshoring in US regions is dependent on the availability of skilled personnel, strength of supply chain clusters, ability to foster innovation, the resilience of the organisation and the supporting services.

Few researchers have examined the nature of barriers to moving production back. Such barriers may include lack of organizational and financial resources and lack of clear foundation for decision, for example, incomplete bill of materials and technical drawings (Stentoft *et al.,* 2015). Future research should address the questions of accessibility, relevance, representation, and accessibility of data for decision making about offshoring and backshoring. If relevant data is more accessible, then decision makers should be able to make better-informed decisions and not necessarily better decisions, but at least decisions based on better information. Panwar, Pinkse and De Marchi (2022), and Barbieri *et al.,* (2022) anticipate Industry 4.0 application of cloud technologies to provide that accurate and visible data to enable better-informed decisions in the future, although this rests on supply chain capability and engagement end-to-end.

The practice of manufacturing relocation is not static but a dynamic phenomenon according to Gylling *et al.,* (2015); Kinkel and Maloca, (2009) and Kinkel (2014; 2020) arguing the need to address dynamic changes for dynamic consideration in location decision making.

2.3 Aligned Theoretical Lens

Propositions for manufacturing reshoring is documented through varied theoretical lens including (but not limited to) transaction cost theory, resource-based view, resource dependence theory, internationalisation theory, and with consideration of operations management theories. The contemporary nature of reshoring means no one theory is rooted in this phenomenon. The Illustrative Literature table in Appendix A was used to establish the initial position of this research (refer to Figure 1.1) broadly identifying the theory focus and research gaps from secondary research. This coupled with an extended review of the reshoring literature in Chapter 2.2 and incorporating the researchers' perspective from professional experience, enabled the theoretical focus for this research.

Resource based view theory has been used to establish a rational for manufacturing companies seeking to assess sourcing strategies pertaining to the availability of resources (McIvor, 2013) including offshoring and outsourcing. Research examining internationalisation spans several considerations, such as transaction cost economics which concentrates primarily on the analysis of hard economic factors (Ellram *et al.,* 2013; Gylling *et al.,* 2014) and examines reshoring motives and associated risks (Foerstl *et al.,* 2016; White and Borchers, 2016), and whilst the researcher recognises these costs as a primary motive identified in the reshoring literature, the position of this research is directed more towards investigating the dynamic impact from unknown cost implications.

Location theory is embedded into this research as a defined reshoring characteristic established in Section 2.2.1 and considers reshoring dynamics, location strategy and location decision making (Arik, 2013; Gray *et al.,* 2013; Tate *et al.,* 2014). Research focusing on the supply chain aspects of reshoring incorporates supply chain and operations management theoretical concepts of lean and agile examining the competitive importance of cost and flexibility, supply chain vulnerability due to complexity, the management of supplier relationships, and the sustainability of global versus local supply (Ashby, 2016; Kinkel, 2012; Silveira, 2014; Thun & Hoenig, 2009).

Market factors of internationalisation such as location-specific factors and firm-specific factors have utilised Dunnings Eclectic Paradigm (Ancarani *et al.,* 2015), whilst the proposition of foreign direct investment or divestment, international mergers and acquisitions were deemed outside the scope of this research. Initially the researcher determined resource dependence theory as an appropriate alternative theoretical lens to investigate reshoring using power relations as the theoretical concept, an ideology from the researcher's professional experience with emphasis on the power balance between customer and supplier as the motive for reshoring. However, at analytical stage 'power' was not positioned the underpinning theoretical focus.

Aligned with the direction of this research and reconfirmed in the analytical process (Chapter 5), the theoretical concepts of lean and agile (and leagile) manufacturing supply chains are carried forward to underpin this research, with location management incorporated as an embedded reshoring characteristic. The application of lean and agile methodologies is not in debate, moreover the theoretical position of lean and agile theoretical concepts within automotive manufacturing has developed and shaped the configuration of supply networks globally; and is hereby reviewed in consideration of the motivations to reshore automotive manufacturing supply chains.

Lean theory is debated amongst Operations Management scholars, with different definitions and perspectives shaping different viewpoints to expand the knowledge and understanding of lean. Management literature often resides in lean as a "context" (Danese *et al.,* 2018) due to the variability and "not one size fits all" (Balzer *et al.,* 2019; Piazza and Abrahamson, 2020) complicating the theorizing and generalisability of lean viewed by other domains such as Organisational Behaviour and Organisational Psychology (Balzer *et al.,* 2019). However, despite confusion and diverse knowledge, the vast research related to lean as a concept is "built on theory, and arrives at theory" (Ahlstrom *et al.,* 2021). Hirsch and Levin (1999) propose viewing lean as the "umbrella concept" providing intellectual connectivity for research and account for the diverse set of phenomena, advocated by Natland and Powell (2017a) to maintain relevance in the field; not to disregard the argument of validity calling for narrow standards (Hopp and Spearman, 2021). Boer *et al.,* (2015) argues in a practical and applied field such as Operations Management, research aims to reflect the contemporaneous practice relevant to the study, with appreciation of the relevance and widely applied lean concept. Alvesson and Blom (2021) acknowledge the use of umbrella concepts as recognised in academic publishing.

The work of Thurer *et al.,* (2017) constitutes theory as an "explanation of observed phenomena" (law) as "a statement about observed phenomena". In applying that 'law', Thurer *et al.,* (2017) positions lean theory as the *"law of just-in-time"* with statement rules pertaining to that theory (law) and subsequent variability of that law as deviation. Whilst most Operations Management laws such as Theory of Constrains (Goldratt and Cox, 1984) focus on the output result from the system, lean theory is "unique since it seeks to explain efficiency and effectiveness" (Thurer *et al.,* 2017). Scholars argue lean theory requires systematic leaning process from multi-level organisation concept (Powell

and Coughlan, 2020), the basis of which theorising has taken decades (Argote, 2011; Crossan *et al*., 2011).

In contextualising lean theoretical concepts for this research, building on the argument for lean theory, the researcher supports the work of Mathieu, (2016) to develop theory consistent with "lean's guiding principle of value", and aim for "creating real-world contributions…. through abductive inference". The justification of abductive reasoning is positioned in 3.2.3 Research Approach moving back and forth to develop new knowledge and refinement of theory, from the investigation of real-world phenomena and adaption of the deliberately selected theory (Danese *et al*., 2018).

Yin (2014) advocates the use of case study as a methodology for building theory that may be applicable to the wider context beyond the existing study; positioned in this research as applicable to the wider UK automotive manufacturing industry and further, manufacturing sector. Creswell (2014) pertains case study research strategy can be highly effective when planned and constructed in real-life situations for the exploration of real-life problems therefore, the interpretation of interview questions and responses, conducted in the real-life live environment, and sharing the real-life examples associated with reshoring, is applied. This researcher argues that the scope and quality of cases and participants within this multiple-case study, are appropriately positioned to offer in-depth interpretations of reshoring within the automotive manufacturing industry. In doing so, the researcher provides a theoretical framework to substantial lean and agile as the underpinning theoretical concepts with the application of methodologies in practice. This framework pools together the literature key concepts, theories, industry and methodology that unfolds in forthcoming chapters.

2.3.1 Lean and Agile Strategies in Automotive Supply Chains

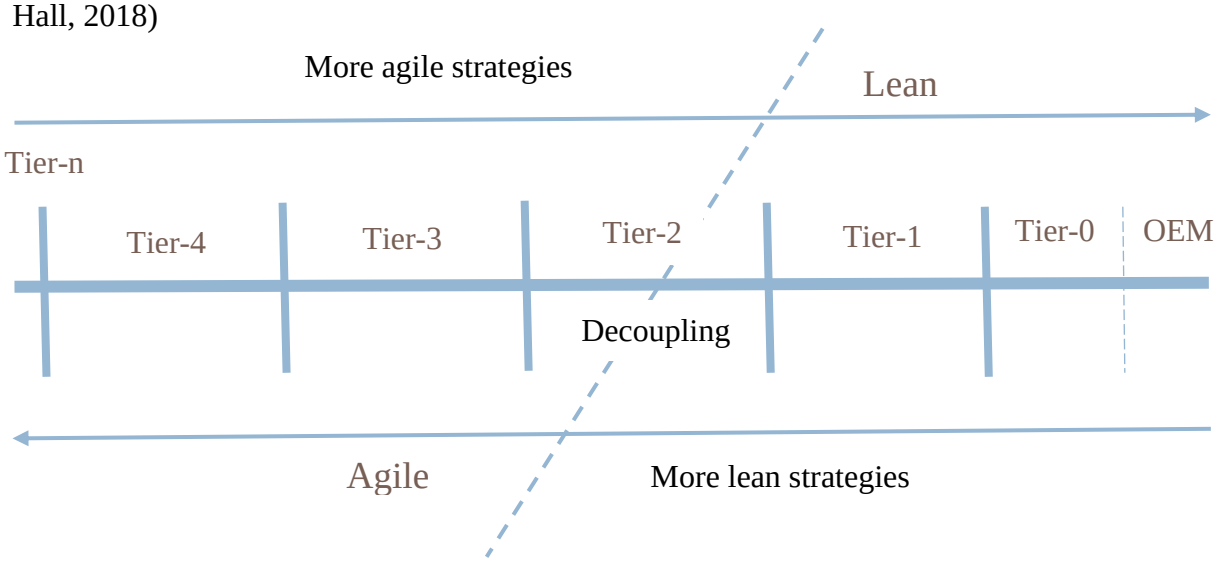
Automotive case studies are well documented in operations management literature, Womack and Jones (1990) detailing the Toyota Production System (TPS) is perhaps the most well-known attribute; so too is the Tier structure within the automotive supply chain depicting upstream and downstream flows of both product and information flow.

In the context of automotive supply chains, the characteristics of lean and agile can underpin drivers the of the firms' manufacturing strategies, whilst also posing barriers to the strategic implementation such as lean production (Marodin and Saurin, 2015; Marodin *et al.,*2017a). Whilst contextual factors of an organisation's age and size are regarded less influential, position of the firm in the automotive tier structure is an important and significant factor in determining the manufacturing strategy (Furlan *et al.,* 2011; Lucato *et al.,* 2014; Qamar and Hall, 2018). In contrast to Marodin *et al*., (2016) and Tortorella *et al*., (2017b), the LAASC[1] model reflects firms operating in the upper tiers of supply chain (typically at Tier-1 suppliers and OEMs) generally adopt a lean manufacturing strategy, whilst organisations lower down the supply chain are more likely to implement an agile strategy (Qamar and Hall, 2018). The decoupling point where lean and agile strategies are likely to converge is Tier-2, shown in Figure 2.3.

Earlier propositions from Bennett and Klug (2012) shows high levels of integration between the OEM and Tier-0; OEM and Tier-1 suppliers (categorised as full or partial modular consortium), to optimize the logistical flow of product, minimal inventory, and synchronized supply. Here, supplier geographical proximity is identified as a key parameter for lean strategy, coinciding with the work of Qamar and Hall (2018).

[1] LAASC is Lean Agile Automotive Supply Chain.

Figure 2.3 Lean Agile Automotive Supply Chain Framework (adapted from Qamar and Hall, 2018)



Rose *et al.*, (2017) established the rewards of lean manufacturing for automotive SMEs as: reduced inventory (83%), reduced floor space utilisation (50%), reduced lead-time (100%), delivery on time (83%), increased productivity (100%), effective cash flow (50%) and increased quality (66%). Detailing the essence of successful lean manufacturing to be that of knowledge, employee empowerment and adoption of best practice.

2.4 Chapter Summary

This chapter reviews the reshoring literature to gain clarity in the boundary of this research and provide justification to the determined theoretical lens underpinning UK automotive manufacturing reshoring. The chapter begins with an evaluation of the reshoring terminologies and characteristics, determining that to be a strategic decision based on location and ownership. Location decision making critiques reshoring options with development Figure 2.1 a two-dimensional reshoring model that considers the

integration of make or buy strategies with location decisions. The researcher extends the work of Drauz (2014) with an adapted 5-step process to location decision-making, framed by the detailed analysis of reshoring characteristics (Figure 2.2). Reshoring motives are analysed to provide clarity of the dominant motivational factors and the barriers influencing reshoring and provision of questioning for the empirical phase. A review of the different theories discussed in the literature enabled the researcher to determine the most appropriate theoretical lens for automotive manufacturing reshoring; a summary of theories examining reshoring is presented in Table 2.5 below.

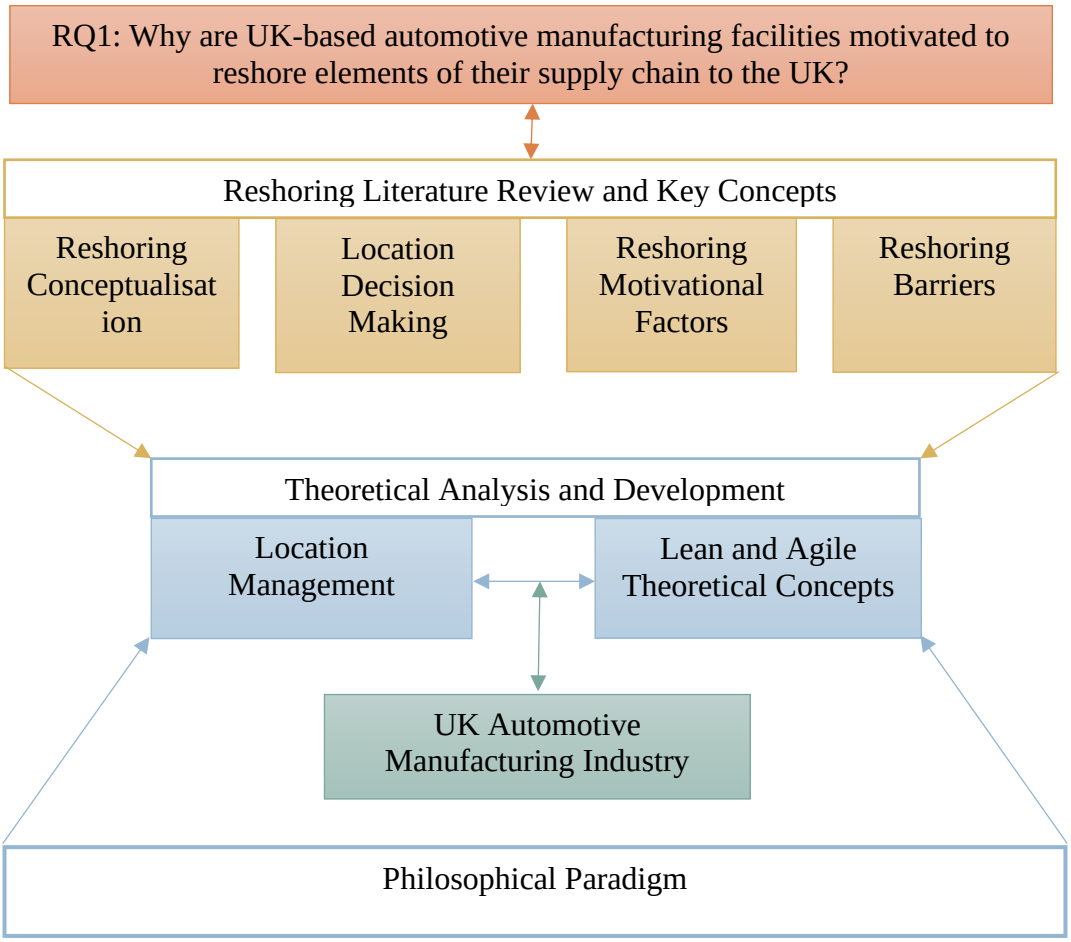
Table 2.5 Summary of Theories Examining Reshoring

Theoretical lens	Reshoring narrative	Appropriate underpinning for RQ1	
Resource based view	Assess sourcing strategies pertaining to the availability of resources.	No	Reshoring to optimise available resources not identified as key motive.
Transaction cost economics	Framework for hard economic factors influencing reshoring.	No	Cost factors investigated from a dynamic perspective requiring abductive reasoning.
Location management	Reshoring dynamics following changes to the external landscape, location strategy and decision making.	Yes	Location strategy and decision making embedded in reshoring characteristics, and central to automotive manufacturing reshoring motives.
Resource dependence theory	Balance of power between customer and supplier and power relationships.	No	Power relationships are not a determined factor 7in addressing RQ1.
Lean and agile theoretical concepts	Supply chain reshoring examines SC complexity, supplier relationships, cost, and flexibility as key motives.	Yes	Lean and agile methodologies embedded in automotive manufacturing. Lean supply chain efficiencies and responsiveness.
Market factor rivalry	Location-specific and firm-specific and product-specific factors mapped to Dunnings eclectic paradigm.	No	Suitable for the categorisation of motives into silos; inhibits the connectivity and interaction between codes and themes. Explanation of automotive requirements/methods not addressed.
Foreign direct investment	Explain the proposition of FDI, mergers and acquisition	No	FDI and divestment from international markets beyond this research boundary.

In summarising the appropriate theory, a more detailed discussion of lean and agile theoretical concepts and the application of lean and agile strategies in automotive

manufacturing offers further clarity and justification. The theoretical framework for this study is presented here in Figure 2.4.

Figure 2.4 Theoretical framework



The review of reshoring literature has enabled the researcher to define the key concepts and important points from existing studies, and in developing RQ1 to address the research gap. The theoretical framework is positioned utilising these key reshoring concept, the analysis of theory discussed in the literature, the methodologies applied in automotive manufacturing industry; and the philosophical paradigm of this research including the value of the researcher. Chapter 3 discusses the philosophical paradigm in detail.

Chapter 3: Methodology

3.1 Introduction

The analysis of existing literature in Chapter 2 has shown the key concepts applicable to this study to be reshoring conceptualisation, motives and drivers, location management and globalised strategies, and identifies a prominent gap in the research from which the research question was established:

> RQ1: Why are UK-based automotive manufacturing facilities motivated to reshore elements of their supply chain to the UK?

This chapter moves on to discuss the philosophical paradigm of this research, methodology and the research method employed for investigation. The researcher notes that in terms of this study, Crotty (2003) is instrumental in the philosophical section of which the chapter draws on significantly amongst other methodological text. This research also draws on Yin (2014) as the foundation to design and justify the case study approach in the methodology section.

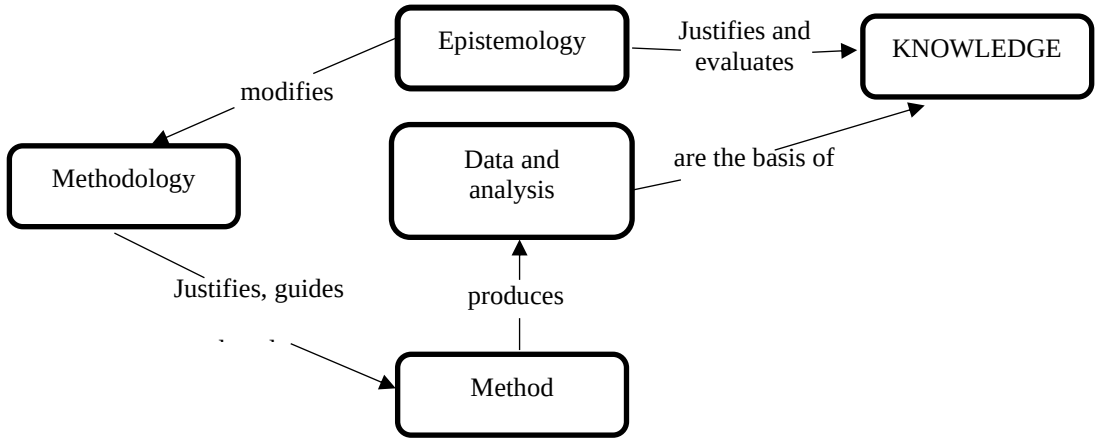
3.2 Research Philosophy

Social research emerged in the twentieth century to extend our knowledge from natural scientific behaviour to include wider social considerations and human behaviours (Hughes & Sharrock, 1997; Collis & Hussey, 2009). The primary concern of social research is to produce information on human thoughts and perspectives, behaviours, and beliefs, in exploring a phenomenon or investigating a particular problem (Henn *et al.*, 2009). Philosophy is the way in which we view the world and make sense of it (Crotty, 2003) and our attitudes towards knowledge and the creation of knowledge (Thorpe & Jackson, 2012). The philosophical position of research is the foundation that underpins

and guides the research process and supports the researcher in the choices and appropriate design of the research in exploring a particular phenomenon (Crotty, 1998; Thorpe & Jackson, 2012; Creswell, 2013).

Figure 3.1 shows the relationship of philosophical elements, which form the basis and justification for the development of knowledge determined by Carter & Little (2007). Definitions and explanations of each element proceed in this chapter.

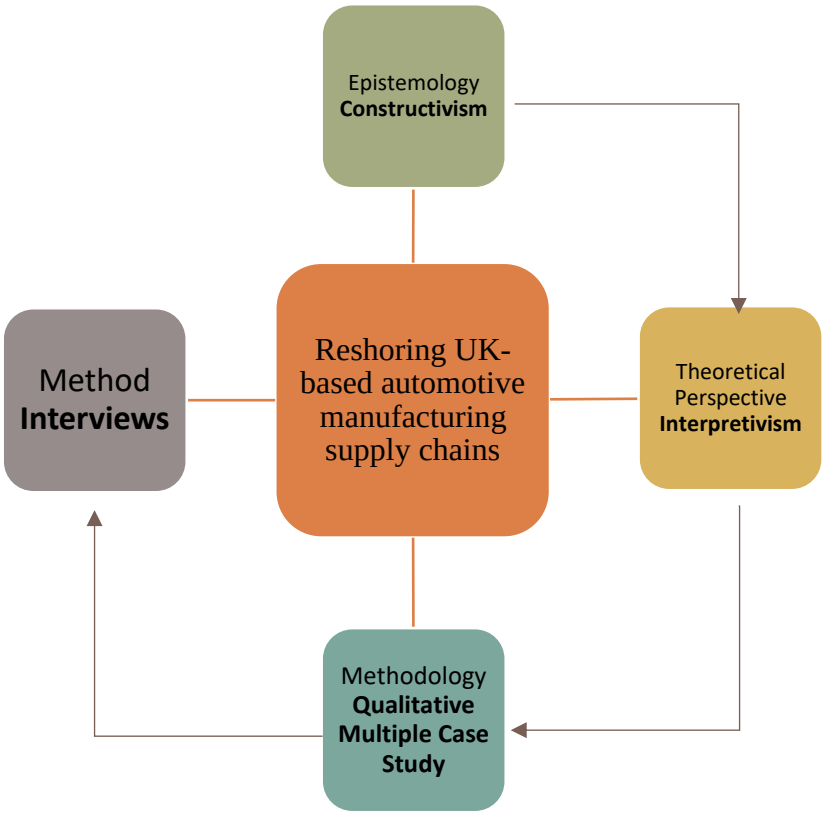
Figure 3.1 The Simple Relationship Between Epistemology, Methodology, and Method



(Source: Carter & Little, 2007, p.1317)

Figure 3.2 identifies the epistemology, theoretical perspective, methodology and methods of this research.

Figure 3.2 Research Philosophical Position



Crotty (2003, p.2) specifies that the research purpose should inform the research design with a comprehensive understanding of what methodologies and methods will be used to address the research question, with justification of the researchers' methodological choices. In doing to, Crotty believes in moving beyond our own assumptions and preconceived ideas that we bring to the research and calls investigation of our theoretical perspective. Cresswell (2013) implies the initial study is informed by our philosophical assumptions in considering what the research can bring to the inquiry, whereby the researchers' history, views and ethical issues are drawn (Denzin & Lincoln, 2011, p.12). Understanding human knowledge from the wider landscape, beyond self-construed

knowledge and perceived characteristics, and the knowledge we aim to accomplish from our research. These epistemological considerations form the basis of four main methodological questions (Crotty, 2003, p.3):

- What *methods* do we use? *(Technique or procedure used to gather and analyse data in relation to the research question)*
- What *methodology* governs our choice and use of methods? *(Strategy, plan, process or design lying behind the use of methods)*
- What t*heoretical perspective* lies behind the methodology in question? *(Philosophical stance informing the methodology and providing context for the process, logic and criterial)*
- What *epistemology* informs this theoretical perspective? *(Theory of knowledge embedded in the theoretical perspective and methodology)*

3.2.1 Research Epistemology

Epistemology is "the study of the nature of knowledge and justification" (Harding, 1987; Schwandt, 2001). Epistemology intrinsic in the theoretical perspective is concerned with human knowledge, the acquisition of knowledge and understanding of acceptable knowledge within our research framework (Jupp, 2006). Theoretical perspective is how we envisage the world and make sense of it, including epistemological assumptions of "how we know what we know" (Crotty, 2003, p.8) and communicating this as knowledge. Maynard (1994, p.10) determines the relevance of epistemology and therefore the need to identify and justify our epistemological stance: "Epistemology is concerned with providing a philosophical grounding for deciding what kinds of knowledge are possible and how we can ensure that they are both adequate and legitimate" (Crotty, 2003, p.8).

Ontology and epistemology are distinct and run in parallel; ontology embodies '*what is'* the existence of reality in the world and the nature of reality (Benton & Craib, 2001; Crotty, 2003; Gomm, 2009), with consideration to what is 'meaning' and 'meaningful reality' (Saunders *et al.,* 2012). Objectivism, subjectivism and constructivism are three different epistemologies with differing perspectives on how to conduct the research and how to present the research (Crotty, 2003).

3.2.1.1 Objectivism

Objectivism takes the meaning that reality exists as constitution of the study, despite human knowledge of the object existence or otherwise, it exists independent of social actors and humans understanding the meaning objectively (Crotty, 2003, p.8). Realism as a notion of ontology often implies objectivism to determine meaning to exist independently of consciousness; Guba & Lincoln support object detachment to understand "how things really are" and "how things really work" (1994, p. 108). Objectivists in social science research adopt research methods from natural sciences to investigate a social phenomenon, insofar as the researcher is completely independent from the research process and management of data (Easterby-Smith *et al,* 1991; Thorpe & Jackson, 2012). In this instance, the researcher's values have no influence on the research output considering the object truth for wide generalisation and development of knowledge. Objectivists believe the use of hypothetico-deductive approach in reducing the variable to its smallest form, enhances knowledge of the problem (Holden & Lynch, 2004).

3.2.1.2 Subjectivism

Subjectivity is the interpretations of meaning imposed on the object by the subject (Crotty, 2003). Meaning arises from the researcher's thoughts and interpretations of the object or phenomenon, emphasising the researcher's involvement in the subject matter,

observations, and methods of investigation (Hunt, 1993; Cunliffe, 2008). Subjectivists create meaning from something and from somewhere, from their own viewpoints of the human world; therefore, the viewpoints of the researcher and stakeholders are rooted in the research process. Radical forms of social constructivism and subjectivism run in parallel, beyond which considerations to the construction of reality as objective rather than subjective form a constructionist viewpoint, (Gomm, 2009).

3.2.1.3 Constructivism

Between objectivity and subjectivity lies the third epistemology of Constructivism. Saunders *et* al., (2012) believe participants utilise their own experiences and perceptions of the world in context, for the emergence of socially constructed meaning. Bryman and Bell (2007) take a theoretical stance to constructionism, recognising that objects and subjects within research exist; objects are reality and form the basis of an investigation into world phenomena.

Crotty (2003) view of constructionism implies that "all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world and developed and transmitted within an essentially social context" (p.42). Meaning emerges from how people think and engage with world objects or a phenomenon rather than inherent within an object or biological mapping (Jupp, 2006). Human beings construct meaning as they interpret the world in which they engage; we as humans do not create meaning but construct meaning through our social interactions and interpretations (Crotty, 2003). Distinguishing constructivism over objectivism from a positive perspective, meaningful reality is 'socially constructed' with the reality that an object or phenomena exists irrespective of our awareness, but only as that object if socially we construe it as being that object (Crotty, 2003).

Crotty advocates the importance of recognising intentionality, a view of phenomenology with constructionism. Intentionality refers to the "referentiality, relatedness, directedness, aboutness" of something (2003, p44); when the human mind is conscious about something, it reaches out and engages with that object. Intentionality rejects both objectivism and subjectivism and embraces the interaction with the human world in establishing meaning (Crotty, 2003; Easterby-Smith, Thorpe & Jackson, 2012).

From theoretical perspectives and epistemologies to methodologies and methods, choices must be justified and research outcomes with merit. Social research may seek true from objective and generalizable results, however, incorporating human knowledge means outcomes will be plausible and suggestive (Crotty, 2003) from which convincing explanations can emerge.

3.2.2 Theoretical Perspective

Consideration of the theoretical perspectives are integral to the philosophical paradigm and justification in methodology and method.

3.2.2.1 Positivism

The philosophical stance of positivism adopts an objective and natural scientific research approach (Jupp, 2006) with an epistemological view that only knowledge based on "observable facts" can be of significance (Easternby-Smith *et al*., 2012, p.57). The development of social science has led to an understanding of "positivism assumes that an objective reality exists which is independent of human behaviour and is therefore not a creation of the human mind" and that "knowledge should be derived from the human observation of object reality" (Crossan, 2003).

The positivist researcher adopts an external position undertaking research in a "value-free" way (Saunders *et al*., 2012). A positivist paradigm is most likely associated with

quantitative highly structured methodology using large datasets collected from factual and objective source, typically surveys or experimental and statistical analysis for the emergence of laws and generalisation (Gill & Johnson, 2010). The quantitative research adopts hypothesis testing and data reduction building small incremental results on existing theory or patterns (Crotty, 2003; Easternby-Smith *et al.,* 2003).

Post-positivism has emerged from the traditional stance of positivism to consider somewhat of an alternative view from the rigid inquiry approach. Here the research is open to the possibility that reality is constructed from the involvement and actions of the researcher (Huges, 1994). Individual behaviours, cultural settings, and socio-cultural factors are recognised as a reality within the research. Forbes (1999) advocates post-positivism as with "establishing warranted assertability" to evidence the existence of phenomena, rather than in search for the absolute truth (Phillips, 1990; Crosser, 2003)

3.2.2.2 Interpretivism

The theoretical perspective of interpretivism is in complete contrast to that of positivist research. The interpretivist researcher adopts a critical argument against the rigidity of positivist approaches in search of deeper understandings of the complexities in the human world and social reality, therefore is more appropriately position within the philosophy of interpretivism (Crotty, 2003; Saunders *et al*., 2012). It is this understanding or "Verstehen" referring to Max Weber (1970) required in social sciences which takes an explicit approach, distinguishing the different methods and methodologies employed (Crotty, 2003). Unlike natural sciences which seeks predictable results, interpretivist research "looks for culturally derived and historically situated interpretations of the social life-world" (Crotty, 2003, p.67). Weber's sociology focuses on qualitative aspects, understanding meaning through social inquiry and rich empirical evidence; beyond the predictability and repeatability of positivist generalisations (Crotty, 2003; Saunders *et al*.,

2012). Adapted from the broader philosophical literature, Table 3.1 provides a direct comparison of positivism and interpretivism.

Table 3.1 Positivism Verses Interpretivism (adapted from Crotty, 2003; Sandberg, 2004; Easterby-Smith, 2008; Saunders *et al*., 2012)

	Positivism	Interpretivism
Ontology	Objective, researcher, and reality are independent	Socially constructed, subject to change, researcher and reality are inseparable
Epistemology	Objective reality, observational facts and credible data only, law-like generalisable results, data reduction	Knowledge is constituted through real world experiences, meanings are subjective, social phenomena
Research Object	Research object exists independently of the researcher	Meaning of the research object encompasses interpretations from real life experiences
Method and Techniques	Statistical analysis, large datasets, mostly quantitative	Phenomenology, in-depth analysis, small samples, qualitative
Theory of Truth	Correspondence theory of true: one-to-one mapping between research statements and reality	Truth at intentional fulfilment: Interpretations of the research object match the lived experiences of the object
Validity	Absoluteness, measurement of data is true to reality	Defensible, knowledge development if credible and plausible
Reliability	Repeatability, research results can be replicated	Interpretation, subjective areas are recognised, and implications addressed

Social constructivism often referred to as interpretive methods, accepts the action and participation of people are determined 'reality' rather than the object; with appreciation for meaning and the construction of meaning based on the experiences of people (Habermas, 1970). It is valid to consider phenomenology and symbolic interactionism within the context of interpretivism.

3.2.2.3 Symbolic Interactionism

Symbolic interactionism as a theoretical perspective adopts the position of continual interpretation of the social world around us and the interaction with others, which influences our own meanings (Crotty, 2003). Set predominantly within pragmatist philosophy building on the works of Mead, Blumer (1969, p.2) identifies three conditions of symbolic interactionism:

1. "that human beings act towards things on the basis of the meaning that these things have for them"
2. "that the meaning of such things is derived from, and arises out of, the social interaction that one has with one's fellow's"
3. "that these meanings are handled in, and modified through, an interpretive process used by the person in dealing with the things he encounters"

Development of Mead's work of symbolic interactionism suggests that of an effective practical application for standardisation in determining the truth (Rescher, 1995, p.710); a reflective process to provide clear ideas (Pierce, 1931-58, vol. 5, p.9); and pragmatism as an analysis of actions under certain conditions (Thayer, 1969, p.429). From a methodological viewpoint, discipline must be exercised to ensure meanings are that if the respondents and not only the researcher (Mitchell, 1977, p.115) emphasising the viewpoint of those studied (Denzin, 1978, p.99), and developing an ethnographical methodology by seeing things from the perspective of others (Crotty, 2003).

3.2.2.4 Phenomenology

Phenomenology focuses on the engagement of humans with world phenomena and the development of meaning from that immediate engagement. Phenomenological research requires pre-existing interpretations to be set aside to promote initial or new experiences

for new meanings to emerge (Crotty, 1996a). At the heart of phenomenology lies intentionality, which focuses on the relationship and inseparable connectivity between humans and the world they interact (Crotty, 2003). The researcher's pre-existing understandings must be "bracketed" where possible to directly experience the phenomena 'first hand' (Crotty, 1996b), interpret and attribute meaning accordingly. Phenomenology naturally fits with constructionism epistemology referring to the engagement of human subjects with objects from which meaning emerges. Phenomenological research is exploratory using ethnographic methods of enquiry. Participant observation is used for qualitative studies to allow the researcher fully to participate and immerse in the research setting (Gill & Johnson, 2010, p.161) embracing the principle of "putting oneself in the place of the other" (Crotty, 2003, p.83).

3.2.3 Research Approach

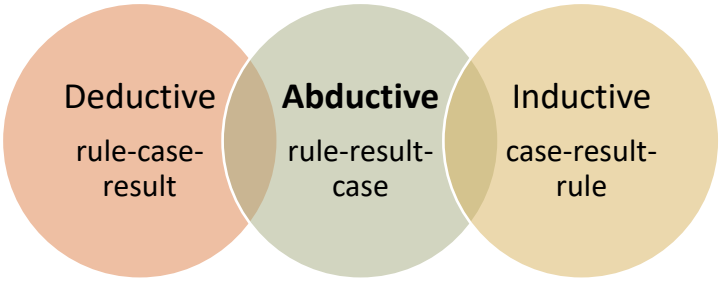
The researcher determines abductive approach for this study as a medium between patterns of deductions and pure induction (Kirkeby, 1990; Taylor *et al*., 2002). Abductive reasoning also inferred to as "reintroduction" Peirce (1931), is a creative and systematic approach to developing "new knowledge" (Andreewsky and Bourcier, 2000; Taylor *et al.,* 2002), deemed a necessity to move beyond the limitations and restrictions of deductive and inductive approaches (Kirkeby, 1990).

Deduction is the dominant approach used in natural sciences, whereby hypothesis or theoretical propositions are subject to rigorous testing (Saunders *et al.*, 2012, p.145); large data sets are measured against the variables to corroborate (or reject) consistency with the theory (Blaikie, 2010). Deductive uses a very structured quantitative methodology to enable replication of results, applying principles of reductionism to achieve the simplest form for generalisation across the research boundary (Saunders *et al.,* 2012).

Induction takes the opposite approach with the emergence of social sciences to provide greater understanding of human interpretations of the social world (Saunders *et al.*, 2012). Whilst the theory may ultimately be the same, development of that theory would follow the data, rather than deduction against theoretical propositions. Inductive research allows greater flexibility and acceptance of alternative explanations, than the rigidity of deduction. Qualitative data often from a small sample size and various methods is more appropriate in understanding the context of phenomena (Easterby-Smith *et al.*, 2008) than a large data set with a deductive approach.

Abductive reasoning adopts an alternative research process to deductive and inductive; deductive research examines the existing theory, derives propositions or hypothesis from that theory, and tests the logical sequence within the empirical settings to generate conclusions, based on the self-generated hypothesis (Kovacs and Spens, 2005). Inductive research takes the opposite approach; with no literature review or predetermined propositions (grounded theory as an example, Alvesson and Skoldberg, 1994), real world observations will emerge into propositions in a theoretical framework (Danermark, 2001). Figure 3.3 shows the comparative research processes; the abductive approach lies somewhere between the hard rules of deduction with rule-case-result pattern, and the complete emergence of inductive research using rule-result-case pattern, taking a balanced approach leading to suggestive rules.

Figure 3.3 Research Process Reasoning



(Adapted from Danermark, 2001; Kirkeby, 1990)

Abductive reasoning follows plausible rules that relate to a particular phenomenon to provide new insights or suggest rules for generalisation across the phenomenon (Andreewsky and Bourcier, 2000). Focusing on particular aspects of certain situations to determine appropriate elements for generalisation and those which are specific to the situation in study, from "situational environmental factors" (Kovacs and Spens, 2005); the experience of the researcher to distinguish particular or generalizable features dependent on experience, thus suggesting the general rules in building theory based on some prior knowledge and understanding.

Reshoring is a contemporary phenomenon with limited empirical studies specific to UK automotive manufacturing, and the application of lean and agile as a theoretical framework to underpin manufacturing reshoring is even more restricted. This empirical study investigates considerations given to environmental and situational factors when making reshoring and location decisions. Prior industrial experience in automotive manufacturing has enabled the researcher to identify a contemporary research gap between the academic field and industry practice.

The abduction process reconceptualises an existing phenomenon with new insight and from a new perspective, for the development of a new conceptual framework (Danermark, 2001; Dubois and Gadde, 2002), to create new knowledge using existing theories from social sciences (Arlbjorn and Halldorsson, 2002). The application of lean and agile theoretical concepts provides a new lens to view reshoring for development of the new framework. Arguably, one of the key differences with abductive (and inductive) research is the emergence of a new theoretical framework from the empirical data, in comparison to evaluating against the predetermined hypothesis (Kovacs and Spens, 2005). Hence, case study research is chosen as the research strategy for this study to corroborate empirical findings and disclose emerging patterns from the automotive sector and case-specific circumstances (Eisenhardt & Graebner, 2007; Eisenhardt, 1989).

Theory matching is emphasised in abductive reasoning as an interactive learning process (Taylor *et al.*, 2002) to match suitable theories with the empirical setting and often found in case study research (Dubois and Gadde, 2002; Alvesson and Skoldberg, 1994). The researcher employs a test phase at the initial empirical data collection stage in this study to test the suitability and relevance of theory in relation to the research topic and case studies. Having deducted the theories already deployed in the literature (typically resource based view, transaction cost economics, internationalisation theory) shown in Table 2.1 Illustrative Literature, the researcher adopts an alternative theoretical lens of lean and agile theoretical concept. To test the appropriateness of theory to reshoring within the empirical case studies, three test interviews at Case A were conducted in the initial stages of data collection.

3.2.4 Philosophical Paradigm of this Research

This research investigates reshoring UK-based automotive manufacturing supply chains and explores the lean and agile theoretical framework within the automotive tier structure.

Following a review of existing reshoring literature and its contemporary nature, the existing body of knowledge remains in the stage of infancy including the motivational factors driving the reshoring phenomenon; and whilst some evidence exists including partial automotive industry focus, many studies follow a secondary research approach, or the empirical evidence collected from cross-industry and multiple geographical environments. Distinctive opportunities are identified in the literature for specific industry and case focus. Secondary evidence also discusses reshoring through narrow and somewhat predictable theoretical lens, and this researcher questions the appropriateness of alternative theory influencing reshoring within the automotive tier structure. Crotty (2003) infers that research is based on the researchers' own assumptions of how people understand and perceive the world. Constructionism is the epistemology underpinning this research in the belief that people, from their own interpretations and experiences within the social world, construct meaning. The context of this study requires the interaction of people who have engaged in automotive manufacturing reshoring for the construction of meaning based on their experiences and understanding of reshoring. In view of Crotty (2003) reshoring phenomena is an active strategy in existence, but only socially and consciously construe it as reshoring through its lifecycle.

Following a review of positivism and interpretivism research paradigms, the researcher resided this study to adopt an interpretivist perspective, which is justified by the qualitative aspects of the study. This social enquiry has the desire to gather empirical evidence from information-rich sources, moving beyond existing evidence and predictable and repeatable positivist generalisations from large-scale data sets (Crotty, 2003; Saunders *et al.*, 2012). Due to the contemporary nature of automotive manufacturing reshoring, the interpretivist paradigm has been employed to understand and explain the reshoring phenomenon in automotive manufacturing supply chains based

on the experience of participants and case company facilities. Interpretivist research design is intended to be small scale, flexible approach and relatively unstructured to incorporate in-depth descriptions (Weinstein & Foard, 2009). This study consists of a small sample from the automotive manufacturing industry context to gain in-depth understanding of the motives and influential factors of UK manufacturing reshoring, to develop new knowledge of UK-based automotive manufacturing reshoring. The philosophical paradigm of this research provides the theoretical basis for the research methodology and method.

3.3 Methodology

The theoretical perspective provides logical criteria for the methodological framework of human inquiry (Crotty, 2003). Research methodology is "a theory and analysis of how research should proceed" (Harding, 1987, p.2) and the "analysis, of the assumptions, principles, and procedures in a particular approach to inquiry" (Schwandt, 2001, p.161) to justify the chosen research methods. Crotty argues, "Different ways of viewing the world shape different ways of researching the world" (2003, p.66), residing choices in the methods of data collection and data analysis, the boundary of the research, and the strategy for achieving the research objectives (Silverman, 2005). Research methodologies may be categorised into two main forms, quantitative research, and qualitative research.

3.3.1 Quantitative and Qualitative Research

Differentiating quantitative and qualitative research is often the use of numeric or non-numeric data; the use of large-scale questionnaires and statistical analysis is typical of quantitative research from a narrow view (Saunders *et al.*, 2012). Quantitative research

is mostly associated with positivist philosophy using a deductive approach, whilst it is possible some quantitative studies will adopt more inductive reasoning and interpretivist study. Quantitative methodologies derive from natural scientific research often using experimental strategies, hypothesis testing and highly structures techniques (Saunders *et al.*, 2012).

Schwandt (2001) considers qualitative research to be social research in the form of text data, collated using open-ended questioning methods to investigate a particular phenomenon whereby data is analysed in textual format to comprehend meaning from social interactions, rather than converting data numerically to test propositions or hypothesis.

Creswell's places greater emphasis on the process and procedures of the research to build a framework for the approach to inquiry including case study methodology appropriate to this research:

Miles and Huberman (1984) ascertain that like quantitative research which requires early structuring of the research design, qualitative research also benefits from prior considerations of appropriate research mechanisms. Silverman (2005) considers four research methods in both qualitative and quantitative terms, shown in Table 3.2 and places emphasis on the methodology as seminal to the method of choice.

Table 3.2 Different Research Methods

Method	**Methodology**	
	Quantitative research	**Qualitative research**
Observation	Preliminary work (prior to framing questionnaire	Fundamental to understanding another culture
Textual analysis	Content analysis i.e., counting in terms of researchers' categories	Understanding participants' categories
Interviews	Survey research: mainly fixed choice questions to random samples	Open-ended questions to small samples
Transcripts	Used infrequently to check the accuracy of interview records	Used to understand how participants organise their talk and body movement

(Source: Silverman, 2001, p.12)

The nature and philosophical position of this research informs qualitative methodology as most suitable for this study, that allows the researcher to employ research methods and techniques to disclose the investigative aspects across the scale of the study. The abductive approach to inquiry allows the researcher to build on existing theoretical frameworks by gaining deeper understandings across the selected case studies from individuals' experiences, beliefs and interpretations from which new meaning and new knowledge can emerge. The researcher determines the depth of inquiry in addressing 'how' and 'why' factors are not readily quantifiable, therefore the researcher employs qualitative case study inquiry to be most suitable for this study.

3.3.2 Case Study

Yin is considered a leading author of case study research and his work is seminal to this section, amongst other contributions. Case study enables the researcher to explore contemporary phenomena, which recognition may be limited to the context of the organisation (Hartley *et al*., 1991), whereby "optimising understanding of the case requires meticulous attention to its activities" (Stake, 2000, p.444). Multiple variations of case study definitions exist "by interest of the individual case, not by the methods of

enquiry used" (Schramm, 1971, Stake, 2005, p.443). Yin "Twofold definition" focuses on the contextual conditions relevant to the case study, with recognition that other characteristics are appropriate features of case study beyond phenomenon and contextual situations:

> "A case study is an empirical enquiry that investigates a contemporary phenomenon in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be evident".
>
> And
>
> "A case study enquiry copes with the technical distinctive situations in which there will be many more variables of interest than data points; and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion; and as another result, benefits from the prior development of theoretical propositions to guide data collection and analysis" (Yin, 2014, p.17).

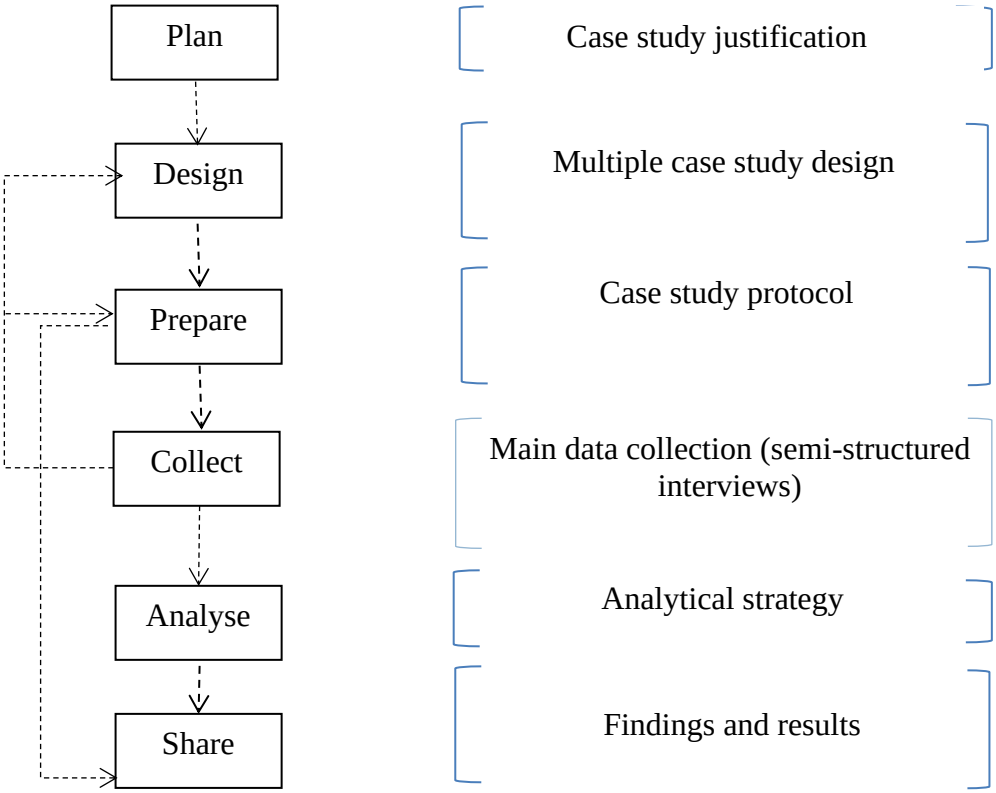
Patton (2002) suggests this triangulation of data to strengthen construct validity can be the evaluation of data sources, different evaluators, different perspective of the same data and different methods. Triangulation of this empirical data sources include manufacturing case-to-manufacturing case, manufacturing case-to-industry forum case, and empirical-to-secondary analysis.

Case study strategy is most suited to research questions requiring in-depth explorations of the complexities in social phenomena, with focal investigation of the "case" from which rich data can emerge (Cassell & Symon, 2004; Yin, 2014). The researcher's role is opportunistic with case study enquiry in addition to executing the planned data collection (Cassell & Symon, 2004). This researcher demonstrates opportunism through

the recruitment of Industry Forum participants from National and Regional automotive governing bodies. Robson (2002) infers the flexibility of case study enables the enquiry to adapt for planned and emerging theory; it can be argued that value is therefore positioned in the exploration of new and emerging organisational and management behaviours (Easternby-Smith *et al.,* 2008). This shift in framework can open avenues of conflict with the initial research expectations, requiring the researcher to be more open-minded to new lines of enquiry (Eisenhardt, 1989). Despite advocating the proposition of theoretical development in single and multiple case studies, Eisenhardt & Graebner (2007) caution the bias of the investigator in drawing false conclusion and encouraging examination of the data in different ways.

This researcher adopts case study as the most appropriate research strategy, with the capability of addressing 'how' and 'why' research questions in a contemporary and complex social phenomenon whereby the researcher has limited control over behavioural events (Yin, 2014). Case study enquiry enables the researcher to gain an in-depth understanding of reshoring motivations beyond surface level investigations (Yin, 2014), and explore the intricacies between the customer and supplier influencing reshoring of supply to the UK. This case study research process is presented in Figure 3.4.

Figure 3.4 Case Study Research Process



(Source: adapted from Yin, 2014)

Yin promotes case study as most appropriately positioned to investigate phenomena with the utilisation of different sources of evidence including interviews, observations, documentation, physical artefacts, and archived data, from which theoretical propositions may be tested or development of new theory arise (2014). The strengths and weaknesses of these different sources of evidence are presented in Table 3.3.

Table 3.3 Six Sources of Evidence in Case Study: Strengths and Weaknesses

Source of Evidence	Strength	Weakness
Documentation	• Stable – can be reviewed repeatedly • Unobtrusive – not created as a result of the case study • Broad coverage – long span of time, many events and many settings	• Retrievable – can be low • Biased selectively if selection is incomplete. • Reporting bias – reflects reporting of author • Access – may be deliberately blocked
Archival Records	• Same as above for documentation • Precise and quantitative	• Same as above for documentation • Accessibility due to privacy reasons
Interviews	• Targeted – focused directly on case study topic • Insightful – provides perceived casual inferences	• Bias due to poorly constructed questions • Response bias • Inaccuracies due to poor recall • Reflexivity – interviewee gives what interviewer wants to hear
Direct Observation	• Reality – covers events in real time • Contextual – covers extent of events	• Time consuming • Selectivity – unless broad coverage • Reflexivity event may proceed differently because it is being observed • Cost – hours needed by human observer
Physical Observation	• Same as above for direct observations • Insightful into interpersonal behaviour and motives	• Same as above for direct observations • Bias due to investigators manipulation of events
Physical Artefacts	• Insightful into cultural features • Insightful to tech ops	• Selectivity • Availability

(Source: Yin, 2003)

3.3.2.1 Case Study Design

Case study approach can be utilised for single and multiple cases designs, with the intention to validate theoretical propositions or distinguish the emergence of new theory (Yin, 2014). Stake determines three types of case studies:

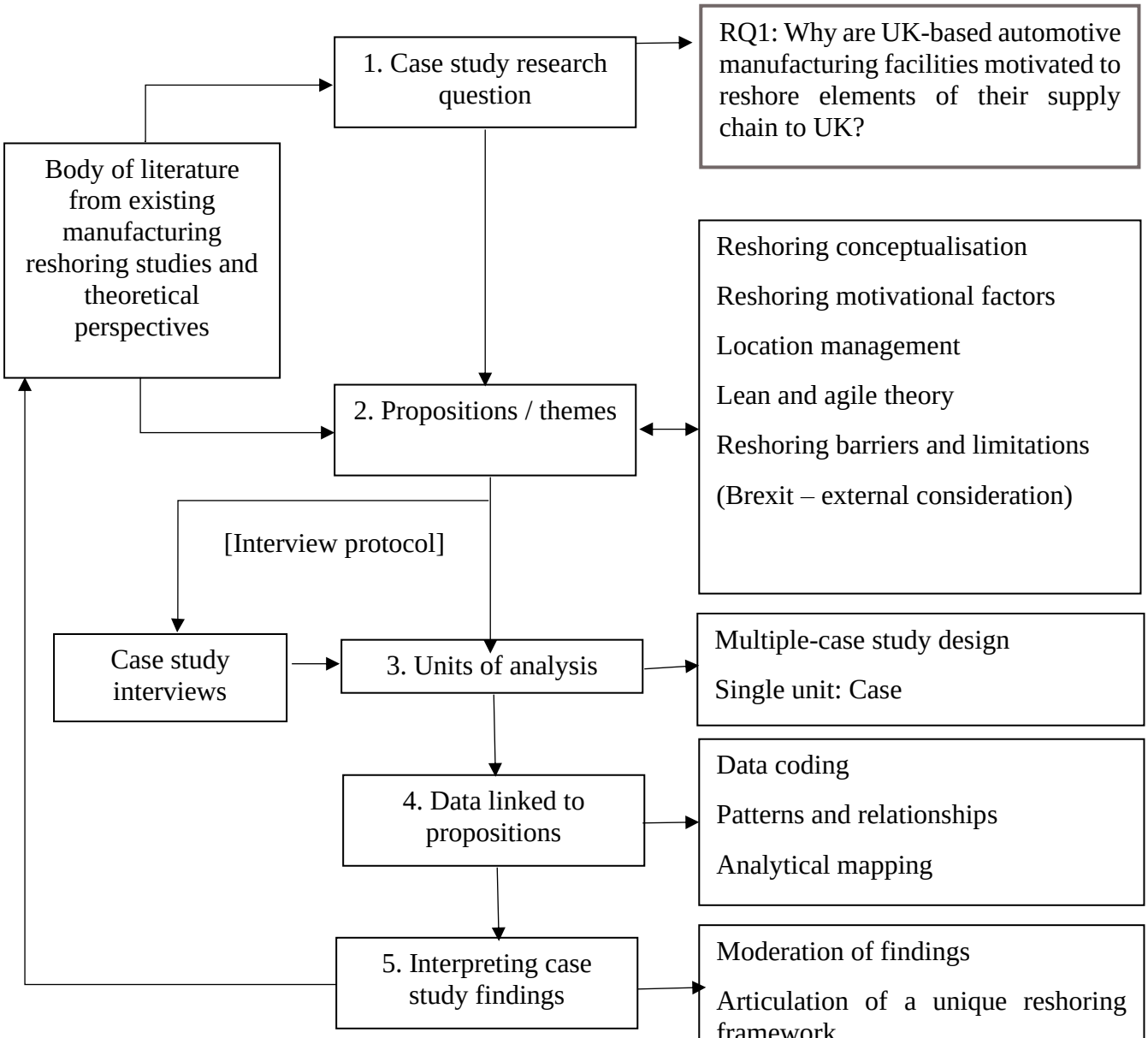
- The intrinsic case study where ‘this case is of interest…in all its particularity and ordinariness’. In the intrinsic case study, no attempt is made to generalize beyond a single case or even build theories.

- The instrumental case study in which a case is examined mainly to provide insight into an issue or to revise a generalization. Although the case selected is studied, the main focus is on something else.
- The collective case study where several cases are studied in order to investigate some general phenomenon (2000, p.437-8).

Brown & Eisenhardt (1989) note the criticality in selecting appropriate case studies for multiple-case design to illustrate similarities and differences of the phenomenon across the research scope. Herriot & Firestone (1983) imply multiple-case evidence provides more convincing and robust research; however, the resourcefulness of the researcher must be recognised with extensive demands on time and resources.

The researcher recognises the option of single-case study of which the sources of evidence discussed earlier are equally applicable; however, this research adopts a multiple-case study design based on Yin's typology of designs for case study (2014). The case study design provides a logical sequence linking the main research components in a coherent way (Cassell & Symon, 2004). The "*blueprint*" for this research (shown in Figure 3.5) explicitly links the data collected and drawn conclusions to the main research questions and propositions from secondary data. In attempting to avoid critical flaws in the research design, this researcher follows Yin's five components of research design descriptor (2014, p.29).

Figure 3.5 Case Study Research Design



(Adapted from Yin, 2014)

The researcher determines the 'case' as the unit of analysis for this study; the case is the UK-based operational facility and Industry Forum governing bodies, whereby the author conducted the data collection process. Yin insists the boundary of case studies must be clear whilst care should be taken to avoid misleading the use of sampling terms (2014,

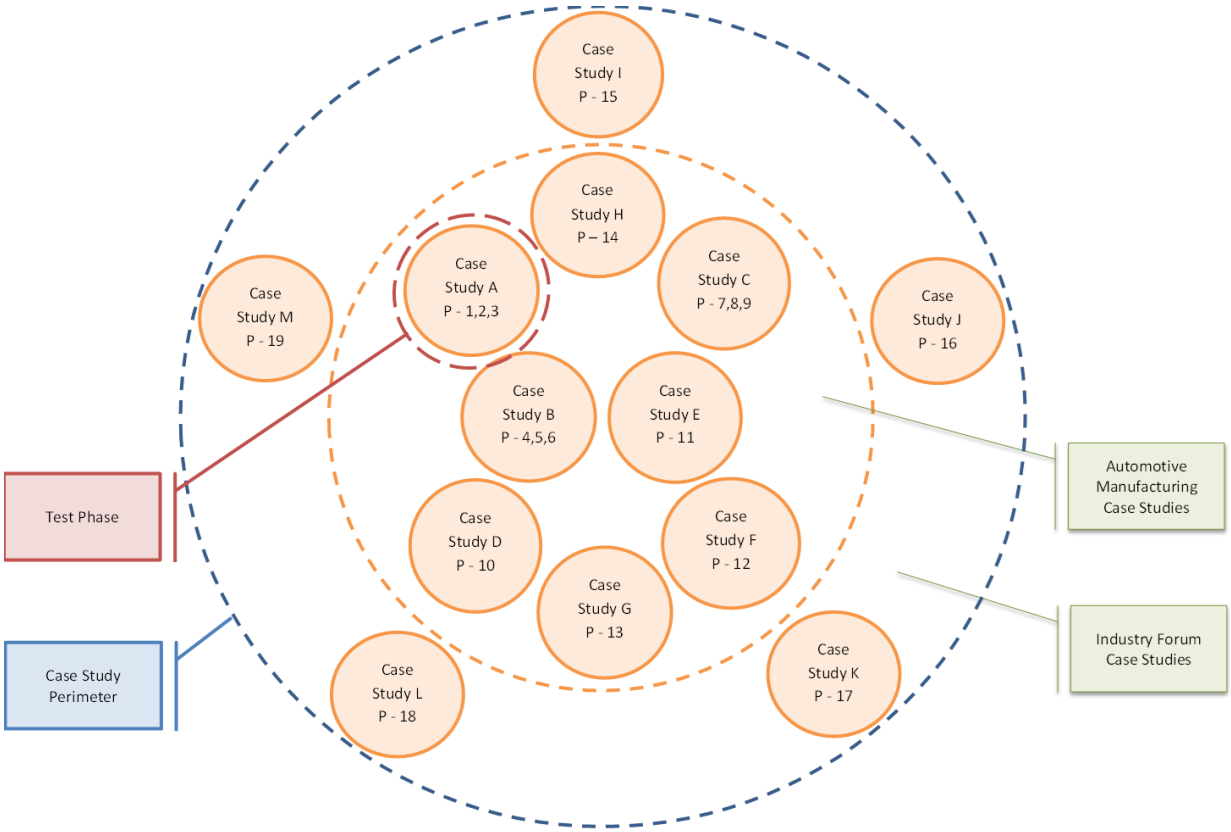
p.42). Nevertheless, acknowledgement of sampling is relevant to differentiate and appreciate the type of sampling used, whilst Yin advocates, a good sample supports external validity identified as a tactic in good case study research. Sampling may be used in both quantitative and qualitative approaches with the use of different logics (Patton, 1990). Probability sampling uses random and statistical representation for generalisations across large programme populations, typically in survey or experimental research. Non-probability sampling usually focuses on small sample size including single or multiple cases for in-depth enquiry and can involve techniques including purposive sampling (or purposeful sampling), snowballing or chain sampling, self-selection, convenience sampling (Patton, 1990; Richie *et al.*, 2013; Saunders *et al*., 2007).

The researcher determined purposive sampling most suitable for the recruitment of participants in this study, advocated by Stake (2000) as a well-matched technique for case study research, enabling the researcher to select "information-rich cases" to enlighten the research questions for this study (Patton, 1990; 2002). From the initial screening of the wider automotive manufacturing industry, a first-attempt empirical case design included the main case study (Tier-1 supplier) with multiple facilities in the UK as a central focus and connected case studies (OEM's) with product supplied by the central case facilities. In an early attempt, the researcher called judgement on the first empirical case design to be too narrow in a bid to explain the research questions, and experienced accessibility challenges with some identified cases despite initial authorisation. The researcher revised the empirical case design as presented in Figure 3.6 selecting case studies that were most likely to provide in-depth information and a balanced geographical spread for representation within the UK automotive manufacturing sector. Purposive sampling technique was used in the recruitment of case study A, B, C, D, H, I, L and M. Case study I acted as a gatekeeper within a professional remit to encourage the participation of

additional case studies corresponding to the screening criteria. Case study I emailed the research synopsis for this study to several senior figures in the UK automotive network, highlighting the potential value of this research to encourage industrial and peripheral participation. In respect of GDPR 2018, interested cases approached the researcher with no prior contact information shared. Bryman & Bell (2007) suggest gatekeepers often have a senior position and the ability to open further lines of enquiry within a network. The efforts of case study I resulted in chain sampling for the recruitment of case study E, F, G, J and K. Chain sampling (or snowballing) is particularly advantageous when research objectives are difficult to identify in certain populations, or in this case, restricted access due to the sensitive context and available resources within the automotive manufacturing industry (Richie *et al.*, 2013). Onward communications from existing participants, particularly senior figureheads, opens the line of enquiry and resides a level of trust in the research; herein, the researcher exercised flexibility during the fieldwork and seized the opportunity to engage appropriate emerging case studies. Patton (1990; 2002) implies "there are no rules for sample size in qualitative inquiry", the researcher exercised judgement to the value of each case, their usefulness, validity and credibility of information-rich cases, and the available resources for the enquiry (Patton, 1990).

Identifying the boundary of this case study sample (Yin, 2014), all eight main case studies are positioned within the automotive tier structure with a UK-based manufacturing or assembly facility that have engaged in supply chain reshoring. All five peripheral case studies exhibit a role in developing UK automotive manufacturing policy and objectives with direct connectivity to the automotive manufacturing industry, who have engaged in reshoring or growing UK-content. An introduction to each case study is detailed in Chapter 4 Case Studies, including an example of the automotive tier structure and the position of the empirical case studies within that tier structure.

Figure 3.6 Empirical Case Design



Beyond the isolation of the selected case studies, the author embraces the opportunity to apply analytical generalisation to other situations, based on a foundation of theory and empirical data gained, whereby generalisations and lessons learnt may stretch beyond the definition of the original case study scenario (Yin, 2014, p.41).

3.3.2.2 Criticisms of Case Study

Empirical case study inquiry is not without criticism or constraints despite becoming a popular research strategy within social science research (Yin, 2014). Rigor is emphasised as the central concern in case study research (Feagin *et al*., 1991) resulting from a lack of systematic procedure in managing data leading to ambiguous conclusions (Yin, 2014). From a positivist perspective, the view that hypothesis testing from replicable statistical evidence instils confidence in the research to provide valid, reliable, and generalizable results for theory development, in avoiding researcher bias and subjectivity from a

weakened methodological approach (Gill & Johnson, 2010). However, case study strategy allows the researcher to comprehend complex problems beyond statistical results and build upon existing case research. Yin (2014) acknowledges the lack of understanding in the application of case study research and the different research designs, recognising that some criticisms may be valid but can be used to continually improve case study research strategy.

The use of case study is commonly criticised for its lack of generalisability particularly when focusing on a single case study. However, Yin (2014) presents a comparison with single experiment in that single cases are "generalizable to theoretical propositions and not populations", thereby a single case is not representative of a "sample" and the aim is to expand theory through "analytical generalisations" and not "statistical generalisations" (p.21). Yin advocates the use of case study, single and multiple case, as a methodology for building theory that may be applicable to the wider context beyond the existing study. Creswell (2014) pertains case study research strategy can be highly effective when planned and constructed in real-life situations for the exploration of real-life problems. This researcher argues that the scope and quality of case studies in this multiple-case study research alleviates many of the identified criticisms of case study inquiry.

3.4 Research Method

Research methods are the "procedures, tools and techniques" used in gathering evidence for research purpose (Harding, 1987; Schwandt, 2001) and shaped by the methodology. Crotty (2003) emphasises the detail required in justifying our choices, in relation to the type interviews conducted, techniques used by the researcher, and the environment or setting the interviews take place.

3.4.1 Research Interview

Within a qualitative framework, data collection by interview is identified as a frequently employed method in qualitative research. In-depth and semi-structures interviews are more appropriate in case study strategy where qualitative analysis is employed to develop deeper understandings of 'how' and 'why' aspects of the investigative phenomena (Saunders *et al*., 2012, p.376). Yin recommends the interview process should not be hurried, allowing the researcher and the participant sufficient time to absorb the data emerging and adjust, if required (2003). Gillham (2000) highlights that through the adoption of synchronous interview process; the interviewer and interviewee must recognise the requirements in time, availability, and commitment.

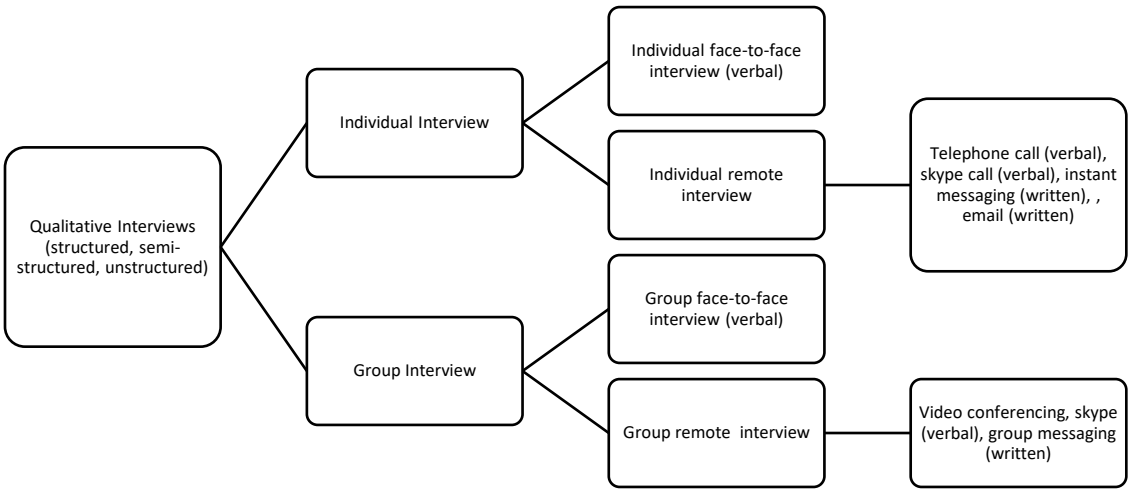
There are many typologies of qualitative research interview and choices made by the researcher should be appropriate to the research strategy. Separating semi-structured interviews and unstructured interviews is largely the guidance of themes, identified in Table 3.4, derived from an initial literature review prior to data collection.

Table 3.4 Typology of Interviews

Typology	**Interview Style and Structure**	**Approach**
Structured Interview	• Predetermined questions • Standardised • Interviewer-administered questionnaires • Formal and structured • Un-bias	• Quantitative research interview
Semi-structured Interview	• **Non-standardised** • **Themes and key questions established** • **Flexible with content delivery** • **Audio-recording or note-taking** • **Use of interview schedule**	• **Qualitative research interview**
Unstructured Interview	• Informal and unstructured • In-depth interviews • Clear idea of investigative areas, but no predetermined questions • Non-directive or free-style • Informant interview	• Qualitative research interview

(Source: Adapted from Bryman & Bell, 2011; Robson, 2011; Saunders *et al*., 2012)

Figure 3.7 Forms of Interviews



(Source: Adapted from Bryman & Bell, 2011; Robson, 2011; Saunders *et al*., 2012)

This research adopts a semi-structured interview typology as depict in Table 3.4. Each case study participant has coherently engaged in a semi-structured interview with the researcher; background research of the case study was conducted to confirm prior or active manufacturing reshoring engagement. The medium of interview employed for this study was individual interview shown in Figure 3.7; the intention was for face-to-face interviews for all participants, however, due to accessibility and availability of some participants, a proportion of individual interviews were conducted by telephone; a breakdown of interview medium is presented in Table 3.5.

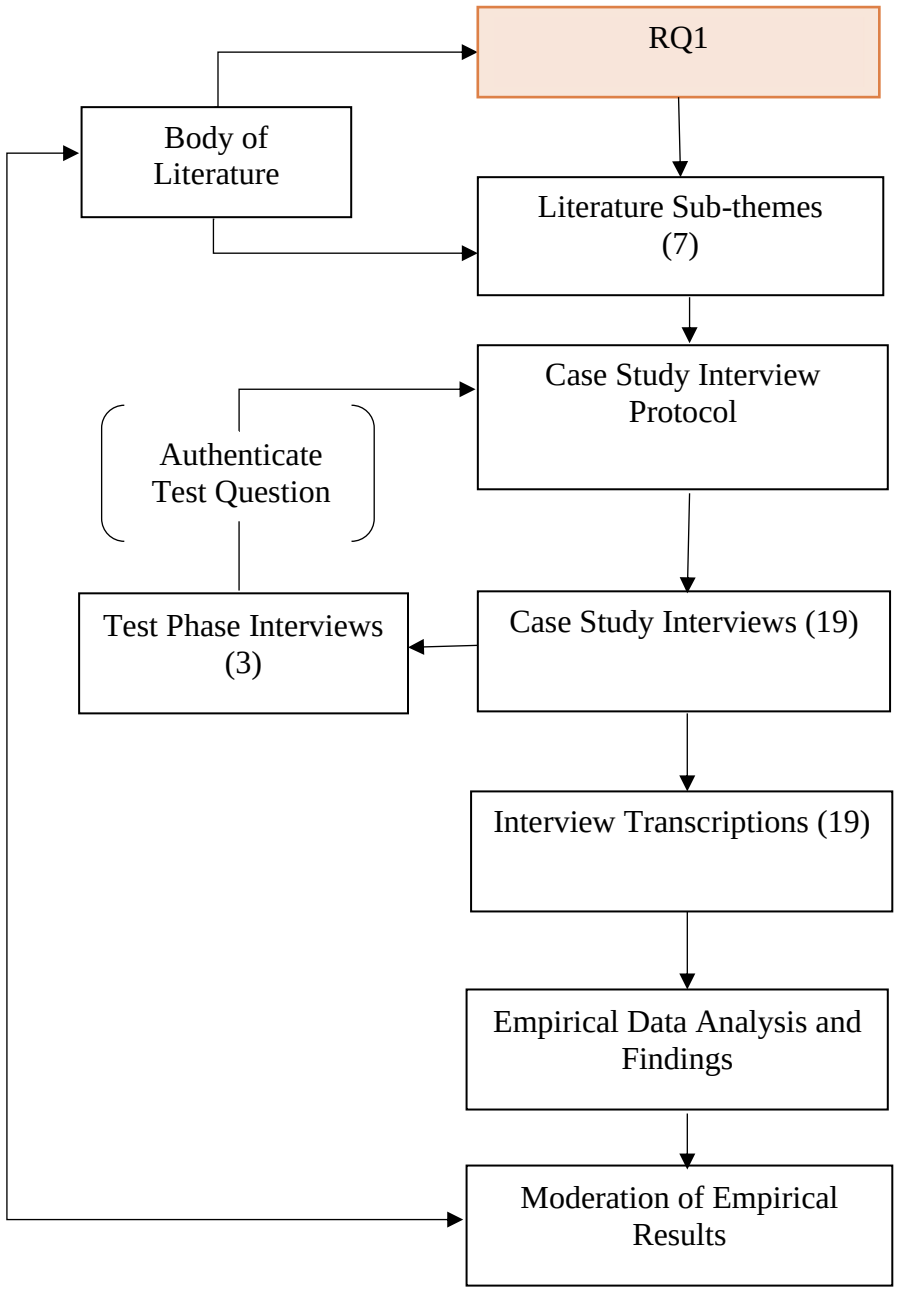
Table 3.5 Schedule of Interviews

Interviewee	Participant Position	Medium	Interview Date	Interview Time-	Duration
Participant 1 Case Study A	Plant Manager of a Tier-1 automotive manufacturer with plant responsibility	Face to face	25/10/17	10:40	1hr 1 min
Participant 2 Case Study A	Production Control and Logistics Manager of a Tier-1 automotive manufacturer with supplier, customer, and logistics responsibility	Face to face	25/10/17	12:10	1hr 5 mins
Participant 3 Case Study A	Production Manager of a Tier-1 automotive manufacturer with plant production responsibility	Face to face	25/10/17	14:04	1hr 18 mins
Participant 4 Case Study B	VP of Supply Chain Management for an OEM with European supply chain responsibility	Face to face	16/03/18	09:00	58 mins
Participant 5 Case Study B	Senior Parts Controller for an OEM with procurement responsibility	Face to face	16/03/18	10:25	1hr 12 mins
Participant 6 Case Study B	Parts Controller of an OEM	Face to Face	23/03/18	15:05	45 mins
Participant 7 Case Study C	Purchasing Manager of a Tier-1 automotive manufacturer with UK plants' purchasing and negotiation responsibility	Face to face	22/03/18	10:57	1hr 35 mins
Participant 8 Case Study C	Supply Chain Logistics Manager of a Tier-1 automotive manufacturer with customer, supplier, and logistics responsibility	Face to face	01/06/18	12:00	1hr 19 mins
Participant 9 Case Study C	Deputy Plant Manager of a Tier-1 automotive manufacturer	Phone	28/06/18	11:00	47 min
Participant 10 Case Study D	Customer Liaison Team Leader of a Tier-1 automotive manufacturer with customer and supply responsibility	Face to face	22/05/18	12:30	1hr 12mins
Participant 11 Case Study E	Supply Chain Projects & External Engagement Manager for an OEM	Phone	11/05/18	13:00	1hr 14 mins
Participant 12 Case Study F	Managing Director of a Tier-1 automotive manufacturer with Plant responsibility	Face to face	23/05/18	14:00	1hr 55 mins

Participant 13 Case Study G	CEO of a Tier-2 automotive manufacturer with Plant responsibility	Phone	16/07/18	12:00	1hr 40 mins
Participant 14 Case Study H	Director of a Tier-2 automotive manufacturer with operational and project responsibility	Face to face	25/05/18	11:05	58 mins
Participant 15 Case Study I	Senior figurehead in a national automotive trade and policy	Phone	26/04/18	13:00	1hr 27 mins
Participant 16 Case Study J	Senior figurehead of a regional authority with automotive manufacturing policy	Phone	17/05/18	10:30	1hr 12 mins
Participant 17 Case Study K	Senior figurehead of an automotive manufacturing service	Phone	27/06/18	09:30	46 mins
Participant 18 Case Study L	Senior Consultant of a national automotive advisory service	Face to face	13/06/18	11:10	1hr 35mins
Participant 19 Case Study M	Consultant, researcher and senior figurehead for an automotive trade and policy service	Face to face	02/06/18	09:30	52 mins

The process flow for data collection is shown in Figure 3.8. Prior to interview, a review of secondary data enabled the researcher to develop the main interview themes from which the interview questions emerged. The main themes broadly address the conceptualization of reshoring, motivational factors for reshoring, location management, power relationships influencing reshoring within the automotive tier structure, automotive methodologies of lean and agile impacting reshoring, barriers and limitations, and the impact of Brexit on manufacturing reshoring.

Figure 3.8 Empirical Data Collection Process



Adjustments were made during the interviewing process with regards to the interview questions/schedule (Yin, 2003). Participation emerged from Industry Forum with automotive governing bodies, a welcomed contribution to the study relevant to the government stream running through the literature. Herein, the researcher recognised that a level of adjustment was required to the manufacturing-case interview questions to be suitable for industry forum-case interviews. Few questions did not apply to automotive

industry forum and others required minor modification; thereby a second set of interview questions referred to as the peripheral case study interview questions, carved from the main case study interview questions, were used to interview Participant's 15, 16, 17, 18 and 19. The interview process and technique applied to both the main case studies and the peripheral case studies was consistent.

During interview with Case I, the participant suggested adding an additional question to the main Core study interview questions targeted at tier-1 suppliers; the rationale being to gain an understanding of the requirements needed for tier-2 partners to break entry into the supply chain and bridge the missing links. The following question was verbally integrated into proceeding interviews:

> "What incentives or help or support would make you consider reshoring supply more actively?"

Interviews were organised at convenient times for case study participants however, some delays were apparent due to operational challenges and availability:

- Case Study A – two-months delay due to operational challenges.
- Case Study D – eight-days delay due to operational changes and availability.
- Case Study F – Three-days delay due to diary changes.

An electronic copy of the interview guide was emailed to participants in advance of the interview date, to allow participants the opportunity to familiarise themselves with the questions and gather relevant data should they wish to do so; clear communication was also given that no prior preparation was required. Introductions by the researcher and participants at the beginning of each interview helped to overcome any initial barriers. The interview guide provided consistency for the interview process and an explanation given at the start of the interview. Additional questions evolved during the interviews

and opportunity to add additional information or ask questions of the researcher was given towards the end. Empirical data collection remained the focus of the interview process, thereafter, networking for further participant recruitment was discussed.

3.4.1.1 Test Phase

The literature review has enabled the researcher to compile a comprehensive set of interview questions to support the semi-structured interviews. The main case study interview questions were born from the reshoring literature; however, prominent theories discussed within reshoring literature are typically Resource Based View, Transaction Cost Economics, and Internationalisation theory. Resource Dependence Theory and aspects of Lean and Agile theory whilst apparent, were limited in discussion within the reshoring context; and presents an original contribution to this research.

To substantiate and determine the most prominent theory in automotive manufacturing reshoring, the researcher conducted a limited number of test phase interviews to validate the appropriateness of this theoretical lens. Abductive case study research frequently incorporates empirical data collection concurrently with theoretical development, activating the essence of abductive reasoning having the ability to move freely forward and back between empirical and secondary knowledge (Dubois & Gadde, 2002; Wigblad, 2003). Participant 1, 2 and 3 from Case A, a Tier-1 automotive manufacturing supplier to the OEM, were selected for test phase interview based on the case study position within the automotive tier structure, interviewee position, and access to interview and second interview if required. Three test interviews we conducted undertaking the full main study interview schedule; each participant stated the interview questions were ‘very comprehensive’ and ‘no further information to add’ at the end. Table 3.6 shows some direct quotations from the test phase interviews in Case Study A, in addressing the test question.

Table 3.6 Test Phase Interview Response

Test Question: Is an operational element of power identified by the case study as having an influence on reshoring within their supply network?	
Case Study A	Quotations from Interviews
Participant 1	"Customer's king" "they are influencing the sourcing of the replacement business because they are basically insisting on a high percentage of local content in order to not have the discussion about exchange rate as I mentioned earlier." "They've actually asked for 80%." "competitiveness is key so depending on the economic climate at the time would I guess depend on whether the OEM would encourage or discourage it and obviously currently they are encouraging it"
Participant 2	"customer supplier relationship is everything" "power lies with whoever is purchasing the product, so it is always the customer and not the supplier, and I don't think that will ever change" "There is constant pressure to keep cost down, constant pressure on your organisation to keep the customer happy" "Automotive is a very competitive and very difficult environment to work in " "there is more willingness to want to work together rather than the OEM driving down to the Tier1, Tier2 supplier, so there's a willingness to want to work but ultimately we all know when the shit hits the fan and there's a bang on the table, we know who the boss is" "possible for them to influence right to the top."
Participant 3	"we fall in line with what (Customer) want" "don't be the slowest bear in the woods" "they have tried to influence us last year we were only holding 1 days safety stock with (European Supplier) when the strike hit, and my Senior and my Parts Controller at (Customer) both said you go to 1.5 - 2 days safety now"

The interview process continued for the remainder of the main case study interviews with no amendments to the interview questions. Case study A interviews therefore became the starting point of data collection. The researcher rationalised using an interview test phase over a pilot study for the following reasons:

- Only one theoretical element requiring validation.

- Main concepts and interview questions derived from the literature review and boundary identified.
- Researcher's own experience of conducting interviews in a professional environment.
- Repeat access to Senior level participants in automotive manufacturing case studies would be extremely difficult.

3.4.2 Data Analysis

For the researcher to establish a true account of the interview beyond vocal discussion with the participants (Miles, Huberman, & Saldana, 2014), all interviews were voice recorded and transcribed in full to gain richness from the viewpoint of the participant and avoid any misinterpretations. Transcriptions were conducted manually by the researcher to maintain confidentiality of the case and participant, and for the researcher to become immersed in the data and gain early understanding to support the coding process (Saldana, 2016; Yin, 2014). Only once all 19 interview recordings were transcribed, did the researcher begin the data analytics. Refer to Appendix E for a sample interview transcript.

In following the iterative process proposed by Yin (2011) the analytical phase comprises of data compilation, data disassembling, data reassembling as outlined below; whilst data interpretation and conclusion are elements incorporated into the discussion of meaningful results and concluding frameworks (Chapter 6 and 7):

1. Data compilation: analysis should commence with an organised approach to compiling and organising all the field data collected, to enable easy retrieval of annotations. The field data in this research is the case study participant interviews, from which the interview transcripts derived. 19 anonymised transcripts were

compiled individually and imported into NVivo Pro 12 and organised as Files: Interviews (see Appendix C).

2. Disassembling data: dismantling the data into smaller components. The approach taken by this researcher was breaking down one interview transcript at a time, reviewing the response from that participant for example Case A, P1 and disassembling the data one question at a time. This enabled the researcher to organise the data more clearly into usable codes to make sense of and analyse initial key points and repeatability.
3. Reassembling data: the process of reconstructing the data to uncover meaningful interpretations allowing patterns to emerge. This process followed many iterations of cleansing the data to ensure the reconstruction of the disassembled data was accurately interpreted and allocated the correct code. This interpretation process is engrained in the interpretivist study and emphasises value in the researcher adopting a manual transcription and analytical process becoming emersed in the data. The reassembling of data was a significant point in this research and revealed the extensive scope of the intended research and the necessity to realign the research question and theory focus. This realignment is presented in Figure 5.1 Evolved Research Position (2).

Whilst limitations pertain for all software, Nvivo Pro 12 was a useful tool in the data analysis process. More specifically, it assisted in better planning and management of data in terms of coding and retrieval, discovering and marking interesting aspects of the data using different colours (Lewins & Silver, 2007).

3.4.2.1 Coding and Data Reduction Strategy

Pertinent to the analytical process was the devise of codes and themes. The researcher employed NVivo 12 Pro to facilitate the collation and organisation of interview

transcripts in one consolidated location. The researcher failed to justify reasons not to use CAQDAS despite controversy of applications such as NVivo for interpretivist studies. However, the use of NVivo in this research was to aid clarity and visibility of patterns and relationships developing from the data. This researcher applied a manual process to the consolidation, disassembling and reassembling of data (Yin, 2011), in doing so the researcher determined the codes appropriate to the small components of data, based on the interview question, key aspects from the literature and the research question. Thus, the role of the researcher was significant in the coding process and development of themes (Plakoyiannaki, 2016; Yin, 2011)., with NVivo utilised as a platform to store and organise data, with numerical provision of codes and references allocated; however, not to perform the analytical role or implicate the integrity of the interpretivist study.

The process of coding and developing themes was an iterative process, moving back and forth during data cleansing to assure accuracy in data allocation and appropriate codes developed. Themes develop from the combination of codes with similarities or differences of relevant narratives relevant to the research topic. Development of themes significant to the research question moves the analytical process to a higher-level for the development of meaningful insights (Miles, Huberman, & Saldana, 2014).

Anonymised interview transcript files for each case study participant were imported to the software NVivo Pro 12 into the file named ‘Interviews’. 19 interview transcripts are evidenced in this file. The broad themes used to develop the interview questions were created as a starting point to begin coding the data, during the coding process more themes emerged from the data. The researcher re-read all the interview data, and in doing so, codes emerged from the data within each theme. The process of coding conducted by the researcher is outlined in the following steps:

1. Import the anonymised interview transcript files – 19 files imported to NVivo.
2. Create the initial broad themes derived from the literature – examples include Motivational Factors, Location Management and Barriers and limitations (refer to Appendix C for all themes).
3. Read the response to each interview question line-by-line – researcher interpreted the data response and established key terms in the specific piece of data.
4. Develop initial codes from data interpretation - key terms and interpretations used to create and label the initial codes.
5. Extract sections of data and allocate to initial codes in NVivo12 Pro - steps 3, 4 and 5 repeated for all data, across all 19 transcripts.
6. Review all initial codes and organise into the appropriate initial themes (established from literature) and/or create new themes – new themes developed: Industry Forum, Corporate Policy and Strategy.
7. Review and re-read all codes and themes and associated data.
8. Cleanse the data and recode (where required) into appropriate codes and themes – cleansing the coded data followed three phases as shown in Appendix D: Data Reduction Process:
    - *Data cleansing phase 1*: Go through each theme and check the data inside is relevant to that theme, if not recode to another code and theme.
    - *Data cleansing phase 2:* Reduce the number of codes by combining common codes allocated to different themes – new themes emerged for example capability.
    - *Data cleansing phase 3:* Organise final themes and codes.

3.4.2.2 Data Mapping Process

The use of conceptual mapping to illustrate empirical data is recognised by Silverman p.204 for the development of theory and to exhibit connectivity from emerging ideas.

Crabtree and Miller (1999) in Cassells and Symons (p.267) recommend using maps, matrices, and other diagrams to display findings and allow the researcher to build interpretations beyond linear analytical processes. The researcher employed Microsoft Visio to aid development of the conceptual map with prior experience of using the software in comparison to the mapping function in NVivo. Figure 5.2 Reshoring Analytical Map illustrates the final themes and codes from the data analysis and details the connectivity and inter-relationships across themes, discussed in Chapter 5 and 6. The articulation of Figure 5.2 serves great importance in directing the reader to the critical motives influencing UK automotive manufacturing reshoring, whilst visually interpreting the complexity involved in the decision-making process towards reshoring supply chains, complexities that may become less distinct with linear analytical presentation.

3.4.3 Triangulation and Research Quality

Triangulation involves the combination of a variety of sources and the accumulation and comparison of data from varied sources to develop well-versed arguments and instil rigour in the research process (Hines, 2016; Yin, 2014). Triangulation in this research involved the viewpoints from manufacturing case-to-manufacturing case; manufacturing case-to-industry forum case, industry forum case-to-industry forum case; and empirical evidence-to-secondary evidence.

Qualitative data is derived from words (Miles and Huberman, 1984), and the validity of interpretations and informed results from qualitative case study research, is scrutinised in a quantitative arena (Yin, 2014). Thematic analysis is appropriate in applied research, commonly social research fields involving policy or practical environments outside of academia and uses a "toolkit" to enable "robust and even sophisticated analysis of qualitative data" (Braun *et al*., 2014).

The logical sequence of the research design supports the fours tests commonly used in wider social research, including case study, to establish the quality of the empirical research. Yin proposes four design tests to validate the quality of case study research designs: construct validity, internal validity, external validity, and reliability. Table 3.7 shows the four tests proposed by Yin (2014) and the application of this study to each test. This provides a chain of evidence from the initial research questions through to conclusion, allowing step-by-step trace back and forth, increasing construct validity and thereby strengthening the overall quality of this case study research (Yin, 2014, p.127).

Table 3.7 Case Study Tactics for Four Design Tests

Test	Case Study Tactic	Phase of Research where Tactic Occurs	Application in this Study
Construct validity	Use multiple sources of evidence. Establish chain of events. Have key informants review draft case study report.	Data collection Data collection Composition	13 case studies, 19 participants recruited to inform this research: all senior figurehead in automotive manufacturing industry. 2 academic colleagues reviewed samples of data interpretation and allocation in the analytical stage and confirmed appropriate.
Internal validity	Do pattern matching. Do explanation building. Address rival explanations Use logic models	Data analysis Data analysis Data analysis Data analysis	NVivo12 employed as a platform to store and organise data. Data coding and themes determined by the researcher appropriate to the small chunks of text, sample check on this process from 2 academic colleagues. Emergent patterns across multiple cases for emergent arguments and new results. Analytical mapping of key findings to visualise the complexity and relationships across themes and aid the moderation of motives across multidisciplinary themes.
External validity	Use theory in single-case studies. Use replication logic in multiple-case studies.	Research design Research design	Figure 3.5 multiple case design. Multiple case study with single unit of analysis. Interviews with Senior figureheads, analysis of repeat viewpoints and emergent relationships. Triangulation of data between manufacturing cases, industry forum cases, and secondary analysis. Moderation of key findings across multiple disciplinary themes, and in relation to secondary analysis.

Reliability	Use case study protocol. Develop case study database	Data collection Data collection	Case study protocol used for every interview and discussed in Section 3.3.2. Table 3.5 schedule of interviews, and Chapter 4 provides an overview of the case and participants, whilst maintaining anonymity.

(Source: Yin, 2014, p.45)

3.4.4 Saturation

Data saturation is viewed an important consideration in qualitative research (Glaser and Strauss,1967: p. 61) determining the point at which data collection should be discontinued; whilst Fusch and Ness (2015 p.1408) affirm the impact on research quality if data saturation is not met. Saturation is when no new data is obtained, and the researcher is confident in the diversity of the data collected pertinent to the research focus (Glaser and Strauss, 1967: p. 61). The point of saturation in this research was at interview 18; at this point in data collection the researcher heard repeated comments over again and saturation was reached; however, the research conducted one further interview to be confident in saturation and no new data emerged.

3.4.5 Reflexivity

This researcher began the doctoral study with a professional background in automotive manufacturing supply chains. In doing so, the existing knowledge, learning and assumptions devised from industry practice and academic learning, initiated the researchers interests in supply chain reshoring within the context of manufacturing. An experienced practitioner in offshoring and outsourcing manufacturing and developing supply networks in emerging economies and developed offshore locations; and the benefits and challenges associated with offshoring, the researcher had an appreciation for the emerging changes in supply chain strategies at the point the researcher transitioned from industry to academia.

In forming the initial research question, RQ2 was on reflection, bias towards the researchers' own assumptions. Conscious of this and the bias one may inflict within an interpretivist study; a neutral position was adopted by the research and two fellow academic colleagues used to proof samples of interpretations at analysis stage to limit bias and prevent misleading and inaccurate conclusion of results. In testing the applicability of RDT as a possible theoretical consideration, the focus of the research proved lean and agile to be the underpinning theoretical lens. A degree of bias is recognised in all paradigms; this researcher empowered the data to lead the direction of the study and inform the results, to minimise the influence.

The researchers own barriers to learning are apparent in the methodology adopted. Quantitative analysis is not a proficiency for this researcher, in addition to the in-depth results called for in the literature. The thought process, perspective, and skill of the research all factor into the research paradigm, and arguably the role of the researcher is to facilitate the process whilst advancing their capability. The illustrative literature shows numerous studies in the quantitative field and this research could have complimented the existing knowledge, however, in addressing the research gaps and optimising the role of the researcher, a qualitative study was informed (Section 3.3.1).

3.4.6 Research Ethics

Under qualitative research, it is important in the research design stage to give consideration for ethical issues that may arise throughout the study and how these issues may be overcome. Research sensitivity may present a particular problem throughout the research process, Weis & Fine infer researchers should give:

> "Considerations involving our roles as insiders/outsiders to the participants; assessing issues that we may be fearful of disclosing; establishing supportive,

respectful relationships without stereotyping and using labels that participants do not embrace; acknowledging whose voices will be represented in our final study; and writing ourselves into the study by reflecting on why we are and the people we study" (Weis & Fine, 2000).

Hatch (2002) emphasises the need to *be "sensitive to vulnerable populations, imbalanced power relations, and placing participants at risk". In qualitative research ethical issues may arise at varying stages of the research process; the* ethical protocol for this research is presented in Table 3.8 to demonstrate transparency according to the recommendations of Lincoln (2009), Mertens & Ginsberg (2009), APA (2010) and Creswell (2012). In protecting research participants, Esternby-Smith *et al.*, (2008, p.134) provides 10 key principles of research ethics:

1. Ensuring that no harm comes to participants
2. Respecting the dignity of research participants
3. Ensuring a full informed consent of research participants
4. Protecting the privacy of research subjects
5. Ensuring the confidentially of research data
6. Protecting the anonymity of individuals or organisations
7. Avoiding deception of about the nature of the research
8. Declarations of affiliations, funding sources and conflicts of interest
9. Honesty and transparency in communication about the research
10. Avoidance of any misleading or false reporting of research findings

In completing this research, the author has acted in accordance with Northumbria University ethical code of practice. Prior to data collection, three ethical consent forms (student, organisational and individual) were complete and submitted to the University's

ethical approval board and approval granted. Examples of ethical consent forms and are included in Appendix F. Interview recordings and transcriptions are held within anonymous files on the University mainframe system, access to this data is restricted to the researcher. Anonymity has been applied to all case studies and participants throughout the research. All research participants were informed that the research data collected will be used to generate this thesis, and potential publication beyond the thesis.

3.5 Chapter Summary

This chapter has appraised the research philosophy, methodology and method appropriate to this research topic and according to the research objectives. Justification of the epistemological, theoretical, and philosophical approach informed this research as an interpretivist study adopting an abductive approach. This qualitative methodology fosters a multiple case study method in the context of automotive manufacturing. The empirical framework consisted of stakeholders within UK-based automotive manufacturing companies (OEMs, Tier-1 and Tier-2 suppliers) and industry forum, with the knowledge and expertise of the sector and reshoring strategy. The rigour of the study is addressed through discussion of triangulation and research quality.

Table 3.8 Ethical Issues in Qualitative Research (*Sources:* Adapted from APA, 2010; Creswell, 2012; Lincoln, 2009; Mertens & Ginsberg, 2009)

Where in the Research Process the Ethical Issue Occurs	Type of Ethical Issue	How to Address the Issue	**Protocols for this Study**
Prior to conducting the study	Seek college/university approval on campus Examine professional association standards Gain local permissions from site and participants Select a site without a vested interest in outcome of study Negotiate authorship of publication	Submit for institutional review board approval Consult types of ethical standards that are needed in processional areas Identify and go through local approvals; find gatekeepers to help Select site that will not raise power issues with researchers Give credit for work done on projects; decide on author order	Three ethical consent forms (student, individual and organisational) complete and submitted for institutional board review Consultation with gatekeepers and participating organisations for access Discussed ethical consent with participants
Beginning to conduct the study	Disclose purpose of the study Do not pressure participants into signing forms Respect norms and charters of indigenous societies Be sensitive to needs of vulnerable populations (e.g. children)	Contact participants and inform them of general purpose of study Tell participants that they so not have to sign form Find out about cultural, religious, gender, and other differences that need to be respected Obtain appropriate consent (e.g. parents, as well as children)	Synopsis of this study sent to gatekeepers and participants Emailed interview questions to participants in advance of scheduled interview Obtained appropriate site authorisation
Collecting data	Respect the site and disrupt as little as possible Avoid deceiving participants Respect potential power imbalances and exploitation of participants (e.g. interviewing, observing) Do not "use" participants by gathering data and leaving site without giving back	Build trust, convey extent of anticipated disruption in gaining access Discuss purpose of the study and how data will be used Avoid leading questions; withhold sharing personal impressions; avoid disclosing sensitive information Provide rewards for participating	Built mutual trust and respect with stakeholders Informed participants of the option to not respond to questions at their discretion Informed participants of how the data will be used and results shared Adopted a neutral position during the interview process
Analysing data	Avoid siding with participants (going native) Avoid disclosing only positive results Respect the privacy of participants	Report multiple perspectives; report contrary findings Assign fictitious names or aliases; develop composite profiles	All case studies are referred to as Case 'A' and Participant '1' as an example Coherent and conflicting perspectives are evident in the data analysis, flowing through the findings and discussion Quotations from interview data support the reported findings Entire data set available for verification in NVivo 12 Pro
Reporting data	Falsifying authorship, evidence, data, findings, conclusions Do not plagiarise Avoid disclosing information that would harm participants Communicate in clear, straightforward, appropriate language	Report honestly See APA (2010) guidelines for permissions needed to reprint or adapt work of others Use composite stories so that individuals cannot be identified Use language appropriate for audiences of the research	APA (2010) guidelines used to construct works Empirical raw data informs the findings, direct quotations support Clear flow from findings to discussion Raw data available for verification of honest reporting
Publishing study	Share data with others Do not duplicate or piecemeal publications Complete proof of compliance with ethical issues and lack of conflict of interest, if requested	Provide copies of report to participants and stakeholders; share practical results; consider website distribution; consider publishing in different languages Refrain from using the same material for more than one publication Disclose funders for research; disclose who will profit from the research	Stakeholders requested copy of report following final submission Opportunity for output to inform automotive policy objectives Journal article publication in progress, submission to follow thesis

Chapter 4: Case Studies

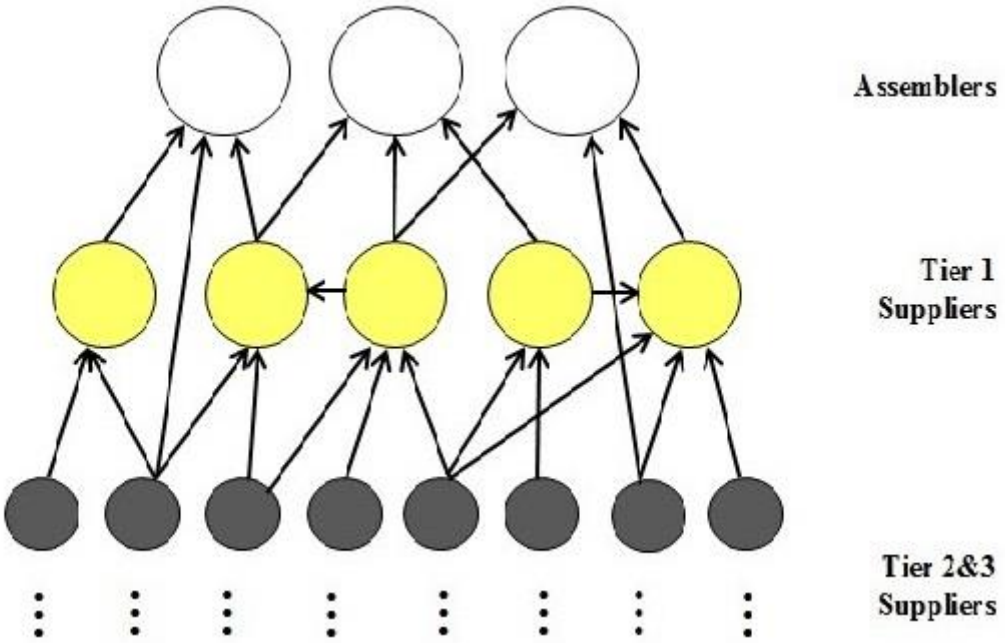
4.1 Introduction

The adoption of multiple-case study design is justified in Chapter 3: Methodology, this chapter proceeds to introduce each of the thirteen different case studies and nineteen interview participants who contributed to the empirical research. This chapter commences with a brief overview of the automotive manufacturing tier-structure depicted by the Keiretsu tier model (Figure 4.1) and the empirical case design (Figure 4.2).

4.2 Automotive Tier Structure

Keiretsu is a Japanese term culturally characterised by the long-term relationships of firms centred around one company (Brouthers *et al*., 2014; Hofstede *et al*., 2010). Japanese automakers typify vertical keiretsu relationships, positioning the OEM as the central focal company of which subordinate suppliers build long-term connections for parts supply towards final vehicle assembly (Brouthers *et al*., 2014; Chen *et al*., 2017). Oka (2013) Keiretsu structure below combines the traditional vertical keiretsu model recognising tiers in the supply structure from supplier~n to vehicle assembler (OEM), with lateral connections for multiple supplier-customer relationships and collaborations between rival firms and direct supply from Tier-2 and Tier-3 manufacturers to the assemblers.

Figure 4.1 Keiretsu Structure (Oka, 2013)

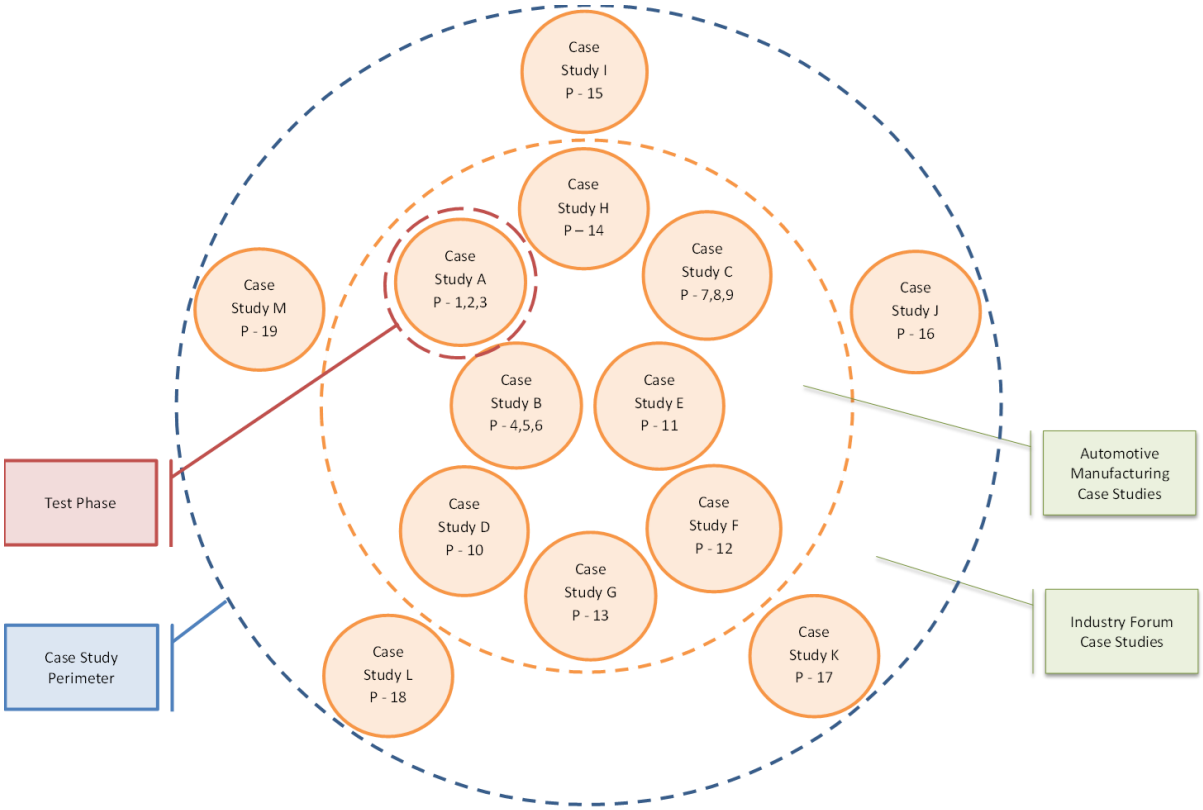


Empirical Case Study A, B, C, D, E, F and H (interview participants 1 to 14) consist of automotive manufacturing industry companies and form the core data set. Case Study I, J, K, L and M (interview participants 15 to 19) consist of automotive industry forum from National and Regional governing bodies/policy makers, as presented in Figure 4.2, Empirical Case Design Model. Within the empirical case design, two prominent UK-based automotive supply chains are inclusive, but not exclusive in supply to only one OEM:

i) Case A, B, D, and H

ii) Case E, C, F, G and H

Figure 4.2 Empirical Case Design



In respect of anonymity, case studies are referred to as Case X and Participant # in correlation to the case study coding applied, this corresponds the Table 3.5 Schedule of Interviews and the NVivo extract shown in Appendix C.

4.3 Case Study Descriptor

4.3.1 Case A, Participant 1, 2 and 3

Case A forms part of the core data set and is an automotive manufacturing facility located in the Northeast of England. The case is a Tier-1 supplier to two different OEM facilities in the UK, with 97.5% supply on a JIT basis and 2.5% non-JIT supply. Facility is a local supplier with a global presence, part of a multinational automotive organisation. Product

manufactured is within the acoustic and soft trim products, supplying components for the engine compartment, passenger compartment and boot compartment, including floor carpets, parcel shelves, boot carpets, dash insulators and engine insulators. Inbound supply network on a JIT basis represents 15% of the total raw material spend in the plant, from one supplier located 20 miles south of the facility and supplies spacers and EPP components.

Since 2010 Case A has reshored two suppliers of raw material components; one supplying felt previously from France, and the other supplying heavy layer previously from Luxemburg. Delivery conditions for both of these suppliers are non-JIT supply and have both subsequently reshored to the UK Midlands area. Raw material product from the reshored suppliers are A-classification parts and deemed critical line-stop products.

Three interview participants at Senior Manager Level were accessible at Case A, face-to-face interviews were held at the case facility lasting a duration of 61 minutes – 78 minutes. Participant 1 has full responsibility for the entire plant both operationally and financially, and the full deployment of Group methodologies. Participant 2 has responsibility for inbound and outbound logistics flows for the plant between suppliers and customers, inventory management, material handling and sequencing operations internally and at the customer premises, production planning and raw material scheduling, departmental resources, and budget control. Participant 3 has responsibility for the manufacturing environment including operational efficiency, build planning, resource allocation, cell maintenance, Employee Empowerment, and deployment of lean tools.

4.3.2 Case B, Participant 4, 5 and 6

Case B forms part of the core data set, and is an Original Equipment Manufacturer (OEM), a vehicle assembly plant based in the Northeast UK, part of a global alliance of

three OEMs with multiple manufacturing and R&D facilities worldwide. The UK facility produces four different vehicle models; the breakdown of inbound supply conditions includes sequence/synchronous supply 21%, CAT3 planned sequence 3%, Kanban top-up replenishment 1%, single tier parts direct from supplier into plant 42% and non-JIT parts going through the warehouse 33%. Of the just-in-sequenced product, 89% is arriving from UK suppliers, 11% from France, and minor proportion from Czech Republic and Germany.

Reshoring activity within Case B is an extensive 83%, which includes their localisation definition of supply returning to the UK and some suppliers previously located in Japan, China or Mexico moving into Europe. Within their reshored supply, split of delivery conditions consisted of 22% JIS, 22% JIT and 56% non-JIT delivery, with product reshored from Japan, China, India, Thailand, North America, and Mexico, and reshored to UK 33%, Spain 27%, France 18%, Czech Republic 17%, Germany 5%, Netherlands 5%, Poland 2%, Turkey 2% and Ireland 1%. Components or modules reshored include electrical 41%, chassis 17%, H-Vac 10%, fixings 6%, body parts 3% and power train 2%, all of which are classed as assembly line-stop parts. Trim parts 18% and another 3% of components are classified safety critical components.

Three senior personnel in Case B agreed to participate; face-to-face interviews took place at the case facility lasting a duration of 45 minutes – 72 minutes. Participant 4 attains the position of Vice Presidency for supply chain management of all European plants within the organisation. Responsibility includes managing all of the Production Control departments in Europe in Spain, Russia, and UK. Production Control departments are responsible for planning production, supply for production and managing the design change of cars. Responsibility extends to Regional Production Control for strategic and new systems development, European production planning at Head Office, responsible for

negotiations between plant and sales, and all vehicle and parts inventory within Europe. Participants 5 and 6 both hold a position of seniority in parts control with the Production Control department at the OEM facility. Responsibility extends to vehicle parts ordering for Chassis components, on-time delivery from all inbound suppliers ensuring no supply concerns impact production, new and existing supplier development and new model development with suppliers, and the management of the Parts Control team.

4.3.3 Case C, Participant 7, 8 and 9

Case C forms part of the core data set and is an automotive manufacturing facility located in the UK West Midlands area. A Tier-1 supplier to multiple OEMs with 99% of the business supplied on a JIT or synchronous basis. Facility is located locally to the customer and is part of a multinational company with a global presence supplying multiple OEMs. Product manufactured is within the interior systems products, including door compartments, instrument panels and spare parts. Inbound material flows from Europe arrive on a daily basis from a Hub in France. UK suppliers deliver daily into the Birmingham Hub with 12-hour deliveries into plant.

Reshoring at Case C has been an active strategy since 2008 involving more than 20 suppliers. Product reshored are all non-JIT supply previously located in Germany, France, Spain, Portugal, Romania, and Poland and reshored to the UK, optimising a combination of insourcing for in-house production within the UK plant and UK supply chains. Reshored products include a variety of A-surface parts, metal bought-out-parts and plastic bought-out-parts, with all plastic mouldings now produced in the UK and repeated strategy on new projects.

Three interviews were obtainable at Case C; face-to-face interviews were conducted for Participant 7 and 8 lasting a duration of 79 minutes to 95 minutes, and a telephone

interview for Participant 9 lasting 47 minutes. Participant 7 maintains a position of 15 years within Case C in engineering and then in purchasing, with responsibility for serial production purchasing, purchasing productivity for cost reduction with the customer, new programme-launch parts and purchasing and supply issues with new suppliers. Actively identifies and develops new UK suppliers in preparation for the internal selection panel within the global company. Participant 8 is responsible for the inbound flow of material from suppliers and outbound flow of finished product to the OEM in JIT conditions, inventory management, raw material scheduling, resource, and financial control of the department. Participant 9 acts in a deputising position for the overall plant operations and financial control.

4.3.4 Case D, Participant 10

Case D forms part of the core data set and is an automotive manufacturing facility located in the UK Midlands area. Facility is a local supplier with a global presence; a Tier-1 supplier direct to customer, supplying four major OEM facilities in the UK and global OEM facilities, and various smaller outfits, supply to all customers is on a non-JIT basis with daily delivery. Products manufactured include prop-shafts and side-shafts. Procurement of inbound raw materials are using Materials Resource Planning (MRP) SAP system with weekly order quantities arriving in non-specific daily deliveries, operating on a safety stock basis.

Over an 18-month crisis period Case D adopted an in-house-to-in-house offshoring strategy, sending the manufacturing of some components from the UK facility to sister plants in Brazil, Germany and Spain. Thereafter, the case has near-shored product from Brazil to Spain for supply to the UK plant, and reshored from Germany and Spain in-house to the UK facility. Participant 10 has worked for Case D 20 years in various

departments including quality, presentation, sales and supply chain for 16 years, with primary responsibility for customer liaison for UK and global OEM facilities.

4.3.5 Case E, Participant 11

Case E forms part of the core data set, and is an OEM, a vehicle assembly facility with multiple sites based in the West Midlands UK. The company has a history of acquisitions with a global OEM and then Steel producer to become a premium brand. In 2008 purchasing strategy changed from a global approach to a local approach; today the company operates with an increased level of local assembly content from Tier-n supply to the OEM assembly plant: UK>50%, European 40% and rest of the world content 10%, representing an increased local sourcing content of 15%. Reshored product consists mainly of large, stamped products i.e., car sides, bonnets, and large injection mouldings; engines represent the largest reshoring project with the launch of their own engine manufacturing centre locally for engines previously supplied from Spain. Inbound components and modules are received JIT or synchronised into the plant. Case H experienced significant growth between 2010-2015 with employment growth of 12k employees and supply chain employment growth in-line with vehicle volume growth, whilst recognising changes in the current market and the UK presence in the global market.

Participant maintains the position of Supply Chain Projects and External Engagement Manager for the OEM, actively looking to improve efficiency through supply chain relationships, working on key projects on supply chain finance, payment terms and the value of money within the supply chain; supply chain engagement and working with government, looking for grants for suppliers specifically. Heavily involved with the Automotive Council actively working with the automotive supply chain group on initiatives.

4.3.6 Case F, Participant 12

Case F forms part of the core data set, and is an automotive manufacturer based in the Northeast, UK across two facilities. A Tier-1 supplier with 85% of sales to five major OEM facilities in the UK on a JIT basis, and 15% of sales to Tier-1 suppliers. Case F has experienced significant growth post 2008 economic crisis with the expansion of new local facilities and with future growth opportunities under investigation. Predominantly a local supplier from the UK facility with some global sales, and part of a global company supplying OEMs worldwide. Commodities manufactured include Interior plastic, exterior plastic, powertrain, SCF fluid carrying systems, motion control devices and keymatics. Inbound flows arrive on a non-JIT basis from a combination of Tier-2 material and component suppliers globally with specific delivery times representing 45% of sales, and local moulding contractors signifying 13% of sales value. Reshoring activity has mainly focused on polymer (chemical) moving supply from Europe to the UK. Some bespoke items have transferred to a UK purchasing agent to leverage buying power, whilst common components for powertrain and exterior parts arrive from Chinese suppliers and high volume of polymer supplied from Europe.

Participant 12 maintains a director's position with financial and operational responsibility for the UK facilities, having transitioned from an operational role into sales, European Operations Manager for all plants in Europe and then UK Directorship. Project managed the stability of the business during the 2008 financial crisis, re-organisation of schedules and labour, and the development of two new operational sites in the UK. Participant was previously President of the Chamber of Commerce, is Vice Chairman of a regional Automotive Alliance, and a Board Member of a Combined Authority LEP.

4.3.7 Case G, Participant 13

Case G forms part of the core data set and is an automotive manufacturing facility based in the UK, encompassing all business under one facility, with automotive representing approximately 25% of turnover. Resides in different tiers between Tier-2 up to Tier-4 with components feeding into several OEMs, majority of which located outside the UK; supply to immediate customer is on a non-JIT basis. Case G are largely a toolmaker for finished tooling, sub-contracted tooling and high-precision tooling and the components of those tools, for automotive manufacturing and other industries. Commodity precision stamping is in the advanced manufacturing silo manufacturing electrical and mechanical components from specialist materials including brass, copper and stainless steel, highly niche supply of complex product with minimal competition in the UK. Components manufactured are non-visible products including electrical connectors, rear-view mirror electrodes, electrical cords, and push-fit connectors for PCB connection. 100% inbound supply of material and components arrive from Germany on a non-JIT basis using weekly schedules for weekly firm-order deliveries. Reshoring activity is tooling related with sub-contracted tooling in China now subsequently reshored back to the UK facility and brought in-house or brought back to a local UK toolmaker; UK reshoring value is estimated £100,000.

Participant 13 holds the current position of Chief Executive with operational and financial responsibility for the company. Worked at Case G for 3-years in sales and marketing and then operational responsibility, prior to which the participant had long-standing in automotive at a Tier-1 supplier of safety systems as Technical Director, witnessing the fashion of offshoring to low-cost economies.

4.3.8 Case H, Participant 14

Case H forms part of the core data set, and is an automotive manufacturing facility located in the Northeast, UK. The company operates within one manufacturing plant, is a Tier-2 supplier of plastic injection moulding parts predominantly supplying Tier-1 automotive companies locally with components feeding into two OEM facilities in the UK. Case H is a Tier-1 supplier of tooling, developing, and producing tools at various grades and weights directly for automotive manufacturers and some other industries. Supply to customer is on a non-JIT basis optimising daily or weekly collections with specified loading times. Inbound raw material largely comes from Europe with a small proportion supplied from the UK, flows are all non-JIT. Product reshored consists of plastic moulding materials previously supplied from Europe and reshored to a local UK supplier; and tooling components reshored from India to the UK for manufacture in-house.

Participant is a company Director responsible for new projects and business development, has an operational background in manufacturing and toolmaking for many years, new programme launches, supplier development and key customer relations. Has taken an active role in the business during growth periods.

4.3.9 Case I, Participant 15

Case I forms part of the peripheral data set, and is a national public body established in 2009 to strengthen working relationships and co-operation between automotive manufacturing companies and the UK Government. Senior figureheads from the automotive industry and government comprise the council and meet periodically to review long-term strategy and policy agenda, aiming to improve access to finance for automotive companies, develop skills initiatives, assess the optimisation of emerging technologies and improve the competitiveness of UK automotive manufacturing. Case I

has three strategic work-streams including Supply Chain, Technology and Business Environment and Skills; Supply Chain is the focal area for this research.

Participant 15 has an automotive engineering background initially sponsored by Ford then progressed into engineering consultancy before working with British Steel and onto a major steel provider in a research capacity. Participant is currently engaged on Catapult planning and development activity, is a senior figurehead for the Case I Supply Chain Group and held membership since 2009, previously chaired SMMT automotive committee for 2.5 years and has particular interest in UK content, supply chain, SMEs, and material strategy with particular interest to improve UK steel content in the automotive sector.

4.3.10 Case J, Participant 16

Case J forms part of the peripheral data set and is a Combined Authority and Local Enterprise Partnership (LEP) considered to be the strongest and most efficient nationally. This LEP was established in 2011 by Government, a business-led partnership encompassing business delegates and local authorities collaborating to create employment opportunities, improve skills in local areas, optimise infrastructure and enhance economic growth. Establishment of this Combined Authority in 2016 reinforced private sector and public sector partnerships with shared objectives and initiated.

Participant 16 has worked for the Combined Authority for 10-years primarily focusing on inward investment for regeneration and supply chain activity, with key employer-relationships in automotive and aerospace industry. Particularly interested in this research from an inward investment perspective and reshoring opportunities for investment.

4.3.11 Case K, Participant 17

Case K forms part of the peripheral data set, and is an advisory service for UK manufacturing sector, a platform designed to steer UK manufacturing firms to achieve higher growth, through connected and knowledgeable industrial partnerships to improve productivity, capability, and market leadership. Case K offers support in areas of process improvement, access to finance, marketing and research and development funding.

Participant 17 commissions the post of leading advisor for the automotive manufacturing strand within the advisory service, additionally working with other core manufacturing industries. Active role working with companies' reshoring supply to the UK from overseas and the development of facilities in the UK; working primarily with SME firms and some larger companies. Participant has a background in automotive manufacturing within UK-based OEM plant, in manufacturing and supply chain.

4.3.12 Case L, Participant 18

Case L forms part of the peripheral data set and is a major trade association in the UK and core to the UK automotive industry with strong reputation, resources and automotive data, and a public voice for UK automotive industry. The membership association provides a forum for 800 plus UK automotive companies, government, and regulators to build relationships and express views on the sector and strategic direction.

Participant 18 is a senior figurehead at Case L, currently leading the manufacturing and supply chain work-stream on behalf of the automotive industry, working with Government and the Automotive Council, providing training and consultancy to support UK supply chains and OEMs with more competitive UK supply chains. Drives the long-term competitiveness of the Automotive Council supply chain group leading various

initiatives and programmes; and has a manufacturing and supply chain management industrial background.

4.3.13 Case M, Participant 19

Case M forms part of the peripheral data set, and developed from a regional to national advisory agency, with a lead role in the Northeast Automotive Alliance. Working with Government bodies, academic institutions, and private companies for the developments of innovative technologies and maximisation of infrastructure, with input to policy and strategy for the UK automotive sector.

Participant 19 is a senior figurehead of Case M, with a multitude of standings in academia, local enterprise partnerships and alliances, and founder of a subsidiary company with public and private interest. With an extensive background in automotive manufacturing including several years working at a UK-based OEM, participant actively researchers automotive and optimisation of innovative technologies with the automotive sector, working with industry partners including OEMs and UK supply chains for the growth of UK local content.

Chapter 5: Analysis and Findings

5.1 Introduction

Chapter 3 discussed the analytical process employed for this research, aided by NVivo12 Pro to store, and organise the data under one platform for manual analytical processing, allocation of small pieced of data to emerging codes, and developing meaningful themes from the codes pertinent to addressing the research question. Chapter 5 moves on to presents the analysis and findings from the data collected in relation to the main research question RQ1. Each theme and associated codes are presented comprehensively with narratives from interview participants highlighted in italics. Interconnectedness and relationships between key issues are identified. Presented in the analysis section is the iterative process undertaken by the researcher to streamline the data in relation to RQ1.

5.2 Iterative Analytical Process

Section 3.4.2 discusses the iterative process of moving back and forth within the empirical data and secondary analysis, and the development of the conceptual mapping looking at the codes and themes, considering the initial 2 research questions and the size of the research, going back to the data and assessing what the data is saying, back to the RQ's and scaling down to RQ1, justification of the mapping, contribution of this mapping to my research i.e. to demonstrate the connectivity and relationships between codes and themes. Iterative process between code to code, code to theme, theme to theme, and theme to code, and addressing the research question.

5.2.1 Alignment of Research Position

A review of the literature in Chapter 2 enabled the research to identify the prominent reshoring concepts and gaps in the literature. Figure 1.1 displays the initial key concepts from the literature, the industry focus and theory focus, to address RQ1.

The researcher conducted the literature review with an initial 25 academic contributions selected to frame the key concepts discussed in the literature and identify relevant gaps for future research, (Appendix A: Illustrative Literature). Key concepts depicted from the literature were: reshoring terminology, motivational factors, global strategies, and location management (see Appendix B: Concept Matrix). Due to the contemporary reshoring topic, initially many gaps were identified from academic literature, including:

- UK geographical location (primary focus is with US, Germany, and Italy)
- Industry specific investigation (primarily cross-sector or multiple industry studies)
- Empirical, qualitative, case study, interviews (emphasis on secondary data or quantitative surveys)
- Theories (multiple theoretical perspectives considered i.e., RBV, TCE, Internationalisation with limited focus)

The researcher optimised calls from the literature in developing the initial theoretical framework to focus on automotive manufacturing, UK facility location, conduct an empirical study using qualitative methodology with multiple-case study strategy, and semi-structured interviews to investigate all key concepts identified in the concept matrix. Based on the researchers' industrial professional experience of customer-supplier relationships and lack of theoretical direction from the literature, the researcher concluded Resource Dependence Theory and Lean and Agile theory as an appropriate theoretical

lens; from this the research question RQ1 emerged, and case study interview questions were developed from the supporting literature:

> RQ1: Why are UK-based automotive manufacturing facilities motivated to reshore elements of their supply chain to the UK?

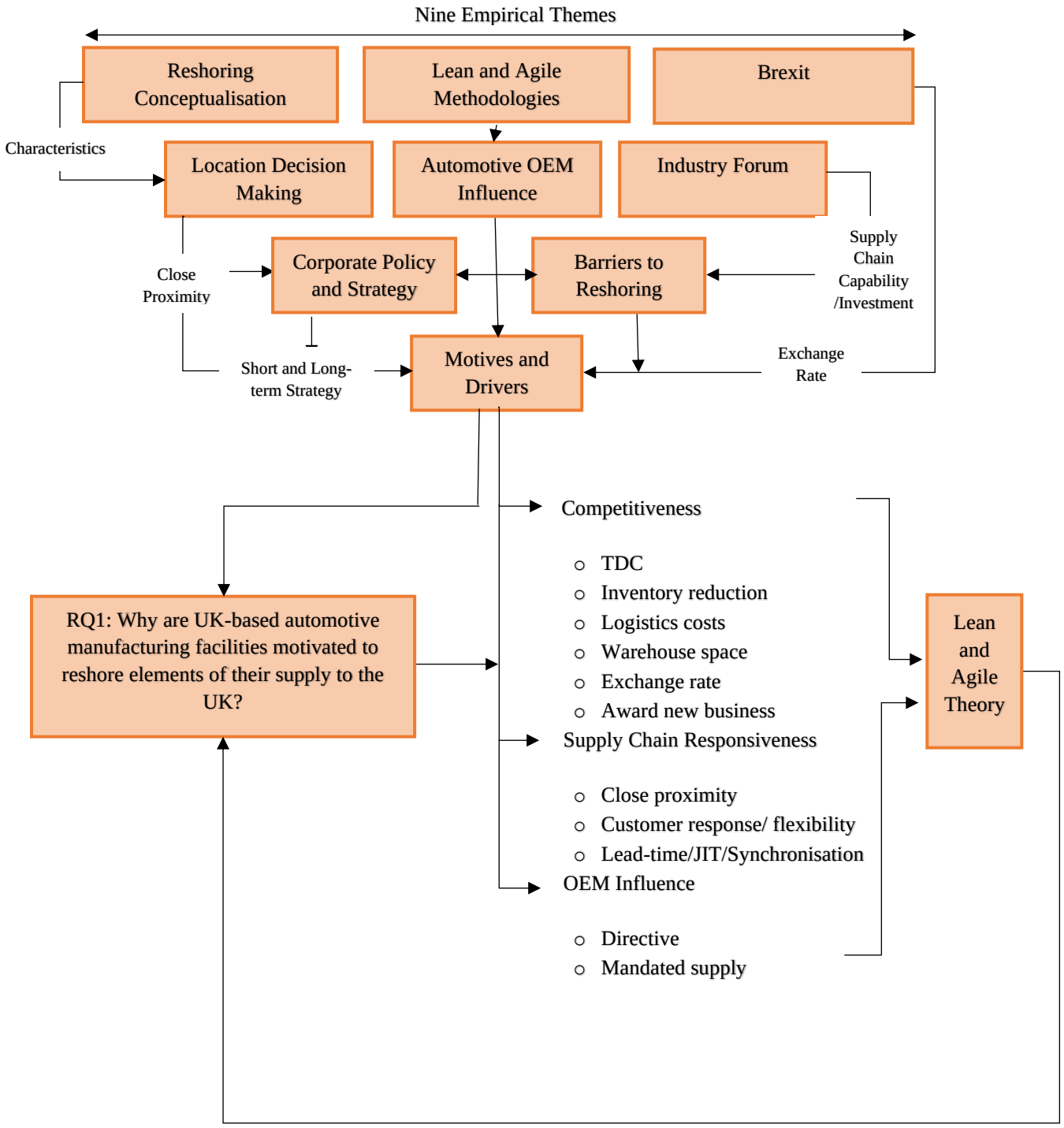
19 interviews were conducted across 13 case studies; the researcher transcribed the interviews and Nvivo was employed to organise and support the coding process. From the literature review and empirical data set, nine themes (Conceptualisation, Motivational Factors, Barrier to Reshoring, Location Management and Decision-making, Supply Chain Methodologies, Power Relations, Corporate Policy and Strategy, Governance and Brexit) emerged in relation to RQ1.

The extensive data set and scope of the research was recognised at this point by the researcher, acknowledging that the breadth of the research was beyond the doctoral study. Reverting to the literature propositions, with clear insight of the empirical data, and acknowledging the underpinning of the research question; a comprehensible decision to progress Lean and Agile theoretical lens and relinquish RDT power relations theme was determined. The analytical process allowed the researcher to associate multi-disciplinary codes across the empirical themes (discussed further in Chapter 6). Figure 5.1 shows the analytical alignment.

Theoretical considerations are streamlined to lean and agile theory with reshoring motives driven by the need to be lean for cost reduction and efficiency to sustain competitiveness. Whilst also needing to be responsive in the supply chain and have the capability to be flexible with customer demand changes. Lean and agile theoretical concepts are embedded into automotive manufacturing conditions and evidenced as the underpinning

theoretical concepts driving reshoring motivates. Whilst OEM influence was determined a prominent motive for automotive manufacturing reshoring, the empirical evidence determines the theoretical concepts of lean and agile as the principal theory underpinning this motive. Whilst the researcher recognises multiple theoretical lens are considered in the wider, this researcher concludes Lean and Agile theory most valuable in addressing RQ1.

Figure 5.1 Evolved Research Position (2)

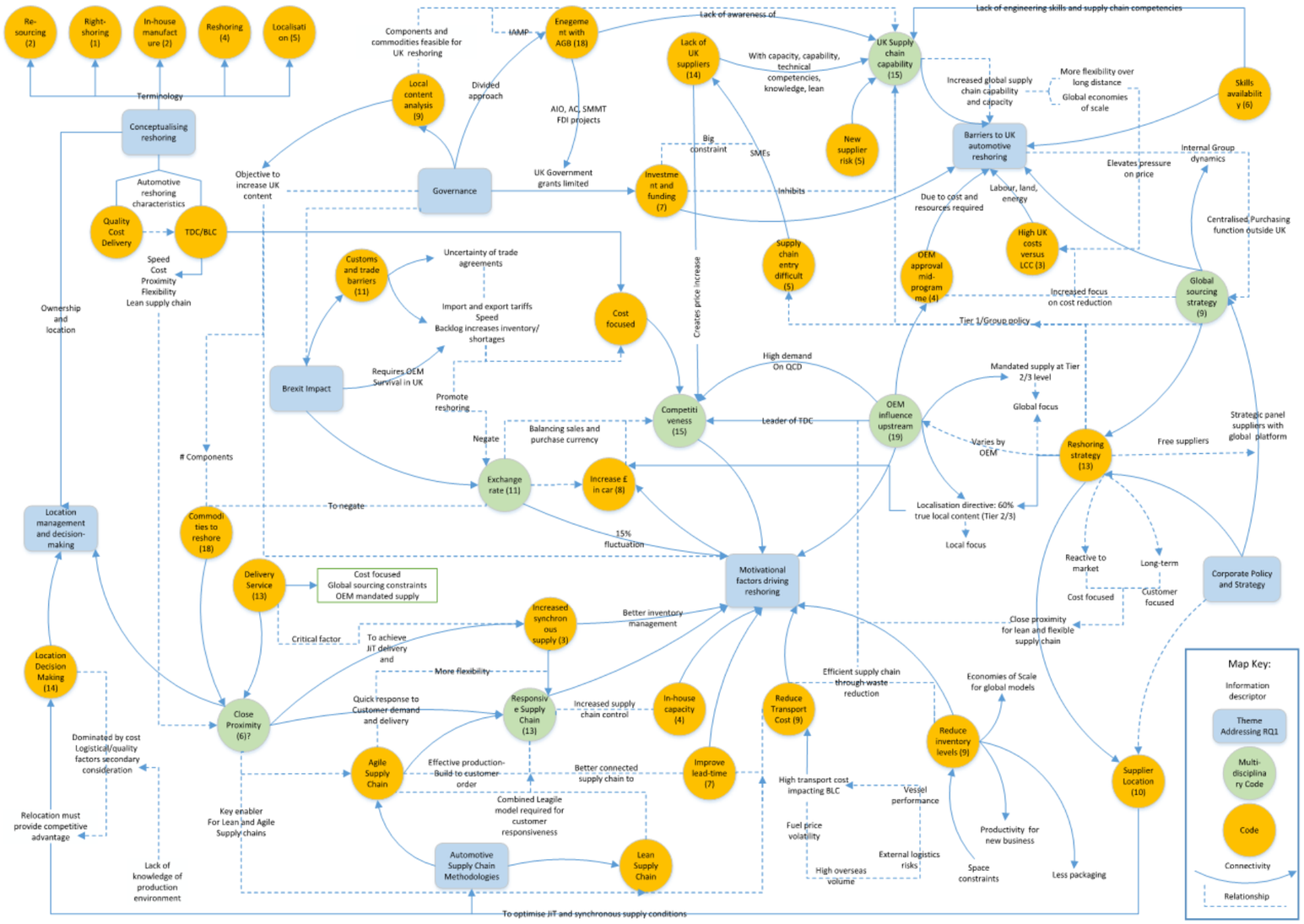


5.3 Themes Relating to RQ1

Findings from the analytical process determined the final themes to be reshoring conceptualisation, location management, automotive supply chain methodologies, motivational factors, Brexit impact on reshoring, industry forum, barriers to UK automotive reshoring, and corporate policy and strategy. Each theme is discussed with narratives from the empirical data and illustrated in Figure 5.2.

Six moderating factors are evident in the Reshoring Analytical Map with strong representation in multi-disciplinary area, demonstrating the high level of interconnectivity across the narrative. For example, Total Delivered Cost (TCD) is based on five key performance indicators, which have direct implications in connecting themes addressing RQ1 (see Figure 5.2); empirical cases reacting to changes in market conditions driven by internal and external strategies to achieve the lowest TDC leading to the need for close proximity. Moderated factors from the empirical results are discussed further in Chapter 6 Discussion.

Figure 5.2 Reshoring Analytical Map



5.3.1 Reshoring Conceptualisation

Misinterpretations of various reshoring terminologies and key characteristics are evidenced from existing data, for example, confusions between make or buy decisions and geographical location choices (Bals *et al*., 2016). Hence, conceptualising reshoring is the foundation for understanding why manufacturing companies are motivated to reshore and how those location decisions are influenced.

Across the entire multiple-case study, six different terminologies were concluded from the empirical data set, including reshoring, localisation, re-sourcing, right-shoring, in-house manufacture, and sub-contracting. Automotive manufacturing case's (Case A-H) specifically discuss variations in definition, whilst industry forum case's (Case I-M) utilised the term reshoring coherently, in support of national automotive manufacturing objectives to *"increase UK content" (Case H)*, initiated through a working strategy between UK automotive manufacturing facilities and UK automotive manufacturing governing bodies such as SMMT[2] and the Automotive Council.

Reshoring key characteristics of 'ownership' and 'location' are synthesised and consistent with existing academic propositions, as presented in Table 2.2. Evidence in Table 5.1 shows congruence of reshoring interpretations to be geographical movement of product supply, within the content of this study.

[2] SMMT is the Society of Motor Manufacturers and Traders

Table 5.1 Summary of Reshoring Interpretations

Interpretation (Interview extract)	**Case Study**
"Moving parts from one area overseas and bringing it closer to this plant"	(Case B)
"Re-location of non-UK supply into UK due to BLC (best landed cost)"	(Case C)
"manufacturing back to the UK from the original country"	(Case A and Case F)
"back from overseas back to the UK" or "the supplier is currently overseas and we decide to bring that supply back to the UK, by changing supplier to a local supplier" or "product could have been originally offshored and then decided to bring back here"	(Case H)
"back from overseas back to the UK" or "the supplier is currently overseas and we decide to bring that supply back to the UK, by changing supplier to a local supplier" or "product could have been originally offshores and then decided to bring back here"	(Case H)
"When something is brought back to the UK from being sub-contracted out of the UK but it's been there before. Its product that's been moved out of the UK supply chain and then reintroduced to it for a benefit"	(Case G)

Governance deciphers the terminology in respect to supply chain movement or facility ownership; localisation, reshoring and resourcing refer to their supply chain geographic, whilst right-shoring, sub-contracting and in-house manufacturing also highlight the transition of bringing product in-house from an overseas supplier. The latter supports the multi-faceted consideration of Ashby (2016) and Gray *et al.,* (2013) and confusion noted by Bals *et al.,* (2016) refer to Figure 2.1.

Five peripheral cases (Case I, J, K, L and M) from governing body positions, operationalise reshoring through the assessment and objective to increase UK manufacturing content. Publishing of the Local Vehicle Content Analysis report (Holweg *et al.*, 2017) has generated interest, awareness, and status of the current automotive

industry position with future growing targets declared by the Automotive Council in 2011 as:

> *"the OEM to tier-1 UK content was 26%. In 2016 that had risen to 44%. And the base line ambition is to grow that to 50% by 2022. Beyond that there are emerging targets for vehicle electrification content of 60% by 2025" (Case I, P15).*[3]

Case A and Case B in conjunction, also declared the supply chain objective to increase true local content for future car manufacturing models. Findings linked to this key point are presented further in Corporate Policy and Strategy theme, and a key point of discussing in Chapter 6.

The gulf between strategic level and operational level with respect to different terminologies is clearly noted by Case A[4], which suggests that operational-level language is filtering and influenced upstream by the OEM (Case B)[5]:

> *"Really speaking we don't use the term reshoring at plant level but I'm sure our purchasing community do, we call it localisation which is obviously the old-fashioned terminology for it" (Case A, P1).*

Considering however, at Case B the term localisation is strategically and operationally communicated and considered the *"old fashioned"* term used in Case A and Case B originating from the historical use of the OEM facility:

> *"Really what we would consider it as is what I call localisation, that's what our manufacturing call it. That is where we are taking a current part or sub-*

[3] Case I is a Professor and Senior figurehead within a National automotive governing body
[4] Case A is a Tier-1 automotive manufacturer and supplier to Case B
[5] Case B is an OEM

components and moving it from one area of the globe to more local to us now. For me localisation is not just moving it to the UK and near the plant it could actually mean bringing it into Europe as well" (Case B, P5)[6].

Relevant factors interpreting reshoring and localisation specifically, heavily focus on the principles within lean philosophy with some agile assortments for customer flexibility. Five interviewees deemed localisation important for cost efficiencies such as reducing transport costs, logistics and packaging cost savings, small inventories and increasing pound-sterling in the car due to the exchange rate, whilst the need remains to consider global requirements and economies of scale. Proximity to the plant, lean supply chain and flexibility to the customer are deemed important factors in localisation strategy. Cost, speed and lead-time are considered key objectives for reshoring; whilst localisation is deemed an operational term within the reshoring strategy and therefore important to include localisation factors; emphasis on lean and agile frameworks become particularly relevant to understand the motivations and influences of automotive manufacturing supply chain reshoring. Case B explains further:

"It is relevant for two reasons localisation, whether it is to Europe or the UK. If it's to the UK for UK OEMs… then obviously the pound content in the car is important and it is important because you are then not susceptible to exchange rate fluctuation. We also have something called the Top 100 parts where we are looking at part size obviously, by reshoring you are saving logistics costs and packaging costs. But localisation is important for lean supply chain and flexibility to the customer" (Case B, P4)[7].

[6] Case B,p5 is a Senior Controller fat a UK-based OEM facility
[7] Case B,P4 is the Vice President of European Supply Chain for the OEM

"it's a lot easier and more cost effective for us as an individual plant to have the parts as close as possible to us but we've got to take into account that the models we are producing are global models and again you get some economies of scale by just having one manufacturing location per part, but again with some components it makes a lot more sense to bring them a lot closer to the plant" (Case B,P5).

Case E[8] acknowledges the term reshoring but as a firm, utilise right-shoring as the implemented strategy, assessing from a business-case perspective based on cost, quality and making the right sourcing decisions regardless of geographical location.

5.3.1.1 Automotive Reshoring Characteristics

Total Delivered Cost, TDC (also referred to as Best Landed Cost, BLC) is the most determined characteristic of reshoring emphasised across ten case studies. Terminology of TDC is regarded in the automotive industry as *"taking everything into account which is the cheapest with all cost factors included" (Case B,p6)*[9], considering the wider cost perspective beyond piece part cost including manufacturing and labour costs, logistics costs, packaging costs, cost of raw materials and the location of those raw materials (i.e. Tier-N+2) which influence raw material cost, capacity and OEE[10], to obtain the true landed cost of a component; then the decision can be made to manufacture within the UK or overseas.

Case A use TDC from a strategic panel of suppliers and have invested in this procurement strategy long-term, having tried to grow their UK supply base supported by UK purchasing; *"so for the UK if a suitable supplier exist in general for the current exchange*

[8] Case E is an Original Equipment Manufacturer (OEM)
[9] Case B,p6 is a Senior Controller at a UK-based OEM facility
[10] OEE is Overall Equipment Effectiveness for manufacturing productivity

rate then the best landed cost should be UK manufacture" (Case A,P1)[11]. Corporate sourcing of strategic suppliers is an assured process for quality supply at Case A; point discussed further in Corporate Policy and Strategy theme, whilst also identified as a barrier to UK automotive reshoring.

TDC is emphasised by Case B with the requirement for Tier-1 suppliers to achieve the best TDC; evidence of learning and practicing the OEM strategy at the Tier-1 suppliers for Tier-2 procurement is apparent at Case F:

> *"…. we've learnt from (Case B) and it's not just the piece price, it's the total delivered cost…we just constantly practice total delivered cost and look at every opportunity and its constantly changing…..the relationship with the Euro has changed dramatically" (Case F, p12)*[12].

Cost benefit or cost match with an inventory or logistics improvement is key for TDC, reinforced by Case A, B, C, D, F and H. Corporate policy and strategy impose restrictions on inventory levels in the manufacturing plant; in Case C group target is less than one day stock holding and major space constraints in the manufacturing plant are a big factor for Case A, B and C which influence the inventory holding policy and the need to increase delivery flows into the plant. Assessment of single sourcing with additional inventory holding and increased delivery flow, versus cost of multiple tool investment for multi-sourcing strategy is a key factor in Case B[13], and *"it comes down to economies of scale in terms of what we're going to manufacture in terms of volume of the car and where were pitching it at"*. From a purchasing perspective, reshoring is regarded as a good

[11] Case A, p1 is the Plant Manager of a Tier-1 automotive manufacturer
[12] Case F, p12 is the Managing Director of a Tier-1 automotive manufacturer
[13] Case B is a UK-based OEM facility

opportunity to support supply chain productivity targets, set at *"5-6% annual purchasing target"* at Case C[14].

Quality, Cost, Delivery (QCD) key performance indicators (KPI's) are engrained in TDC and synthesised across eight case studies; assessing the available capacity against the volume required, supplying the aligned quality agreed by the supplier and the customer, and with some cost benefit to the company to remain competitive, highlighted by Case A and H:

> *"So a key one is to locate high volume high quality products due to transportation costs and the need to reduce lead-times, and in terms of the reasons why is effective, we need to improve quality and delivery performance in strategic suppliers we have" (Case A, p1)*[15].

Adding further with emphasis on competitiveness:

> *"It's really down to cost and optimising the best cost for the business and improving our logistics because by improving logistics you can reduce cost. It is about trying to improve the supply chain in terms of logistics, quality, and responsiveness and cost overall. By doing so it allows us to be more competitive as a manufacturer, as a supplier and potentially win more business" (Case H, p14)*[16].

Perspective of Case G[17] is an exception to the cost priority, whilst QCD remains the focal, as an automotive toolmaker and component manufacturer, cost is the least important characteristic:

[14] Case C is a Tier-1 automotive manufacturer
[15] Case A,p1 is the Plant Manager of a Tier-1 automotive manufacturer
[16] Case H,p14 is the Director of a Tier-2 automotive manufacturer
[17] Case G is a Tier-2 automotive manufacturer

"it's really about lead-time, cost, and quality……quality is number one, lead-time is number two and cost is actually the least…. customers know the cost of making a premium quality tool and the cost remains the same on making those tools…. you can save a lot of money, but you end up with a tool that only lasts 2 years and then it goes in the bin…… it suits some job….no-one is going to thank me for laying down a tool in China that is going to go in the canal in 2-3 years" (Case G, p13)[18].

Speed becomes the challenge here considering the vast resources available in China *"I had a tool maker with 1 man 1 job for example, the Chinese will throw 16 men on 1 job so they can be done incredibly fast"* (Case F, p12)[19] making speed a competitive factor in their reshoring strategy.

5.3.2 Location Management

Supply chain reshoring strategy is deemed a location management decision, coherently concluded in Chapter 2 Table 2.4 and supported with interview quotations in Section 5.3.1. Four codes determine location management as a key connected theme in addressing RQ1 including: supplier location decision-making, commodities for reshoring, delivery service and close proximity.

5.3.2.1 Supplier Location Decision Making

The nomination of suppliers and the locations engrained in those decisions have major implications on the ability of the manufacturing facility to satisfy internal demands and customer requirements. Additionally, the conditions agreed when making supplier

[18] Case G,p13 is the CEO of a Tier-2 automotive manufacturer
[19] Case F,p12 is the Manager Director of a Tier-1 automotive manufacturer

nominations have implications on the plants ability to be lean and agile; in turn this affects the plants opportunities to reduce cost, become more responsive and remain competitive.

Consensus from five Cases suggests location plays an integral role in supplier nomination in relation to global platforms[20] and the global presence or suppliers with the ability to support the customer on a global scale beyond local commitments. This is also highlighted as a barrier in global sourcing strategy, for SMEs aiming to engage with Tier-1 suppliers, see section 5.3.9 for further insights.

Cost is reported the dominant criteria in supply chain location and reshoring decisions, synthesised across eight Cases, implying softer items of logistics and quality reliability are given secondary consideration. Comments from Case F emphasise cost prioritisation:

> *"number one driver will be just to reduce the purchase cost" (Case F, p12)*[21].

Annotations from interview indicate the product TDC is inclusive of logistics costs for the determined contractual conditions, however, the additional costs for accommodating the nominated logistics conditions, supplier on-time delivery and quality reliability, and lead-time result in higher inventory and obsolescence, and arguably generate an operational cost to the business which are less quantifiable and often excluded from the TDC agreed at nomination. Case C elaborates:

> *"Global decision is based on cost for suppliers and OEMs and this cost is the driver and not taking into account delivery and flow. Some logistics processes not taken into account can lead to non-profitability if the supplier is not ready which*

[20] Global platforms refers to Cases (UK facilities) who are part of a global company
[21] Case F,p12 is the Managing Director of a Tier-1 automotive manufacturer

may look on paper that the decision is profitable but the hidden costs make it not profitable" (Case C, p8)[22].

Narratives infer supply relocation must provide a competitive advantage to justify the investment in changing supplier location. The decision-making process outlined by eight Cases show similarities in the process steps and involvement of roles, with key features such as PPAP[23] as standard. Evidence repeatedly suggests that initial instigation and final decisions are made by purchasing based on TDC, whilst it appears at operational plant-level the focus is guaranteeing supplier capability and readiness in relation to QCD, endorsed by Case B:

"As far as the plant is concerned they look at supplier capability, so they will audit the supplier to make sure that they are capable" (Case B, p4)[24].

From these eight case studies, Case A, B, D, G and H emphasise a knowledge gap of the real production environment, supporting propositions by Colotla *et al., (2003),* hereby decision-makers may not fully appreciate the operational implications for the plant regarding the location decisions made. Comments by Case A, B and H draw attention to the disparity:

"Absolutely. There is a gap between the programme management team and the plant management team, and some of that comes because of product and process knowledge and length of service in the business" (Case A, p3)[25].

[22] Case C,p8 is the Supply Chain Manager of a Tier-1 automotive manufacturer
[23] PPAP is Pre-Production Approval Process
[24] Case B,p4 is the VP of Supplier Chain Europe for a UK-based OEM facility
[25] Case A,p3 is a Production Manager of a Tier-1 automotive manufacturer

"Some of the people making the decisions have never actually worked in the environment and know what it's like or expedited parts from a supplier" (Case B, p4)[26].

"I definitely think I have over-estimated people's experiences of these things, so there is a gap. There is a skill to successfully offshoring and reshoring and being selective in terms of which ones you do and which ones you certainly don't do" (Case G, p13)[27].

However, this argument is contested by Case C and E, stressing the level of risk evaluation and investment in developing such decision-making processes with knowledge of operational requirements; whilst Case F follows a *"very prescriptive specification"* recognising knowledge could always be improved. Location decision making is highly intertwined with Automotive Supply Chain Methodologies theme (Section 5.3.3) and Corporate Policy and Strategy theme (Section 5.3.4).

5.3.2.2 Close Proximity

At the heart of location management is the importance of close proximity of customers and suppliers; this is identified as a moderating factor with high connectivity across multiple themes addressing RQ1.

Case C, D, G and H view close proximity as a vital constituent in their supply chain strategy, having reshored for in-house production of automotive tools and components. In-house capability is deemed essential for the production, maintenance, and service provision; it allows customers to visit, quick reaction to changes in customer schedule or

[26] Case B,p4 is the VP of Supplier Chain Europe for a UK-based OEM facility
[27] Case G,p13 is the CEO of a Tier-2 automotive manufacturer

design changes, and transparent with emphasis on better process flow and control of supply.

Inventory management is synthesised as operationally important for close proximity across six Cases, to benefit from reduced inventory levels, optimisation of logistics flows, easier to manage inventory, and to omit the challenges from external factors. Case B elaborates on recent external events impacting the flow of inventory:

> *"If I've got something close to me, I haven't got to worry about an earthquake in Japan, I haven't got to worry about a fire on a ship which we had last week, I haven't got to worry about a typhoon in Thailand. I haven't got to worry about a port strike in Calais. I haven't got to worry about snow in France and Paris grinding to a holt like it did a month ago. So, all the external factors" (Case B, p4)*[28].

Comments from Case M[29] highlight encouragement from the OEM for increased local content to reduce inventory and gain more flexibility in the supply chain. A responsive supply chain is necessary for the operation of Just in Time networks to run efficiently, and typically the norm in UK automotive manufacturing. The geographical distance of suppliers plays a critical role in enabling efficient logistics, and a dynamic responsive supply chain for increased synchronicity, an argument supported by Case A, B, C, D, H, K and M. Comments from interview highlight the rationale and prospectus of key commodities deemed desirable for close proximity, based on the need to be ever more lean and agile in the supply chain. This relationship is discussed further in section 5.3.3.

[28] Case B,p4 is the VP of Supply Chain Europe for an OEM with UK facility
[29] Case M is a Senior figurehead for an automotive trade and service body

Links between location decision-making and corporate policy and strategy showed global purchasing strategies can be a barrier to reshoring and has implications on the plant making location decisions, with strategic level purchasing located overseas separate to the operational plant (group) making purchasing nomination decisions which impact operationally (plant level) in terms of responsiveness, inventory level, transport logistics etc. This was shown to have implications on delivery service due to being heavily cost focused and insufficient consideration given the service level required by suppliers. Narratives from Case A, B, C and F emphasise the piece part cost by Purchasing and the limited consideration given to deliver service requirements to achieve JIT deliveries and synchronous supply. Case G argues:

> *"I think there is still a place for offshoring but for the right things. For us it's about making the right decisions around what we do bring in-house and what we don't and I think we made bad decisions on that before" (Case G, p13)*[30].

5.3.2.3 Commodities for Reshoring

Nine commodities were considered advantageous for current and/or future reshoring within the context of automotive manufacturing; a synthesis of desirable components for reshoring are presented in Table 5.2. The author recognises that whilst a level of bias exists in preferences for supply chain reshoring subject to each case study's interests, clear synergies exist for the reshoring of complex tooling and equipment, metal parts, plastic mouldings, alloy wheels, and product requiring JIT delivery/sequence/synchronisation to the customer.

[30] Case G,p13 is the CEO for a Tier-2 automotive manufacturer

Table 5.2 shows alloy wheels attracted attention from 31% of Cases expressing the desire to reshore alloy wheels to the UK. Currently, there are no UK manufacturers of alloy wheels with the capability to satisfy UK vehicle assembly volume. Case B explains wheels are currently sourced from the Far East rendering an extensive 12-week order lead-time that negatively impacts on the ability to operate with lean management principles due to high inventory levels and long lead-times, and averting flexible capability to response to changes in short-term demand:

> *"Again it's one of the selling points in the car but they're large and heavy and expensive but simply to manufacture, so it would make great sense to have them next door to us and we could reduce our inventory massively by just having something like that next door to us" (Case B, p5).*[31]

Investigations are widely supported by Case B, J, I and L to understand the opportunities for a UK alloy wheel plant with the need to apprehend *"what the operational requirements are, what's the par demand of an alloy wheel plant, and can we pull together a proposition that would help get some traction in that space (Case J, p16)".*

Table 5.2 Automotive Components for UK Reshoring

Component or Tooling	**From Region**	**Case, Participant**	**Narrative from Interview**
Surface trim – somould Heavy Layer Laminated products	France – Internal supplier	Case A, p1 Case A, p2 Case A, P3 Case I, P15	Eliminate exchange rate impact Close proximity to benefit from lean supply chain UK supply chain exists
Tooling and Equipment High speed progression tooling Complex tooling Maintenance spare parts PPE	Italy, Korea, China, India	Case A, p3 Case K, p17 Case G, p13 Case K, p17	True landed cost Available capacity Increase company growth Increase technology advances in R&D
Metal and forging parts	Any	Case B, p4	Inventory reduction

[31] Case B, p5 is a Senior Parts Controller at a UK-based OEM

Metal BOPs		Case B, p5 Case D, p10 Case C, p7 Case C, p9 Case F, p12	Supply chain exists in UK Logistics cost Steel availability Currency
Plastic injection mouldings Plastic BOPs Instrument panels	Any	Case B, p4 Case C, p7 Case C, p9 Case K, p17	Logistics cost Inventory reduction Balanced against labour cost Supply chain exists in UK Supply chain coordination
Non-labour intensive electronics Wiring harness	Any	Case B, p4	Logistics cost Inventory reduction Balanced against labour cost
Alloy wheels	Korea	Case B, p5 Case B, p6 Case I, p15 Case J, p16 Case K, p17	Inventory reduction Improve delivery process Simple production process
LCD displays	Europe	Case B, p5	Inventory reduction (if infrastructure exits)
JIS/JIT/late configuration parts	Europe	Case B, p5 Case E, p11	Inventory reduction
Vinyl supply	Germany	Case C, p8	Cost reduction
Batteries Motors Power electronics Electric vehicle components Connected autonomous vehicle items	Any	Case I, p15	Some UK capability exists Opportunities to develop capability
High volume parts	Any	Case K, p17	Supply chain coordination
High value components (seats, cockpit modules)	Europe	Case B, p5	Inventory reduction
Large and heavy product	Any	Case B, p4 Case D, p10 Case E, p11	Logistics cost Inventory reduction Balanced against labour cost
Non-labour-intensive processes	Any	Case B, p4 Case K, p17	Logistics cost Inventory reduction Balanced against labour cost
Any component with capable supply chain	Any	Case A, p1	Logistics cost Inventory reduction

Critical components for close proximity are summarised from the multiple-case study as; dimensionally large and heavy product; production line-stop parts, high volume and high value components, non-labour-intensive manufacturing processes, product requiring

synchronisation to the OEM vehicle assembly line, and components manufactured by poor performing suppliers.

Labour cost is significant contribution in the piece part cost of the product, requiring a balanced approach with logistics cost and inventory holding *"So, there's no point in going to a place if labour is 20% cheaper if it's going to be 40% extra for logistics" (Case B, p4)*[32]. With TDC the determined priority, balancing the holistic cost of labour, logistics and inventory appears critical, and changes in these key cost factors shift the balance for the best TDC supplier. Additional criticisms come from the disregard of less quantifiable items (non-predetermined cost factors) that present significant on-cost to the manufactured product; 25% of Cases identified manufacturing tooling and equipment critical for reshoring either to a UK supplier or in-house tool production, due to the unknown subordinate costs incurred for the readiness of new production tools; Case A illustrates:

> *"So, we have examples here where we've just had a press made in India and it was delivered here in July and I've just got the first part off it last week, and there has been 3 Indian Engineers in here since July and they just went home last week (3 months) and I think that probably tells you everything you need to know. We could have bought a press in the UK, had it installed, up and running a long, long time before this happened, and this press is 2 years late now" (Case A, p3)*[33].

High specification, challenging tooling are more appropriately positioned for manufacturing in-house or in close proximity to the customer, rendered by the complexity of adjustments necessary for production readiness, Case G[34] classifies. Additional costs

[32] Case B, p4 is a VP of supply chain management for an OEM
[33] Case A,p3 is the Production Manager for a Tier-1 automotive manufacturer
[34] Case G is a Tier-2 automotive manufacturer

gained through product complexity, capability or additional labour required for production readiness from offshore suppliers, highlights the disparity of real TDC to forecast. Connection here can be clearly made with the challenge of dynamic cost factors (Kinkel & Maloca, 2009; 2014) discussed in Chapter 2 and their proposal for dynamic bandwidth costing.

Five cases ascertained metal castings and plastic mouldings are commodities where UK supply chain infrastructure readily exists, whereas somould/laminated product[35], alloy wheels and LCD displays are regarded as having barriers requiring supply chain investment. Secondary case data substantiates component findings with commitment and investment into new UK facilities for an aluminium castings plant; a phased manufacturing and assembly facility for fibre reinforced plastics; and additional production and assembly lines for electrically powered motors (Holweg *et al.,* 2017). Local Vehicle Content Analysis (LVCA) highlights the lack of reliable comparative data analysis for UK automotive supply chain sourcing (Case I, p. 15), emphasising the need to collate reliable data through survey of UK automotive manufacturing firms (Holweg *et al*., 2017). Between the OEMs and Tier-1 suppliers (restricted parameter of secondary data) local content is approximately 44%, however, increasing industrial pressure has encouraged some case companies to target an optimistic 60% true local content[36] sourcing (further discussed in Section 5.3.4.4) Synthesis of case studies within one UK automotive supply chain, highlights the need to omit the negative impact of the exchange rate from Tier-2 suppliers upstream, a factor implicating major consequences to the competitiveness of the supply chain and hence an inflated localisation target.

[35] Somould/laminated product is an industrial textile carpet material with a laminated backing, used to manufacture interior car components

[36] True UK local content refers to product manufactured at Tier-2 level in the UK and sourced from Tier-2 upstream to OEM assembly in the UK.

5.3.2.4 Delivery Service

High delivery performance and high delivery frequency are deemed important factors requiring close proximity of supply, to reduce inventory and accommodate space constraints in the manufacturing facility; a coherent proposition supported by eight Cases. That said, Case A argues poor supplier performance is not a major driver for UK reshoring with their existing stable supplier base, emphasising any new UK suppliers must guarantee supply capability prior to contact.

Dynamic consideration by Case G[37] place delivery as a vital priority with emphasis on lead-time, noting that increased logistics costs are factored-in for air freight solutions. Service criticality appears to move beyond piece part cost[38] in this case.

Narratives suggest Quality Cost Delivery (QCD) remain conflicting between purchasing decisions and requirements of the operational plant; Case A elaborates:

> *"….there is a lot that the plant is expected to absorb…. space is becoming more and more of an issue in those decisions. So from a component perspective, if we can get a supplier to supply everyday versus once a week then the benefit of the plant is there for everybody to see because you don't have to hold as much stock, but again we are advised and managed by people outside of the plant and are forced to accept a weekly delivery because of the part cost and again the plant has to absorb the consequences that go with that" (Case A, p3)*[39].

This response is echoed in Case B, p4[40] emphasising *"we are very, very cost focused rather than delivery focused"* and Case E, p11[41] *"an increased amount of focus on cost"*

[37] Case G is a Tier-2 automotive manufacturer
[38] Piece part cost is the cost to manufacture the value-added product, excluding external service costs.
[39] Case A, p3 is a Tier-1 automotive manufacturer
[40] Case B, p4 is a VP of supply chain management for an OEM
[41] Case E, p11 is the Supply Chain Projects Manager for a UK-based OEM facility

with supplier nominations often based on cost without the capability to meet delivery requirements. This consensus shared across the data highlights the disparity between purchasing decisions made centrally, for the management of operations within the manufacturing facility (Colotla *et al.,* 2003). An obstacle shared across the global Case platforms (Case A, B, C, D, E) of this study, with purchasing nominations targeting global supplier platforms for price optimisation through global economies of scale, imposing constraints to optimise customer delivery requirements. Adding further that as a company:

> *"...we've got to persuade ourselves that we are customer number one and not cost number one, actually if you become customer number one, cost will look after itself" (Case B, p4)*[42].

This argument indicates a strategic transition moving from cost-centric to customer-centric focus is required, this is strategically aligned with Case G[43] proposition to surpass customer expectations of high-quality product and delivery, placing greater reliance on *"the potential for supply chains to be more flexible over longer distance"* (Case E, p11)[44].

Comments from interview ascertain delivery service an important dynamic with the increasing demand to be ever-leaner and more responsive in the supply chain to sustain competitiveness; registered a key motive of reshoring appearing in multiple-disciplinary themes. Case accord recognises supply chain close proximity as advantageous to improve reaction time and reduce waste within the supply chain. However, where supply is mandated upstream by the OEM, often for cost benefits and often to global supply platforms; delivery conditions are usually pre-established between the OEM and Tier-

[42] Case B,p4 is the VP of Supplier Chain Europe for a UK-based OEM facility
[43] Case G is a Tier-2 automotive manufacturer
[44] Case E is a UK-based OEM facility

N+2 supplier and not visible to the Tier-1 supplier prior to nomination. These obligations can limit the opportunity to improve delivery service such as JIT delivery to the Tier-1 supplier and highlights the degree of control upstream supply chain by the OEM. Case E further adds that delivery service *"is mandatory in a sequence JIT industry, so it has to be 100% on-time" (Case E, p11)*[45].

Whilst cost appears the main focus across the multiple-case study (Case G exceptional), synthesis from interviews suggests all manufacturing facilities deem on-time delivery service a critical factor, with OEMs commanding 100% on-time delivery for synchronised and sequenced JIT conditions from the Tier-1 suppliers feeding into the OEM assembly plants irrespective of positive or negative surrounding factors. This means in situations such as Case F[46], the supplier is squeezed between ensuring 100% on-time delivery service to the OEM and ascertaining the cheapest possible purchasing cost, residing:

> *"We've got to make sure they match but we have to achieve 100% on-time delivery performance all of the time, therefore we do whatever we have to do to achieve that……to achieve the price if we need 16 weeks lead-time we will, and hold the inventory level" (Case F, p12)*[47].

Case H[48] adopts a balanced approach with delivery service requirements included in the overall consideration, making clear:

[45] Case E,p11 has management responsibility for supply chain projects at a UK-based OEM facility
[46] Case F is a Tier-1 automotive manufacturer
[47] Case F,p12 is the Managing Director of a Tier-1 automotive manufacturer
[48] Case H is a Tier 2 automotive manufacturer and Tier 1 tool maker

"We cannot take a contract if we are unable to meet the demands of the customer for delivery service, that would set us up to fail, but the decision must be economically justified" (Case H, p14)[49].

Refer to section 5.3.4.4 with further insight into OEM influence.

5.3.3 Automotive Supply Chain Methodologies

Principles of lean and agile supply chain management are dominant in the responses to interview; therefore, this theme is positioned as the main theoretical consideration in application to the automotive manufacturing industry, towards understanding the motivations for reshoring supply to the UK. The conceptual illustration and findings for Theme 3 are hereby presented.

5.3.3.1 Lean and Agile Supply Chains

Narratives of applied methodologies in each manufacturing case are summarised in Table 5.3. This shows lean manufacturing is dominant with 75% of Cases embedding lean principles for waste reduction and improved efficiency. Case C explains the company's internal framework modelling the classic Toyota Production System (TPS) based on *"lean manufacturing and low cost, bringing in what we need when we need it, and we should be in line with our customer requirements" (Case C, p7)*[50].

[49] Case H,p14 is a Director at a Tier 2 automotive manufacturer
[50] Case C, p7 is the Purchasing Manager of a Tier 1 automotive manufacturer

Table 5.3 Applied Methodologies by Case

Methodology	Case Study	Narrative
Lean	A, B, C, D, and F	Culture of supply chain and company Pulling product from customer demand Lean principles/waste reduction embedded OEM influence/requirements
Agile	G	Infrastructure to support and responsive to customer changes
Leagile	B, C and H	Predominantly lean with increased agility driven by customer
	E	Infrastructure to accommodate lean and agile

Case A[51] emphasises a lean environment due to pulling product through their system based on stable customer demand, and a strong company focus on waste elimination to improve efficiency. Further to that, Case B[52] stresses the plant is very good at practicing lean with minimal inventories, short lead-time from most suppliers, and JIT and synchronous deliveries from close proximity suppliers. Case F[53] points out they have lean supply to the OEM with a very tight packaging loop, however, the implications of remaining competitive on price means Case F's inbound supply of materials are in bulk to reduce buying costs. Whilst Case D[54] expresses lean implementation is currently work in progress with a target for full implementation for their manufacturing strategy and facility site.

In exception, Case G articulates their level of agility and ability to respond to changes and problem solve:

[51] Case A is a Tier-1 automotive manufacturer
[52] Case B is a UK-based OEM
[53] Case F is a Tier-1 automotive manufacturer
[54] Case D is a Tier-1 automotive manufacturer

"I think we've got the size, strength, and structure to be particularly agile, so when problems occur and they do, we are pretty slick at sorting them out. So, we have a process to follow in terms of rating the issue and getting it closed out and elevating the issue. So, the latter, we are certainly agile but not both" (Case G, p13)[55].

A combination of lean and agile is evident in Case B, C, E and H with lean principles prominent in the business. In Case C[56] for example lean is driven by corporate strategy for cost reduction, however as a Tier-1 sequence supplier, the UK facility must quickly react to changes in customer demand, from their OEM who is not lean. Case B[57] acknowledges the plant is heavily lean and becoming more customer-focused with future aspiration to have more agility with the customer. Case E[58] presents a combination of lean and agile based on product or process speciality and volume, to accommodate the classic lean high-volume process and specialism requiring more agility.

5.3.3.2 Responsive Supply Chain

Seven Cases conclude close geographical proximity is a key enabler for lean and agile supply chains. Case F, G, H, B and A reflect on geographically distant suppliers as being more challenging in problematic situations with distance implicating lead-time, a series of direct quotations from the case's provide clarity and consensus to the important of supply chain responsiveness:

"Risky, as the cost of resolving the problem is horrendous rather than down the road" (Case F, p12)[59].

[55] Case G, p13 is the CEO for a Tier-2 automotive manufacturer
[56] Case C is a Tier-1 automotive manufacturer
[57] Case B is a UK-based OEM facility
[58] Case E is a UK-based OEM facility
[59] Case F, p12 is the Managing Director of a Tier-1 automotive manufacturer

"The speed is the thing, having the issue isn't really a problem for the customer, it's how well and quickly you resolve them and then put a permanent corrective action in place.....response is everything. Response time becomes more challenging the longer supply chain" (Case G, p13)[60].

"Communication can be more difficult and especially face-to-face visits…. packaging can be an issue…. often run short of customer packaging in the loop and the longer the loop the longer the lead-time so that definitely has an impact" (Case H, p14)[61].

"Being able to respond can take longer simply due to the longer distance" (Case H, p14)[62].

"… not able to respond quickly to changes in requirements…it takes them longer to recover in case of a supply chain disruption" (Case A, p1)[63].

"To be lean and agile then the supply needs to be close to you, it's as simple as that" (Case B, p4)[64].

Interviewees emphasise the need for quick response to changes in customer demand and implications of supply chain disruption; and greater flexibility enabling a more responsive supply chain. This is viewed by participants as requiring close proximity of supply in order to allow more effective build to customer order and a better-connected supply chain. Optimisation of JIT and increased synchronous supply is equally said to require close proximity to improve supply chain flows and provide the desired flexible and responsive supply chain. Case B stresses the high volume of changes as a result of reacting to the

[60] Case G, p13 is the CEO of a Tier-2 automotive manufacturer
[61] Case H, p14 is a Director of a Tier-2 automotive manufacturer
[62] Case H, p14 is a Director of a Tier-2 automotive manufacturer
[63] Case A, p1 is the Plant Manager of a Tier-1 automotive manufacturer
[64] Case B, p4 is the VP of Supply Chain Europe for an OEM with UK facility

customer because, "*customer is king, and the schedule changes a lot".* Drawing attention to "*coloured parts"* as the most implicated components:

> *"Most of our coloured parts are either in the UK or in Europe. Previously we have had coloured parts such as door handles located in India and China, but we don't anymore". "Coloured parts are one which I would advocate are close as possible to the site" (Case B, p4)*[65].

Case C further stresses the lack of control of an embedded supply chain over far geographical distance or high-risk countries impacted by environments constraints, such as OEM mandated suppliers or the Japanese earthquake, and the consequences associated. Nylon66 ingredient is an example of a world shortage affecting automotive manufacturing in almost all aspects of the car, with

> *"Only three suppliers in the world who can supply a particular ingredient for Nylon66 and all three have declared Enforcement in Shaw (no longer available) and all of a sudden the complete supply chain for Nylon 66 is going to very quickly grind to a halt" (Case C, p7)*[66].

A clear message driven by OEM's is the criticality of component availability inferring response time is everything, with the desire to order parts at short notice, for example *"45 minutes" (Case B, p5)*[67]. The supplier location plays a vital role in the ability to optimise JIT arrival and synchronous flows, with emphasis on reducing inventory and supplier lead-time. Responsive supply chain is a key motivational factor for UK reshoring and categorised by the author as a moderating factor across multi-disciplinary themes (Illustrated in Figure 5.2 Reshoring Analytical Map)

[65] Case B, p4 is the VP of Supply Chain Europe for an OEM with UK facility
[66] Case C, p7 is the Purchasing Manager for a Tier-1 automotive manufacturer
[67] Case B, p5 is a Senior Parts Controller for an OEM with UK facility

5.3.4 Motivational Factors Driving Reshoring

At the core of this investigation is the variety of motives encouraging the multiple-case studies to reshore. Motivational factor's theme is highly connected to all themes presented and dominant in addressing RQ1. Eight subordinates are determined as having a strong influence on reshoring automotive supply to the UK.

A responsive supply chain as depicted in 5.3.3.2 is a moderating factor with pungent dialog in several conceptual themes. In direct relation to motivation of reshoring, responsiveness is emphasised by the desire to increase synchronous supply and JIT deliveries to the customer, to reduce lead-time and gain better inventory management. Thus, linked to the need for close proximity and implicated by supplier location, as shown in the Figure 5.2, adding further:

> *"We do attract suppliers here as the plant has a successful reputation especially for synchro suppliers which is one of the main drivers for localisation" (Case B, P6).*

5.3.4.1 In-house Capacity

Annotations identify increased capability of internal processes and resources have enabled the advancement of reshoring activity, through changes in operational strategies and expansion of UK facilities for production of automotive parts and tooling, notably in Case C, D, F, and G. This perspective offers a proactive approach to reshoring in the main.

A strategic change adopted by Case G[68] enabled the plant to move from a *"cost-centre to a profit-centre"* through redesigning the capability on offer and selling the facility and skill available. Historically, this facility focused all activity on producing tools and then

[68] Case G is a Tier-2 automotive manufacturer.

running them in a power-press to make the components and profit from the results; and whilst this continues, Case G felt they were *"missing a trick"* with capability:

> *"Our tool room is state of the art, its virtually clean room capability and I just felts we were A. under-selling ourselves on what we can do, and B. we just didn't have the capacity to do enough; and we redesigned the offering, redesigned the model, and added some more capacity in. That was the driver for us to be able to bring more products in-house[69] and reshore it from where we were doing it" (Case G, p.13)[70].*

Having invested in the capability, Case G have transformed from making a financial loss on tooling, to this year *"we did 22% profit in our tooling"*, grown their apprenticeship scheme from zero to ten apprenticeships in the last four years, and won business with a US customer against Chinese competitors.

The control of production process and supply chain to produce premium quality tooling is deemed critical and therefore a priority for internal manufacturing, whilst less complex tooling may be offshored under controlled measures if the risk to quality is minimal, in circumstances where customer order lead-time cannot be achieved in-house. Whilst Case H[71] comments the balance between available in-house capacity and high customer expectation for order lead-time is a "*tricky one to manage"*. Case G[72] recognises there remains a need for offshoring, but this must be the right product to offshore and equally the right product to reshore, point supported by Case E[73]; emphasising that wrong

[69] The term 'In-house production' refers to product being manufactured internally within the UK facility.
[70] Case G, p13 is the CEO of a Tier-2 automotive manufacturer
[71] Case H is a Tier-2 automotive manufacturer
[72] Case G is a Tier-2 automotive manufacturer
[73] Case E is a UK-based OEM facility

decisions have been taken in the past and it is vital to assess and make the appropriate right-shoring decisions.

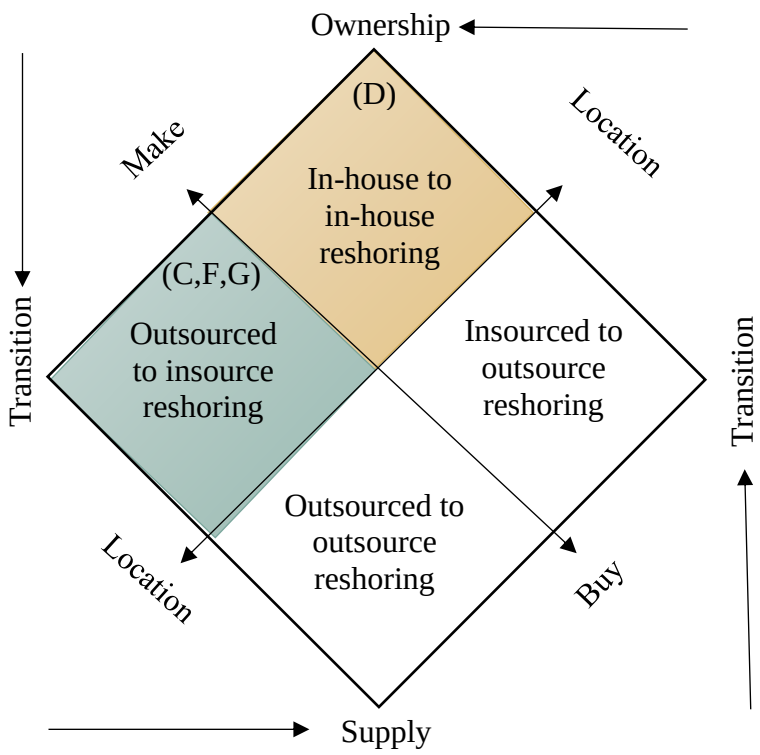
Available capacity identified in Case C[74] with under-utilised tooling as a result of high management turnover, lead to a supply shift from offshore outsourcing from Spain, Germany, and France, to producing in-house at the UK sequence facility. During an 18-month crisis, Case D[75] offshored some production to sister companies in Spain and Germany; with improved capacity in the UK facility that production was reshored back in-house. In the same instance, some product was offshored to Brazil with the intension of now moving closer to the home country, to a sister company in Spain to enable more frequent and secure delivery of product. Expansions of Case F[76] UK facilities resulting from increased order winning, has then created more in-house capacity for parts production. The consensus here is the ability to reshore for in-house production enabling an increased level of supply chain control and in turn, allows the supply chain to be more responsive, identified as a moderating factor for reshoring.

This cuts across location decisions factors (refer to Section 2.2.3) and the cross-dimension of ownership and location characteristics and decisions. Below, Figure 2.1 Reshoring Options demonstrates the 'outsourced-to-insourced reshoring' transition empowered by Case C, D, F and G (shown in green) moving from an external offshore facility to an internal facility in the home country. Additionally, Case D (shown in yellow) engages with 'in-house-to-in-house reshoring' transition moving the production and supply of components from an internal facility overseas to an internal facility in the home country;

[74] Case C is a Tier-1 automotive manufacturer
[75] Case D is a Tier-1 automotive manufacturer
[76] Case F is a Tier-1 automotive manufacturer

in these cases, the transitions are the result of optimising in-house capability (including capacity).

Figure 2.1 Reshoring Options



Options	Explanation
In-house to in-house reshoring	Internal facility overseas to internal facility home country
Outsourced to outsource reshoring	External supply overseas to external supply home country
Insourced to outsource reshoring	Internal process overseas to external supply home country
Outsourced to insource reshoring	External supply overseas to internal facility home country

(Adapted from Ashby, 2016; Gray *et al.*, 2013).

5.3.4.2 Reduce Transport Cost

Pressures to reduce transportation costs are compelling issues in the drive to reshore supply to the UK, an argument supported by eight Case Studies. With 88% of investigated manufacturing case studies embedding lean or partial-lean frameworks, the emphasis is placed on waste reduction with efficient supply chains through improved lead-time, synchronised flows, and reduced inventory levels.

Anecdotes from 5.3.1.1 synthesise logistics costs as a key characteristic of TDC and the need to achieve the best TDC. Case A, B, C, E, F, H and M all conclude high transport costs have significantly inflated the TDC and the need to reduce logistics costs; notably due to the volatility of fuel prices which, have been influenced (significantly but not exclusively) by the Brexit scenario, coupled with high volumes of overseas sourcing over the last two decades. Further insights on Brexit see 5.3.6.

Consensus from interview highlights the prospect of lower transport costs through more localised sourcing; with acknowledgement for the additional cost benefit when economies of scale are optimised (Case C). The potential to reshape transport structure is widely recognised with some improvement transformations already in-progress, with the viewpoint that a more integrated and connected supply network is prosperous. Case A and Case C elaborate:

> *"It will have massive benefits because we will be able to look to establish more milkrun's because we will have more volume in the UK which will again help us to reduce transport costs and reduce packaging costs" (Case A, p1)*[77].

> *"Transport can be grouped and more efficiently than if around the world, if close by and grouped it is more cost effective for transport" (Case C, p7)*[78].

Although participant8 recognises that local sourcing is not always cost effective with each opportunity requiring careful assessment, suggesting under such circumstance's reshoring would not proceed.

[77] Case A, p1 is the Plant Manager for a Tier-1 automotive manufacturer
[78] Case C, p7 is the Purchasing Manager for a Tier-1 automotive manufacturer

External logistics risks appear to have major implications on the supply network, where mitigation and control is limited, and imposed costs are the reality, laying emphasis on countermeasures by way of additional inventory holding. Case A explains further:

> *"All it takes is for one error at the tunnel, bad weather picks up, immigrants, terrorism, all modern things that we wouldn't look at 20 years ago, all of those things are day-to-day occurrences now" (Case A, p2)*[79].

Case B gives weight to external factors bringing attention to the impact from recent international strike events, whilst accentuating *"poor vessel performance"* as one of the three biggest issues in the supply chain today; cyber security identified as another. This has an inherent influence on the efficiency and responsiveness of the supply chain:

> *"Vessel performance is slowing down the ships because of fuel economy but also the global capacity of the ports is getting very near to not being sufficient" (Case B, p4)*[80].

Benefits of reshoring are highlighted through the desire and potential to transform the supply network structure, considering more flows arriving by trucks and/or synchronously rather than by vessels from abroad, aspiring to the subsequent cost benefit from localised sourcing.

5.3.4.3 Reduce Inventory Levels

Unanimous outcome from interview, suggests a reduction of inventory levels is highly desirable and a major driver to reshore supply to the UK. The cost of inventory has direct correlation to the flow of transport and frequency of delivery and therefore, the drive to

[79] Case A, p2 is the Production Control and Logistics Manager for a Tier-1 automotive manufacturer
[80] Case B, p4 is the VP of Supply Chain Europe for an OEM with UK facility

reduce transport cost (section 5.3.4.2) through increased localised sourcing supports the motive to reduce inventory levels through increased delivery flows.

Close proximity of suppliers allows for increased inventory turnover and therefore reduced inventory levels. Improving lead-time and synchronised supply is highly desirable in support, whilst recognising the additional benefit of *"less packaging cost and investment" (Case F, p12)*[81] required in the loop for continuity of supply.

The principles of lean manufacturing drive an efficient supply chain through waste reduction and the classic do more with less scenario (Womack and Jones (1990) is evident (see Table 5.3 for methodologies by case study), with issues such as space constraints in manufacturing facilities, delivery assurance and cost reduction identified as big factors. Comments from Case A, D and K elaborate these points:

> *"We have issues with space onsite in Washington…bringing product back to the UK means you can lower your safety stocks, so you are holding less inventory" (Case A, p1)*[82].
>
> *"Most of our parts are brought in on a weekly basis which means you have to hold more stock. If you can have local suppliers, then your leanness is better, and we can look at daily call-ins. So that's a KPI we are measured on, our inventory. If you bring in from further afield you have to have more safety stock available in case of transport and seasonal issues" (Case D, p10)*[83].
>
> *"Leaner supply chain and from that comes cost reduction. Cost if a big factor and it is usually driven from the top, and in automotive the cost driver is from the OEM and goes up the supply chain. Being closer to your suppliers allows for inventory*

[81] Case F, p12 is the Managing Director of a Tuer-1 automotive manufacturer
[82] Case A, p1 is the Plant Manager for a Tier-1 automotive manufacturer
[83] Case D, p10 is a Customer Liaison Team Leader for a Tier-1 automotive manufacturer

reduction, more frequent deliveries, more JIT or sequencing of parts etc" (Case K, p17[84]; echoed by Case M, p19)[85].

Inventory is a KPI with strong analytical focus, emphasised by Case A, B and D; suggesting a reduction in inventory instantly improves the bottom line, by which *"you're tracked on your performance for your budget commitments" (Case A, p2)[86]*. Showcasing inventory productivity such as improved cash flow, plant space reduction and increased JIT delivery, can position the facility more favourably in the prospect of new business opportunities; Case B validates:

"It's one of our reporting elements, what stock we've got and what stock we hold and that is looked from every plant when new model decision making is made, so if we can get that down to a minimum, we look a more productive and more valued plant, somewhere where they want to give new models to" (Case B, p5)[87].

However, the need to optimise the benefits from purchasing economies of scale is evident in some cases (which cases, quotes here). To secure new business and achieve the best TDC required by the customer, Case F accepts the necessary implications of bulk-buying raw material purchases and the cost associated with holding such inventories. Whilst Case F firmly invests in lean manufacturing and deployment of tools in accordance with their OEM, during the interview Case F, p12[88] recognised that upstream flows to the customer are highly lean and responsive, yet no resemblance is apparent of lean manufacturing principles for inbound flows from their supplier network. Additionally highlighting their direct correlation between longer lead-times and higher obsolescence:

[84] Case K, p17 is a Senior Figurehead for an automotive manufacturing service with Regional responsibility
[85] Case M, p19 is a Senior Figurehead for a Regional Authority with automotive policy
[86] Case A, p2 is a Production Control and Logistics Manager for a Tier-1 automotive manufacturer
[87] Case B, p5 is a Senior Controller for an OEM
[88] Case F, p12 is the Managing Director for a Tier-1 automotive manufacturer

"We've just written off in the last 6 months £160,000 worth of obsolescence. You think well £78 million business well that's not too bad. Then we do that twice per year so maybe £300,000. But when you look at competitiveness, it's made up of a thousand bites not just one or two things, so that's one of the contributing factors" (Case F, p12).

Case C highlights the additional cost benefit from bulk purchasing in the UK to optimise buying cost and reduced lead-time, whilst as a facility, is driven by physical, financial, and corporate policy constraints:

"We have major space constraint in UK plants and group target is less than 1 day stock – 0.7/0.8 days in plant. Some plants have standard portfolio of product, but Case C have non-standard, so stock is all over the plant which requires increased deliveries to the plant" (Case C, p7)[89].

Further insights to corporate policy in section 5.3.5.

5.3.4.4 OEM influence

Recognised for its multi-disciplinary connectivity across other themes, OEM influence is deemed by this researcher as a moderating factor with in-depth discussion in Chapter 6.

Two OEM case studies contributed to this investigation (Case B and Case E) by which they appear to adopt different strategies and objectives in their approach to global and local sourcing. Evidence in Case E supply chain presents more of (but not exclusively) a global focus further upstream with some Tier-2/3 suppliers mandated by the OEM. It appears under these conditions there is little negotiation; thus, meaning Tier-1 suppliers have restricted opportunity to make independent sourcing decisions for inbound supply.

[89] Case C, p7 is the Purchasing Manager for a Tier-1 automotive manufacturer

A *"complex component system"* is identified by Case E as a prime example of directed supply, placing emphasis on the Tier-1 supplier to *"own the commercial relationship"* with the Tier-2 supplier. A proposition echoed by Case C and Case D, elaborating here on the challenges associated with managing those relationships:

> *"With 'OEM'[90] mandated suppliers some of them won't even talk to you. Supplier in South Wales I went to visit to understand why they couldn't supply us, to find out they already had 'OEM-a' and 'OEM-b' on-site, and they had 19 programme launches all at the same time and all crashed into each other. With directed suppliers you are blind at what is going on most of the time and with 'our OEM' it is very risky" (Case C, p7)[91].*

> *"We have one OEM that we have that issue with sometimes. It depends on where they purchase their items from…they have a vehicle which is made for so many regions and it depends on who you're making for…one of our sister plants makes for one region and we make for another region but we have to purchase the part from the same manufacture. So that can be an issue for us sometimes" (Case D, p10).*

Admittedly, in such situations the OEM will have *"more influence where that Tier-2 supplier locates itself" (Case E, p11).* These mandated suppliers are predominantly (not exclusively) located overseas for electrics, aspects, and laser seat parts at Case C, with a proportion of *"OEM 95% turnover we have 10 mandated suppliers" (Case C, p8)[92].*

The amplification of OEM programme launch delays can have a major impact on *"budget planning"* and *"financial performance"*; coupled with the lack of visibility upstream

[90] 'OEM' denotes the named OEM at interview
[91] Case C, p7 is the Purchasing Manager for a Tier-1 automotive manufacturer
[92] Case C, p8 is the Production Control and Logistics Manager for a Tier-1 automotive manufacturer

Case C showcase the severity placed upon Tier-1 supply operating without a fully established BOM[93]:

> *"You don't know the volume mix by component therefore you can't build a budget with no costings. We were still launching components at SO[94]P which were double the price of the standard product and you just can't plan for that" (Case C, p7)[95].*

Linking back to the conceptualisation of reshoring (5.3.1), Case E, p11 defends making the *"right-shoring"* decision regardless of geographical location, by which those decisions are often made by the OEM for upstream component sourcing. This is debated further in Chapter 6.

Evidence in Case B supply chain clearly demonstrates a local focus, with a self-declared ambition for Tier-1 suppliers to achieve 60% true local content for upstream sourcing for all future production car models; thus Tier-1 suppliers are required to purchase 60% of components from UK Tier-2 suppliers. A consensus gained from Case A, B, C, D, F and I, with further clarification:

> *"So, they've been very specific and clear about it and they've put a lot of pressure on their Tier-1s to increase the Tier-1 UK content because (Case B) want it to be 60% UK content real and not just nominal. If 60% of their spend is with their UK based tier-1s, that doesn't mean their UK content is anywhere near 60%. Rule of thumb, we think real UK content is somewhere around 25%. It's basically doubling the Tier-2 content and that's done through the Tier-1s" (Case I, p15)[96].*

[93] BOM is Bill of Material
[94] SOP is Start of Production, the commencement of volume production for the market
[95] Case C, p7 is the Purchasing Manager for a Tier-1 automotive manufacturer
[96] Case I, p15 is a Senior Figurehead within a National automotive governing body

Strong localisation focus is emphasised across 11 Cases to negate the impact of the exchange rate following Brittan's decision to exit Europe. Further insights into Brexit impact in 5.3.6.

The IAMP[97] development is eagerly viewed by case B as a *"perfect opportunity"* to reshore a supplier from their existing manufacturing base to the manufacturing park adjacent to Case B; highlighting the obvious benefits of lead-time and inventory reduction for the OEM, but equally for the supplier who may benefit from *"government incentives" (Case B, p5)*[98]. A proposition supported by Case I, J and L.

> *"The short term is to get stuff into Europe, to reduce your lead-times.....but long-term if you look at the UK.....you've got the IAMP which is the International Automotive Park, so long term is to get as many suppliers as close to the plant as possible and then you can start thinking of synchronous supply and very lean supply chain, no inventory holding etc, greater flexibility to the customer" (Case B, p4)*[99]

Synthesis from 8 Cases concludes OEMs have a significant influence over the location of Tier-1 facilities directly, based on the product profile manufactured and the delivery conditions required by the customer, namely JIT, sequence, or synchronous supply. It is argued by Case J, K and M that OEMs pave the way, dictating location to an extent and the supply chains follow in trend, where government and policy environment supports. Case B offers confirmation that *"Yes the OEM influence location"* with the desire for

[97] "IAMP is designated a 'Nationally Significant Infrastructure Project' (NSIP) by the UK Government, and is a partnership between Sunderland and South Tyneside. IAMP is a hub for automotive, advanced manufacturing and technology businesses, accelerating economic growth and generating the conditions for private sector investment of over £400 million. IAMP One is a designated Enterprise Zone and as such, occupiers can benefit from Enhanced Capital Allowances status" (iampnortheast.co.uk; makeitsunderland.com)

[98] Case B, p5 is a Senior Controller for a UK-based OEM facility

[99] Case B, p4 is the VP of Supply Chain Europe for an OEM with UK facility

supply to be as local as possible, illustrating they have recently sourced a new supplier for engine development and Case B pushed to secure the local UK supplier plant over the German facility:

> *"Because they are local to us, and we can go in there on a daily basis if they have any problems. It also allows us to have another little manufacturer where we can have a lot of influence" (Case B, p5)*[100].

A plethora of quotations from Case E, A, C and F corroborate OEM influence over facility location:

> *"Nature of the tier 1 suppliers are all global and multi-national, quite often it is a request to a MNE to relocate and set up a new facility for the benefit of 'OEM', that will require a regional office in addition to a new manufacturing plant" (Case E, p11)*[101].

> *"For sure the OEM did influence the location of this facility at the time and that's mainly due to the size of the products that we manufacture… to supply them just-in-time conditions, and they are influencing the sourcing of the replacement business because they are basically insisting on a high percentage of local content in order to not have the discussion about exchange rate" (Case A, p1)*[102].

> *"OEM went through big outsourcing phase for production of large bulky components (centre-consoles quoted as example of that) which is why the OEM ended up with the supplier park close to their plant for suppliers to perform*

[100] Case B, p5 is a Senior Controller for a UK-based OEM facility
[101] Case E, p11 is a Supply Chain Projects Manager for a UK-based OEM facility
[102] Case A, p1 is a Plant Manager for a Tier-1 automotive manufacturer

assembly tasks that the OEM used to do. Significant influence on Tier-1 suppliers' activity and operations" (Case A, p1).

"OEM like 'Customer' wants all suppliers in sequence and this is why we are not far from them. In sequence method supplier, the customer will drive the location of supply" (Case C, p8)[103].

"OEM saying to overseas suppliers, you're only a supplier if you supply in Japan, Europe, or the States, and if you're not in Europe you're not a supplier anymore. So now we've got a bit of a gold rush. Japanese suppliers want to move to the UK" (Case F, p12)[104].

Case A additionally highlights all change requests requiring Pre-production Approval Process (PPAP) with the OEM having a *"massive operational influence" (Case A, p2).* However, whilst PPAP secures continuity of approved supply, non-approval is also viewed by the Tier-1as a potential barrier to reshoring; whilst the OEM clarifies inhabitation would be "*only for Total Delivered Cost" (Case B, p4)*[105].

The extent to which OEMs have influence on upstream supply chain reshoring appears to vary with divided opinions ranging from *"not very far....I don't think we have that much affect" (Case B,p4)* to the opposite end of the spectrum *"very, very far, Tier-4/5" (Case C,p8)* with *"huge impact" (Case J, p16);* depending on the OEM, the objectives and policies they deploy and the components in question. However, 15% of Case's argue the OEM have no influence on upstream sourcing, Case G and Case H evidence this:

[103] Case C, p8 is a Supply Chain Manager for a Tier-1 automotive manufacturer
[104] Case F, p12 is a Managing Director for a Tier-1 automotive manufacturer
[105] Case B, p4 is the VP of Supply Chain Europe for an OEM with UK facility

"I can honestly say OEMs have not influenced the decision-making process in my time. It tends to come down to a discussion between us and our customer who aren't the OEM" (Case G, p13)

"The OEMs don't have any impact on our decision making with our suppliers" (Case H, p14)

Nevertheless, a coherent viewpoint from the entire multiple-case study, regardless of tier structure, is that competitiveness is key, and consensus shows that is driven by the OEM. The OEM are identified as the leaders of Total Delivered Cost and the supply chain follow in trend (refer to section 5.3.1 quotes). Within the concept of TDC, the OEM places high demands on QCD from upstream suppliers and *"suppliers need to be geared up to ensure those levels of performance" (Case A, p1).* This is linked to the drive for an efficient, cost effective and responsive supply chain embedded in the lean and agile techniques (implementation as per Table 5.3) driven by the customer. Whilst there is an argument that the OEM does not place direct request upon the specific location of sub-suppliers, it would appear the directive for 60% localised supply means at macro-level (country location), the OEM have a high influence over sub-supplier reshoring to the UK or near boarder location.

During interview, it was narrowly perceived that the OEM's had little influence over upstream sourcing and that as a Tier-1 or Tier-2 supplier, the choice to nominate suppliers is the discretion of the company. However, this view is then compromised by the emphasis heavily on the localisation directive by case B for 60% true local content; and the extent of mandated Tier-2/3 suppliers by case E.

5.3.4.5 Competitiveness

Identified as a multi-disciplinary node, competitiveness is a dominant motive with high connectivity in several other themes. Synthesis across the entire empirical case design relates the need to sustain competitiveness as the most prevailing operational factor motivating reshoring amongst UK automotive manufacturing facilities. Three compelling categories are clearly identified within competitiveness:

- Cost reduction and efficient supply chain
- Increased agility with the customer
- New business acquisitions

92% of Cases appear to be heavily cost focused; identifying cost as the primary objective to remain competitive, with Case G an exception. A cost reduction focus is apparent in the desire to employ a leaner supply chain, with the need to reduce the classic lean waste Marodin *et al*., (2016) including (not exclusively) inventory reduction through small lot deliveries and reduction in safety stock; reduced logistics costs and impact from fuel price fluctuations; reduced warehousing space through increased delivery flows; shorter lead-times and an increase in synchronous supply enabled through supplier close proximity. Section 5.3.4.4 discusses TDC as a major driver from the OEM filtering upstream with the need to achieve the lowest TDC to remain competitive, with Case B supply chain demanding an increase in true local contact to remain competitive, Case A elaborates:

"Initially the customer was requesting us to source in low-cost countries, and now they're asking us to basically bring supply back to the UK in order to remain competitive" (Case A, p1).

The impact from Brexit and the dynamic currency exchange rates is identified as a significant accelerator in this reverse strategy (see section 5.3.6 for further insights).

Theoretically, agility combined with lean principles (discussed in 5.3.3) enables the supply chain to sustain competitiveness; close proximity enables cost reduction through reduced inventory levels, reduced geographical logistics and reduced overall lead-time, whilst providing greater flexibility and a more responsive supply chain. Case M and Case K elucidate:

> *"A closer connected supply chain will allow opportunities to reduce cost which is always a big driver and respond to the customer" (Case M, p19).*

> *"Cost if a big factor and it is usually driven from the top, and in automotive the cost driver is from the OEM and goes up the supply chain. Being closer to your suppliers allows for inventory reduction, more frequent deliveries, more JIT or sequencing of parts etc" (Case K, p17).*

Economies of scale are also considered for large global suppliers (such as Case C and F) thus enabling lower purchase price for components coupled with the advancement of global logistics solutions, whilst recognising the consequence is the reduced likelihood of winning business acquisitions for smaller local suppliers.

UK supply chain capability, whilst identified as a significant barrier to UK reshoring, for Cases C, D and G has enabled opportunities to increase their level of competitiveness through developing capability and optimising their competitive position in the market. Recognition and utilisation of available capacity has enabled Case C and Case D to reshore-insource, returning manufacturing from offshore supply to in-house production in their UK facilities. Redesigning their strategic model and portfolio offering, Case G recognised they were *"missing a trick.....with state of the art tool room and virtually clean room capability"* making the strategic decision to *"move away from being cost*

focused to being profit focused and selling the facility and skill we have available" (Case G, p13).

Case F draw on their autonomy to control every aspect of decision making whilst governance prevents some competitors and customers, positioning themselves in growth opportunities and improving operational efficiencies through the development of modern premises. Case F explain their benchmark capability has been used by Nissan as an example to synchronous suppliers; further suggesting suppliers reshoring into Sunderland IAMP will have competitive advantage over suppliers operating from dated facilities because *"reshored companies will have better facilities"* whilst existing plants are *"flat out now and pushing their limits"*.

Annotations from automotive governing bodies position capability as core to improving competitiveness and securing business acquisitions, running programmes to support Tier-1 to Tier-n suppliers *"become more competitive to win more orders....to help grow UK content" (Case L,p18)*, though recognising that supply chains grow at different rates depending on the opportunities within the commodities and who is driving it (Case M and Case L). In addition, Case H adds:

> *"It's about trying to improve the supply chain in terms of logistics, quality, responsiveness and cost overall. By doing so it allows us to be more competitive as a manufacturer, as a supplier and potentially win more business" (Case H, p14).*

However, the ability to be competitive and win new business acquisitions over offshore manufacturers still presents an issue in terms of direct labour cost, even with the offset of logistics comparisons (Case A).

5.3.4.6 Lead-time

The desire to reduce or improve on delivery lead-time from the supplier was acknowledged by seven cases as a motivation for reshoring. Narratives suggest close proximity of suppliers helps to achieve a better-connected supply chain. Lead-time plays an important role enabling flexibility with the customer and making the supply chain more agile. For example, Case A confirms holding 6-8 hours stock between supplier and customer delivering on a JIT basis and maintains the capability to react to customer changes or and absorb minor disruption. Yet acknowledges the equivalent scenario would not be possible between Case A plant and their offshore suppliers due to the geographical distance imposing longer lead-times. The interaction of lead-time is engrained in responsive supply chain.

5.3.5 Brexit Impact on Reshoring

Two interview questions engaged participant insights on the implications of Britain exiting Europe and the imposition towards reshoring. At the point of interview, Brexit was vacant from academic literature therefore and not identified as a prominent analytical factor in Chapter 2. However, with recognition of the change in political circumstances in an unprecedented time, the author decided to include two broad interview questions considering Brexit to demonstrate recognition and inclusion (rather than exclusion) of an important scenario that will inevitably impact all companies in some form.

High levels of automotive supply chain uncertainty in a very unsettling period of turmoil that is the Brexit scenario, is the feeling captured from ten Cases, with varying levels of optimism for the future security of UK automotive manufacturing and supply chain risk. An unprecedented phase means there are more questions than answers to understand the full extent Brexit will have on reshoring supply chains to the UK and to that, participant speculation and scenario planning appears underway. Nevertheless, whilst ambiguity is

high and the situation changeable, the impact from Brexit to UK automotive manufacturing is certainly apparent from the dynamic exchange rate and the uncertainty of trade agreements.

5.3.5.1 Exchange Rate and Increase GBP in the Car

The process of Britain exiting Europe has had substantial impact on the currency exchange rate with participant commentary of 15-20% differential. Synthesis across the entire multiple-case study concludes the automotive manufacturing industry is experiencing significant impact from this dynamic situation, emphasising *"exchange rate is a big problem across the supply chain" (Case B, p6).*

Exchange rate is certainly motivating the extent to which some case studies are actively reshoring, though Case B, C, I, K and M note that reshoring was an active strategy prior to the Bexit scenario and the negative impact from the exchange rate has been more of an accelerator to an existing strategy rather than an initiator. Identified in 5.3.4.4 OEMs have adopted different approaches to supplier location with evidence in Case B supply chain taking direct steps to target increased localised production to increase GBP in the car. Case A comments the unprecedented circumstances of one OEM compensating suppliers for exchange rate impact. It would appear the localisation target is largely to negate the impact of the exchange rate by operating in a common currency between the OEM, Tier-1 and Tier 2 supplier. Evidence from the OEM:

> *"If you look right now in our Brexit type situation if you like, that is why we've got greater targets to get more pound (£) content into the car, the pound has devalued by about 20% so it makes more sense to get product made here" (Case B, p4).*

Case A enlightens from their supplier perspective:

> *"Currently we have 95% of the sales of the plant are in Euros, so because of what's going on with the exchange rate with Brexit, it's having a huge impact and we can't allow that to happen for the future. We're in commercial negotiation we can speak to them currently about compensation for exchange rate, but for the new business, it's not going to be something that we are allowed to put on the table. For the new business we don't want to be talking about exchange rate, so the only answer there obviously is to bring the product back to the UK" (Case A, p1).*

Case C and Case H concur the OEM (notably Case B) has the desire to purchase as much as possible in GBP-Sterling, having *"taken the hit"* on the existing car model in light of the negative exposure from the exchange rate which has been *"crippling for suppliers"*. Consideration of small suppliers by Case I suggests the typical *"5-6% margin"* for Tier-2 suppliers is largely eroded due to the increase of raw material import costs, loss of European labour, and increase to recruitment and training costs potentially valued at *"£30,000-£40,000 per person".* Noting the argument from Government to increase levels of export and become more competitive as a result of the exchange rate, which appears not to factor in the typical *"3-4% overall cost"* to export business leaving minimal margin. Case I explains:

> *"Tier-2 suppliers in the UK who export to mainland Europe, they've been squeezed to hold their Euro pricing, so they get hit with their raw material import and hit with European export pricing" (Case I, p15).*

Holistically concluded, cost focus is a major influential factor; and plays a significant role in promoting reshoring partially (not exclusively) to negate the detrimental impact from exchange rate dynamics. Case F emphasises the importance of balancing sales and

purchase currency for manufacturers to sustain levels of profitability and supply chain competitiveness:

> *"Some companies in the Northeast they buy in Euro and sell in Euro, so they are converting their Euro into many, many more pounds, and become more profitable. We are a balanced company, so we have a balance of purchases versus sales. Some companies their margins have gone through the floor because there operate in the wrong currency" (Case F, p12).*

Consensus highlights the many implications from the Brexit scenario to which the end is unknown, with exchange rate representing only one significant factor; levels of uncertainty for trading conditions equally sit at the forefront.

5.3.5.2 Customs and Trade Barriers

As political negotiations on Brexit continue, it appears the concerns surrounding international trading conditions remain prominent for automotive manufacturing supply chains (not exclusively). Ten Cases concur a period of high uncertainty for the industry with future impact unknown; whilst positivity prevails and OEMs uphold optimism with hope of free-trade agreements in reach, the transition period and future outcome is speculation and remains unclear. Case G attributes the degree of impact will be defined by verdict of a hard or soft Brexit, Case B and E add:

> *"Although we are trying for a soft Brexit I think all OEMs are planning for a hard Brexit" (Case B, p5).*

> *"Depends on the deal, our hope is that there will be no discernible change and access to European market will continue unhindered" (Case E, p11).*

Security of future business for UK automotive manufacturing requires the survival of UK OEM assembly plants; Case G advocates over the coming 5-year period, the once

renaissance in UK car manufacturing may diminish in the likely-hood that *"they will pull out if there is not free movement of trade.* Case L adopts a polarised view suggesting if the majority of a vehicle model volume is produced in Europe, then supply is likely to be sourced from main-land Europe; equally if the majority of volume is assembled in the UK, the OEMs will want to source from UK-based Tier-1's. This corroborates with Case C proposition that due to the level of future uncertainty; it could be more prosperous being in the UK and mitigating the risk if supplying UK-based OEMs.

> *"We might find in certain instances it could strengthen the UK supply chain, and in others it will definitely weaken it" (Case L, p18).*

Case studies part of large organisations such as Case A, emphasise concerns associated with the UK plant profitability and the support from their organisational Group to win new business acquisitions in the era of uncertainty and instability.

If discussions on customs and trade tariffs don't go the way the automotive manufacturing sector want them to go, the on cost to automotive supply chains will be considerable, with the need to significantly increase UK content or significantly decrease it. Case I explains:

> *"Because multi-border travel through complex system from a bunch of components that may go backwards and forwards across the European border two or three times just adds a tariff each time… I'll import the raw material and everything else has to be done in the UK, I only pay a tariff on the raw material" (Case I, p15).*

Therefore, competitiveness for import and export will potentially be affected, although Case B advocates Germany exporting large volumes of cars to the UK and the process goes both ways.

From a logistics perspective, the consensus around customs is that it will be an *"absolute nightmare" (Case B, p4)* with detrimental impact to just-in-time deliveries and synchronised flows. Longer supply chains, long lead-times and significant waiting time and delays are anticipated if customs clearance is an imposed measure of Brexit, Case C estimates:

> *"It will be operation stack across Europe because every road in and out of Calais and Dover will be stacked up for 30, 40, 50 miles. You won't be able to process the stuff through customs quick enough. If you are JIT supply like we are then we will end up air freighting stuff on a daily basis because you just won't be able to get product across the borders" (Case C, p7).*

The consequences of operational chaos and inefficiency of supply will inevitably result in additional inventory holding to mitigate risk factors, but the level of impact will vary depending on the position within the automotive tier structure. At OEM level, Case B anticipates an initial *"10 days inventory from parts coming in from Europe".*

The elevated impact of Brexit on reshoring is viewed as an accelerator, based on the OEMs remaining in the UK and leading a supply chain reshoring strategy; a prime example of this is Case B:

> *"So, one would be hopeful that we are going to get a fairly favourable outcome but it certainly means we are going to need to localise product. It certainly means we are going to need to increase the pound content in the car. And it certainly means we are going to need to have suppliers closer to us" (Case B, p4).*

5.3.6 Industry Forum

Five UK governing body cases contributed to this investigation, all of whom are actively engaged in collaboration and deployment of reshoring manufacturing supply chains to

the UK and growing UK automotive content. Emphasis is largely placed on awareness and developing a clear understanding of the current and potential growth of UK automotive manufacturing as a result of reshoring (not exclusively), whilst making progress in certain commodities. Industrial partners appear more focused on incentives and the monetary aspects associated with returning supply, to which the barriers for reshoring are strongly linked. Three subordinates are identified in Theme 6 as relevant to the motivational factors and barriers to reshoring.

5.3.6.1 Local Content Analysis

The Automotive Council coordinated a study in 2011 to establish the existing UK local content at OEM to Tier-1 level, results showed UK content was 26% and by 2016 that had risen to 44%; with a *"baseline ambition to grow that to 50% by 2022 and emerging targets for vehicle electrification content of 60% by 2025" (Case I, p15).* It appears 60% local content volume is an industry-agreed top-line figure corresponding to that of Germany and France. Therefore, the rationale of Case B to achieve 60% true local content, whilst noted as ambitious, seems to correspond with enhanced targets. The key differential here is the extent to which local sourcing extends up the automotive tier structure; the 2011 study focuses on the purchase between OEM and Tier-1 supplier, whilst the directive from one OEM (Case B) is for Tier-1 suppliers to achieve 60% real local content from Tier-2 suppliers, and therefore extending the objective further up the tier structure; endorsed by Case I:

> *"Nissan have self-declared ambition to increase their UK content to 60%... they've been very specific and clear about it, and they've put a lot of pressure on their tier-1s to increase the tier-2 UK content because Nissan want it to be 60% UK content real and not just nominal. If their 60% of their spend is with their UK based tier-1s, that doesn't mean their UK content is anywhere near 60%, Rule of*

thumb, we think real UK content is somewhere around 25%, It's basically doubling the tier-2 content and that's done through the tier-1s" (Case I, p15)[106].

That said, the disparity between OEM supply chain objectives is highlighted by Case C:

"JLR support local supply and stand at these SMMT events and say they are and will invest in UK local content, but most directed supply is in Europe and far-east. They talk a good story but don't actually walk-the-walk" (Case C, p7)[107].

Synthesis of Case I, J, K, L and M show bodies including Automotive Council, Automotive Investment Organisation, Department for International Trade and Local Enterprise Partnerships, are currently working on roadmaps to deliver policy objectives and stimulate innovation within the industry to boost growth in commodities whereby capability exists, or the potential is prosperous.

Whist some progress has been made to reshore manufacturing; Case K highlights a work-in-progress transition building on the existing data analysis. Chemical space has experienced significant growth in the Tees Valley area benefiting from local infrastructure and supply chain capability, as a direct result of work initiatives with the Automotive Council Keen interest is shown in understanding the operational requirements and inward investment potential in particular for *"energy intensive segments and within that, looking at alloy wheel production....there is no significant allow wheel producer in the UK" (Case J,p16);* a proposition supported by Case B, I and K. It is recognised that such investment would likely require mass collaboration of UK OEM plants for aggregated demand, which then presents a competitive challenge.

[106] Case I, p15 is a Professor and Senior figurehead within a National automotive governing body.
[107] Case C, p7 is the Purchasing Manager for a Tier-1 UK automotive manufacturer.

Opportunities exist in some industrial spaces, however, unless companies engage with industry forums for strategy and policy objectives, the potential opportunities will go unnoticed, demand uncertain and constraints underrepresented. The growth in chemical space is an example where opportunities have been ceased to benefit from the development and capability of those commodities, because of the work with the automotive council (Case F).

5.3.6.2 Engagement with Industry Forum

Lack of awareness impinges the knowledge of supply chain capability and technical competencies. The lack of engagement with automotive governing bodies both nationally and locally, particularly at Tier-1 level (identified by Case A, C, D), denotes the development in underrepresented areas or technical spaces, particularly within SMEs or Tier-3 onward suppliers, go unrecognised and therefore underutilised. This signifies that the lack of engagement between manufacturing cases and industry forum, is a restraining factor in the development of UK supply chain, self-inhibiting UK automotive manufacturing reshoring.

> *"Different OEMs are greater or lesser involved in automotive council activities and the aims and objectives. Some of them take the objectives close to their strategies more than others, so it varies across the OEM population" (Case I, p15)*[108].

Evidence from the multiple-case study suggests there is a 50/50 split between automotive cases who are proactively engaging with automotive council objectives, and those adopting a more reactive approach. Rather, some cases negate the role of engagement

[108] Case I, p15 is a Professor and Senior figurehead within a National automotive governing body.

and respond to external factors re-enforcing change; despite the broad opportunity to contribute towards paving the way forward for UK automotive manufacturing.

Table 5.2 provides a non-exhaustive list of desirable commodities for reshoring, whilst it should be noted that every commodity listed may not be apparent to Automotive Council Members due to the resistance of some companies to engage with industry forum. Case A is a primary example of a Tier-1 supplier that distances itself from forum engagement whilst, acknowledging the need for a significant increase in their reshoring activity to mitigate exchange rate and the follow the directive of their primary OEM. Narratives from Case A and Case I, suggest there is a knowledge gap of the existing UK capability in some commodities, such as textile whereby reshoring is highly desirable, yet the capability is not transparent at Tier-1 level.

The apparent need for better awareness of available resources, potential opportunities and investment is evident, calling for greater cohesion between UK Government, automotive governing bodies, and industry organisations (both MNEs and SMEs). Yet, the disparity actively reshoring whilst seemingly disengaged from industry forum. In contrast, Case E interacts with the automotive council regularly and has previously reshored but does not have an active reshoring strategy moving forward. Whilst Case B is a significant driver of supply chain reshoring to the UK is heavily involved with local and national automotive roadmaps.

Identified as a grey area, Case G indicates the impact of work by the automotive council as *"a slow burn",* with bi-annual meetings well-attended by the OEMs and lower-tier suppliers, but the bit in the middle is not well regarded.

> *"In the supply chain council there's probably 40-50 people at every meeting, but of those 40-50 people there's 25 OEMs and probably 20 SME type company's like*

'Case G' and only a handful of Tier-1s and that's the big grey area. If you've got both ends of the supply chain engaged but not the middle it becomes something quite difficult to deliver" (Case G, p.13).

Coherent argument across the manufacturing case studies, call for greater intervention to support SMEs and develop the supply chain, yet controversially, work to date and future roadmaps for developing UK supply chain capability go unknown due to a lack of engagement with the Automotive Council from Tier-1 suppliers.

5.3.6.3 Investment and Funding

To advance reshoring requires funding, investment, and government support, particularly for SMEs it inhibits the suppliers' ability to break into the market and constraint of UK supply chain capability; was viewed by eight cases as a pertinent constraint to reshoring.

"The real problem is that unfortunately a large part of the UK manufacturing industry has died out so it hasn't had the right level of investment, the right level of support, and I genuinely think that it's unlikely that it's ever going to be placed at the level it's been at in the past" (Case A, p1).

"There is a general feeling that if we can establish some R&D capability in the UK, the changes of that being followed by manufacturing capability are quite strong" (Case I, p15).

Increased investment from UK Government is required to overcome some of the barrier to reshoring, investment in UK supply chain capability which is the most significant barrier for UK reshoring. Differential between Government grants/funding in UK compared to EU and USA. *"Funding to support regional supply chains is important",* AMSCI funding was available in 2014 under the coalition government, under the conservative government funding dried up, Case G adding:

"Government influence to reinvest back into the manufacturing supply chain for metals would have to happen for what we do" (Case G, p13).

Investment to support SMEs in particular is identified as a major requirement. Collaborations between UK-based OEM facilities to aggregate the volume to attract an Alloy Wheel manufacturer to invest and reshore to the UK was viewed key target (Case I). AOI part of the DIT are focused on attracting foreign direct investment in the automotive supply chain and increase UK sourcing (Case I, p15).

UK Government support and incentives required to support Case A targeting reshoring from Europe but that rests on the capability of the UK supply chain and for Case A, the existing alternative suppliers in the UK do not have the capacity to produce the volume currently procured from oversea group plants. There is also the competitiveness of reshoring due to all manufacturers of the same commodity "*fishing in the same pond",* this case call for UK Government to step in to offer support to SMEs in raising their platform to the required demand. Timing would seem of the essence with Case A recognising some movement for improvement, but "*not quite sure that they are happening quick enough, that's the point".*

Grants are limited in the UK in comparison to European / USA countries, and then the interference of Brexit causing disruption and uncertainty. Government has a big role to play the IP of future car models, again Brexit factors have a big role her which is managed by UK Government (Case E p11).

Case E acknowledges the contribution made by the Automotive council with a chair position on the Supply Chain Group, identifying opportunities for reshoring, supporting grant and funding to bridge the gaps in business areas in relation to capital expenditure, skills and development.

The need for additional investment, funding and Government support is regarded as a significant obstacle for UK automotive manufacturing reshoring, particularly for SME suppliers.

> *"Larger companies like OEMs and tier 1s have the ability to invest and co-ordinate more easily…but SMEs require a bit more support in terms of funding, identifying the real opportunities and coordinating the transition" (Case K, p17).*

5.3.7 Barriers to UK Automotive Reshoring

Multiple factors synthesised as motives for UK reshoring are also identified as key barriers inhibiting automotive manufacturing reshoring; Competitiveness and OEM Influence are key examples. Whilst the intentions for reshoring (past, present, and future) are highly driven in many cases, the obstacles involved are equally regarded. Therefore, to balance the understanding as to why automotive manufacturing facilities are motivated to reshore to the UK, it is fundamental to address the barriers that need overcome. Figure 5.2 displays the subordinates identified as significant constraints to UK reshoring.

5.3.7.1 UK Supply Chain Capability

Narratives from the entire multiple-case study confirms capability of UK supply chains is a momentous challenge for UK automotive manufacturing reshoring. Irrespective of size, structure, or core process, 100% of the data set expressed concern between the desirable reshoring ambitions and the ability to achieve the desired outcome:

> "A*vailability is a major constraint" (Case C, p7).*

> *"Supplier capability her in the UK and attracting those suppliers" (Case B, p6).*

> *"Capability and capacity in the UK are a big constraint…. some commodities are just not here in the UK" (Case M, p19).*

"…. issue is having suppliers capable of supplying what you need….there may be some opportunities but I don't think that will be for the whole supply chain. Some commodities will not exist here in the UK, not to the volume of cars being built" (Case H, p14).

The most significant challenge being the lack of available suppliers in the UK, with the capability, capacity, knowledge, and technical competency to fulfil the requirements of UK automotive manufacturing demand. The capability of UK manufacturing supply chains has depleted *"due to offshoring for such a long period of time" (Case C, p7)* (inclusive of, but not limited to automotive industry). The gap in UK supply is emphasised by Case A, C and G:

"Reshoring will be the difference between this plant winning new business or not, and unfortunately the majority of our raw material is made in (internal supplier) and trying to find trying to find someone who can take that business here in the UK is pretty difficult" (Case A, p3).

"Been out in the past and had a look for material suppliers in the UK and unfortunately, they are all our competitors…. we don't want to give out work out to our competitors" (Case A, p2).

"Strategy I have been following since early 2008 has now exhausted what can be reshored due to UK supply chain suitability. Others I would love to reshore, but the suitable UK supply chain does not exist due to loosing big chunks of UK manufacturing" (Case C, p7).

"Aluminium wheels there's no supplier but being looked at within SMMT but requires huge commitment for investment by OEMs". "We could bring carpets,

vinyl's back to UK but suppliers are either not available or not suitable, not fit-for-purpose for the (case) panel" (Case C, p7).

"Because it is metal, there's no facility in the UK to reshore that to….there is nowhere in the UK, there's no mills, I need metal mills to be able to buy from in the UK" (Case G, p13).

"The mill that we buy from are consolidating all the time, so we used to buy stainless steel from 2 mills, and they merged. We went from a tri-source to a dual-source to a single-source and we have just managed to get a second source on again. It reduced capacity for what we buy which means lead-time and cost can go up as a result" (Case G, p13).

Case F shows the optimisation of reshoring in commodities such as chemical space where capability exists in the UK, has proven highly successful, benefiting from the culmination of regional capability, investment, and collaborative working. Whilst Case I offers a controversial viewpoint of UK supply chain capability awareness:

"OEMs have no ideas of what Tier-2 suppliers are around in the UK. They don't go through their Tier-1s to find out, and most Tier-1s don't have much idea because of their international sourcing strategies. And the answer, well I need someone with capability, capacity, global reach, or global partnership so they can be integrated into my global supply chain. And you're not going to have a company that knocks on the door saying I can do all this, because companies that are doing all that at the moment are probably working with them already, so it's a chicken-and-egg situation" (Case I, p15).

Lack of lean supply chain infrastructure among UK suppliers has an impact on their ability to satisfy methodological demands of the customer (lean being the prominent

methodology implemented, see Table 5.3). The automotive industry as a whole and in particular the OEMs, are incredibly demanding of the supply chain; the narrative *"customer is king"* is substantiated a major force in supply chain behaviour, a view supported by customer and supplier. Demands of the lean supply chain impacts a suppliers' suitability, to satisfy the capability requirements of global purchasing panels, to be recognised as a panel supplier. Despite some purchasing functions operating on an international scale, the evidence shows lean supply is a locally driven supply chain requirement.

Anecdotes from Case A, C, E and F confirm decades of offshoring has enabled advancements in global manufacturing capability and refinement of logistics networks; in turn this has enabled overseas suppliers to develop and increase their capability and optimisation. Economies of scale from global suppliers are recognised as a compromise from a lean perspective, with weighted motivation to reshore for the reduction of inventory (evidenced in section 5.3). This coupled with greater logistics flexibility over longer distances, elevates the pressure on price when establishing the most competitive supplier. Case F represents a Tier-1 supplier who actively engages in reshoring, with a slick reputation for continuous improvement and delivery of lean principles to the customer; yet optimises economies of scale for production purchases to ensure competitiveness and continuity of business award.

Case A, C and D support this debate, recognising the advancement in global manufacturing capability elevates the pressure on price for UK facilities when bidding for business, often rendering the UK manufacturer uncompetitive.

Competitiveness is a major driver of reshoring, concluded in section 5.3.4; whilst 100% of the Cases acknowledge the difficulty in redesigning their existing global supply

network to restructure in the UK. The costs of manufacturing in the UK in comparison to overseas suppliers, is acknowledged as the most detrimental factor, with emphasis placed labour cost as the most influential variance:

> *"…RFQ showing labour cost for UK much higher than overseas suppliers…." (Case A, p3).*

> *"Labour cost here is still high in comparison to some countries, so the more labour content the higher the labour cost is in the total delivered price" (Case B, p6).*

This is contrast to the literature which shows the differentials in labour cost is not so significant (Table 2.3) which summarises the optimisation of low-cost labour (a driver for offshoring) is no longer a valid option due to the increases in Chinese wages particularly over the last 10 years. Case E argues:

> *"OEMs remained very focused on costs thus offshoring remains the best way a Tier-1 can achieve cost reductions" (Case E, p11).*

> *"High costs, labour, land, energy versus low-cost countries" (Case E, p11).*

Cases B, C, D and G offer a more optimistic perspective, having redesigned their offering and strategic model, adopting more of a localised focus to strengthen their competitive position. Whilst equally acknowledging the capability-bottleneck from increased demand for localisation; "*Ultimately, we are all fishing in the same pond… even when suppliers have the competencies, demand outstrips capacity" (Case A, p1)*. Consensus here, is a price increase for UK manufactured product which, then impacts competitiveness and feasibility to reshore supply to the UK; and particularly when considered in conjunction with the increased capability and flexibility of offshore suppliers (refer to 5.3.8.1).

Significance is given to the need for UK Government intervention with funding and investment into UK supply chains, for SMEs in particular, to boost availability.

5.3.7.3 Supply Chain Entry

New suppliers trying to enter the market encounter major challenges in the automotive manufacturing industry. Organisational structure and strategy are determined as controlling inputs that obstruct suppliers, particularly SMEs at Tier-2/3 level, trying to supply a Tier-1 company. Five Cases conclude supply chain entry is even more difficult when Tier-1 suppliers with a global platform are constrained by corporate sourcing policies and centralised purchasing functions. Case I explains further:

> *"Tier-1 multinational or global companies and along with that they have their global sourcing strategies for their requirements from Tier-2. So, if you are a UK SME wanting to supply to a global Tier-1 its quite tough. You've got to break-through, and it may be that the Tier-1 organisation in the UK has very little UK content. It doesn't have UK purchasing functions, it doesn't have UK supplier development functions. It's dialled into a global sourcing strategy, making the break-through quite difficult" (Case I, p15).*

In the case of A, C and D, a high percentage of supply comes from global sister plants therefore requiring strategic decisions as to whether the company could afford to lose that business overall to an external supplier. Case C emphasises *"group strategy"* as a major blocking point to reshoring, thus making it *"very difficult for Tier-2/3/4 suppliers to find their way through the supply chain to offer what they do" (Case G, p13).* Beyond which, Case A argues that due to offshoring, UK manufacturing industry *"hasn't had the right level of investment or the right level of support"* particularly for SMEs.

In contrast to the evidence in Table 2.3 quality is not identified as a motive of UK automotive supply chain reshoring. Initially following the height of offshoring, supplier quality and performance was an element requiring extensive management by the customer; further on and lessons learnt, quality and performance from distant suppliers are not deemed high risk. Case G reflects on three fundamental lessons to reduce risk exposure:

> *"Understand the reasons behind making supplier location changes, to then make the right decision; validate, test and improve the risks associated; and pick the low-hanging fruit with simple changes and work up to more challenging ones" (Case G, p13).*

Case A accentuates the effectiveness of their existing global supply network, with minimal risk from existing Tier-2 global suppliers; therefore, to re-establish supply in the UK requires extensive testing and verification of supplier capability prior to and in parallel with the existing offshore supplier. The challenge then becomes that of the UK purchasing team to *"find the right new supplier and fight the battle to actually add them to the validated supplier panel…. the validation process is quite long so we may risk the opportunity of having a bigger group of panel suppliers" (Case A, p1).* The risk then becomes one of lost opportunity rather than a risk to supply continuity. Case L highlights "*the risk versus reward balance for a lot of suppliers is adversely stacked against them" (Case L, p18).* Whilst the opportunity to invest and grow the business is presented, the uncertainty of platforms moving outside the UK or an OEM deciding to relocate the entire UK facility overseas and order books collapse, remains a risk to suppliers.

5.3.7.4 OEM Approval Mid-programme

Due to cost and resources required to process supply changes once suppliers have been nominated at the beginning of the programme, big focus on cost reduction and lack of resources to manage new programmes, achieve cost reduction and additional process significant supply changes, Case F adds:

> *"Like the OEMs we are so focused on new models" (Case F, p12).*

Make the link from OEM approval to OEM influence driven by the OEM strategy which is then a motive for reshoring. This positions barriers to reshoring as relevant for discussion in relation to the motives.

Due to the lack of engagement and awareness of UK supply chain capability, OEMs and Tier-1 suppliers don't have a good understanding as to the capability existing in the UK, despite Tier-1s arguing the lack of availability in the UK, and therefore to reshore product mid-point during an existing programme would draw additional resources that are most likely allocated to planning the next new programme.

5.3.7.5 Skills Availability

Lack of engineering skills and supply chain competencies was determined a significant factor to overcome by Case F, G, H, and I. Manufacturing facilities require skilled engineers with the technical competencies to support the manufacturing and engineering process; the lack of available skill is determined:

> *"Big challenge is the skills challenge, labour" (Case F, p12)*

> *"Over the years manufacturing has been offshored extensively and with that the labour skills capability have gone also…You cannot run machines without engineers and those engineering skills are some of the most recognisable skills*

which have disappeared…as product returns there will be a bottleneck of engineering skills shortage…we make tooling, we appreciate the value and work required to run these tools" (Case H, p14)

Action plans from Government bodies and investment into apprenticeship schemes are recognised with a time lag for skills development, and further corroborates with the urge for investment and funding; Case J elaborates:

"Pressure on the skills in the supply chain…certainly in the west Midlands there are some places there with an aging workforce and also the ability to bring young people into the industry…much of the effort is by the LEP" (Case J, p16).

Development happens where the manufacturing is present, therefore technical developments for many commodities is overseas where the manufacturing is held, therefore the skills have depleted in the UK (Case F).

5.3.8 Corporate Policy and Strategy

Where cases formed part of a global platform, group politics appeared to play a significant role in the ability of the local facility to reshore supply. Narratives showed that decisions are often made outside of the facility by teams located at Headquarters, although recognised that decisions made at group level were in most cases, for the benefit of the group and not an individual manufacturing plant or division. Case A provides an example:

"There is a strategy from plant to plant, but if there is a strategy for the Group or the Division then that would take president over what the plant has to say. I've given an example of utilities and I can give an example of PPE supply as well, where we've probably had to take a £40000 hit as a plant, but we've saved over £250,000 across the plants in the UK. So I think the plant does have to have a

strategy because we have a budget to achieve and then we've got the group purchasing people who have a budget to hit and the UK purchasing people who have a budget to hit as well, and ultimately if our purchasing people can give a £250,000 saving in the UK then the Group will take that and the plant will just have to take the hit" (Case A, p3).

Narratives show the approach taken by different cases follow different strategies, Case B follows model-dependency:

"It does come down I think to model dependency and which model we are producing…one of the vehicles that we are producing at the moment we are one of three plants which manufacture that so it becomes more of a global decision on that…something that is based in Europe, I think we can have more influence as to where we are getting our parts from" (Case B, p4).

Despite intentions and desires of UK facilities, the decision factors are not always in the control of the UK plant. Where cases are not governed by corporate policies from the global company, the option to reshore is that of the facility and appears to be met with less resistance and barriers.

Linking to the lack of engagement and collaboration within the automotive tier structure, evidence showed Tier-1 suppliers appear to be the less represented category at industry forum events, and this lack of engagement was viewed by Tier2/3 cases as a blocking point for Tier-2 supplier entry to UK automotive supply chains. It was apparent that reshoring strategies in one case can result in barriers to entry to another case, for example between Tier-1 and Tier-2 suppliers, with frustration expressed by Case G.

Looking at the barriers to reshoring, capability within the UK is highlighted as a major issue, whilst anecdotes show the full potential supply chain capability is not fully understood due to a lack of industry engagement with governing bodies. In addition, global sourcing strategies of some Tier-1 suppliers and/or the OEM with global platforms, raises the barrier to entry for Tier-2/3 suppliers, with unachievable requirements to break through market entry. This also evidences that different companies at different levels pf the automotive tier structure, within the same supply chain, are working on different supply chain location objectives.

5.3.8.1 Reshoring Strategy

Across the empirical data set, differences were apparent in the reshoring strategies adopted. For example, Case B declared a localisation strategy to reshore as much supply from overseas locations back to the UK with a target of 60% true local content for future programmes. In contrast, Case E despite having previously engaged in reshoring activity in the past, now adopted a globalised focus.

Evidence from Case A highlights a potential strategic change in their approach to corporate sourcing policy, triggered by the need to remain competitive in the supply chain and the significant impact from Brexit on supply chain purchases, adding further:

> *"think it will be a positive thing and I think it will be years ago that wouldn't be accepted as a positive thing internally from a strategic point of view because obviously we are trying to protect the level of business in the other plants but I think the people in the ops positions now and ops directors roles realise the impact that this exchange rate is having…they realise in trying to protect the competitiveness of this plant that's got to happen"(Case A, p1)*

Outlining the plant's immediate strategy to act on all potential reshoring opportunities available however, recognising the barriers of supplier capability as a problematic obstacle:

> *"short-term strategy would be to really investigate opportunities which exist in the UK but typically we need to find suppliers in the UK that have got the capacity and technical capability to be able to supply at the levels that we require...and that's something that we are actually finding to be quite a challenge" (Case A, p1).*

Adopting a more flexible approach, Case H confirms *"we don't really have a reshoring strategy"* with the ability seize attractable opportunities as they become apparent and recognise the benefit of independent decision-making:

> *If an opportunity presents then we will assess that opportunity, but we are not specifically focused on reshoring our supply chain at the moment…that's not to say we don't seize those opportunities when they come up….in the short term we are waiting to optimise improvements as they are available" (Case H, p14).*

Agglomeration of interests across UK OEMs has directed leaders within industry forum to investigate possible opportunities in the UK and work with potential partners, whilst Case I informs the huge investment required by OEMs. The added constraint being the lack of collaboration declared by Case B with other OEMs.

Reshoring is not a group strategy and certainly is not that today. Localised effort from local purchasing for stable supply chain ideally local:

> *"We could bring textile and vinyl back to UK, but suppliers are either not available or not suitable, or not fit-for-purpose according to the group strategy" (Case C, 7).*

5.3.8.2 Global Sourcing Strategy

Evidence by Case G signifies the difficulties in operating at Tier-2/3 in the UK, due to the global sourcing strategies enforced by Tier-1 suppliers and is a barrier in for UK supply chains in both directions.

> *"it's very difficult for a Tier-2,3,4 supplier to find their way through the supply chain to be able to offer what we do for them" (Case G, p13).*

Case I confirms a big focus on cost reduction and global platform supply, linking to being a significant reshoring barrier and a reshoring motive and hence the need to discuss barriers in relation to motives. Case G highlights the benefits of the Automotive Council forums and the positive work conducted by regional and national parties, and equally acknowledges the fact that as a UK company Case G do not supply any of the UK-based OEMs.

> *"we certainly don't supply BMW Mini, JLR, Nissan with any stamp metal parts and it's not for want of trying".*
>
> *"I can tell you know, the Automotive Council, its fantastically well attended…in the supply chain council there's probably 40-50 people at every meeting, but of those 40-50 people there's 25 OEMs and probably 20 SME type companies like Case G and only a handful of Tier-1s and that's the big grey area".*
>
> *"If you've got both ends of the supply chain engaged but not the middle it becomes something quite difficult to deliver" (Case G, p13).*

The gulf in UK supply chain capability at Tier-2 may partially be addressed by the gulf in awareness and insistence of global sourcing strategies that exclude UK Tier-2 suppliers without a global platform.

5.4 Chapter Summary

This chapter provides an accurate account of the empirical findings from the empirical analysis. The role of the researcher is to interpret and synthesise the data; in doing so an interpretation of the empirical findings are presented for each code and theme determined relevant in addressing RQ1. The evidence is supported with narratives directly from respondents to add value and depth to the results.

The analysis and reporting of findings are illustrated in Figure 5.2 Reshoring Analytical Map, this serves great importance in providing visualisation of the big picture and the relationships and connectivity across themes; and supporting the moderation of important points for discussion in Chapter 6.

The analytical process resulted in eight themes relevant to addressing RQ1. Reshoring conceptualisation revealed the term "localisation" and "right-shoring", and the use of these terms flowed through the supply chains. The characteristics of these conceptualised terms were primarily related to cost and the importance of achieving competitive Total Delivered Cost. Location management was deemed an important factor and in particular, the proximity of supplier to gain advantages with increased delivery flows, synchronisation, and overall lower cost. Desirable components for reshoring are shown in Table 5.2, beyond the generalised large and heavy components, alloy wheels, surface trim, metal parts and plastic injection mouldings were all deemed highly desirable for UK reshoring.

Whilst variations were evident in the embeddedness of lean and agile methodologies applied in each case, lean was the most prominent application driven by supply chain culture and influenced by the OEM (refer to Table 5.3). Agility was narrowly adopted resulting from infrastructure however, the need to adopt a hybrid strategy with more

agility was emphasised due to customer demand changes versus existing lead-times, problems in the supply chain and to increase synchronisation of supply. Supply chain responsiveness was deemed a key enabling factor in supporting both lean and agile supply chains with the need for suppliers to be flexible and responsive at short notice.

Motivational factors driving reshoring in addition to supplier location and responsiveness included in-house capacity whereby a review the case's existing manufacturing available capacity identified opportunities to reshore-insource from offshore-outsource supply. A reduction in transport costs showed the inflated cost of fuel and the impact from longer geographical distance was prominent, particularly in cases with lean supply chains. Similarly, the need to reduce inventory levels due to offshore implications such as exaggerated lead-time in-turn impacting supply chain flexibility and responsiveness, space constrains and the cost of holding inventory. The influence of the OEMs upstream supply chain was synthesised as significant in several aforementioned factors, beyond which the directive to achieve 60% true local content imposed by the OEM was a direct motive for Tier-1 suppliers to reshoring supply to the UK, whilst OEM mandated supply at Tier-2 was viewed constricting for Tier-1 suppliers.

Competitiveness remains the overall priority motivating automotive manufacturers to reshore supply to the UK. The results show some disparity between primary and secondary research, for example, quality was a key motive identified in Table 2.3 Reshoring Motives and Drivers, yet the empirical case data expressed the impact of reshoring to have a potential risk to quality given the good quality from offshore supply.

From a cost perspective, unprecedented action in the supply chain highlighted the need to negate the impact from Brexit with exchange rate fluctuations and the degree of uncertainty causing concern. Engagement with automotive Industry Forum highlighted

a divided approach with Tier-1 suppliers most vacant thus, a lack of awareness of potential and prospective reshoring opportunities contributed to the constraints. The most significant barrier to UK reshoring focused on the capability of UK supply chains following a period of extensive manufacturing offshoring, with cases arguing a lack of capability in the UK to support reshoring demands and the need to further investment. This was elevated by cases that lacked engagement with Industry Forum. Constraints imposed by corporate policy and strategies where global sourcing platforms informed purchasing policies, was viewed problematic considering the exchange rate fluctuations and the directive to increase local sourcing content.

The evidence shows reshoring opportunities are not always maximised due to manufacturers being unaware of existing and potential UK suppliers, for cases that lacked engagement with Industry Forum. This highlights a gap in UK reshoring-knowledge and awareness, that was additionally emphasised by Industry Forum as requiring update to understand the UK supply chain gaps and develop future roadmaps to build UK supply chain capability.

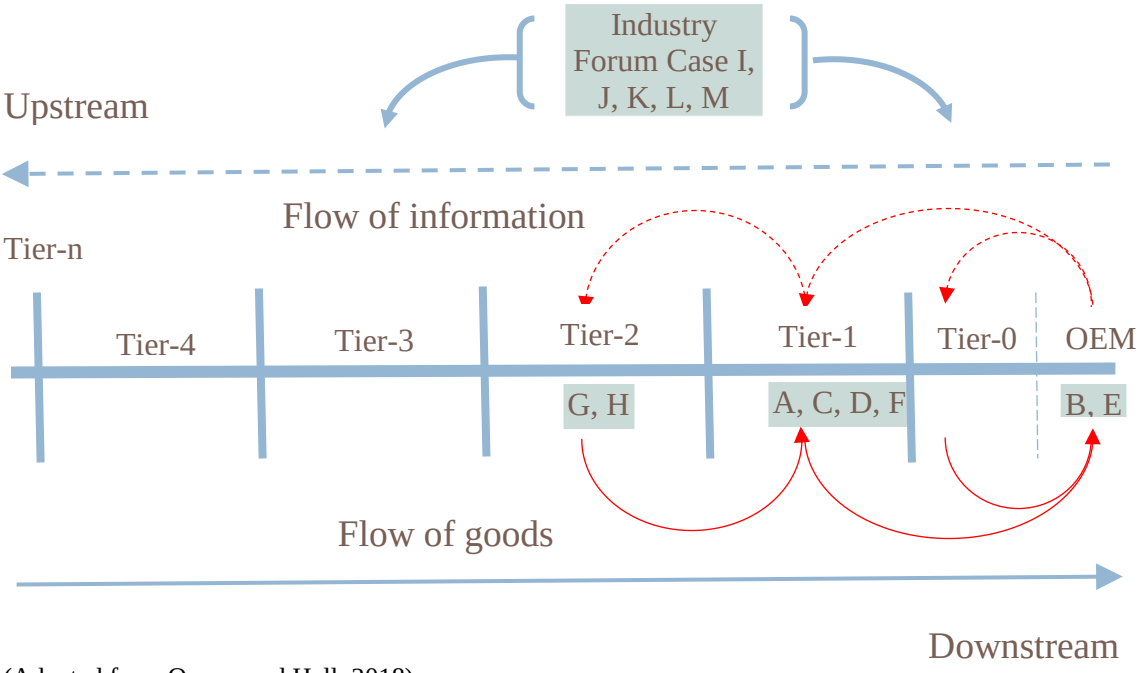
Chapter 6: Discussion

6.1 Introduction

The research findings presented in Chapter 5 lead on to provide insight to the meaningful results discussed in Chapter 6. Figure 5.2 Reshoring Analytical Map serves great importance as a clear aid for this researcher to demonstrate the important analytical points and relationship between relevant themes. Extracted from Figure 5.2, the unique representation of six moderating factors is illustrated in Figure 6.2; and serves as a meaningful visual interpretation of the important points pertinent to the multiple-disciplinary themes.

Whilst maintaining anonymity, an applied approach using terms appropriate to the automotive tier structure such as OEM, Tier-1 and Tier-2 are used in this chapter to substantiate the value of the results. To aid clarity and consistency, Figure 6.1 shows a simplistic interpretation of the automotive tier structure and the position of the empirical Case's within the tier structure. The scope of this research focuses on the OEM, Tier-1 and Tier-2 suppliers, and Industry Forum from National and Regional automotive governing bodies. This model adapted from Qamar and Hall (2018) is utilised again in Figure 6.3 to illustrate the supply chain sourcing strategies.

Figure 6.1 Automotive Tier Structure and Case Identification



(Adapted from Qamar and Hall, 2018)

As a result of personal and wider environment extenuating circumstances, this researcher recognises a time lag from data collection to submission of this thesis. During this extended period there have been changes to the external landscape (notably Brexit and Covid-19 pandemic, and more recently political unrest in the East) acknowledged by this researcher. To check the validity of the research findings, this researcher initiated a follow-up response with five accessible participants from the primary data collection; the acknowledged findings are summarised:

- Post-Brexit, OEMs are driving a high percentage of 'local' components within their build to meet Regional Value Content (RVC) regulation.
- RVC is initially set at 55% for ICE vehicles and 40% EV and Hybrid vehicles[109].

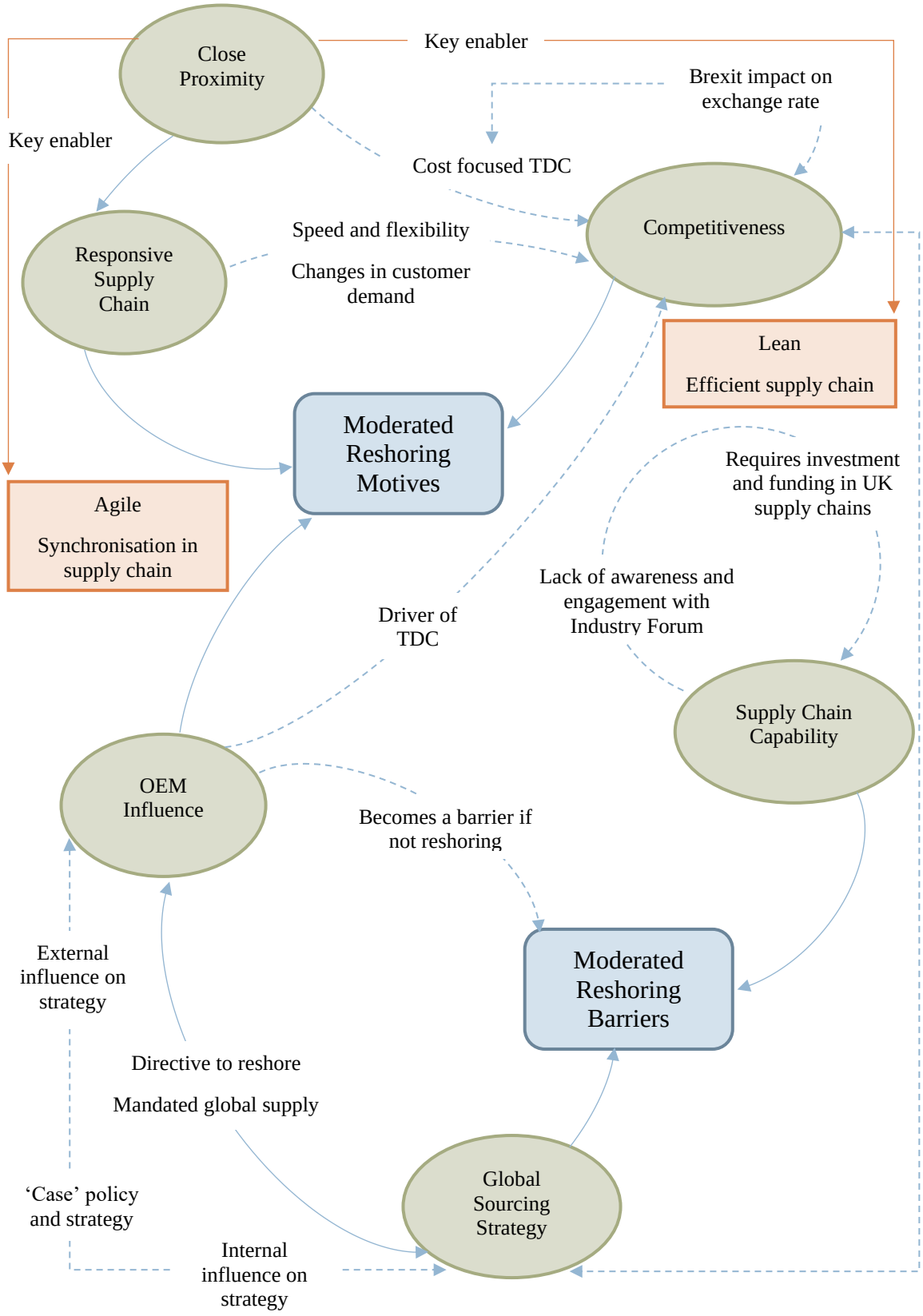
[109] ICE vehicles are cars with combustion engines; EV are electric vehicles; and Hybrid vehicles are a combination of ICE and EV capability.

- Demands for achieving local supply are likely to get tougher in coming years.
- There is a need to localise more of the supply chain to avoid paying additional tariffs when exporting (more than three thousand pounds per vehicle).
- Components manufactured in Europe are generally more expensive and needs to be balanced.
- Global supply chains were significantly disrupted due to the unavailability of semi-conductor components. This highlighted real concerns with global supply chains and the importance of supplier proximity.
- Disruption to global supply chains due to Covid-19 pandemic have imposed significant consequences on the availability of parts and reliability of supply.
- Political unrest in the East created uncertainty of global logistics flows, product delayed or held with unconfirmed lead-time and impact on supply chain planning and execution.

The data analytics for this research were gathered during a period of monumental change and appear in Chapter 5 Findings. Recognition is given to the further elements that exist although not part of the real underlying research points. Acknowledgement is positioned here to evidence the researchers' awareness of these further external changes and confirm the research findings as presented in Chapter 5 remain relevant to this study.

Drawn from the main interests identified in Chapter 2, the analytical framework positioned in Chapter 3, and findings presented in Chapter 5; this chapter discusses meaningful insights of the moderated factors that underpin reshoring motivations and incorporate the barriers. Figure 6.2 Moderated Reshoring Motives illustrates the important empirical points carried forward for discussion across multidisciplinary themes.

Figure 6.2 Moderated Reshoring Motives



6.2 Moderated Factors for Automotive Reshoring

This researcher identifies six multi-disciplinary codes as moderating factors from the several influencing themes; these moderating factors carry forward to appreciate meaningful insights in understanding why UK automotive manufacturing facilities are motivated to reshore supply from overseas back to the UK. The evidence presented shows visible contribution to address the motivations for reshoring UK automotive supply chains, whilst apprehending key barriers:

1. Close proximity
2. Responsive supply chain
3. Competitiveness
4. OEM influence
5. Global sourcing strategy
6. Supply chain capability

Contrary to the motives identified in Chapter 2 Table 2.3 ascertaining cost of poor quality and theft of intellectual property were significant drivers for manufacturing reshoring due to product being produced offshore; Chapter 5 did not pertain quality or intellectual property as motivation to reshore supply. In essence, the quality of product manufactured offshore was regarded as *"not an issue"* in the supply chain, with Case A specifying continuity of product quality is one of the benefits of their existing offshore suppliers. Intellectual property was not identified by any case as a motive to reshore. Similarly, the cost differentials in labour rates between the host and home country was determined a key factor in the secondary research, yet there was minimal acknowledgement of labour, land and energy combined, across the multiple-case study; suggesting that labour rates specifically are not a focal consideration in reshoring decisions, whilst labour cost is included in the TDC.

The supply conditions required by an automotive OEM was regarded by the case OEM themselves and Tier-1 suppliers as highly demanding, with emphasis on delivery service, competitiveness, and no disruption to the OEM production line. These requirements of the customer are embedded in lean and agile methodologies.

6.2.1 Close Proximity

Reshoring was ascertained a location decision in Chapter 2 and confirmed with empirical evidence in Chapter 5. A prominent consideration in the location management theme was the proximity of suppliers in geographical relation to the customer, in the automotive tier structure. Results pertain the vitality of close proximity for building supplier relationships into supply chain strategies, visiting supplier premises and the ability to resolve issue quickly; whilst acknowledging advancements in technology to aid communications and having all suppliers geographically close is not realistic or viable.

Determined a key enabler to building responsive supply chains, the interconnectivity between these reshoring motives provides the opportunity for increased synchronisation of delivery flows with customer demand, and the ability to adapt quickly to changes in customer build patterns. In parallel to the remunerations from offshored supply, the consequences of exaggerated lead-time, delayed response to customer demand changes, and supplier relationships were drawn from the geographical proximity of suppliers with limited ability for the customer to have a physical presence at the offshore supplier premises. Proximity was regarded the key enabler for speed in the automotive supply chain. This signifies that shorter geographical distance has influence (in part) to the level of agility the supplier can operate with the customer.

The benefits with close proximity of supply were recognised across the entire multi-case, as reduction in inventory holding, optimisations of logistics flow with increased deliveries

and negate (some) challenges from the external environment. Case B contextualised the severity of external challenges whereby arm's length control was very limited:

> *"If I've got something close to me, I haven't got to worry about an earthquake in Japan…a fire on a ship…a typhoon in Thailand… port strike in Calais…snow in France and Paris grinding to a holt…" (Case B)*[110].

The value of supplier proximity was signified at OEM and Tier-1 level as prominent to mitigate (in partial) the global external risks that challenge continuity of supply. The necessity for Just in Time and synchronised networks to run efficiently are not uncommon (Bailey, 2014; Bennett and Klug, 2012) in automotive manufacturing, and the geographical distance of suppliers was deemed critical for efficient and dynamic supply chains with increased synchronicity. Table 5.2 denotes the commodities desirable for reshoring, based on the underlying need to be even more lean and develop more agility in the automotive supply chain.

The location of the Tier-1 automotive suppliers is in partial, determined by the needs of the OEM, the criticality of commodities or modules manufactured and the capability within the supply chain. Case A for example, articulated their manufacturing plant location within the OEM supplier park (Bennett and Klug, 2012) four miles radius from the OEM plant; specifically, and primarily to serve that OEM[111] with sequence delivery conditions for OEM assembly line-stop product, and top-up delivery conditions for non-JIT[112] product. Meaning for line-stop product, the unique product code supplied to the OEM must be in the exact sequence to match the vehicle code on the assembly line at the

[110] Case B,p4 is the VP of Supply Chain Europe for an OEM with UK facility
[111] Case A is a Tier-1 supplier with 96% of the business supplied to the local OEM (four-mile radius). The remainder of the business is supply to other UK-based OEMs.
[112] Non-JiT product are components delivered to the OEM in small batches; these are not sequenced or synchronous components. Product must be available to assemble in the car at the 'fit-station' and small inventory is located near lineside for continuous top-up.

exact point in time and location (point-of-fit station) as the vehicle arrives for assembly. Non-JIT product is delivered the OEM designated area close to the assembly line, to top-up the inventory kanban.

Reshore-insourcing was considered a vital strategy for continuous observation of potential opportunities. Where in-house capability (including capacity) exists within the Case company, the systemised process for reshoring the offshore-outsourced product and gain additional control of the supply chain was followed. A continued space for offshoring is evidently recognised with emphasis on making the right decision to bring supply closer to home and/or manufacture inhouse; Case G acknowledged falling foul of "*bad decisions"* in the past. The level of autonomy for making location decisions was varied across the multi-case (discussed further in Section 6.3) and links directly to the sourcing strategy employed in the business.

6.2.2 Responsive Supply Chain

Having established the integral relationship with supplier proximity, the requirement for a flexible and responsive supply chain between the OEM through to Tier-2 suppliers was signified a fundamental motive for automotive reshoring. The direct relationship between reshoring motives and automotive supply chain methodology themes were prominent. Conclusions pertain automotive manufacturers require the ability to exercise operational flexibly to accommodate changes in customer demand and respond to change from wider supply network disruption which, over time has become a significant threat to continuity of supply. Aspects including cost of recovery where lead-time is longer due to geographical distance was viewed *"horrendous"* compared to the recovery of local supply issues with easy access to suppliers' site.

Demand stability in automotive manufacturing was considered unpredictable in some (not all) supply chains, although increased levels of unpredictability resulting from external influences that implicate the industry, were distinguished. Results showed the need to reinforce a flexible approach upstream, and in some cases downstream, to compensate for the lack of accurate and timely data flows *"because schedules can and do change frequently" (Case B; Case C).* Capability in the existing supply chain is argued a critical constraint; customer schedule changes and the severity of external disruption must be acknowledged and effectively managed for current and future planning. New programme launches (this can be multiple launches at one time) coupled with existing production schedules were prime examples of OEM disruption propelled upstream. Case C signified the familiarity of being several months post programme launch date without a confirmed bill of material (BOP) to manufacture customer product. Knowledge of the customer and their way of working, and close proximity to the customer site were considered fundamental in the supplier's ability to respond and recover from disruption; articulated from the entire multi-case.

Supply chains with greater geographical dispersity, were viewed as more challenging with emphasis to high-risk and critical components and/or processes[113]. Coloured-coded components (sub-assembled product with colour-match to the car, for example front and back bumpers or wing mirrors) and synchronised components (product identically matched to the identification of the car arriving at the exact build time and fit point, for example cockpit module or seats) were deemed most critical, to mitigate risk of implicating the customer's vital production build-plan. The effects of change in demand results in short-notice parts ordering upstream; in context the lead-time can be as little as 45 minutes from the OEM communicating changes to the production build plan to the

[113] High-risk and critical components and/or processes are determined by the case and case-customer

supplier delivering product to accommodate the change; meaning, location is imperative factor for responsiveness. The consequences of maintaining resilience with offshore supply were characterised as *"risky"* and *"expensive"* in comparison to problem-solving suppliers "*down the road" (Case F)*. The interaction and impact on competitiveness was recognised with excessive cost implications that were not quantifiable at supplier nomination stage.

Speed was substantiated as most critical in response to supply chain disruption and customer demand changed. The term *"Customer is King"* was described as well-known in the automotive manufacturing industry and concluded that customer order schedules can and do change; suppliers are expected to respond quickly and maintain continuity of supply. Irrespective of the issues incurred, response is everything. Viewed as more challenging, primary concerns with lead-time from offshore suppliers was concluded *"…it takes them longer to recover in case of a supply chain disruption and they are not able to respond quickly to changes in requirements" (Case A)*.

In automotive manufacturing every second is calculated in workflow and the associated cost of that workflow, therefore speed (whilst maintaining quality assurance) implicated competitiveness in the supply chain. The evidence shows a responsive supply chain requires agility from upstream suppliers, to act quickly to demand fluctuations, and to be flexible and adaptable to both internal and external supply constraints. The OEM stressed *"to be lean and agile then the supply needs to be close to you, it's as simple as that"*. Case's that displayed the application of an agile approach (Table 5.3), the emphasis was centred around 'being flexible' with demand and supply, rather than the embeddedness of specific agile models.[114]

[114] This research does not set out to disprove the application of agile models in Case companies; rather, no specific agile frameworks were demonstrated in the empirical data set.

6.2.3 Competitiveness

Determined in Chapter 5 as the most prominent motivational factor for automotive manufacturers to reshore, competitiveness in the supply chain ascertained three compelling constituents: cost reduction and efficient supply chain; increased agility with the customer; and new business acquisition. Results showed competitiveness as the most interconnected motive amongst all empirical analytics with a strong foothold in cross-cutting themes; and instrumental with automotive manufacturers in their decision to reshore to the UK.

Lean components including efficiency and reliability in the supply chain were deemed influential to the cost bearing to facilitate continuity of supply to the customer. Emphasis was placed on the network failure inhibiting lean efficiency mechanisms and reduced control in the supply chain from unpredictable events, all of which incur additional costs and impede the 'true' TDC discussed in 5.3.1. The level of exposure to supply chain control and the associated cost implications of that, was deemed significant with action required. Yang, Ou and Chen (2021) argue the change in tariffs impact the level of competitiveness where companies have offshored to optimise low-cost; where import tariffs rise, reshoring becomes a more favourable strategy. An unsettled environment requires more suppleness across the network to accommodate some of the potential impact in the supply chain; this extends the early considerations by Kinkle and Maloca (2014) calling for a bandwidth approach to cope with dynamic cost boundaries.

Automotive manufacturing is a highly controlled environment and speed is of the essence 'time is money' and every second of manufacturing is calculated in monetary value, therefore, unplanned dynamic changes impose a dynamic cost, to a greater or lesser extent. Intermittent supply chain disruption such as machine breakdowns, material shortages and logistics delays are generally absorbed in the network; however, where cost

implications were deemed medium- or long-term with foreseeable cost impact to the supply chain such as from Brexit and exchange fluctuations, the ongoing variable restrictions of Covid-19 around the globe, and more recently the unstable political conflict in the East causing erratic supply chain disruption; the counterbalance was to reshore supply from oversees to the UK (for Case B where UK capability barriers persisted, nearshoring to Europe was advanced) where possible (with continuation plans in place for further reshoring) to stabilise and negate the cost impact. A follow-up with Case B revealed the increased need to continue reshoring supply over the coming years to offset the export tariffs, of approximately three thousand pounds per vehicle. The denotation behind the actions taken by over ninety percent of the multi-case, signified reshoring as a reactive measure to the wider cost implications affecting the ability of automotive manufacturers to maintain competitiveness in the supply chain. This conflicts with the work of Barbieri *et al.,* (2022) suggesting firms with cost and efficiency-seeking strategies are inclined to relocate internationally to a third country, and those with market-seeking strategies are more inclined to relocate to the home country. This empirical framework articulates cost and efficiency are clear objectives for competitiveness, motivating supply chain reshoring to the home country.

Inventory reduction requiring less warehouse space, reduced lead-time through close proximity of suppliers, reduced logistics cost an impact from fuel price fluctuations, and increased synchronised flows were some of the prominent competitive cost factors highlighted in Figure 5.2 Analytical Mapping driving UK reshoring and underpinned by the theory of lean management. Empirical evidence showed that cases who embedded lean methodologies in the workplace, corroborated the need to reduce supply chain wastes (in partial) from offshore supply, through the implementation of reshoring strategies. The driving force behind the efficiency improvements and cost reduction was verified by the

entire multi-case as leading back to the OEM, driving competitiveness through TDC and service requirements.

> *"Initially the customer was requesting us to source in low-cost countries, and now they're asking us to basically bring supply back to the UK in order to remain competitive" (Case A).*

Clearly articulated from the Findings and Discussion 6.2.2, heightened service expectations are intensified in automotive manufacturing and form an important element of the competitive framework.

Whilst the data set did not qualify 100% embeddedness of the combined lean and agile methodologies (Leagile), the foundations of lean and/or agile applications in all case studies were articulated. Demonstrated in Table 5.3, with the exception of Case G, all manufacturing cases operated with lean (or had the infrastructure to do so). Two thirds of manufacturing cases had the ability and infrastructure to facilitate agility with the customer. Beyond that, whilst Case A fully embeds lean management, a compelling argument to exercise agility to facilitate changes in customer demand was compelling. What was acutely apparent from all cases and articulated by Case M, was the necessity for suppliers to be responsive and flexible towards customer needs, whilst maintaining lean applications:

> *"A closer connected supply chain will allow opportunities to reduce cost which is always a big driver and respond to the customer" (Case M).*

Signifying particularly between the Tier-1 supplier and OEM, enhancing agile capability was considered opportunistic for increased synchronised delivery flows, to enable effective build-to-customer order production, greater supply chain control and flexibility of customer demand changes, and efficient inventory management. Denoting, the

combined approach of increased agility and cost-efficient applications was perceived to enhance competitiveness:

> *"Cost if a big factor and it is usually driven from the top, and in automotive the cost driver is from the OEM and goes up the supply chain…being closer to your suppliers allows for inventory reduction, more frequent deliveries, more JIT or sequencing of parts etc" (Case K, p17).*

UK supply chain capability whilst viewed as the most significant barrier to reshoring, for Cases C, D and G this enabled opportunities to increase their level of competitiveness through developing capability and optimising their competitive position in the market. Recognition and utilisation of available capacity enabled Case C and Case D to reshore-insource, by returning manufacturing from offshore-outsource to in-house production in their UK facilities. By redesigning their strategic model and portfolio offering, Case G recognised they were *"missing a trick.....with state-of-the-art tool room and virtually clean room capability"* making the strategic decision to *"move away from being cost focused to being profit focused and selling the facility and skill we have available" (Case G).*

The interrelationship between competitiveness, built up from the foundations of lean and agile methodologies, with the influence of close proximity, responsive supply chain and the OEM was evidently intertwined.

> *"It's about trying to improve the supply chain in terms of logistics, quality, responsiveness and cost overall. By doing so it allows us to be more competitive as a manufacturer, as a supplier and potentially win more business" (Case H, p14).*

The autonomy to make independent decisions on the strategic and operational direction of the facility was scrutinised and an element of contention (discussed further in 6.2.6). Cases such as F and G were seen to utilise their autonomy for business growth and development of new modern premises, and benchmark capability to strengthen their competitive offerings. The results were well regarded by the customer and used an exemplar to the synchronous supply network to advance reshoring prospects through the utilisation of the Sunderland IAMP for competitive advantage over suppliers operating from dated facilities. The OEM perceived companies who reshored to be in a stronger position with more advanced facilities, in comparison to existing plants that *"are flat out now and pushing their limits"*. Adding to this, the automotive governing bodies affirmed capability as the core ingredient for improved competitiveness and security of future business acquisitions. Nevertheless, the recognition of large global suppliers optimising economies of scale to achieve lowest purchase price offshore, and the lower cost of offshore direct labour, remained a competitive debate for those cases with global platforms and less autonomy in decision-making. In partial, the consequence to localised suppliers was reduced likelihood of business acquisition.

6.2.4 OEM Influence

Clear differentials between OEM supply chain strategies were ascertained; Case B was highly focused on reshoring as much of their supply chain as possible to the UK, or at least near-border locations. Whilst, Case E having historically reshored some supply to the UK, emphasised making the 'right-shoring' decisions when sourcing components. For Case E this was partially achieved by mandating a high proportion of Tier-2 suppliers or sub-suppliers to the Tier-1, and enabled economies of scale for purchase price from the global supply base. The location of mandated suppliers was considered offshore locations.

What was explicit, was the control to which the OEMs exercised over their supply chains, and the ability to drive OEM strategies upstream; despite annotations by OEMs for not having influence over Tier-1 sourcing patterns. Through the optimisation of a global sourcing approach for reduced purchase price, and the imposed mandated inbound supply conditions, Case E gained control of the upstream supply beyond the Tier-1 supplier, reinforcing competitiveness through an overall cost reduction in sub-assembled components.

The work content and associated costs to operationally manage the mandated upstream supplier's (from Tier-2 upward), was then absorbed by the Tier-1 supplier. Results from the multi-case stressed the associated cost of mandated supply was unpredictable and in hindsight became a cost burden at the Tier-1 supplier. The right-shoring decision applied in Case E supply chain was not entirely restricted to overseas suppliers with reshoring having previously been an active approach in the past; however, corporate changes had led to an increased (not exclusively) global and directed supply chain approach.

Case E confirmed a *"complex component system"* would constitute a prime example of directed supply and emphasised the responsibility of the Tier-1 supplier to *"own the commercial relationship"* with the Tier-2 supplier. Under mandated supply conditions, limited avenues of negotiation were understood to have restricted the opportunity for Tier-1 suppliers to make independent sourcing decisions and inhibited Tier-1 supplier productivity; thus, meaning the competitive attainment at the OEM was shown to have a detrimental impact at Tier-1. The management of directed supplier relationships was viewed highly problematic *"with OEM mandated suppliers some of them won't even talk to you"*. An example detailed the uncovering of a Tier-2 mandated supplier:

> *"I went to visit to understand why they couldn't supply us, to find out they already had 'OEM-a' and 'OEM-b' on-site, and they had 19 programme launches all at the same time and all crashed into each other. With directed suppliers you are blind at what is going on most of the time and with 'our OEM' it is very risky" (Case C,).*

The impact on supplier budget planning and financial performance was signified, with the lack of visibility upstream and downstream with an amplified 100% increase on standard product price at programme launch; and accentuated "*you just can't plan for that"*. The need for agility was unquestionable in this rather unstable and variable supply chain. Close proximity of the supplier was deemed a key requisite for a responsive supply chain yet, mandated suppliers are predominantly (not exclusively) located offshore for electrics, aspect, and laser parts; and the increased influence of Tier-2 supplier location was endorsed by the OEM.

Adopting the right-shoring strategy corroborates with the work of Kim and Chung (2022) from a closed-loop supply chain perspective; inferring the benefit of the right-shoring decision should be for the supply chain and not an individual node. What appears to be a *right-shoring* decision for the OEM may not be the right-shoring decision for the connected supply chain, and so this author positions further investigation is required to examine the right-shoring decision from end-to-end supply chain.

In complete contrast, Case B supply chain demonstrated a localised focus, with an ambitious target for Tier-1 suppliers to achieve 60% true local content for upstream sourcing for all future programmes. True UK content signifies, Tier-1 suppliers must source their inbound supply from Tier-2 suppliers located and manufactured in the UK; therefore, the directive to achieve 60% UK content in the final assembled vehicle means

60% of Tier-2 supplier manufacturing must be located in the UK. The existing '*true'* or *'real'* UK content based on previous work conducted by the Automotive Council was estimated "*real UK content is somewhere around 25%" (Case I, p15).*

Whilst evidence in 6.2.3 demonstrated supplier growth and increased competitive position through grasping reshoring opportunities, and to a degree proved that opportunities do exist (in part) for UK supply chain reshoring; the disparity between the existing true UK content and the OEM supply chain target, was an estimated deficit of 35% UK Tier-2 manufacturing. By no means was this target viewed by Tier-1 suppliers as an impossible task, furthermore, Tier-1 suppliers appraised the rationale and necessity to act with urgency to negate the financial impact from the wider dynamic changes implicating competitiveness. The directive was recognised partly as a response following the unprecedented compensatory agreement between the customer and supplier, that was coerced because of exchange rate fluctuations affecting the existing programme in production, whilst the OEM clarified the impossibility of compensating on future programmes. The entire multi-case comprehended the reality and reshoring challenge to be primarily limited by UK supply chain capability.

A compelling aspect to this research is the degree of manipulation in the automotive tier structure. Positioned at the head of the supply network, authority exercised by the OEM was not unexpected however, the stimulus upstream (and in some cases inhibition) to reshore supply is not widely researched, furthermore, the induced lean and agile methodologies driving OEM location decisions influencers upstream, are scarce. Yet, the consistent viewpoint of the multi-case verified to a greater or lesser extent, OEMs do leverage their operational authority to influence location decisions and the necessity to reshore supply upstream.

Evidence showed OEMs have significant influence over the location of Tier-1 supplier facilities directly with emphasis on the product profile manufactured and the delivery conditions required by the customer, namely JIT, sequence, or synchronous supply. It was argued by Industry Forum[115] that OEMs pave the way, dictating Tier-1 supplier location and supply chains follow in trend, where government and policy environment supports. Without divergence, OEMs concurred that *"Yes, the OEM influence location"* with the pre-requisite for Tier-1 suppliers to accommodate the requirements of the OEM:

> *"Nature of the tier 1 suppliers are all global and multi-national, quite often it is a request to a MNE to relocate and set up a new facility for the benefit of 'OEM', that will require a regional office in addition to a new manufacturing plant" (Case E)*

Irrespective of the OEM supplied, Tier-1 cases harmonised the location of their own facilities were unquestionably influenced by the OEM, as a requirement to supply in sequence or synchronously, or due to the profile of the product manufactured. The location of the supplier park in close proximity to the OEM was acknowledged as the result of an outsourcing activity for Tier-1 suppliers to perform assembly tasks on behalf of the OEM, corresponding to the work of Bennett and Klug (2012). The current pull by the OEM to reshore more Tier-1 suppliers was viewed as a direct influence by the OEM for competitiveness (reinforcing the OEM is the leader of Total Delivered Cost) and responsiveness within the supply chain. In addition, that same pull from the OEM was evidenced travelling through the Tier-1 and up to Tier-2 supply, with the objective for Tier-2 reshoring to support what was viewed as an optimistic 60% real local content in the car.

[115][115] Industry Forum is the collective for Cases I, J, K, L and M, representing figureheads from automotive manufacturing governing bodies.

The IAMP[116] development was eagerly viewed by Case B as the *"perfect opportunity"* to reshore a supplier from their existing manufacturing base to the manufacturing park adjacent to Case B; highlighting the obvious benefits of lead-time and inventory reduction for the OEM, but equally for the supplier who may benefit from *"government incentives"* A proposition supported by Case I, J and L. Long-term, the OEM wants suppliers in the IAMP *to reduce your lead-times.....but long-term if you look at the UK.....you've got the IAMP which is the International Advanced Manufacturing Park, so long term is to get as many suppliers as close to the plant as possible and then you can start thinking of synchronous supply and very lean supply chain, no inventory holding etc, greater flexibility to the customer" (Case B).*

When it comes to location and reshoring decisions making, it can also be argued that the OEM inhibits supply chain autonomy by directly influencing the location of the tier-1 suppliers, and through the directives imposed onto the Tier-1 suppliers for Tier-2 sourcing. Global sourcing strategies at the Tier-1 additional constrain autonomous decision making for supplier sourcing at local plant level, opting for remunerations from global platforms.

The extent to which OEMs have influence on upstream supply chain reshoring was concluded variable with divided opinions ranging from *"not very far....I don't think we have that much affect" (Case B)* to the opposite end of the spectrum *"very, very far, Tier-4/5" (Case C)* with *"huge impact" (Case J);* depending on the OEM, the objectives and

[116]"IAMP is designated a 'Nationally Significant Infrastructure Project' (NSIP) by the UK Government, and is a partnership between Sunderland and South Tyneside. IAMP is a hub for automotive, advanced manufacturing and technology businesses, accelerating economic growth and generating the conditions for private sector investment of over £400 million. IAMP One is a designated Enterprise Zone and as such, occupiers can benefit from Enhanced Capital Allowances status" (iampnortheast.co.uk; makeitsunderland.com)

policies they deploy and the components in question. Tier-2 case suppliers argued no influence on upstream sourcing, adding:

> *"I can honestly say OEMs have not influenced the decision-making process in my time. It tends to come down to a discussion between us and our customer who aren't the OEM" (Case G).*
>
> *"The OEMs don't have any impact on our decision making with our suppliers" (Case H).*

The contradiction by the OEM highlights a degree of naivety in their operational influence upstream. Triangulation of empirical cases, including the OEM, verified the directive for 60% true local content imposed onto Tier-1 suppliers; meaning 60% of product must be manufactured in the UK at Tier-2 and supplied to the UK Tier-1. Given the current estimated deficit of 35%, the Tier-1 suppliers will certainly need to reshore a large proportion of their Tier-2 supply to the UK, to achieve the OEM directive. Therefore, despite Case B eluding their limited influence upstream, compelling evidence debates sub-supplier reshoring (or mandated supply) as being highly influenced by OEM strategies.

6.2.5 Global Sourcing Strategy

Reshoring conceptualisation 5.3.1 explicitly placed Total Delivered Cost as the competitive framework adopted by the multi-case and the basis for supplier nominations; additionally concluded in 6.2.4 was the leadership of TDC coerced through the supply chain by the OEM. TDC was characterised to include all aspects of quality, cost, and

delivery as the main operations key performance indicators considered in automotive manufacturing, in addition to HSE[117]; accumulated in the supplier nominated cost.

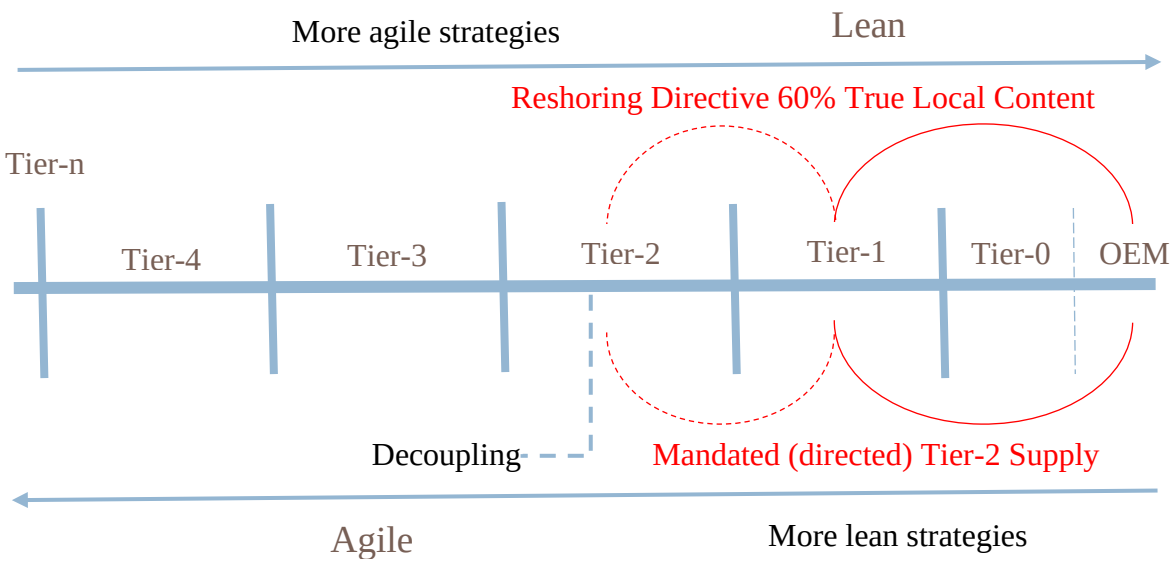
However, a clear frustration evidenced by the OEM, Tier-1, and Tier-2 suppliers, was the additional cost of supplier non-conformity following nomination. Factors including poor supplier performance, part shortages, emergency freight, quality problems and tooling concerns/modifications; were considered additional cost implications in managing the supplier to attain the required service levels. Conflict between the real delivered cost actualised at local plant level and the established TDC used by purchasing at supplier nomination, was distinct. Arguably, local and/or global-based suppliers impose a risk of unquantifiable additional costs, although it was deemed the further geographical proximity of the supplier the greater the management cost impact at local plant level. It was not to suggested suppliers located overseas were not good suppliers; moreover, the impact from supplier nominations based primarily to satisfy cost objectives, the TDC was viewed less inclusive of the real cost impact and the real operational requirements, where supplier service requirements did not meet the UK manufacturers' expectations. Examples such as tool manufacturing was primed a major non-conformity resulting in the local plant to resolve the concerns with local suppliers at a secondary non-budgeted cost to the plant. Case A, C and D signified intergroup global suppliers as notoriously problematic to manage, at new programme launch phase and throughout volume production, whilst also presenting the most challenging to reshore due to corporate policy and strategy. The disparity between local plant operational requirements to perform synchronous supply or just-in-time deliveries to the customer versus the cost objectives of purchasing teams for supplier nominations, was ostensible. Future implementation of micro-supply chains proposed by Panwar *et al.*, (2022) would alter supply chain dynamics

[117] HSE is the health, safety and environmental KPI measured in a company.

from the predominantly lean methodologies to further embrace supply chain agility, noting increased agility as a reshoring motive to achieve supply chain responsiveness.

Linking back to the conceptualisation of reshoring (5.3.1), Case E defends making the *"right-shoring"* decision regardless of geographical location, by which those decisions are often made by the OEM for upstream component sourcing. The work of Qamar and Hall (2018) was extended to reflect the differentiated positions of the OEM reshoring strategies, and furthermore, the pressure leveraged by the OEM (6.2.4) evidently transitioned upstream to the Tier-2 supplier. Illustrated in Figure 6.3 the decoupling point for lean and agile methodologies, and the OEM directive to reshore or mandated supply, resides at Tier-2, thus absorbing the associated decoupling cost such as upstream bulk purchase towards Tier-n, and the efficient and responsive flows required downstream at the OEM.

Figure 6.3 Lean and Agile Automotive Reshoring Model



(Adapted from Qamar and Hall, 2018)

Empirical results exhibit an ambitious strategic target, for supply chains to become more agile downstream and specifically at the OEM; a challenging target for Case B where lean is an embedded into the cultural standard. Thus, meaning between the OEM and Tier-1 supplier, and in partial Tier-2 supplier, lean applications (including minimal or no inventory, small production cycles, high frequency changeover, increased delivery flows or JIT, and more) are maintained with embedded continuous improvement; whilst the intention for increased agility in operations and supply chain processes are (in partial) supported by close proximity of Tier-1 and Tier-2 suppliers, for increased flexibility and highly responsive supply chain.

Despite different strategic approaches in different supply chains (i.e. directive to reshore or mandated supply), these results highlight the increased demands at Tier-2 decoupling point with suppliers squeezed between supply chain strategies, aligning to the work of Qamar and Hall (2018); and at Tier-1 with the heightened co-ordination of the OEM directives for 60% true local content and the associated complexities of achieving the ambitious target; or the arduous management of upstream mandated Tier-2 suppliers, whereby absent relationships are reduced to transaction processing. Arguably, that the strain on the supply chain for reshoring is heavily absorbed at Tier-1 and Tier-2, whilst not to disregard the impact or work involved further upstream and at the OEM.

Internal strategies and decision influencers presented in Figure 6.4 Dynamic Reshoring Decision Framework add further constricting layers to the automotive tier structure considering reshoring. Results emphasis the difficulties encountered by Tier-2 suppliers unable to break through the glass ceiling to gain entry to the Tier-1 preferred supplier list. Despite capability and the benefits of close proximity, global sourcing policies are a key barrier to entry where facilities are incorporated into a global landscape and strategic sourcing objectives target global company benefits over local plant advantages. Conflict

between global strategies and local plant objectives were evident in Case A, B, C and D with respect to the demand of the global company, and frustration of missed opportunities at local plant level, and similarly acknowledged at Case H and K.

Case G quotes the significant gap or grey area of Tier-1 supplier attendance industry forum meetings for the discussion of automotive supply chain policy, direction and roadmaps and signifies the difficulty as a Tier-2/3/4 supplier to navigate progress into the automotive supply chain to offer products and services. Whilst Case A for example emphasised the barriers that are UK supply chain capability due to the lack of capable SMEs available locally; calling for more intervention by UK Government, and quicker to bridge the gaps in the desired UK supply chains. Case A are an example of the companies absent from industry forum network meetings to work with partners to bridge those gaps. Moreover, Case A is an organisation evidenced as heavily controlled by corporate policy which restricts the open access for non-existing Tier-2 panel members to integrate into the supply chain.

The researcher notes the classic example of a Tier-1 supplier unhappy with the lack of SMEs in the UK and requiring more government support, with no interaction with the services that collaborate the supply chain or the SMEs who are requesting to be accepted into the supply chain. The integration between global sourcing strategies and UK supply chain capability are evident.

Directives to achieve 60% local content requires an estimated 35% increase for Tier-1 suppliers to secure UK Tier-2 manufactured product,[118] thereby conflict between supply chain targets and internal company objectives are apparent. Demands to satisfy the customer requirements whilst operating within the boundary of the Case's own strategic

[118] Based on local content analysis study by the Automotive Council, admittedly difficult to obtain accurate true local content information

framework (global or local sourcing) can present in two-ways and is apparent in the alignment (or misalignment) of customer-supplier sourcing objectives:

1. Accelerator to reshoring
2. Barrier to reshoring

Results indicated that the alignment of customer and supplier sourcing strategies generated more cooperation from the customer to reshore upstream supply; whilst Tier-1 suppliers acknowledged the lengthy process for quality assurance and difficulty gaining OEM approval through the supplier PPAP[119] process, particularly mid-programme. Therefore, working towards the same supply chain objectives was viewed as an accelerator to reshoring, and more widely supported by automotive governing bodies such as the Automotive Council to maximise awareness of the opportunities and initiatives available.

Barrier to reshoring can be upstream and/or downstream. Restrictions on reshoring supply was repeatedly emphasised at Tier-1 where cases were incorporated into the global landscape with clear group targets for global sourcing advantages. These constraints are embedded into decision point 4 and 5 in Figure 6.4, with internal restrictions on supplier nomination to only the approved panel suppliers, to which the approved suppliers have global supply capability. The secondary impact determined for that internal strategy was the restricted access for new UK-based Tier-2 suppliers with local supply capability to gain entry to the Tier-1. Where global sourcing objectives were not considered a factor, results unveiled the increased autonomy to make independent reshoring decisions and were enthused to reshore supply, where opportunities were viable, and capability existed.

[119] PPAP is the Production Part Approval Process and is a standard approach used in the automotive industry for manufacturers to approve changes to production designs and processes.

6.2.6 Supply Chain Capability

Prominent from the empirical findings were the challenges and barriers faced by UK automotive manufacturers, actively reshoring and motivated to continue with a shift in their upstream location sourcing strategy. The case evidence at all levels of the automotive tier structure and industry forum, substantiated that capability of UK automotive manufacturing supply chains was a significant challenge for the UK industry to overcome to achieve the desired targets; whilst acknowledging the process to be a *"slow burner"* rather than a quick fix, and resides with the predicted reshoring statistics at a rate of 13.1% return (Rampon and Rivo-Lopez, 2022).

Chapter 1 considered the evolution of offshoring manufacturing strategies and case evidence positions UK automotive manufacturers followed that offshoring trend, primarily to reduce cost through the optimisation of low-cost labour. The empirical consensus endorsed the advancements in global manufacturing beyond the initial labour-intensive offshore advantage, to incorporate supply network refinements and increased capability across a global platform. The competitiveness of global suppliers was identified as a contributing barrier to reshoring, with particular emphasis on TDC elevating price pressures on UK manufacturers and often rendered uncompetitive. Whilst the attractiveness for low-cost labour has eroded in the past 10 years with the increased wages in low-cost economies; Case A highlighted that the labour cost element in the TDC remained a competitive barrier for UK suppliers quoting for business against global manufacturers.

The embeddedness of lean principles in manufacturing operations for cost efficiency, posed controversial with economies of scale purchase strategy from global suppliers. Inventory holding was a seemingly contentious point with customer expectations of minimal inventory and maximum flexibility versus the needs of the supplier (most evident

at Tier-2) to manufacture economically to adhere to the TDC; combined with the enhanced logistics solutions over longer geographical distances, appeared to elevate the pressure on (potential) UK suppliers to prove competitive. Panwar, Pinkse and De Marchi (2022) signify the expected changed to supply chains post-Covid-19 pandemic including investment and deployment of Industry 4.0 to benefit from the visibility of supply chain inventory and the ability to make better-informed decisions and forecast the development of micro-supply chains to cater for just-in-case scenarios. Elements of Industry 4.0 compliment that of automotive manufacturing although deployment end-to-end supply chain is questionable and could be viewed with secondary capability issues. The use of micro-supply chains holds weight in agile systems whereby inventories are not considered critical wastes; this is not the case for lean supply chains with just-in-case inventory working against deployment of lean manufacturing. Supplier capability is inhibited by the demands imposed by OEMs and Tier-1 suppliers to meet the required standards, namely operating processes for reliability and TDC, therefore, the expectations of Panwar *et al.,* (2022) on future supply chains could further inhibit supply chain capability for automotive manufacturing where lean management is an embedded methodology. The likelihood of OEMs and Tier-1 suppliers adopting a complete shift in methodology is view unlikely based on the evidence in Table 5.3.

Clearly narrated by the Tier-1 suppliers was the advancement in global supply capability, and the low-risk level from establish supply networks; despite being motivated to reshore as much supply as possible to the UK, Case A acknowledged the heightened risk of reshoring even when capability does exist and the significance of managing the transition effectively. Case F admitted to the full embedment of continuous improvement and lean tools to facilitate the customer requirements, however, the management of inbound production purchases (for example, raw materials) from upstream suppliers was self-

confessed to be that of bulk purchase, mainly from offshore suppliers to achieve the lowest cost possible. Affirmed during interview, without securing the lowest material purchase cost, the Tier-1 (Case F) would not be competitive to secure the business with the OEM. Reshoring strategy here was affirmative having taken advantage of reshoring in the chemical space locally, however, the entire empirical dataset corroborated *"Supplier capability here in the UK and attracting those suppliers"* was a significant obstacle to overcome due to "*some commodities are just not here in the UK"*.

The utilisation of Figure 2.1 Reshoring Options provides a framework for manufacturers to assess their existing supply chain strategy against location and ownership options, and the potential to transition their location strategy to promote opportunities to reshore supply. Tier-1 suppliers evidenced the capability to offer that two-dimensional transition from outsource-offshoring to insource-reshoring strategy, with elements of supply whereby capacity existed internally in the UK facility.

The lack of available suppliers in the UK with the capacity, knowledge, technical competency, and overall capability to fulfil the requirements of UK automotive manufacturing demand was considered a major barrier. Whilst a portfolio of reshoring opportunities was available or engaged, it was viewed that some commodities would not exist in the UK due to the volume of cars being built. Metal was a commodity identified as being almost impossible to reshore due to the insistence of no metal mills in the UK, and the consolidation from three to one metal mill offshore. Whereas the wiring harness was considered a viable opportunity to develop in the UK due to the simplicity of the process. Tier-1 suppliers pertained reshoring as a necessity for competitiveness and continuity of the plant; whilst Case A was actively pursuing a reshoring strategy, it was evident the majority of product was produced by internal offshore suppliers and a

disbelieve that capability existed in the UK to reshore their textile material; and offered an insightful position of the challenges faced:

> *"Reshoring will be the difference between this plant winning new business or not, and unfortunately the majority of our raw material is made in (France) and trying to find someone who can take that business here in the UK is pretty difficult…been out in the past and had a look for material suppliers in the UK and unfortunately, they are all our competitors…. we do not want to give out work to our competitors" (Case A).*

A similarly position was argued by Case C stipulating commodities such as vinyl are either not available in the UK or the supplier not fit-for-purpose to gain entry to the approved supplier panel; associated with the restrictions debated in 6.2.5 with Tier-2 manufacturers unable to gain entry as an approved supplier. That said, evidence from Industry Forum indicated the potential of local textile manufacturers and viability of that commodity for reshoring. Table 6.1 shows the status of case study manufacturers' engagement with Automotive Industry Forum; the evidence at Tier-1 positioned those suppliers actively reshoring to have a distant relationship with Industry Forum. The lack of engagement posed a gap in Tier-1 supplier knowledge of the potential UK reshoring opportunities within their desired commodities; therefore, agreement of supply chain capability was corroborated a barrier, but the knowledge gap of existing UK capability is significant again.

Table 6.1 Case Engagement with Automotive Industry Forum

Manufacturing Case Study	Automotive Tier Structure	UK Reshoring Status	Engagement with Forum	Lean / Agile Methodologies
Case A	1	Active	Distant	Lean
Case B	OEM	Active	Collaborative	Lean (A)
Case C	1	Active	Distant	Lean (A)
Case D	1	Active	Distant	Lean
Case E	OEM	Preceding	Collaborative	Leagile
Case F	1	Active	Collaborative	Lean
Case G	2	Active	Collaborative	Agile
Case H	2	Active	Distant	Lean (A)

The consolidated view from Industry Forum highlighted a further gap in awareness of UK supply chain capability and signified the lack of collaboration and communication across the tier structure to understand and develop UK supply chains to a standard fit for automotive purpose. Case I offers a critical interpretation of the underlying awareness issues and the current standpoint:

> *"OEMs have no ideas of what Tier-2 suppliers are around in the UK. They don't go through their Tier-1s to find out, and most Tier-1s don't have much idea because of their international sourcing strategies. And the answer, well I need someone with capability, capacity, global reach, or global partnership so they can be integrated into my global supply chain, and you're not going to have a company that knocks on the door saying I can do all this, because companies that are doing all that at the moment are probably working with them already, so it's a chicken-and-egg situation" (Case I).*

Undoubtably, an 'actual' gap was evident in UK automotive manufacturing supply chain capability. Beyond that, emerged a 'knowledge' gap of the current capability obtainable in the UK supply chain; and therefore, two elements of the supply chain capability barrier

are to overcome; engagement and awareness for knowledge development being more straightforward to address.

The automotive standards required by the OEMs impose barriers to potential upstream supplier entry. The strict protocol and capabilities to become a Tier-1 supplier to the OEM or a Tier-2 supplier to the Tier-1 means approval is restricted to existing proven manufacturers, and across the existing supplier-base that was deemed to be predominantly global supply. Where prospective suppliers exist in the UK but do not meet the operational standards required, the OEM or Tier-1 suppliers have the opportunity to either invest further to develop the UK manufacturer or bypass that reshoring opportunity. It was recognised that not all UK manufacturers have the operational infrastructure to facilitate all the OEM and Tier-1 requirements, implementation of lean methodologies and quality control were identified as gaps, whilst Table 6.1 distinctly showed lean methodologies were dominant and evidence indicated lean supply as a locally driven supply chain requirement.

UK Government investment at Tier-2 supplier infrastructure was deem necessary to develop the UK supply chain; whilst reshoring investment and financial schemes were available through AMSCI funding during 2014, those schemes no longer exist to financially support UK reshoring; however, evidence signified the work by national governing bodies including the Automotive Council and SMMT, and Local Enterprise Partnerships were continuing to develop awareness of existing UK manufacturing in spaces where capability did exist for reshoring, whilst investing resources into potential Tier-2/3 suppliers to develop the automotive standards required by the Tier-1 suppliers and the OEMs in essence of supplier approval. That of course, requires engagement from manufacturers with forum initiatives to advance the knowledge of developments in potential UK supplier capability.

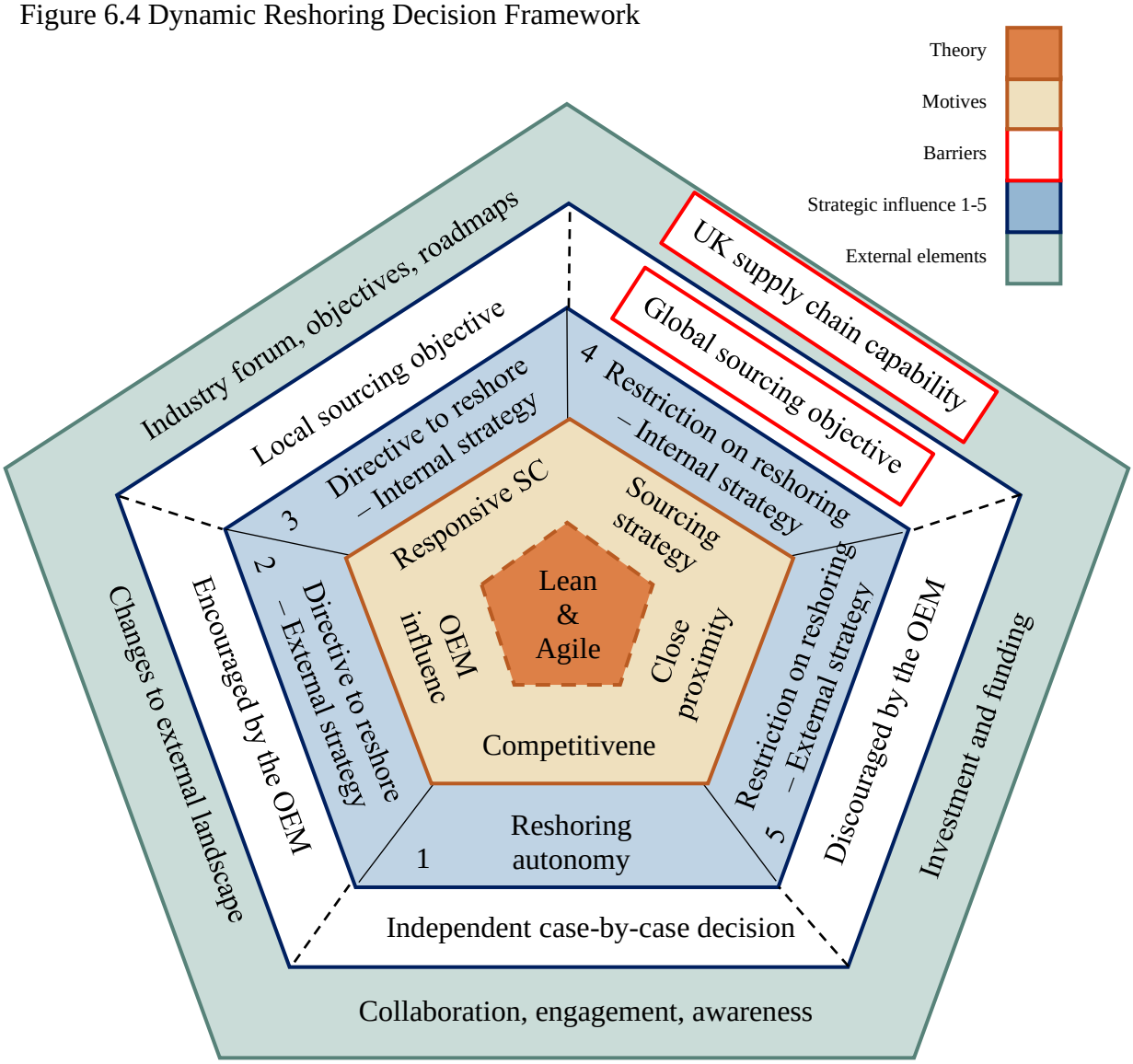
Results give context to the challenges of supply continuity across the global landscape, with loss of oversees suppliers, shortage of components or the unpredictability and delay of logistics. Implications follow the uncertainty of the significant changes to the external landscape including Brexit, semi-conductor component shortage, Covid-19 pandemic and global political unrest, and the different perspectives that influence and motivate the decision to reshore.

6.3 Dynamic Reshoring Decision Framework

The important motivational factors driving UK automotive manufacturing reshoring and the barriers that impede the full execution of that change, are explicitly discussed in Section 6.2 with an interconnected perspective across multiple-disciplinary themes. The significance and profound impact of these results were authenticated through triangulation of manufacturing case – to - manufacturing case equal to or across the tier structure; manufacturing case – to – Industry Forum case; and the cross dimension of empirical cases to the secondary body of literature. The moderated reshoring motives form the basis in understanding why automotive manufacturing facilities have pursued avenues to rebuild a localised supply chain.

Presented in Figure 6.4 Dynamic Reshoring Decision Framework, the formation of a unique reshoring paradigm was constructed from the moderated reshoring motives and the underpinning theory of lean and agile methodologies that drives the motivations positioned at the core of this new framework. Meaningful interpretations enabled the comprehensive categorisation of reshoring decision influencers, informed by internal and external strategies, and the inclusivity of the wider dynamic external landscape.

Figure 6.4 Dynamic Reshoring Decision Framework



Reshoring is driven by the embeddedness of lean and agile methodologies into the multi-case operations; these decisions can either be made at a local level (within the case study plant), or where the case is part of a globalised company, input from the wider company policy. Results showed that the OEM had a significant influence over the likelihood of reshoring manufacturing supply to the UK, to accelerate or to restrict. Despite narratives of limited interference, results across the entire multi-case study showed that OEMs have and do impose directives to reinforced upstream supplier sourcing strategies. This was

determined by (but not limited to) a strategic reshoring directive and/or mandated supply by the OEM.

Results place UK automotive manufacturing facilities in five different positions for reshoring decision-making. At the core of this strategic decision is the embeddedness of theoretical applications; across this multiple-case study these are determined as lean and agile theoretical concepts and is the established foundation that underpins meaning to the moderated reshoring motivations. The strategic decision to engage (or suspend if reshoring is no longer an active strategy) is ascertained in Figure 6.4 Dynamic Reshoring Decision Framework:

1. Autonomy to reshore with the ability to exercise independent decision processors and focus on increased reshoring for local supply. Case-by-case opportunities are optimised through local plant decision-making. Reshoring motives place emphasis on competitiveness, responsive supply chain and UK supply chain capability.
2. Directive to reshore driven by the cases' internal strategic direction, with greater focus on increasing reshoring of inbound supply to the plant. Reshoring motives primarily focus on competitiveness and the optimisation of increased flows from suppliers in close proximity.
3. Directive to reshore driven by the strategic objectives of external stakeholders, with focus on increasing reshoring supply to the plant. Emphasis is placed on 'true local content' objectives driven by the OEM upstream to Tier-2 suppliers (and potentially beyond). Reshoring motives focus on optimising increased flows from close proximity supply, enabling responsive supply chain and competitiveness.

4. Restriction on reshoring due to the cases' internal sourcing strategy to adopt or maintain a global focus. Cases with a global footprint place emphasis on global supplier sourcing for global competitiveness. Local plant competitiveness and global company competitiveness may conflict.
5. Restriction on reshoring contained by the strategic objectives of external stakeholders, with focus on directing nominated suppliers further upstream. Global focus is primarily mandated by the OEM and based on competitive motives, with ability to accommodate more agile flows. Customer and supplier competitiveness and preferences may conflict.

The peripheral layer in Figure 6.4 represents the dynamics of the external environment that are highly changeable and instrumental in the decision-making process within a case company; for example, policy changes led by government will naturally shape the objectives and roadmaps at Industry Forum, seeking to shape the industry landscape. Engagement with industry forum generates greater awareness of supply chain development and opportunities and enables input for the development of future automotive roadmaps. Capability of UK supply chains presents a significant constraint to UK reshoring. Development in supply chain capability in a specific space will open opportunities for further reshoring; companies with the autonomy to make reshoring decisions may choose to optimise without overpowering from internal or external stakeholder objectives.

Changes to the external landscape (including but not limited to) UK Government electives, Brexit, Covid-19 pandemic, global semi-conductor shortage and the war in Eastern Europe, to a greater or lesser extent have impacted on the various positions of reshoring and in most cases, accelerated the motivation to reshore manufacturing supply from overseas to the UK. Changes to UK Government impact the allocation of

government funds and the availability and priority of investment to increase UK supply chain capability.

Engagement with Industry Forum has proved influential in making future reshoring decisions (Case G is a prime example) enabled primarily through the awareness of supply chain capability and development in chemical space. This is currently impeded through a lack of engagement with Industry Forum in 50% of cases, and the objectives and inputs to develop further capability in the UK. Wider knowledge of reshoring motivational factors coupled with the knowledge of desired automotive components or commodities for UK reshoring (refer to Table 2.3 Reshoring Motivational Factors and Table 5.2 Automotive Components for UK Reshoring), provides information scaffolding for Industry Forum and Governing Bodies to make decisions and develop future roadmaps aligned to the industry demands. Addressing the UK capability gap identified as a major barrier to UK reshoring is a substantiated example; through examination of this accumulative approach (both theoretical and practical; primary and secondary analysis), automotive manufacturers and Industry Forum can utilise this evidenced-based approach to harness future planning and decision making, to incorporate the dynamic motives beyond simple financial factors, and build roadmaps to develop the future capability of UK manufacturing supply chains.

Referring to Table 5.2, metal parts and plastic injection mouldings are components whereby capability currently exists in the UK and the associated parties are aware, however, this supply chain is largely mandated by the OEM with global supply chain objectives. In contrast, despite being highly desirable for reshoring by OEMs, the UK supply chain capability currently does not support the production of alloy wheels for high volume but is noted by Industry Forum as investigative for future cumulative demand production. Surface trim is a prime example of the need to reshore to the UK however,

due to the lack of supplier engagement with automotive Industry Forum, a lack of awareness of the existing UK supply chain capability impedes that potential; thus, emphasising the significance of supply chain engagement for capability awareness.

Examining the results of the multi-case study and the existing motivational factors identified in Table 2.3, the evidence shows in automotive manufacturing industry, the OEM is highly influential for upstream supply chain reshoring with progressive or regressive objectives. This is synthesised within each of the two supply chains led by contrasting OEM objectives, that being to reshore supply to the UK to achieve 60% true local content in the vehicle; and in contrast, to mandate supply at Tier-2 to optimise globalised flows. Results show the objective to reshore is not without challenge, primarily the capability of UK supply chains and impact from corporate strategies targeting global platforms.

Understanding the accumulation of motives, in particular dynamic motives beyond simple financial factors (for example: supply chain responsiveness and flexibility, close proximity to enable synchronisation and/or increase delivery flow to reduce TDC), and the associated barriers to reshoring (linked to capability and restrictions from corporate policy and strategy); the existing UK supply chain capability, and the potential opportunities for wider industrial development to grow UK automotive supply chains. This combined, offers an analytical process by which case companies can evaluate the appropriateness of reshoring opportunities for their existing supply chain requirements and future decision making, taking into consideration the degree of strategic influence 1-5 (Figure 6.4) a case has in reshoring decision making. In addition, engagement with Industry Forum in this analytical process would allow the collation of reshoring data for existing and future supply chain requirements, thus supporting the development of future automotive manufacturing roadmaps. Figure 6.5 visualises this as a closed-loop process

for building UK reshoring-knowledge and awareness within automotive manufacturing and supports Figure 6.4 Dynamic Reshoring Decision Framework.

Figure 6.5 Reshoring-knowledge and Awareness Process

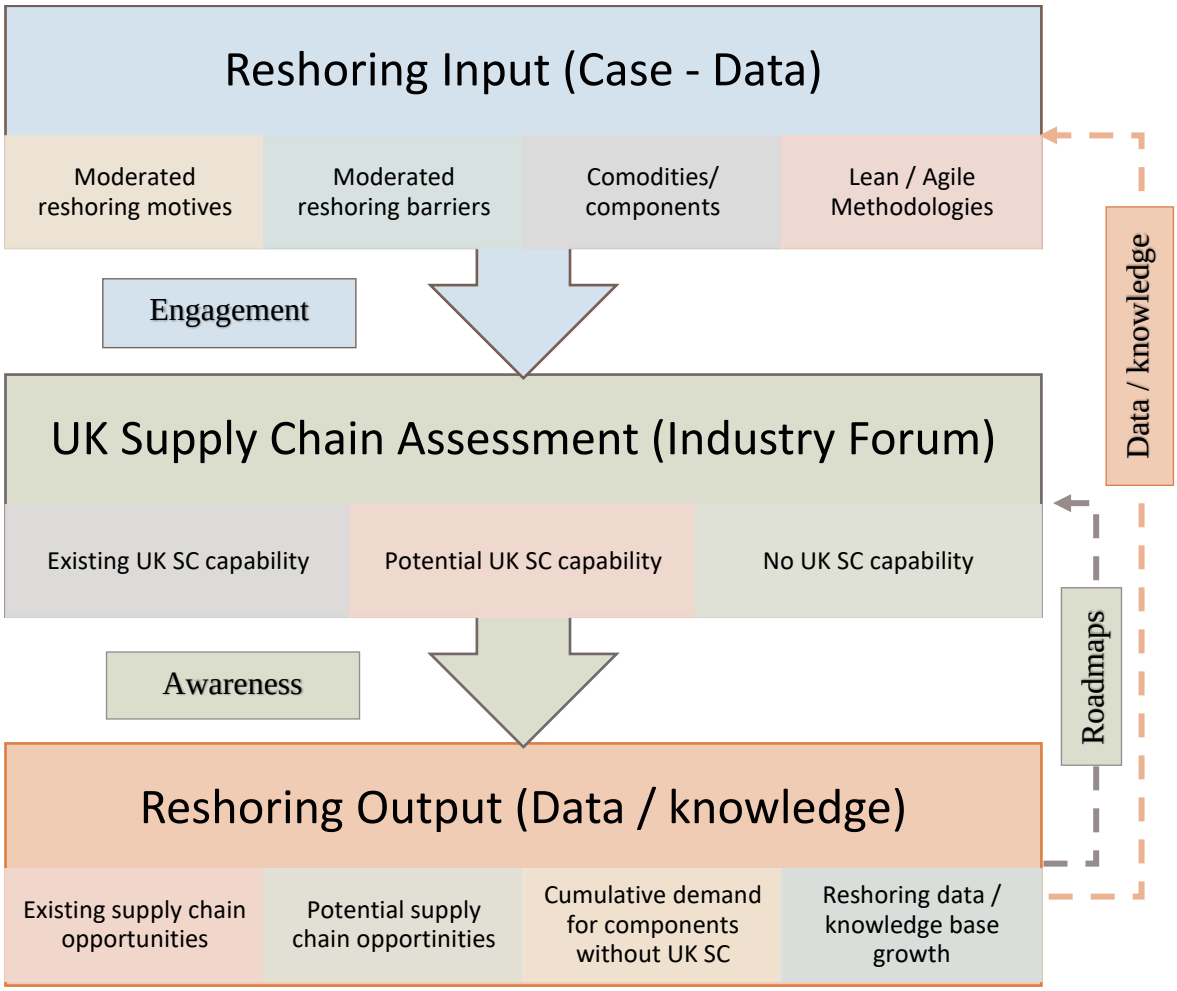


Figure 6.5 provides a collative framework for the purpose of scaffolding reshoring-knowledge and awareness through the engagement with automotive Industry Forum, contributing data to and gaining knowledge from an evolving central point for UK automotive supply chain information. As policy makers, the sharing of data, information and/or knowledge with Industry Forum (Regional and National) enables the development

of future roadmaps, policy planning and decision making to shape and grow the capability of UK automotive supply chains, currently identified from this research as a significant barrier to UK automotive manufacturing reshoring. Where capability constraints persist (steel supply for example) data capture for cumulative options can be fed back into the process (UK-wide OEM demand for alloy wheels) enhancing UK supply chain capability awareness and potential future planning.

Articulation of Figure 6.4 and 6.5 provides a unique framework derived from the empirical results of this study, and addresses RQ1: Why are UK-based automotive manufacturing facilities motivated to reshore elements of their supply chain to the UK?

6.4 Chapter Summary

Across the multi-disciplinary themes displayed in Figure 6.2, the moderated motives and associated barriers generated meaningful insights to appreciate the impact towards UK automotive manufacturing supply chain reshoring.

This research shows the theoretical underpinning of lean and agile theoretical concepts are at the core of the motivation to reshore elements of the supply chain, within the boundary of UK-based automotive manufacturing. In doing so, four moderated factors (close proximity, responsive supply chain, OEM influence and competitiveness) from the multi-disciplinary research themes were determined as motives to reshoring, and two moderated factors (supply chain capability and global sourcing strategy) were determined as barriers to reshoring. Articulation of the unique Figure 6.2 Dynamic Reshoring Decision Framework was informed by the meaningful results of location decision-making, internal and external influencers, moderated motives and barriers, and

underpinning theory of lean and agile; and constitutes an original contribution to knowledge.

Chapter 7: Conclusion

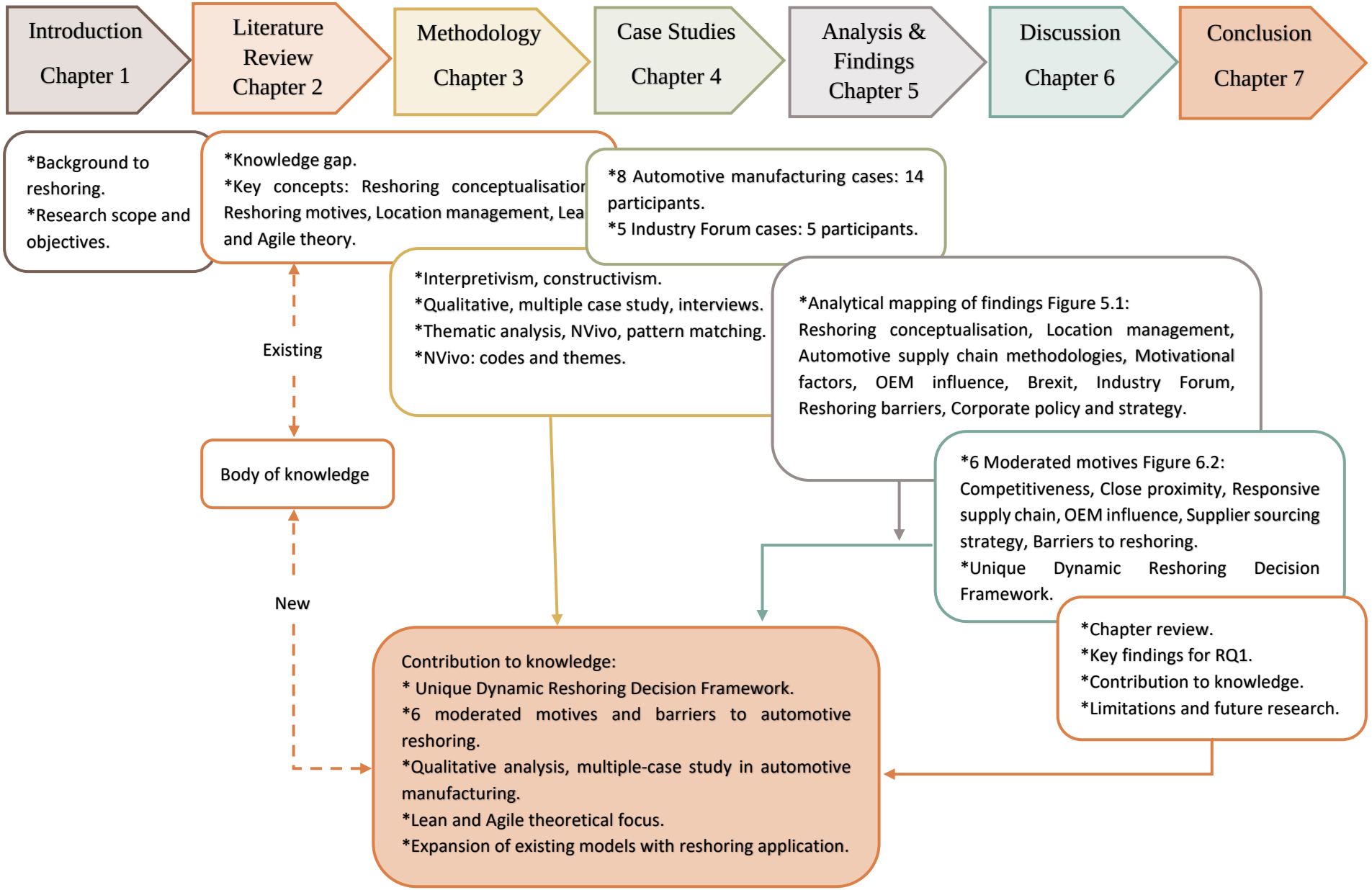
7.1 Introduction

From the identification of the initial research ideas, through the methodological paradigm and discussion of important results; Chapter 7 provides a review and concludes the investigation and research process; firstly, with a review of the outcomes from Chapter 1 through to Chapter 6. The researcher will then address the Research Question (RQ1) and research objectives, with a reflection on the research process. This research draws explicit attention to the contribution of knowledge, from the analytics discussed and furthermore, the unique Dynamic Reshoring Decision Framework. Process mapping of reshoring findings and moderated results is distinctive in this research; and the expansion of existing theoretical models developed to exemplify the position of automotive manufacturing reshoring to the UK.

7.2 Key Findings

The key findings from each chapter are presented in Figure 7.1 and shows the flow and interconnectivity between each chapter, and the closed loop of the unique aspects of this research informing the existing body of knowledge.

Figure 7.1 Key Findings: UK Automotive Manufacturing Reshoring



7.2.1 Chapter 1: Introduction

The background to this research stems from the evolution of manufacturing and sourcing strategies dating back to late 1960's (Dunning and Lundan, 2008; Hatonen and Erikssion, 2009). With manufacturing industry sectors from developed countries embracing the outsourcing and offshoring of manufacturing activities to emerging economies primarily to benefit from low-cost labour and resources. Manufacturing was the number one industry for offshoring pre-2000; thereafter value-creation and innovation became key incentives with knowledge–intensive roles and knowledge-seeking strategy recognised as an important motive for offshoring of advanced tasks (Jensen and Pedersen, 2012; Kennedy and Sharma, 2009).

Changes in offshore conditions have led firms to re-evaluate their supply chain location strategy (Fratocchi *et al.*, 2014), with recent statistics suggesting on average 13.1% of firms with prior offshoring activity, reshored within a period of 9.4 years. Despite the advantages with offshore opportunities, problems with managing geographically dispersed supply chains, challenges with operating at a distance and changes to the external environment, have initiated a review of globalised supply chains and the prospects of reshoring to manufacture locally.

The initial review of existing studies (see Appendix A) confirmed the infancy of reshoring literature and the wide range of gaps for potential research. The strength of existing studies favoured quantitative methodology, a variety of theories, and a generic manufacturing industry focus. Calls for greater depth of research and a focal industry sector and the prominent concepts; coupled with the researcher's professional experience in automotive manufacturing supply chains, prompted the research question(s):

RQ1: Why are UK-based automotive manufacturing facilities motivated to reshore elements of their supply chain to the UK?

To address RQ1, five research objectives were defined, and are addressed in Section 7.4:

RO1: Conduct a literature review pertinent to the research topic to determine the research gaps in the existing reshoring literature and the focus of this research moving forward.

RO2: Design the most appropriate research methodology and method to collect rich viewpoints from participants with experience and knowledge of automotive manufacturing reshoring.

RO3. Critically evaluate the most appropriate analytical process to analyse the empirical data, present the findings and validate the results.

RO4: Critically evaluate the motives for UK automotive manufacturing supply chain reshoring, and in do so, the main barriers that impact UK reshoring.

RO5. Articulate a unique reshoring framework to underpin UK automotive manufacturing supply chain reshoring.

7.2.2 Chapter 2: Literature Review

Chapter 2 addresses RO1 with a literature review pertinent to reshoring and more specifically automotive manufacturing reshoring. The secondary analytics enables the researcher to clearly identify gaps in the existing reshoring literature and articulate propositions to move forward for empirical investigation. These propositions formed the basis of the interview guide with themes and interview questions born from the secondary literature.

Reshoring is a contemporary research area that has evolved substantially between 2014 and 2022. The early published work guided the researcher in establishing clear concepts and themes to pursue forward with the investigation and develop inroads to the appropriate methodological considerations. This Illustrated Literature (Appendix A) and Key Concepts matrix (Appendix B) were valuable in positioning the initial focus of this research. As the reshoring literature has evolved, the research outputs are aligned to the research question RQ1. Thus, more recent literature utilised in the Reshoring Motives matrix will not appear in the Illustrative Literature table (Appendix A) that was developed to initially establish the position of this research.

The key concepts analysed in this chapter include the characterisation of reshoring and defining meaning around those key terms to avoid misinterpretation; location decision-making and location strategy; reshoring motivational factors pertinent to addressing RQ1; the barriers and limitations to reshoring in conjunction with reshoring motives; and the theoretical proposition of lean and agile methodologies in automotive supply chains.

7.2.3 Chapter 3 and 4: Methodology and Case Study

Constructionism is the epistemology underpinning this research, believing that people interpret the social world with their own experiences and from that construct meaning. The context of this study requires the interaction of people who have engaged in automotive manufacturing reshoring for the construction of meaning based on their experiences and understanding of reshoring. The interpretivist paradigm has been employed to understand and explain the reshoring phenomenon in automotive manufacturing supply chains based on the experience of participants and case company facilities. This interpretivist research design allowed for small scale, flexible approach and relatively unstructured to incorporate in-depth descriptions (Weinstein & Foard, 2009).

Qualitative methodology was most suitable for this study with an abductive approach to inquiry allows the researcher to build on existing theoretical frameworks by gaining deeper understandings across the selected case studies from individuals' experiences, beliefs and interpretations from which new meaning and new knowledge can emerge for reshoring automotive manufacturing supply chains to the UK.

The research adopts multiple case study as the most appropriate research strategy, with the capability of addressing 'how' and 'why' research questions in a contemporary and complex social phenomenon whereby the researcher has limited control over behavioural events (Yin, 2014). This enabled the researcher to gain an in-depth understanding of reshoring motivations beyond surface level investigations (Yin, 2014), and explore the intricacies between the customer and supplier influencing reshoring of supply to the UK. Semi-structured interviews were conducted across 13 case studies with 19 senior figureheads from automotive manufacturing companies in the UK and automotive industry forum. Data saturation occurred at interview 18, with the 19th interview providing confidence of data saturation.

7.2.4 Chapter 5: Analysis and Findings

The empirical Figure 5.2 Reshoring Analytical Map serves great importance in visualising the entire empirical findings and enabling the researcher to moderate the important motives from the multi-disciplinary themes. The architecture of the empirical analytical map demonstrates the complexity of the wider considerations motivating UK automotive manufacturing reshoring, and reflects the qualitative methodology employed in this research, illustrating both corroboration and variation in perspectives, and the interconnectivity across themes.

The empirical themes from the analytical process include reshoring conceptualisation, location management, automotive supply chain methodologies, reshoring motivational factors, OEM influence, Brexit, industry forum, reshoring barriers, and corporate policy and strategy. Discussed within each theme are the pertinent nodes in which the theme is developed. These finding offer significant insights into the motivations and related factors influencing reshoring within the automotive manufacturing industry; an original element that is not evident in the secondary literature. This empirical evidence derived from Senior figureheads in the automotive sector, provides quality and reliability of the important aspects for UK automotive manufacturing reshoring.

7.2.5 Chapter 6: Discussion

The significant motives and barriers evident in the findings, form the basis of this chapter. The Analytical Map of the empirical findings enabled this researcher to moderate the important points through the connectivity of multi-disciplinary themes. Triangulation of empirical findings from across the automotive tier structure (OEM, Tier-1, Tier-2) and between industry case studies and automotive industry forum, and the secondary evidence; enabled the moderation of four motives and two barriers across multidisciplinary themes.

Close proximity, responsive supply chain, competitiveness, OEM influence, UK supply chain capability and global sourcing strategies were the most significant contributing factors motivating the reshoring of automotive manufacturing supply chains to the UK. The most recent literature in 2022 is acknowledged to validate the originality of the important results against contemporary research. Encompassing the moderated results, Figure 6.4 Dynamic Reshoring Decision Framework was articulated to address RQ1 and an original contribution of this research.

7.3 Research Question

The research question established in Section 1.2.1 and the focus of this research throughout, was:

> *RQ1: Why are UK-based automotive manufacturing facilities motivated to reshore elements of their supply chain to the UK?*

To address RQ1, the researcher employed the most appropriate method guided by the philosophical paradigm and gaps in the secondary research. Following the analytical process and moderation of findings, the unique Dynamic Reshoring Decision Framework (Figure 6.4) was articulated from the empirical results and is an original contribution to the work.

Section 6.3 discusses the articulation of this unique framework, to encompasses the underpinning theory of lean and agile concepts driving the motivation for UK automotive reshoring. The 6 moderated motives and barriers (Close proximity, responsive supply chain, competitiveness, OEM influence, UK supply chain capability and global sourcing strategies) discussed in Section 6.2 justify the embeddedness of lean and agile theoretical concepts. Five strategic influencers are categorised and linked to the wider sourcing objectives internally and externally: and considerations of the dynamic external environment. These decisions factors draw together the internal reshoring motives and the external dynamics into a combined model. This Dynamic Reshoring Decision Framework addresses RQ1 with informed new knowledge to address why UK-based automotive manufacturing facilities are reshoring elements of their supply chain to the UK.

7.4 Reflection of the Research Process

7.4.1 Research Objectives

The following research objectives were explicit in Section 1.2.3 to satisfy the necessary requirements of this research:

RO1: Conduct a literature review pertinent to the research topic to determine the research gaps in the existing literature and focus of this research moving forward.

A comprehensive review of the reshoring literature was conducted, and the analytical results evidenced in Chapter 2. The Illustrative Literature (Appendix A) enabled the researcher to identify gaps in the available literature and determine the key concepts for further investigation (Appendix B). At the initial stage, the literature was in its infancy and the available gaps were plentiful. Calls for empirical investigations, concentrated industry studies, insightful research, with greater depth, and alternative theory focus were all identified as requiring investigation into the emerging reshoring phenomenon. Key themes and questions within the key themes formed the basis for data collection interviews. The review of relevant literature followed a continual process throughout this research; following data analysis the realignment of the research focus and the moderation of empirical findings, an update of the literature review pertinent to the moderated motives was conducted.

RO2: Design the most appropriate research methodology and method to collect rich viewpoints from participants with experience and knowledge of automotive manufacturing reshoring.

RO2 was satisfied in Chapter 3 and 4. The philosophical paradigm for this research was concluded in Section 3.2 and supported the justification for qualitative methodology. A

multiple case-study empirical framework was employed using semi-structured interviews.

RO3. Critically evaluate the most appropriate analytical process to analyse the empirical data, present the findings and validate the results.

Justification of RO3 was satisfied in Section 3.4. Interviews were transcribed manually to gain clear understanding of the data. Thematic analysis used to analyse repeat patterns in the data and Nvivo employed to aid the organisation of the data with a manual coding process in Nvivo to control and interpret the data according to the interpretivist study. Development of themes and thematic mapping of wider results, to show connectivity across all themes. Moderation of results in Chapter 6 with interconnectivity across multi-disciplinary themes.

RO4: Critically evaluate the motives for UK automotive manufacturing supply chain reshoring, and in do so, the main barriers that impact UK reshoring.

RO4 was satisfied in Chapter 5 and 6. The reshoring motives from the secondary analysis are presented in Section 2.2.5 Reshoring motivational factors. The empirical findings related to RQ1 are presented in Section 5.3 visualised in the Analytical Map (Figure 5.1). The moderated motives across the multi-disciplinary themes are discussed in Section 6.2 and balanced against the most recent literature.

RO5. Articulate a new reshoring framework to underpin UK automotive manufacturing supply chain reshoring.

RO5 was satisfied in Section 6.3. A unique empirical framework articulated from the results in Chapter 5 and Chapter 6, is presented in Figure 6.4 and addresses RQ1. This framework considered the underpinning theory, moderated motives and barriers, strategic influencers, and external factors.

7.4.2 Researcher Reflection

This researcher began the doctoral process with a professional background in automotive manufacturing supply chains and therefore had expectations of the results in the early stages of this research. The lessons learned for this researcher was allowing the research process and results to lead the direction of the study; this was evident in the alignment process following data analysis. Enabling the data to direct the focus of the research question RQ1 in moving forward with a Lean and Agile theoretical focus; and propose future research opportunities from the wider exploration of theory and empirical evidence towards RDT power relations.

Analysis from Chapter 2 initially informed expectations for the dominant motivations for reshoring, to be reduced lead-time, quality, and cost differentials in labour. Whilst cost was a prominent factor in competitiveness and the labour cost included in the TDC, labour cost was not synthesised as a significant motive. Reduced lead-time to increase the synchronicity between supplier and customer was evidenced as a motive driven by the need to reduce cost and increase supply chain responsiveness. Quality was not concluded a motive to reshore. On the contrary, quality from existing offshore suppliers was regarded in some cases as a formidable risk to reshoring, due to the established quality standard with existing offshore suppliers.

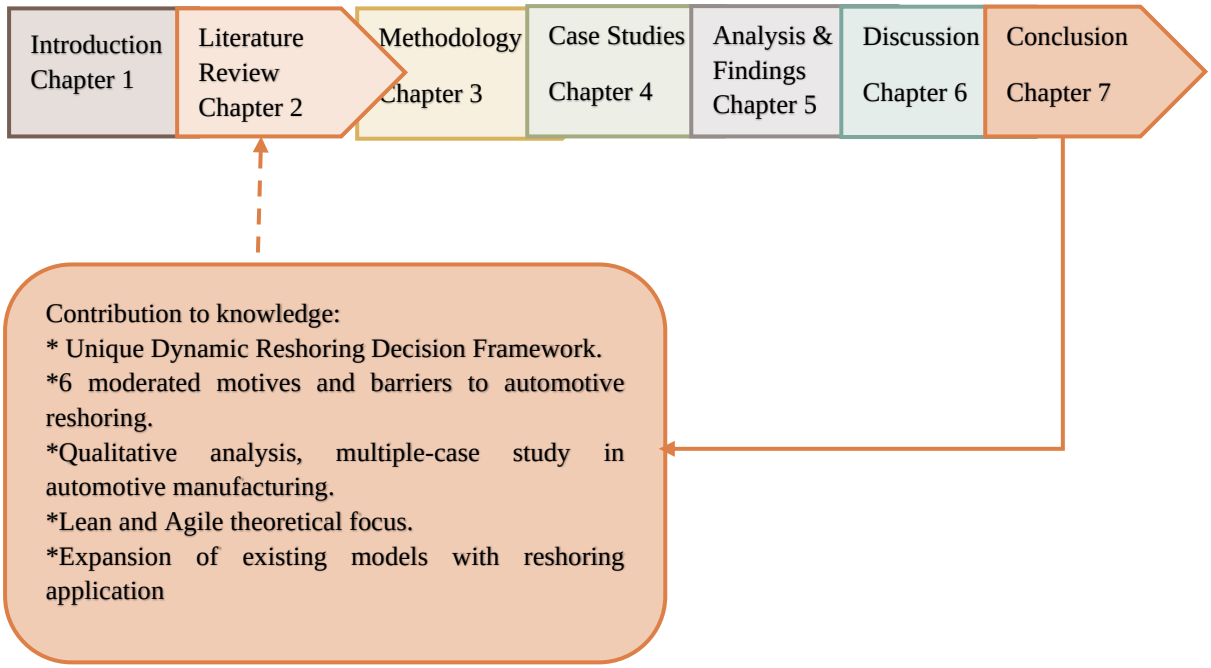
A surprising element not identified in the reshoring literature was the OEMs influence supply chains automotive tier structure, not necessarily in the same direction, but both supply chains heavily influencing supply conditions (directly or indirectly) for OEM competitiveness. Not considering the detrimental impact of that influence to the upstream suppliers at Tier-1 for management process and Tier-2 for decoupling. Whilst technology and digitalisation was discussed in the literature in relation to Industry 4.0, the empirical results did not pertain Inventory 4.0 as a motivation to reshore to the UK.

A change in theoretical underpinning was an unexpected shift following the empirical analysis. Originally this researcher planned to focus on resource dependence theory as a means of investigating the relationship between the OEM and supply chain reshoring, whilst considering the appropriateness of lean and agile. However, it was evident following the analytical process that the scope if the research was too broad (although not lacking depth) and the theoretical underpinning of multiple theories was also too broad. Allowing the empirical evidence to lead the direction, this researcher concluded theory of lean and agile methodologies to be at the centre of motivations for automotive supply chain reshoring.

7.5 Contribution to Knowledge

At the initial stage of this research, there were undoubtably gaps in the body of literature and vast opportunities to build an original contribution to knowledge. Whilst the contemporary reshoring literature has continued to evolve, the position of this research has retained several unique contributions, exhibited in Figure 7.2. The original aspects of this study were established from and within both primary and secondary research and developed across all the analytical chapters (Chapter 2-6).

Figure 7.2 Contribution to Knowledge (extract from Figure 7.1)



7.5.1 Theoretical Focus

Evidence from secondary research shows a variety of theoretical lens were utilised to gain an insightful and clear understanding of reshoring from a wider perspective, including transaction cost theory, resource-based view, internationalisation theory, supply chain management, factor market rivalry. Until now, operations management theories were not a leading viewpoint in the reshoring literature however, the depth of this empirical research verified that, the theory of lean and agile concepts embedded within operations management theory, are positioned at the core of UK automotive manufacturing reshoring (presented in Figure 6.4) and underpin the motivations to reshore manufacturing supply chains to the UK.

The empirical data has led the direction of this research; the realignment of the theoretical focus (presented in Figure 5.1) within the scope of this study was purposive of the empirical evidence. The theoretical position of this research addresses a gap identified

by Ahlstrom *et al.,* (2021) to introduce strategic components to lean and develop abductive field research to refine existing theoretical lenses. The change or shift in strategic sourcing from overseas supply to localised manufacturing from suppliers in close proximity, provides the opportunity for lean applications deemed a necessity for supply chain competitiveness. Justified in Chapter 3 the philosophical position of this study is abductive and designed to gain rich meaningful insights into a leading sector; the application of lean (and agile in some cases) is embedded into the automotive manufacturing industry and evidenced as the underpinning theoretical concepts for UK automotive manufacturing reshoring.

The embeddedness of lean and agile methodologies is motivating UK automotive supply chains to reshore manufacturing supply to the UK, thus changing the design and landscape of UK supply chains; in turn, reshoring supply chains to the UK enables greater supply chain agility. It is therefore argued by this researcher, that reshoring phenomena has the ability to change the theoretical concepts applied in automotive manufacturing industry; thus, embeddedness of theoretical concepts into practice, under the reshoring phenomena, enabling applied practice to develop lean theory concepts.

7.5.2 Expansion of Secondary Models

The adaption and expansion of three theoretical models were utilised in Chapter 2 and Chapter 6. The work of Drauz (2014) is discussed in Section 2.2.2 providing a framework of strategic evaluation and decision-making process for outsourcing and offshoring; and recommends applying only the latter step ‘supplier selection’ or ‘location selection’ in the decision-making process. However, in applying the same process to location decisions, variables in the reshoring terminology (see Table 2.1) extend beyond the one-dimensional process including, characterisation of reshoring definition; intended location proximity to the home market; and ownership of the reshoring facility or supply chain

element. Additional disputes in repatriation arguing location decisions are agnostic of prior offshoring practices with variables requiring wider considerations (Gray *et al*., 2013; Bals *et al*., 2016), therefore step 1 to 3 in Figure 2.2 are necessary and justified. The researcher adapted Figure 2.2 the values and characteristics associated with reshoring location decisions, and the appropriate steps. Articulating this framework, the work of Drauz (2014) includes decision steps for outsourcing and offshoring and refers to re-insourcing. The construction of reshoring steps and characteristics determined from analysis in Chapter 2, compliments the work of Drauz (2014) by adding a fourth dimension to the model with defined reshoring characteristics for each process step. In adapting this theoretical model, the rational and staged approach could be valuable to case companies such as Case F, who self-declared making irrational outsourcing and offshoring decisions prior; or Case D, who have offshore-outsourced production and reshored supply with limited operational control of the location decision process.

Figure 2.1 Reshoring Options contributed to theory by moving beyond the work of Gray *et al.* (2013) and Ashby (2016) to critique the strategic sourcing options through the development of a two-dimensional framework. The researcher articulates the framework utilising the determined reshoring characteristics of ownership and location (in Section 2.2.1) and the reshoring options available for transition between location strategic decisions making and make or buy options.

This framework additionally provides a practical assessment tool for manufacturers to understand their existing sourcing strategy and the potential to transition based on capability (including available capacity). The application of Figure 2.1 is applied to this case research and demonstrated in Section 6.2.6.

Lean and Agile are positioned in this study as the underpinning theory driving the motivations of UK automotive manufacturing reshoring. Qamar and Hall (2018) offer a Lean and Agile Automotive Supply Chain Framework that reflects firms operating in the upper tiers of supply chain (typically at Tier-1 suppliers and OEMs) generally adopt a lean manufacturing strategy, whilst organisations lower down the supply chain are more likely to implement an agile strategy (Qamar and Hall, 2018); and position the decoupling point for lean and agile strategies to converge at Tier-2 (Figure 2.3). The researcher has chosen to utilise the framework by Qamar and Hall (2014) and adapt the model at three points in this thesis, providing consistency and clarity for the reader, with a framework directly relevant to the underpinning theoretical position of this research.

The adapted LAASC Figure 2.3 compliments the work by Qamar and Hall with alternative visual interpretation of the framework, with the automotive Tier structure guidance of lean and agile applied strategies within the tier structure.

Figure 6.1 shows a simplistic interpretation of the automotive tier structure and the position of the empirical Case's within the tier structure. The scope of this research focuses on the OEM, Tier-1 and Tier-2 suppliers, and Industry Forum from National and Regional automotive governing bodies, and aids clarity for the reader in discussing the applied terms in Chapter 6.

Figure 6.3 further extends the work by Qamar and Hall (2018) to reflect reshoring directives and the implications within the automotive tier structure. From the OEM perspective results determine two strategies: local focus with a reshoring directive to achieve 60% true local content; and global focus with mandated (directed) supply at Tier-2. In both strategies, this model illustrates the directives from the OEMs to the Tier-1 suppliers to manage the 'scenario', and the impact of that 'scenario' residing at Tier-2.

This depth of understanding of reshoring in applied terms, with the underpinning lean and agile theory driving the motives, moves ahead of Qamar and Hall (2014) and the contemporary reshoring literature in 2022, by Barbieri *et al.,* (2022); contributing to the development of knowledge and practice.

7.5.3 Methodology

The Illustrative Literature (Appendix A) evidences the methods applied in existing reshoring studies and the call for in-depth analysis of empirical research and concentrated industries. Reshoring studies thus far have predominantly followed a quantitative approach with the use of surveys and secondary data analytics; whilst few qualitative studies have undertaken empirical methods although these are cut across various industries and countries. This research contributes to the methodological gaps by conducting qualitative research to gain rich meaningful insights to this contemporary research topic. Kim and Chung (2022) summarised the methods of thirty existing reshoring studies, confirming a mix of conceptual research, case studies and survey-based research pertinent to the motives and drivers of reshoring, from 2012 to 2021, from companies located in US, Europe and UK, and within a wide range of industries and markets. Whilst UK location, case study method, and automotive industry were all elements considered to a greater or lesser extent in the reshoring literature, these are independently considered across the range of studies and combined with other location and industry sectors. This research adopts a concentrated approach and focuses on quality (over quantity) and depth of meaningful insights, by defining the boundary of UK-based companies, in automotive manufacturing, qualitative methodology using multiple-case study method; that previous research does not analyse. The conceptual framework was designed to address gaps in the method identified in Appendix A. Illustrative Literature, and evidence by Kim and Chung (2022) confirms that gap remains in 2022.

Chapter 3 justifies the methodological choices made, following Yin (2014) with a multiple case study empirical framework specifically within UK automotive manufacturing industry. The use of semi-structured interviews supports the abductive research approach with the ability to move back and forth and be flexible within the research, this was demonstrated in the alignment of theoretical focus, demonstrated in Figure 5.1 Evolved Research Position. The research design employed 19 interviews participants at Senior Manager level, from the automotive tier structure (OEM, Tier-1, Tier-2) and Industry Forum from National and Regional automotive governing bodies. This empirical design is not typical of the existing reshoring literature and contributes quality and reliability to the body of knowledge.

The analytical findings of this research are presented in Chapter 5. Whilst thematic analysis and the mapping of empirical results is not a new method, within the body of reshoring literature this analytical mapping is not evidenced in any of the existing reshoring studies. The presentation of these findings in the Reshoring Analytical Map (Figure 5.2) enables the reader to view the bigger picture and the interconnectivity of findings across multiple-disciplinary themes and facilitates moderation of the important points addressing RQ1.

7.5.4 Moderated Reshoring Motives for UK Automotive Manufacturing

The most prevalent concept in the reshoring literature focused on the motivations to reshore manufacturing supply to the home country and formed RQ1 to understand why UK-based automotive manufacturing facilities are motivated to reshore elements of their supply chain to the UK. Secondary analytics showed reshoring motivations to be widespread factors, with data from a multitude of industries (due to the contemporary research field). Table 2.3 provides a complete listing of all identified motives to reshore, with the most repetitive (categorised more than ten studies) being: narrowing differentials

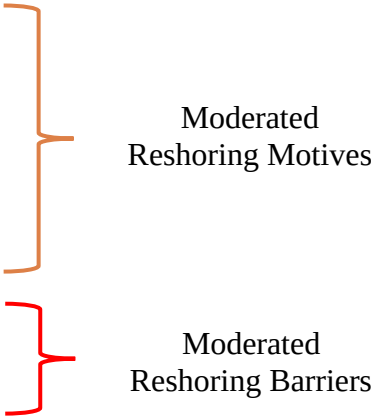
in labour cost from the host country, quality of product from offshore supply, reduced lead-time to market and supply chain flexibility. Motives with moderate repetition (categorised more than five studies) included: availability of skills, innovation and automation, supplier speed and reliability, management coordination costs, currency exchange, risk of intellectual property theft, global economic crisis, and lack of knowledge. This analysis adds to the work of Baroncelli *et al.*, 2017; Foerstl *et al.*, 2016; Fratocchi *et al., 2014;* Lampon and Rivo-Lopez, 2022; White and Borchers, 2016.

In comparison of the primary and secondary analytics, a clear margin in the motivations for reshoring is verified with evidence from the empirical framework moving beyond the existing literature. Narrowing differentials in labour cost and poor-quality product from overseas suppliers were not considered as motives to reshoring by the empirical cases. On the contrary, Case A explicitly confirmed the product from most overseas suppliers was good quality and reshoring from those suppliers was considered a risk requiring close management. Equally, labour costs from overseas suppliers in comparison to UK suppliers remained a constraint in the TDC for supplier sourcing, therefore restricting cases part of a global platform. Where cases could exercise full autonomy in supply chain sourcing and location, labour costs were not a motivation. Intellectual property, lack of knowledge and innovation were not identified by any of the automotive cases. Empirical results did corroborate select reshoring motives with secondary analysis, specifically, elements of lead-time reduction, speed, and supply chain flexibility; and the cost implications associated with the economic crisis, currency exchange and management costs with offshore supply.

The empirical findings of this research are discussed in Chapter 5 with representation of the entire empirical data and illustrated in Figure 5.2. The moderation of these empirically defined motives is based on repetition from across the empirical framework,

and the interdisciplinary of motives in cross-cutting themes, to determine the most important factors to address the research question RQ1. In doing so, this research presents four moderated reshoring motives and two moderated reshoring barriers as the most significant influential factors considered by UK-based automotive manufacturers in the process of making reshoring decisions for their supply chain, illustration of moderated motives in Figure 6.2:

1. Close proximity
2. Responsive supply chain
3. Competitiveness
4. OEM influence
5. Global sourcing strategy
6. Supply chain capability



The six moderated factors provide meaningful insights and clarity to comprehensively interpret why UK-based automotive manufacturers are motivated to reshore supply to the UK, and the crucial barriers inhibiting the extent of UK supply chain reshoring. The cost-related motives identified in the literature partially corroborate with point Competitiveness motive. Exceeding this, the new empirical results confirm total delivered cost (TDC) is the most interpreted consideration for competitiveness motive. TDC incorporates the automotive characteristics of quality, cost, delivery, with high demand from the OEM as the leaders of TDC. The connectivity of OEM influence motive has significant impact on the necessity to be competitive.

The originality of the OEM influencing reshoring upstream, is verified in this research with impact up the supply chain to Tier-2 manufacturing and is vacant from the existing reshoring knowledge. A unique aspect to the OEM influence in one supply chain is the

directive imposed on Tier-1 suppliers to achieve 60% real local content meaning, Tier-1 suppliers must source 60% of their manufacturing purchases such as raw materials, from Tier-2 suppliers manufacturing in the UK. The directive substantiated by the OEM, Tier-1, Tier-2, and Industry Forum, authenticated a strategic change in sourcing objectives to reshore and localise as much supply as possible. This localised directive incorporates the essential increase of pound-sterling in the car to negate the cost impact from dynamic external changes, in unprecedented circumstances where supply chain compensation was granted at the interim due to the onset of Brexit. Yan, Ou and Chen (2021) align the changes in import and export tariffs to implicate the decision to reshore when import tariffs rise; this corroborates in partial with the changes in exchange rate affecting the competitiveness of companies operating in the UK with offshore supply chains. Exceeding that element, the empirical results focus on the role of the OEM influencing the decision to reshore supply to the UK to negate the exchange rate impact with an imposed reshoring directive.

The OEM directive to reshore 60% real UK content, and the OEM mandated supply at Tier-2/3, whilst objectives differ by OEM the imposed implications present similarly upstream. Figure 6.2 displays the reality of both the directive for localisation and mandated supply; with the objectives imposed by the OEM onto the Tier-1 suppliers to manage the scenario, be it relocate suppliers or manage the relationship with Tier-2 suppliers; and manipulating the location of the Tier-2 supplier. The controversial viewpoints in both directions were rich.

The desire for increased agility driven from the OEM concluded supplier close proximity the key enabler for lean and agile supply chain, and critical to achieving a responsive supply chain. These considerations support existing knowledge within the lean and agile concepts however, the requirement for close proximity and responsive supply chains as

important motives for automotive manufacturing reshoring is new. Reshoring to achieve greater flexibility is expressed in the literature (Table 2.3); moreover, the need to gain control in the supply chain, increase logistics flows and synchronicity for better inventory management, and respond quickly to customer changes in demand; were deemed important motives connecting the requirement for close proximity and responsive supply chain. Critical components for reshoring are summarised in Table 5.2 as dimensionally large and heavy product; production line-stop parts, high volume and high value components, non-labour-intensive manufacturing processes, product requiring synchronisation to the OEM vehicle assembly line, and components manufactured by poor performing suppliers. Emphasis was given to reshoring alloy wheels production to the UK although consolidated demand across the different UK-based OEMs would be required to justify the investment, although narratives highlight the barriers in OEM collaboration and communication.

Lean and agile theory being the underpinning theoretical lens, at the core of reshoring motives, the necessity to be lean and the requirement or desire to be agile, is the underpinning theory that drives the reshoring motivation of competitiveness, close proximity, responsive supply chain and OEM influence. The significant barriers to reshoring included UK supply chain capability and restrictions from global sourcing strategies; these moderated barriers provide clarity of the limitations for UK automotive reshoring extending studies, whereby limitations have focused on shortages in skilled labour and energy costs in the UK.

The most recent work of Barbieri *et al.*, (2022) positions manufacturing firms with cost reduction and efficiency-seeking relocation strategies, to emend their prior offshoring location decisions to seek relocation in a third country (RTC). Further concluding that firms with a market-seeking location strategy whereby market advantages have been

depleted in the host (offshore) country or a shift in strategy is apparent, are more likely to relocate to the home country (RHC). This research corroborates part of the latter aspects of Barbieri *et al*., (2022) with empirical results confirming a shift in supply chain strategy resulting in a directive to reshore to the home country. The directive from the OEM is to achieve 60% real local content in the car and currently transitioning from a globalised to a localised supply chain strategy.

The OEM has imposed this directive to reshore onto their UK Tier-1 suppliers to source Tier-2 product manufactured in the UK (refer to Figure 6.3 for visual clarification). This shift could be categorised as reshoring for market-seeking advantages, with empirical evidence fostering the advantages of supplier close proximity to enable a highly responsive supply chain and links to the desire for OEMs to increase the levels of agility in their supply chains.

Several factors in this empirical research move beyond the recent conclusions of Barbieri *et al.,* (2022) including the concentrated focus on UK-based automotive manufacturing to provide clarity and focus in a leading industry sector, enabling greater depth of meaning from a reliable empirical framework, that exceeds the amalgamated and generalised manufacturing industry. Secondly, from the six moderated factors verified in Section 6.2, competitiveness is authenticated as a leading motivation for UK-based automotive manufacturing reshoring to the home country, or as close to the home border as geographically possible. Section 6.2.3 substantiates cost-focus and efficiency at the forefront of competitiveness therefore, this empirical evidence conflicts with Barbieri *et al*., (2022) view of efficiency-seeking strategies relocating to a third country, whilst acknowledging the possibilities, this cost-focused and efficiency seeking empirical framework argues automotive manufacturing companies reshore to the home country for cost and efficiency advantages.

The theoretical underpinning of this research is determined through the embeddedness of lean and agile theoretical concepts. Whilst the 2022 literature evaluates different theoretical positions to determine why reshoring has become a developing phenomenon, the consideration of lean and agile theoretical concepts driving reshoring motivations, is vacant. This research enhances meaning in addition to the theoretical considerations of Barbieri *et al*., (2022) by determining lean and agile as the theoretical foundations and verified empirically, that underpin the motives for UK automotive manufacturing reshoring.

7.5.5 Unique Dynamic Reshoring Decision Framework (DRDF)

Positioned in Section 6.3 is a new reshoring framework developed entirely from the triangulated empirical analysis. Within the reshoring literature there are many theoretical models to address different concepts related to reshoring, for example, Dunning's Eclectic Paradigm used by Barbieri *et al.*, (2022) was utilised to assess reshoring motives as efficiency-seeking or market-seeking strategies. Drauz (2014) evaluation process for location decision-making, supports the decision process with a step-by-step approach to outsourcing and offshoring; the model was further adapted by this researcher to include insourcing and reshoring with the characteristics and conceptualisation defined in 2.2.1. Kim and Chung (2022) developed a mathematical supply chain model to analyse the reshoring motives for manufacturing centres and supply chain facilities to the home countries, incorporating management perceptions and aspects from government experiments. Aspects from Kim and Chung (2022) are broadly considered factors incorporated into this unique framework, analysis of reshoring motives for manufacturing and supply chain facilities, management viewpoints and an element of governing body. Conversely, the methodological paradigms differ significantly in breadth and depth. Barbieri *et al.,* (2018) presents strategic decision factors driving reshoring from the

external environment including access skills and knowledge, external labour costs, external customer issues, lack of skills, risk, and supply chain management issues such as poor infrastructure. In acknowledging these external drivers are the motives identified within Figure 5.2; the external influences in Figure 6.4 focus on the dynamic changes to the external landscape for example, Brexit and the direct impact from the exchange rate fluctuation having influence on reshoring to the UK; changes in UK Government affecting investment and funding for UK supply chain development in diminished sectors and regions; and the layers of influential factors that begin to unravel and implicate other motives such as, the change in supply chain strategy by the OEM having influence on the upstream supply chain.

Surpassing frameworks in the most recent reshoring literature, this unique Dynamic Reshoring Decision Framework (Figure 6.4) was developed entirely from the empirical analysis to include the underpinning theory focus (7.5.1), moderated reshoring motives and barriers (7.5.4), strategic decision influencers and the dynamic external environment (Section 6.3).

Figure 6.4 draws on the original theoretical elements and positions lean and agile theoretical concepts and applied methodologies at the core of this reshoring framework. The method from which the analytics gain depth of meaningful insights adopt a qualitative approach within the concentrated UK-based automotive manufacturing industry and case study interviews with Senior Figureheads in automotive OEMs, Tier-1 and Tier-2 suppliers, and National and Regional Industry Forum. The moderated reshoring motives and reshoring barriers are underpinned with the embeddedness of lean and agile theoretical concepts, and the highly dynamic external influencers that accelerate or impede or autonomise the case company decision to reshore supply to the UK.

The integration and corroboration of these original aspects add value with a contribution to theory, and the potential to contribute to practice through increased awareness of UK supply chain capability, supporting reshoring decision making, and aiding the development of automotive industry roadmaps to develop capability and shape policy. Figure 6.5 utilises the moderated reshoring motives and barriers (section 6.2), the desirable components for UK reshoring (Table 5.2), and the underpinning lean and agile methodologies as inputs to assess the UK supply chain capability. This key element at this stage of the process is engagement with Industry Forum, utilised in the form of a supply chain knowledge centre. The output from assessment enables the case to either practically move forward with existing supply chain reshoring opportunities, investigate potential capability, and contribute data back into the reshoring-knowledge process. In addition, Industry Forum can utilise the data to assess cumulative options and as a means for developing roadmaps and shaping policy. This collative framework supports Figure 6.5 Dynamic Reshoring Decision Framework and aims to scaffold reshoring-knowledge and awareness through the engagement with automotive Industry Forum, contributing data to and gaining knowledge from an evolving central point for UK automotive supply chain information.

7.6 Limitations and Further Research

The researcher recognises that all research has limitations, the boundary of this research is justified in Chapter 3. Limitations in the areas of sectoral and industry focus, geographical specific, methodological approach, and theoretical lens are identified.

Emphasis in this study is placed on the manufacturing sector and this does not include manufacturing R&D. When conducting this study, the researcher did not have open

access to participants in case study R&D centres. R&D services in the manufacturing industry are often offshore (particularly for large multinational companies). Service sector reshoring is also not considered within this research, although delivery service levels within the manufacturing supply chain are discuss. Future research may focus on the service aspects and the impact to the end user following supply chain reshoring.

This research focuses on operations management theory of lean and agile (or Leagile) methodologies as the underpinning theory, following the realignment of the research focus at the analytical stage. Resource Dependence Theory was initially proposed to investigate reshoring with consideration to the power relationship between OEM and upstream suppliers. Due to the breadth and scope of this study, RDT theory remains a proposal for future research output, recognising the potential to further compliment this research adding to the body of knowledge.

Empirical data is limited to UK-based automotive manufacturing companies who have actively reshored elements of their supply chain, and public sector automotive governing bodies. Justification of the empirical framework is discussed in Chapter 3; the rationale for adopting an automotive focus was based on the strength of the industry, automotive reshoring activity and call for specific industry focused studies within the existing reshoring literature. Further opportunities exist to test the applicability of this research in other leading industry sectors for example, rail, textile and apparel, electronics and so on, using primary data where accessible and/or building on secondary research.

Multiple-case study methodology is applied in this research from a UK perspective and is restricted to UK-based automotive manufacturing facilities and UK automotive governing bodies, without size restrictions. It is possible within MNEs, the geographical boundary of data could obscure the global company perspective, despite explicitly

considering global sourcing strategies as a moderated barrier; therefore, future research may consider a single MNE case study with data from globally diversified facilities. In particular, the corporate political trajectory on reshoring across global facilities would be explicit, and inclusive of R&D functions may prove accessible.

The researcher adopts a qualitative methodology appropriate for the researchers' core skills and to gain in-depth rich empirical data through semi-structured interviews; it is however recognised that the use of interviews can limit the quantity of participants within a given study based on available resources and participant access, in contrast to quantitative survey. Many of the existing reshoring studies adopt a survey or secondary data approach across multiple industry sectors (see Illustrative Literature Appendix A) due to accessibility constraints in which gaps are identified for in-depth case study investigations.

Adopting the right-shoring strategy corroborates with the work of Kim and Chung (2022) from a closed-loop supply chain perspective; inferring the benefit of the right-shoring decision should be for the supply chain and not an individual node. What appears to be a *right-shoring* decision for the OEM may not be the right-shoring decision for the connected supply chain, and so this author positions further investigation is required to examine the right-shoring decision from end-to-end supply chain.

Appendices

Appendix A: Illustrative Literature (IL) for Initial Research Position

Literature Summary							Focus Areas Framing Gaps:			
IL Study No.	Author	Method	Research Position (sector and location)	Paper Summary	Theory Focus	Gap(s) Identified for Future Research	Lean and Agile Theory	Resource Dependence Theory	Automotive Industry	Reshoring (elements of) Supply?
1	Arik (2013)	Secondary data	Conceptual	Provides theoretical propositions to test strategic management and international business theories on reshoring dynamics, location decision making and market entry strategies.	Location theory	Analysis of processes leading to the discrepancy between initial estimated cost and total actual cost of offshoring from a firm-level strategic management perspective. Investigation into the firms' response on government incentives.	No	No	No	No
2	Arlbjorn and Mikkelsen (2014)	Questionnaire survey	Danish manufacturing industry	Demonstrates company size influences the participation rate of insourcing/outsourcing, offshoring/back-shoring activities. Highlight supply chain design and innovation to be viewed as dynamic capabilities for contemporary competitive advantage.	Internationalisation	Antecedents, motivators, and barriers of the use of globalisation strategies from a longitudinal perspective. Research in supply chain design as a dynamic capability. Explore to what extent automation can maintain jobs in home country. Explore how ambidexterity as a dynamic capability supports dynamic globalisation strategies and supply chain design.	No	No	No	Yes
3	Bailey and De Propris (2014)	Case study interviews	UK automotive manufacturing	Investigates the current scale, limitations, and drivers of reshoring from a GVC perspective, proposes a service and manufacturing hybrid model. Emphasises the role of government for skills development and finance to support manufacturing reshoring to the UK.	Internationalisation	Alternative theoretical lens: Resource dependence theory Resource/knowledge-based theory SCM theory Transaction cost & capability	No	No	Yes	No
4	Bishop (2011)	Case study interviews	U.S. & China apparel industry	Argues creating a lean enterprise and embracing technology are key to reducing time and cost which tip the scale to manufacture in the U.S.	Practitioner paper	Theoretical considerations and alternative industry considerations.	Partial	No	No	No
5	Ellram *et al.*, (2013)	Survey	U.S. MNE's	Determines government policy impact's location decisions over time. Supply chain factors are becoming increasingly more important, and organisations are moving towards total-cost impact when making owned manufacturing location decisions.	Transaction cost economics	Research into supplier location decision making required. View from an alternative theoretical lens – i.e. resource dependency theory	No	No	No	No
6	Fratocchi *et al.*, (2013)	Secondary data	Various industries & countries	Preliminary characterisation of the main features of back-reshoring operations and motivating factors. Acquisition-led developments favour complex post-merger re-organisation extending de-internationalisation and foreign divestment decisions.	Internationalisation FDI	Is reshoring a 'correction mechanism' of earlier misjudged managerial decisions and is it a temporary phenomenon or stable strategic decision in a dynamic environment? To what extent has the financial crisis moderated company and industry level strategic location decisions? Alternative theoretical position.	No	No	No	No
7	Fratocchi *et al.*, (2014)	Secondary data	Conceptual	Comparison of theoretical concepts, characterising back-reshoring as part of the firms' dynamic internationalisation strategy.	Internationalisation	Is reshoring an emerging strategy to later become intended strategy driving international operations? Home versus foreign location advantages. What specific components are being reshored and rational? Exit/entry modes for de-internationalisation.	No	No	No	No
8	Gray *et al.*, (2013)	Secondary data	Conceptual	Presents 5 assertions framing reshoring as a location decision derived from historical offshoring decisions.	Location Theory	Rich data required to understand the context and drivers of reshoring.	No	No	No	No

						Influence and impact of resources for location decision making.				
9	Jensen and Pedersen (2011)	Survey	Danish cross-sector firms	Determines that firms offshore advanced tasks to access high-quality skills and knowledge driven by the firms' international strategy to achieve competitiveness, over cost saving motives of less advanced tasks.	Internationalisation	Determine tasks and components suitable for reshoring and the motives to return to the home country, through alternative theoretical lens.	No	No	No	No
10	Kinkel (2014)	Survey	German manufacturing industry	Demonstrates the rate of offshore decline in German manufacturing, providing brief descriptors of exit modes and reshoring motives.	Internationalisation	Framework to determine if outsource-back-shoring is a long or short-term strategy. Are local manufacturing companies more important to MNE's or will extensions of global value chains remain the dominating role?	No	No	No	No
11	McIvor (2013)	Conceptual review	Conceptual	Presents complimentary and contradictory prescriptions for outsourcing manufacturing using transaction cost economics and resource-based view theory.	Transaction cost theory and resource-based view	Location decision making through resource dependence theory.	No	No	No	No
12	Silveira (2014)	Survey	International metal/machine manufacturing	Indicates supply and design offshoring is positively related to the competitive importance of cost and flexibility, but not delivery, through an internationalisation lens.	Internationalisation	Requires analysis of alternatives to offshoring i.e. reshoring and from alternative theoretical perspective.	Partial	No	No	Yes
13	Slepniov, Waehrens and Johansen (2014)	Mixed-methods enquiry	Scandinavian MNE's & SME's	Implications of strategic roles and locations of manufacturing for innovative capabilities for potential offshoring success.	Location theory	Relationship between the scale and scope of 'reshoring' and the role and capability of the home country, specific to automotive manufacturing.	No	No	No	No
14	Tate (2014)	Survey	U.S. various industries	Presents motivating factors and the attractiveness of the U.S. for organisations reconsidering their shoring decisions.	Factor market rivalry	Determining the 'right-shoring' decision based on available resources and customer influence (resource dependency theory). Examining reshoring through the lens of factor market rivalry considering strategic and non-strategic resources. Is reshoring an expansion to the make or buy study?	No	No	No	No
15	Tate *et al.*, (2014)	Survey	U.S. manufacturing industry	Determines key factors through factor market rivalry lens that affect companies' manufacturing location decisions and associated risks, demonstrating the changing importance over a 6-year period.	Factor market rivalry	Scenario planning/model to support long-term shoring decisions (practical model) encompassing the availability and dependency of resources through resource dependency theory.	No	No	No	No
16	Thun and Hoenig (2009)	Survey	German Automotive Industry	Determines globalisation, product variant and outsourcing as top 3 drivers of supply chain risks, with offshoring presenting greater supply chain vulnerability due to complexity. Companies with high implementation of supply chain risk management results in greater supply chain performance.	Supply chain risk management	To what degree will reshoring affect supply chain risks and supply chain vulnerability, application in the UK automotive industry?	Partial	No	Yes	Yes
17	Gylling *et al.*,(2015)	Case study	North European bicycle manufacturing	Suggests reshoring is a manufacturing location decision, which is fraught with risk and based on limited information available then simplified. Suggests there is a misalignment of location choice in MNEs at factory and network level; with volatility and uncertainty requiring local production.	Transaction cost economics	Broad qualitative and quantitative factors require consideration in location decision making. Case based SME does not allow interpretation and generalisation of results. Understanding of the non-product related costs over the entire product range. Alternative theoretical lens.	No	No	No	No
18	Ancarani *et al.*, (2015)	Secondary data	U.S. and EU multiple industries	Focuses on the duration of foreign ventures and the reshoring exit strategy. Discusses motives for reshoring and drivers of location decision, differentiating location-specific advantages and firm-specific and product-specific characteristics. Literature mapped onto Dunning's eclectic paradigm.	Internationalisation - DEP	Alternative theoretical perspective. Qualitative analysis with empirical data.	No	No	Yes	No
19	Fratocchi *et al.*, (2015)	Secondary data	U.S. and EU multiple industries	Categorises and defined back-reshoring as a non-linear internationalization process. Provides a literature review for motivations of back-reshoring strategies from academic and	Internationalisation	Alternative theoretical perspective. Qualitative analysis with empirical data. Development of new model.	No	No	Yes	Yes

				newspaper evidence, of various industries including automotive, and countries. Uses secondary data for hypothesis.						
20	Foerstl *et al.,* (2016)	Conceptual review	Conceptual	Conceptual approach through transaction cost economics and organisational buyer behaviour theories. Develops a theoretical framework for reshoring and insourcing decisions and evaluates reshoring and insourcing drivers. Discussed future research directions.	Transaction cost economics and organisational buyer behaviour	Alternative theoretical framework. Empirical data analysis within a specific sector.	No	No	No	No
21	Kinkel (2012)	Survey	German manufacturing companies	Focuses on the motivations of production relocation and backshoring decision making, with emphasis "dynamic" changes and compares pre and post economic crisis results. Hypothesis testing across German manufacturing industries including automotive manufacturing. Recommends scenario-based decision-making tools for the assessment of production locations based on bandwidths of criteria in different scenarios.	Location theory	Alternative theoretical perspective. Empirical data analysis within a specific sector. Qualitative analysis.	Partial	No	Yes	Yes
22	Dachs and Kinkel (2013)	Survey secondary data	European manufacturing companies	Analyses data from the European Manufacturing Survey (EMS) of over 3300 companies. Focuses on the rate of backshoring across different regions and changes pre and post the economic crisis; analyses backshoring at different industry levels and motivational factors.	Internationalisation	Comparative studies of diverging back sourcing patterns according to countries, sectors, MNEs vs. SMEs and various targeted markets and regions. Alternative theoretical perspective. Qualitative analysis.	No	No	Yes	Yes
23	Drauz (2014)	Case study interviews	German automotive manufacturers and Tier 1 suppliers	Primary focus on re-insourcing following outsourcing decisions within the automotive manufacturing sector, however, make the direct link to offshoring and reshoring decisions. Discusses the motives and drivers and manufacturing strategic decision making which can be aligned to reshoring motives and decision making. Provides figure to depict the process for outsourcing and offshoring which can be expanded further for reshoring.	Benchmarking	Alignment outsourcing/re-insourcing with offshoring/reshoring. Larger sectoral study within the automotive industry, and within UK automotive clusters. Theoretical focus.	No	No	Yes	Yes
24	White and Borchers (2016)	Survey	US MNEs, various	Developing on the work of Ellram et al. (2013) categorising reshoring motivational factors into 8 dimensions and testing the most important and most risk factors.	Transaction cost economics	Alternative theoretical perspective. Qualitative analysis. Concentrated sectoral study. Development of new framework/model.	No	No	No	No
25	Ashby (2016)	Site visits and Interviews	UK clothing industry	Analyses the motives, drivers, benefits and challenged of UK reshoring with empirical evidence from the UK clothing industry. Focuses on the management of supply, supplier relationships and the sustainability of global versus local supply.	Operations management theory	Broader data set (beyond 1 case study) to allow generalisation. Multiple comparative case studies of firms and industry specific reshoring factors. Examine how supplier relationships contribute to reshoring decisions and outcomes, and impact on sustainability.	Partial	No	No	Yes

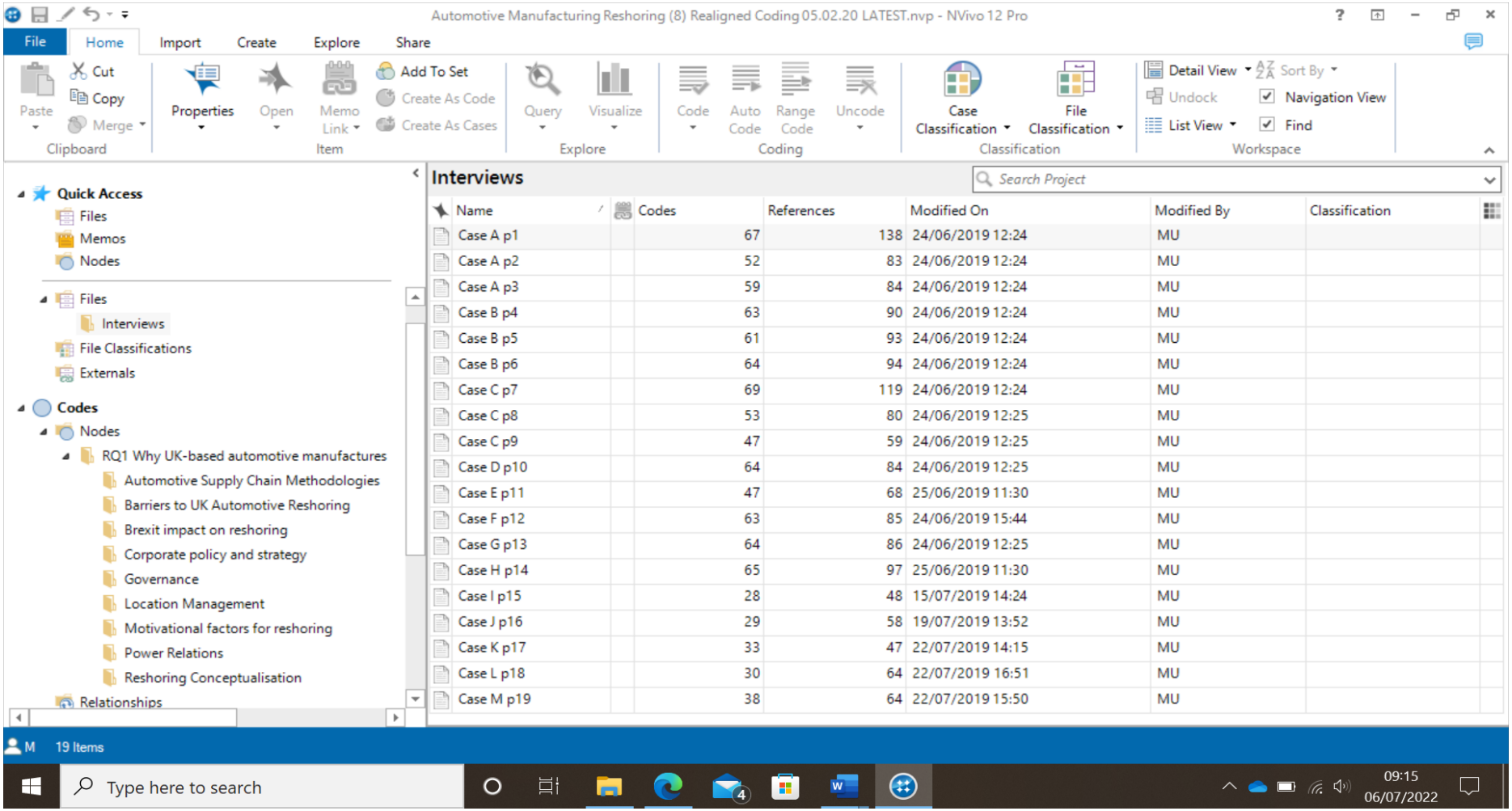
Appendix B: Key Concepts Matrix (from IL)

IL Study No.	Concepts									
	Reshoring Terminology	Reshoring Motives & Drivers	Government Policy	Global Strategies[120]	Supply Management	Location Decision Making	Dynamic Capabilities	Competitiveness	Supply Chain Risks	Barriers and Limitations
1				*		*	*			
2	*	*					*	*		
3	*	*	*	*						*
4		*								
5		*	*			*				
6	*	*		*						
7	*	*		*						
8		*	*			*				
9		*		*				*		
10	*	*		*						
11						*				
12	*			*				*		
13						*	*			
14	*	*				*				
15	*	*				*			*	
16								*	*	
17	*					*			*	
18	*	*				*				
19	*	*		*		*				
20	*	*								
21	*	*		*		*	*		*	*
22		*				*	*			
23		*		*		*				
24		*				*			*	
25	*	*	*	*	*	*				*

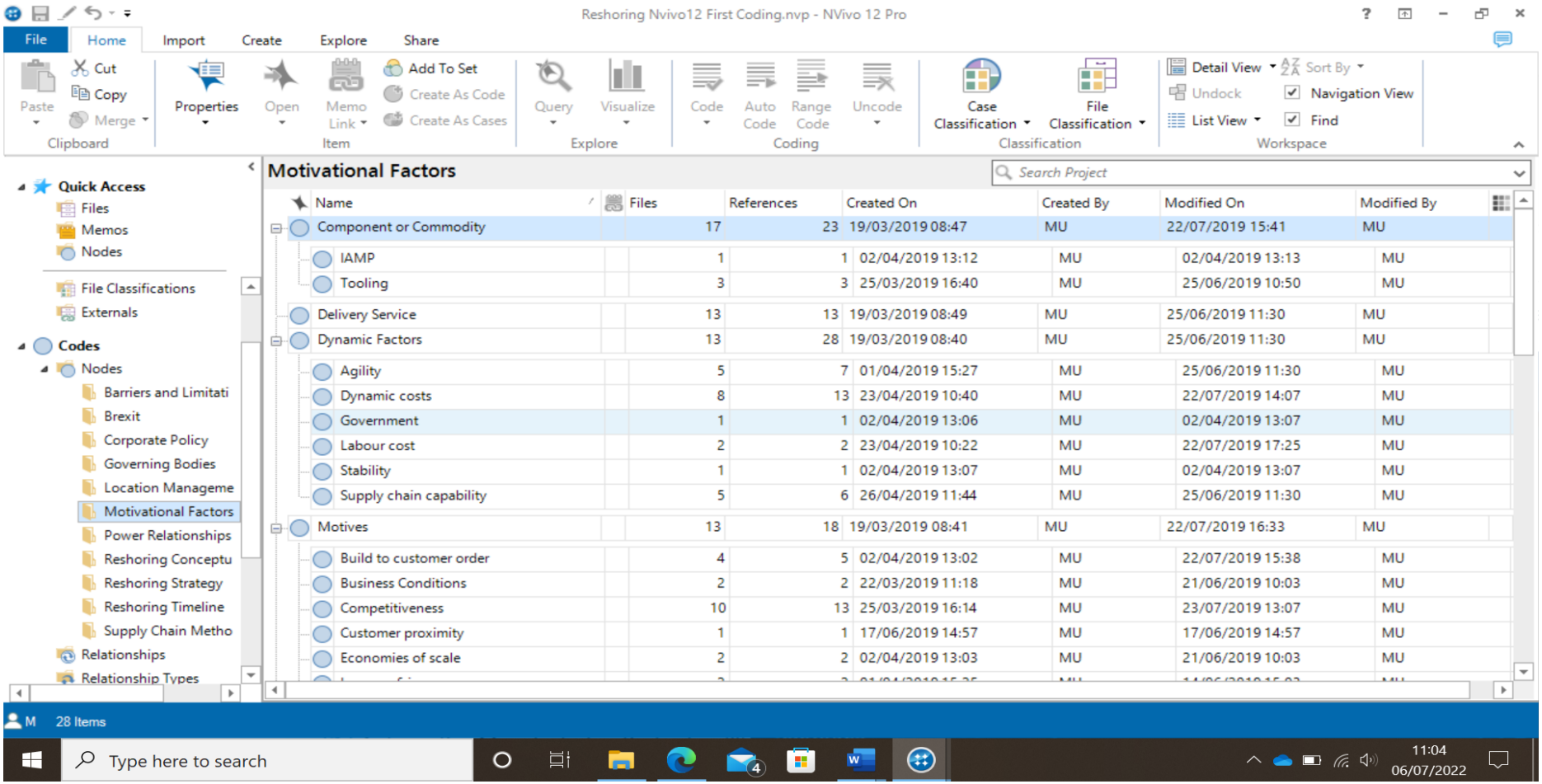
[120] Internationalisation and de-internationalisation are included in global strategies concept.

Appendix C: Sample Data Coding in Nvivo 12 Pro

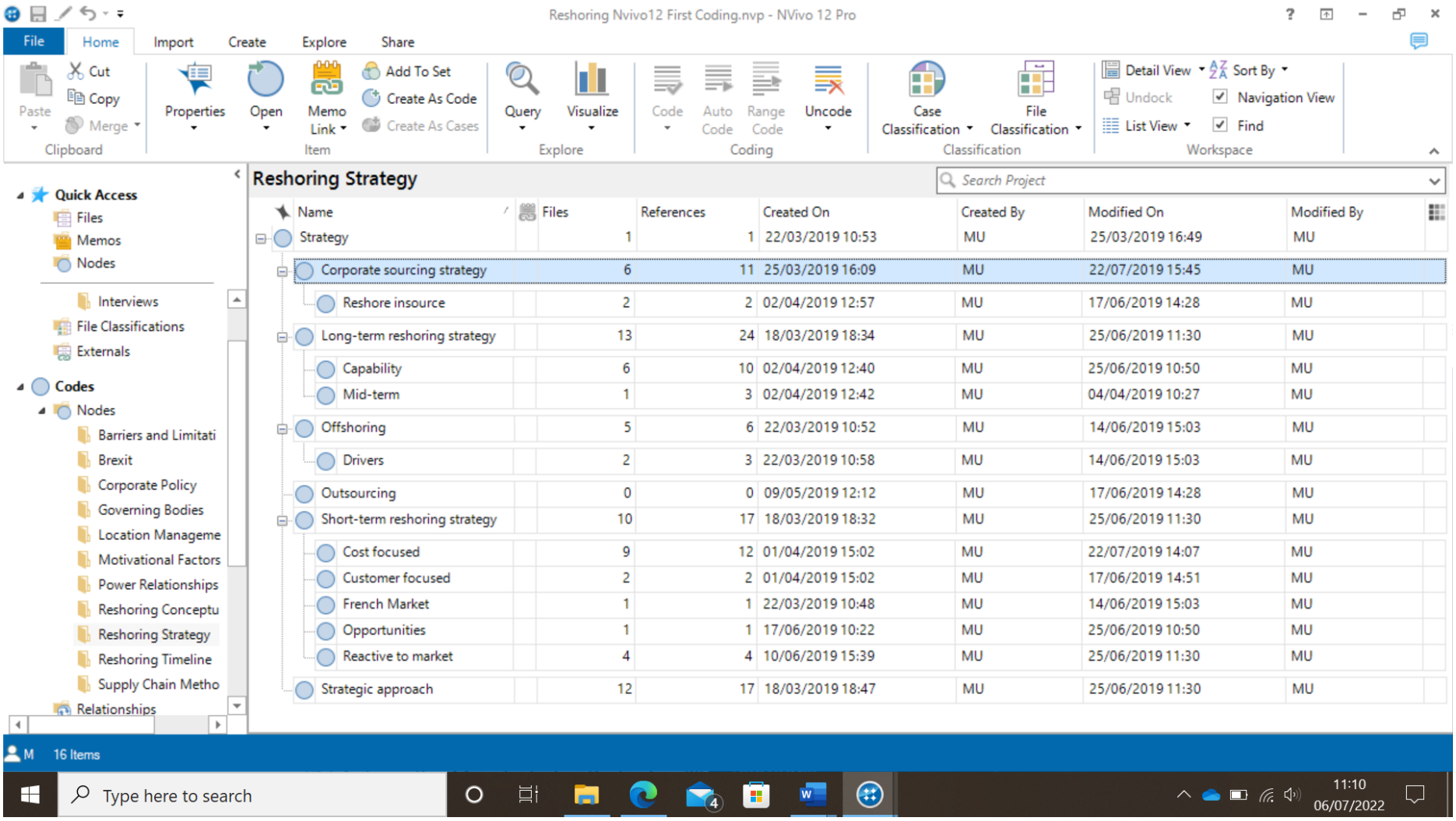
Extract of realigned coding with themes pertinent to RQ1.



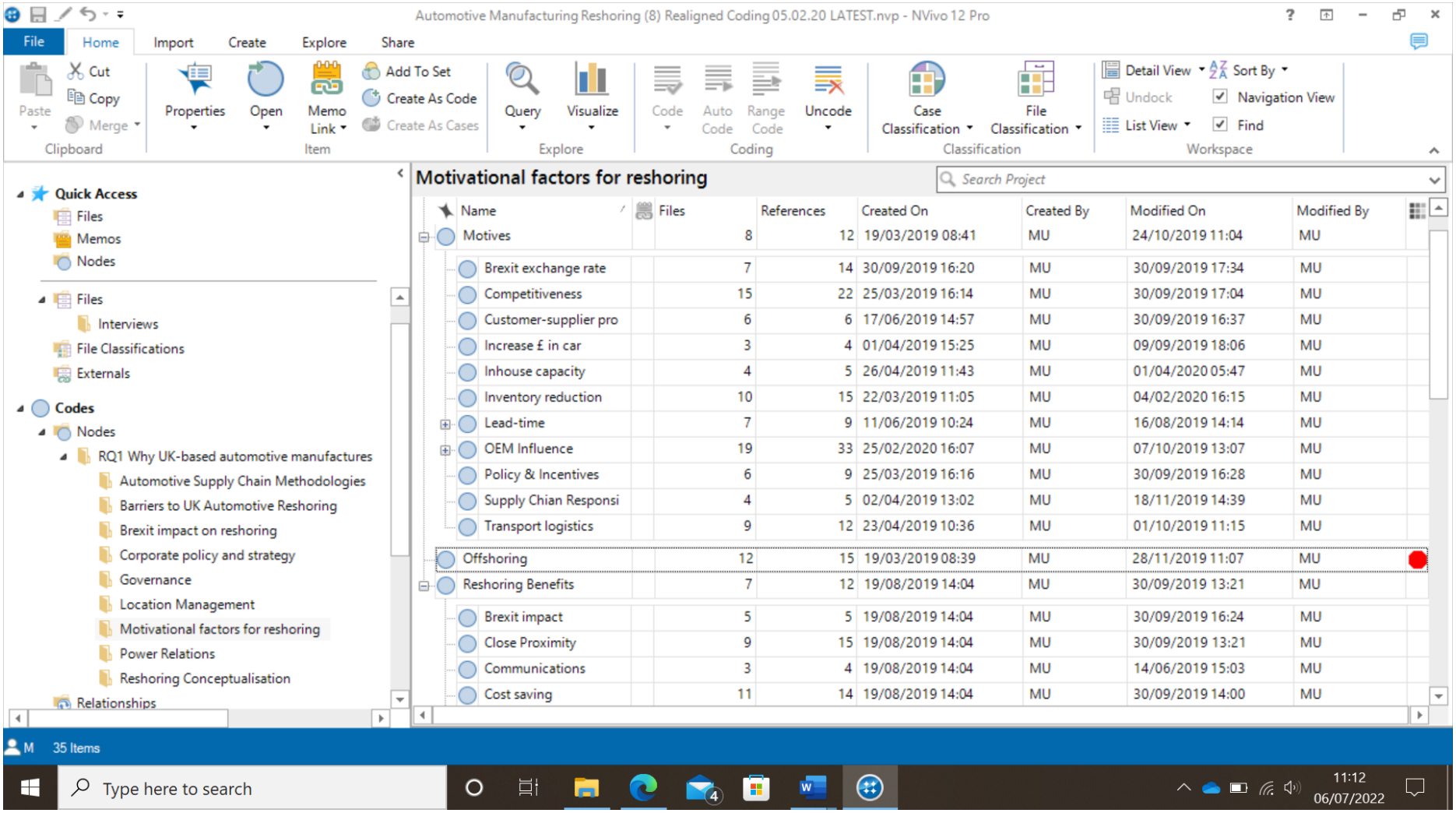
Extract of first coding process, motivational factors theme.



Extract of first coding process, reshoring strategy theme.


Reshoring Nvivo12 First Coding.nvp - NVivo 12 Pro
File
Home
Import
Create
Explore
Share
Cut
Copy
Merge
Paste
Clipboard
Properties
Open
Memo Link
Add To Set
Create As Code
Create As Cases
Item
Query
Visualize
Explore
Code
Auto Code
Range Code
Uncode
Coding
Case Classification
File Classification
Classification
Detail View
Sort By
Undock
Navigation View
List View
Find
Workspace
Quick Access
Files
Memos
Nodes
Interviews
File Classifications
Externals
Codes
Nodes
Barriers and Limitati
Brexit
Corporate Policy
Governing Bodies
Location Manageme
Motivational Factors
Power Relationships
Reshoring Conceptu
Reshoring Strategy
Reshoring Timeline
Supply Chain Metho
Relationships
Reshoring Strategy
Search Project
Name
Files
References
Created On
Created By
Modified On
Modified By
Strategy 1 1 22/03/2019 10:53 MU 25/03/2019 16:49 MU
Corporate sourcing strategy 6 11 25/03/2019 16:09 MU 22/07/2019 15:45 MU
Reshore insource 2 2 02/04/2019 12:57 MU 17/06/2019 14:28 MU
Long-term reshoring strategy 13 24 18/03/2019 18:34 MU 25/06/2019 11:30 MU
Capability 6 10 02/04/2019 12:40 MU 25/06/2019 10:50 MU
Mid-term 1 3 02/04/2019 12:42 MU 04/04/2019 10:27 MU
Offshoring 5 6 22/03/2019 10:52 MU 14/06/2019 15:03 MU
Drivers 2 3 22/03/2019 10:58 MU 14/06/2019 15:03 MU
Outsourcing 0 0 09/05/2019 12:12 MU 17/06/2019 14:28 MU
Short-term reshoring strategy 10 17 18/03/2019 18:32 MU 25/06/2019 11:30 MU
Cost focused 9 12 01/04/2019 15:02 MU 22/07/2019 14:07 MU
Customer focused 2 2 01/04/2019 15:02 MU 17/06/2019 14:51 MU
French Market 1 1 22/03/2019 10:48 MU 14/06/2019 15:03 MU
Opportunities 1 1 17/06/2019 10:22 MU 25/06/2019 10:50 MU
Reactive to market 4 4 10/06/2019 15:39 MU 25/06/2019 11:30 MU
Strategic approach 12 17 18/03/2019 18:47 MU 25/06/2019 11:30 MU
M
16 Items
Type here to search
11:10
06/07/2022

Extract of realigned coding, motivational factor's theme.



Appendix D: Data Reduction Process

Cleansing Phase	Changes Made
Data cleansing phase 1	68 iterative changes made to original data coding; multiple data sets exist in some codes
Data cleansing phase 2	Alterations to codes and themes: (units of data) • Renaming the theme Governing bodies to Governance • Reshoring timeline theme deleted (1) and data recoded to long tern reshoring strategy • Outsourcing code deleted (0) • Opportunities sub-code (1) deleted, data recoded to Short-term reshoring strategy and Governance theme Barrier and Limitations Theme: • Labour cost (5) sub-code moved to sub-code of High UK Costs • Volume (1) sub-code deleted, data recoded to Lack of sales • PPAP costs and OEM approval reallocated to OEM validation • Lack of sales (2) sub-code deleted, data recoded to Competitiveness • Awareness (2) sub-theme reallocated to Governance theme • Cultural change (1) sub-code deleted, data recoded to Global sourcing strategy • Supplier performance (2) sub-code delated, data recoded to End-to-end supply chain • Local sourcing (3) sub-code deleted, data recoded to Investment to improve SC capability • Wider engagement code reallocated to Governance theme Brexit Theme: • Renamed Brexit to Brexit impact on reshoring • Removed Brexit from Barriers (3) and recoded data • Corporate police theme renamed as Corporate policy and strategy • Reshoring strategy theme allocated as code in Corporate police and strategy • Global sourcing strategy code allocated to Corporate policy and strategy theme • Renames Brexit codes to Brexit impact on automotive, and Brexit impact on reshoring • Inventory sub-code (1) deleted, data recoded to customs and trade barriers • Stability (2) sub-code deleted, data recoded to Brexit impact on automotive and Uncertainty Corporate Policy and Strategy Theme: • Corporate policy and strategy data merged into one code • Reallocated reshoring strategy theme to Corporate policy and strategy theme • Corporate sourcing strategy (7) and Reshore insource (2) sub-codes deleted, data recoded to Corporate policy and strategy • Mid-term (3) sub-code deleted, data recoded to Long term reshoring strategy • French Market (1) sub-theme deleted, data recoded to Reactive to market • 11 data references from Short-term reshoring strategy recoded to relevant sub-codes • Offshoring drivers (3) sub-code deleted, data recoded to offshoring • Corporate policy and strategy renamed to Corporate strategy and sourcing policy to incorporate data from Purchasing and sourcing Governance Theme: • Renamed Automotive Council – Automotive governing bodies agenda • Corporate policy (2) sub-code deleted, data recoded to Corporate policy and strategy • Investment (9) sub-code deleted, data recoded to Investment and funding • Wider engagement (15) sub-code deleted, data recoded to Engagement sub-code • Awareness (4) sub-code deleted, data recoded to Opportunities Location Management Theme: • Reshoring benefits code (13) reallocated to Motivational Factors theme • OEM Influence sub-code deleted (6), data recoded to Power Relations and Component Type codes • Close Proximity (10) data reallocated to Component or Commodity and Power Relations • Component Type (14) data merged with Component or Commodity • Shared Logistics sub-code (1) deleted, data duplicated in Inventory sub-code • Changed Nomination Process sub-code to Decision-making Process • Changed Wider Environmental Impact code to Environmental considerations

	• Reallocated data from Supplier Nomination (15) to Decision-making Process Motivational Factors Theme: • Supplier nomination code (3) deleted and data recoded to Decision-making process and Cost focused codes • Delivery service code reallocated as a sub-code to Close Proximity in Location Management • Vessel performance (1) sub-code deleted from Reshoring Benefits – data duplicated in Motives • Drivers (7) sub-code deleted from Offshoring code, where data already exists • Improved quality (1) sub-code deleted, data coded to Cost saving • Motives code (6) data sets recoded to sub-codes within Motives • Renames Build to customer order code, to Responsive supply chain • Business conditions (4) deleted, data reallocated to relevant Motives sub-codes • Economies of scale (3) sub-code deleted, data recoded to Transport logistics and Competitiveness sub-codes • Vessel performance (2) sub-code deleted, data recoded to Transport logistics Reshoring Conceptualisation Theme: • Exchange rate code and sub-codes deleted; (11) iterations of data recoded to Brexit impact on automotive-exchange rate code • Challenges in-house to local outsource sub-code deleted; data recoded to Barriers and limitation's theme • Terminology code (3) deleted; data already exists in Localisation sub-code • Product sub-code (2) deleted, duplicate data • Transport sub-code deleted (1), data recoded to Lead-time sub-code Power Relations Theme: • Renamed On-time availability to Supplier Responsiveness • Reallocated Critical Factors (9) data to Supplier responsiveness • Responsiveness (10) sub-theme deleted; data recoded to Supplier responsiveness • Recoded Automotive mind-set (1) to Critical Factors • Intensity (1) sub-code deleted, data recoded to Anticipation • Visibility (1) sub-code deleted, data recoded t Supplier responsiveness • Expectations and Constraints code deleted, data recoded to Supplier responsiveness • Language barrier (3) and Buffer (1) sub-codes deleted, data recoded to Geographical distance • Performance measurement (2) deleted, data recoded to OEM influence • Relationship (2) sub-theme deleted, data recoded to Customer-supplier relationship code Supply Chain Methodologies Theme: • OEM Influence (3) and Outsourcing (1) deleted, data recoded to OEM Influence in Power Relations theme
Data cleansing phase 3	Organising final key themes: • Reshoring conceptualisation • Motivational factors • Barriers to UK automotive reshoring • Location management and decision making • Brexit impact on reshoring • Corporate policy and strategy • Supply chain methodologies • Power relations • Governance

Appendix E: Sample Interview Transcript

Question Number	Interview Question
1	Can you confirm your position within the automotive tier structure (i.e. OEM, Tier 1, 2 etc) and the product(s) you manufacture? Yes so we are a tier 1 supplier and we supply acoustic and soft trim products, we supply parts for the engine, compartment, passenger compartment and boot compartment, and typically those parts are floor carpets, parcel shelf, boot carpets, dash insulators and engine insulation.
2	Can you confirm your % split of supply to each UK OEM and conditions of supply (i.e. JIS, JIT, Non-JIT etc.)? Yes so we supply 97.5% of our business to Nissan on a JIT supply and 2% of our business to Toyota in Burnaston and the delivery conditions there are non-JIT.
3	What proportion of your inbound supply network is delivered on a JIS or JIT basis and from which regions? So I would say we've only got 1 supply delivering in these conditions currently em and they represent 15% of the total raw material spend in the plant and they are located 20 miles south of the facility. And what type of product do they supply? Spacers and EPP parts OK
4	How many suppliers have you reshored since 2010? 2, so we reshored 2 suppliers, 1 supplying felt from France and the other supplying heavy layer from Luxemburg How many were JIS/JIT and how many non-JIT suppliers? Those 2 suppliers were non-JIT suppliers
5	Which regions have you reshored from and to? France and Luxemburg both to the UK Can you confirm whereabouts in the UK, are they very local to this plant? No not so local, in Nottingham and Bradford
6 Theme 1	What components or modules have been reshored and can you categorise them (i.e. line-stop parts, safety critical etc.; BOP, raw material; ABC class)? Yes so both of these products are linestop, I would class them as A class parts and they are raw material.
1a B	How would you interpret the concept 'reshoring' and what terminology do you refer to? So I guess and this is speaking really at plant level as appose to purchasing level we would class it as being moving manufacturing back to the UK from the original country, but really speaking we don't use the term reshoring at plant level but I'm sure our purchasing community do, we call it localisation which is obviously the old fashioned terminology for it. Why is this terminology relevant to your plant? And in terms of it being relevant to the plant em I guess originally when I was looking at the terminology for the reshoring I didn't think it was applicable because we actually haven't had any business which existed in the UK which has went abroad and then come back but now understanding it is just

	returning back to the UK and it is being particularly relevant to get product which is really dense requiring large vehicle fill, to get that product back into the UK to save on transportation costs.
2	What is your short-term and long-term reshoring strategy? So short-term strategy would be to really investigate opportunities which exist in the UK but typically we need to find suppliers in the UK that have got the capacity and technical capability to be able to supply at the levels that we require, em and that's something that we are actually finding to be quite a challenge. Em and then the long-term strategy it looking to source new targeted business with these suppliers. Em, so the next real challenge for us as a plant is to regain the Qashqi replacement business which is due in June 2020 is the SOP, em and we are also targeting the new Xtrail business which Nissan have em so obviously there will be a lot more volume coming our way hopefully if we are successful, em so really because of the impact of the exchange rate currently, its having a massive impact on the P&L of the plant so for the new business we really need to seek to be sourcing a lot of our product in the UK. So currently we have 65% of the sales of the plant are in euros so because of whats going on the with exchange rate with Brexit etc it's having a huge impact and we can't allow that to happen for the future. Do you think that is just for this plant locally or is it company-wide? No no for sure it is impacting the other plants but to be fair I'm not really sure what % of sales the other UK plants have in terms of euros but it's probably a similar level to us.
3	Can you identify the key characteristics within your reshoring strategy, and why? So a key one is to locate high volume high Q (quality) products due to transportation costs and the need to reduce lead-times and in terms of the reasons why is effectively we need to improve quality and delivery performance in strategic suppliers we have.
4a B	Was your reshoring activity planned and executed as part of the company's long-term strategy, or a reactive decision made in the short-term, and why? I would say it's probably a mid-term strategy to source in the UK, mainly originally it was due to the transportation cost and the volatile fuel prices. How does this differ with your prior offshoring decisions? This is a difficult one for us really because we weren't really in that position to start with so I would say it doesn't really apply. If you consider different product that has previously been located in the UK but has then been sent overseas, any product that you've had, what might have been the driver for that? It would be competitiveness, it's all about price at the end of the day so the only reason we would look to do that would be to get it at a cheaper piece part price and at that time it would be the influencing factor would be the wage costs.
5	Is there a standard approach/strategy to reshoring across the organisation, or is it specific to business groups/individual plants? Why is this the case? So yes we do have a strategy, so Faurecia works on what we call 'best landed cost' so this is em something which the purchasing team work with and basically we use a nominated panel of strategic suppliers so we are not really allowed to give business to suppliers unless they exist on the Faurecia panel. Em so for the UK for suitable supplier exist in general for the current exchange rate then the best landed cost should be UK manufacture, em in general it is the UK Faurecia procurement team that have pushed for UK suppliers to be added to the Faurecia panel of suppliers so theres been a lot of work particularly that has been done in the last few years, otherwise the supply would be outside of the UK. Em I think the one exception to this situation however is, is when you are influenced by the OEMs so this would be when they have a mandated supplier em, and basically we are forced to use them, em and these would basically fall out of any normal purchasing strategy, em but pretty much not the purchasing organisation is quite tight nit and from a commodity point of view like I say your basically not allowed to look to em nominate suppliers who are not on the panel. We have has a quite interesting situation lately where when we are talking about sourcing because of capacity issues that we have had in the plant because we have actually been forced to em outsource some tools for product that we actually manufacture internally within the plant, we've actually been forced to just get the tools out and we've actually gone to UK suppliers based in the Midlands em to actually manufacture the parts on our behalf, and that's been an interesting em thing that

	we've had to cope with the purchasing people because ultimately you are not really allowed to do that so then we've had to em really pull forward what's called a nomination committee toi get their agreement to do it but it has been actually after the event because when you are up against it you have just got to go out and do whatever you need to do to keep supply going. When you refer to purchasing, are you referring to purchasing within this particular plant or centralised purchasing? In the past its centralised purchasing but really at plant level we have only had in the last couple of years some presence of em in terms of what we call a VIE, so we've actually had a VIE person em sitting in the plant, em for 2 years who have really been the purchasing interface between the plant and the central team. Em, however, 2 weeks ago we employed our own serial buyer em so Marianne has only been with us sine last Monday, she will report directly into the central purchasing team and will be a fully-fledged purchasing person for the plant really and that will be the first time we've had that for, gosh 10 years. OK And again that's another, the driver for that or the push from me to try and get that as headcount was mainly to do with the challenge of what we see with regard to the need to focus more on moving product from Europe to the UK because of the impact of the exchange rate and what I was discussing there about the need to have that as a strategy for the new business that we will hopefully be awarded though now above any time is the more important time to actually have that presence in the plant. So with that kind of longer-term strategy in mind, what do you forsee as being the timescales for bringing that product back from Europe back to the UK? I would say it's got to happen certainly it's got to happen by January 2020, em, but a lot of that em like I said before is going to really be dependent on finding the right level of suppliers in the UK. Em we already know that em, the current suppliers who could be the alternatives don't have the capacity to take the volume that our current group suppliers are supplying us with, so and then obviously our competitors are all fishing in the same pond so I guess it's going to be interesting in terms of whats going to happen in the future because everyone's talking to the same suppliers, so I think this is where really the government's got to step in and really offer some support to em SMEs to get to where they need to be. Are you aware of what is available in terms of reshoring, particularly with regards to SMEs? No, and we haven't been involved with any of it no, but I am aware, I have read some of the literature that there is things happening, I'm just not quite sure that they are happening quickly enough, that's the point. The em, so digressing ever so slightly but, the Automotive Council has quite a targeted strategy to bring a lot of automotive manufacturing, particularly supporting SMEs back to the UK, em so whilst the UK coalition government set up Reshore UK which is now collapsed which is where a lot of the AMMSCI funding came from Right Em that doesn't exist now, however you have got Reshoring UK which is partly supported by the Automotive Council, so there is a big strategy within the Automotive Council to bring that back so I think there's a lot of initiates which SMEs, more targeted towards SMEs than big corporations trough, em, but I think you need to start at the bottom to be able to make that foundation support available. Yeah yeah for sure Just on the thought of bringing those products back in 2020, what type of components are you considering needs to return back to the UK? So, in order to get rid of this impact we are having with exchange rate then the products would be em, surface trim basically, em and we're talking somould and laminated products which are currently sitting with our em sister plants in France. OK And obviously you can imagine the impact of that on Faurecia in terms of the overall strategy for our business group because obviously those plants are relying on the Washington business for their P&L. Em, so quite interesting last week I was at a em risk analysis meeting to do with the acquisitions for

	the new programmes and you know that theme was a hot topic of discussion em bringing to light the fact that we cannot afford to continue to rely on these suppliers not fully anyway, I do think the outcome is going to be that we will still source a proportion of the work from these suppliers but then the other proportion will hopefully be within the UK. So that's interesting because you will then effectively by what your saying be moving it from an inhouse manufactured supplied product from a sister plan to an externa,l so you effectively will be outsourcing it, reshore outsourcing as oppose to offshore from an internal supply Yeah And how do you think that would be viewed, do you think that is going to be a move, em a positive move as such for the company or do you think it will be a challenge to try to make that move, taking it from an in-house manufactured product in an overseas facility to an external supply? I think it will be a positive thing and I think it will be years ago that wouldn't be accepted as a positive thing internally from a strategic point of view because obviously we are trying to protect the level of business in the other plants but I think the em the people in the ops positions now and ops directors roles realise the impact that this exchange rate is having and to be honest there's a level of like almost paranoia amongst the French about this whole Brexit impact em and your know they tend to talk about it more than what we do in the UK, so whenever we go, whenever I'm attending meetings in France, it's the first questions; whats happening with interest rates, what's happening with inflation blady-blady-bla, so I think they realise in trying to protect the competitiveness of Washington as a plant that's got to happen. In terms of the challenges, then the challenges are going to be associated with actually dealing with a new supplier em, but obviously we would make sure that we did all the ground work to start with in order to eliminate the risk, we don't want to be, you should get benefits in moving product closer to you in terms of intimacy with the suppliers etc etc, you speak the same language, there's loads of advantages and we just have to make sure that they've got the right capability before we make the decisions to switch. OK
Theme 2	
6a b	Did the 2008 economic crisis influence the company's offshoring trend? It didn't actually, although this is one of the thinks that I've had to em ask our purchasing team to kind of comment on and the comments that have come back from the purchasing team is the other way round, so in 2008 basically the UK purchasing team had already started to actually reshore. Em, and the guide for the exchange rate decision there was basically £1 equals £1.20, em so yeah so it was the other way round. OK When do you think you were at the height of offshoring? Do you know? I would probably say 2010. Can you explain the major driving factors for offshoring pre and post 2008 economic crisis? Again its down to em, cost.
7	How has the erosion of low cost labour overseas exposed other on-cost 'dynamic' factors in your supply? So I would say that low cost labour or the attraction of low cost labour was probably masking other factors so transportation costs I know I keep speaking about but that's quite a key thing for the plant, and the fact that the lowest costs not already, sorry sometimes it means the highest risk, so you've got the hidden costs of having to deal with em different cultures, the language barriers, the lead-times etc.
8a b	Why is your facility motivated to reshore elements of your supply chain? So initially I would say the volatility of fuel prices and that resulted in high costs of transportation, and also the customer, so the customer has, initially the customer was requesting us to source in low cost countries, and now they're asking us to basically bring supply back to the UK in order to remain competitiveness, and then also we have issues with space onsite in Washington, em so the idea of bringing product back to the UK means you can lower

	your safety stocks so you are holding less inventory, em we've got increased control on the supply base, we've got faster response time and leaner supply chain, and again coming back to exchange rates that's going to be the real biggy now. So one of the points you said was that the customer is asking you to bring product back to the UK, is that across all 3 of your customers? Eh, no just with one of them in particular Is it the high volume customer? Yeah And the reason there is what they're basically saying to us is, obviously we in commercial negotiation we can speak to them currently about compensation for exchange rate, but for the new business, it's not going to be something that we are allowed to put on the table, so em effectively what they are saying to us is that you've got 2 years and by the time we come round to the new business we don't want to be talking about exchange rate, so the only answer there is obviously is to bring the product back to the UK OK What are the key drivers that have encouraged the company to reshore supply and how are these significant to your plant?
9	Which reshoring motives would you regard as being dynamic factors and how significant are these dynamic factors on your reshoring strategy? So I would say exchange rate is significant Customer request – significant Reducing deliver lead-time – significant Improving supply chain reliability – significant, and Improving quality assurance – I would deem that to be significant
10	What emphasis is given to dynamic factors in comparison to hard factual considerations when making reshoring and location decisions? Again it is all coming back to price, so for us its being competitive and the lowest landed cost So, when we talk about the very significant impact of supply chain reliability, em influence from the customer, quality, lead-time, how is that embedded into the consideration or is it not considered, is it purely the hard cost factual landed cost that is taken into account when making those decisions or is the reliability of the supply chain, the guaranteed quality, the customer importance, is that factored in? Yeah I would say so, so typically in the em nomination committee, which is the first thing that triggers off an activity to resource, to be fair the information which goes on the nomination committee template is pretty much it's all about cost, em and then basically the softer items tend to get discussed as part of the conference calls and I think we touch on this a little bit later on but what actually comes out of these nomination committees is, at the attendance is obviously purchasing people, we have logistics, plant manager, all the right level of people attend that nomination committee and really if em the logistics manager or the plant manager has a reservation about a decision which looks like it's only going to be based on cost then it's in their interest to ensure they attend that meeting and make sure that their voice is heard so that would be taken into consideration as well, so we wouldn't just go with the cheapest price and then go with a really poor, poor performing supplier, and that's why there is such a lot of importance placed on em getting these bunch of suppliers on the panel and then once we know that they are on the panel we have a really high level of confidence that tose suppliers are going to be meeting our requirements, I guess the trick is to get them on the panel in the first place. OK
11a b	Which components or commodities do you deem suitable for reshoring and why? So, answer to this is pretty straight forward, any components em provided there is a supply base capable of supporting our requirements Are there any products that you feel wouldn't be suitable for reshoring for any particular reason? Em,

	So for example, if we looked at A class parts, B class parts, C class parts No I would say that it would be an advantage, there would be nothing I would like better to be dealing with UK suppliers 100% em, so irrespective of weather it is an A class part or a C class part for me it doesn't really matter. OK To what extent is the delivery service considered in the component feasibility for reshoring? I would say it's really important Why is it really important? Really important for us, as I've mentioned because of the space constraints we have we need to make sure that we don't have to hold additional inventory for suppliers unreliability, and you know to be fair I have to say that over the years we've managed our suppliers in such a way that they really understand our requirements now and it's very rare that we have an issue where suppliers are not delivering on time and to the right quantity, very very rare, even with our sister plants now, so em we don't have to accommodate poor performance so that's why if we do move more business to the UK we absolutely need to make sure that the supplier in the UK are capable of giving us the same service then we can take advantage even more of their proximity and reduce inventory levels even further. And what type, when we talk about delivery service, what type of delivery service do you expect? Really just that the product, if it's exworks supplier that the product's available ontime for our collections to the right quantity and to the right quality, and then if it's a supplier who is in DDP conditions with the plant, basically the delivery arrives on time. OK It's pretty straight forward
12	Do you regard the key reshoring motives identified to be company-wide motives, or differ depending on different business groups supplying different OEMs? Why? So again this just comes, so the purchasing strategy for Faurecia, obviously we have different Business groups operating in different areas, but the strategy is common for everybody, so again it's this terminology of best landed cost, that's the strategy that's used across all business groups, and again as I said earlier, the only exception to this is if the OEM basically mandates a supplier which doesn't really tend to be common within our business group but certainly is within the likes of exhausts where they're dealing with metals and things like that. OK
Theme 3	
13	What considerations are given to environmental, situational and contextual 'dynamic' changes when making reshoring location decisions and why? So I would say here that in terms of sourcing decisions again its going back to the fact that we are only really allowed to use these strategic panel suppliers which are audited and validated, so really we you know we are stuck with that as a strategy really, and changes after a nomination would only really happen if we are up against it in terms of exchange rate for example and it would only occur if the relocation was deemed to be a profitable one, em and one that was going to end up giving us a competitive advantage. OK
14	Can you explain the criteria, decision making process and strategic evaluation process the plant proceeds when making reshoring and location decisions? So again key decision factor is price, so is there any actual benefit to move Then after that would be also to improve quality and delivery performance, em if on paper going back to this nomination committee there is a saving then the proposal goes to the nomination committee and that comprises purchasing, quality, logistics, engineering and the plant team, and then there will be a debate, a decision as to whether to proceed with the proposal to resource at that committee.

	Who makes the final decisions? It really depends, em I would say that in most situations it would be the purchasing team, it would only really be if there was a real contention coming from the plant in terms of the plant not wanting to go down that route, it would be escalated and then it would go up to the ops director of the region to really make the decisions, but I can't recall any sourcing decisions which have gone down that route, certainly in the last 4 years or so. OK
15a b	Why do you believe your chosen process and evaluation methods are effective, or not effective? I would say that going back to what I've just said there that they are effective, em we have a process in place which is understood by everybody, em and the key point really is having an effective em set of supplier on the panel, that's the key thing. How would you suggest improving that process maybe? I would say maybe the plant could be involved in the process a little bit earlier, so have a little bit more influence prior to the nomination committee, em but then again we have a purchasing team for a reason and we are relying on them to do the ground work really so that by the time they come to the nomination committee you've got all the facts and data in front of you and your hopefully reviewing data from the right level of selection. How has this changed from offshoring decisions to reshoring decisions? Has there been any change? No I would say no difference, in general there would be an extensive discussion to move from Europe to UK however, once in the UK theres often little desire to move back to UK. OK, you might have already covered in the previous questions…
16a b	Who (individuals and organisations) are involved in supplier location decisions from outside and inside the plant? Yeah all of those I mentioned in question 14, purchasing, quality, logistics, engineering, plant team Which other departments do you believe should have input, and why? I think all departments should have an input and pretty much they do, so really in terms of their attendance at the nomination committee em, we don;'t often get everybody attending and that will mean quite often that they are happy with whatever the selection if going to be, so em purchasing are quite within their rights to go ahead with a nomination even if people haven't rubber stamped it because by the fact that they are not on the call means that they haven't got a point to make and they are quite happy with it. OK
17a b	Do you believe there is a knowledge gap of the production environment and supply risk when making supplier location decisions? So for us I would say there is little risk, again it's because we are using a validated supplier panel, em the only risk would be that we're not actually keep to add new suppliers em so the validation process if quite long and from my point of view we may risk the opportunities of having a bigger group of panel suppliers, em and this is one of the challenges for the UK purchasing team now to find the right new suppliers and fight the battle to actually get them added onto the panel So do you think when this committee's in place and your discussing the possibilities of new suppliers or locations, the production environment is well represented? I would say so yeah, yeah definitely. Why is this the case and how could it be improved?
18	Why do you believe reshoring supply to the UK will be advantageous for the plant, the company and the automotive manufacturing industry? Yes, so again I would say if the right supplier can be found, the material, the components, the processes we need, I firmly believe we should be able to source in the UK more than what we do today, but again the real problem is that unfortunately a large part of the UK manufacturing industry has died out

	so it hasn't had the right level of investment, the right level of support, and I genuinely think that it's unlikely that it's ever going to be placed at the level it's been at in the past. OK, and why has reshoring been beneficial to the plant? Because it has allowed us the closer proximity benefits you have as a result of having close suppliers.
19	How have these identified benefits transpired into positive results? So can you give some examples of some positive results that have transpired as a result of bringing product back to the UK? So I would say lower inventory levels, better quality performance of suppliers, so obviously when you are closer you are able to go and spend more time with them, and the benefits that come from intimacy really so em, you know if we need to do last minute changes because we have a quality problem or the material won't run or it's not in specification you can jump in a car and go visit the supplier and explain to them face to face, they can come to the plant and witness your problems, so really yeah it's the same I guess for us with the OEM that we are close to, is that you have a problem then you go meet them face to face and your able to get solutions to problems much quicker.
20	How will reshoring supply reshape your supply network? Well really this one is only going to be, it's only going to benefit us if the UK purchasing team success to get suppliers in the position to be approved by the Faureica panel, em, and in terms of if that happens, the supply network it will have massive benefits because we will be able to look to establish more milkruns because we will have more volume in the UK which will again help us to reduce transport costs, reduce packaging costs, em so really again it is another cost benefit.
21	What are the 'lessons learnt' from making supplier location changes? I would say that in the ones that we have experienced there's actually, it sounds a bit crazy really but no lessons learnt really learnt because what we find is if the management process is followed correctly which it has been for the major movements that we've made, all aspects are managed correctly then the change tends to be very smooth and the benefits that we hope to get are gained, the only problems that we have is that the process is not managed correctly, em and there has been examples in other plants where disasters have happened because things have not been done correctly or they've tried to be pushed through, but certainly from my experience in this plant, em things have gone pretty smoothly whenever we've done supplier changes.
22a b Theme 4	Can you classify the type of suppliers and components you deem critical for close proximity? I would say large components, line stop components, high value, high volume components, em and components which are manufactured by poor performing suppliers. Why is it operationally important to have suppliers in close proximity to your plant? Response time, opportunity to build supplier intimacy through regular contact, lead-time reduction, reduction in costs, transport, stock holding and packaging, and the ability I guess to respond to shortages (giggle), so If you're having an unexpected em material shortage then obviously it's much better to have someone on the doorstep than in France.
23a b	What would you deem a critical element of component availability, and why? So basically to be able to supply on time and at the right quantity in order to keep inventory levels low. What would you deem a critical element of the production process, and why?

	So the key thing here particularly for our plant is the reliability of the equipment, we must have the equipment producing the parts per hour that's planned and the only thing that really tends to prevent that from happening currently is the reliability of the machinery because we don't tend to have issues with reliability of supply. OK
24a b	Do you consider reshoring a way of adapting to changes in the external environment? Yes I would say so, so again we keep going on about exchange rate but that's a key thing that's changing and reshoring is going to help that situation. What are these changes and how has reshoring enabled the plant to adapt?
25	How important is it to nurture customer-supplier relationships in automotive manufacturing and what methods are used? So yes its very important because the environment is really tough and competitive, the key thing really I think is to be aware of customer expectations and on the other hand be aware of supplier capabilities, so from an OEM perspective whilst we need to understand exactly the way they tick, they similarly have got to understand our constraints and what our limits are particularly in relation to capacity and I think the key method there to get over those two items, you've got to act with a level of transparency, you've got to be able to know what to tell the customer and know not what to tell them and at the end of the day communication is key. OK
26	Where does the power balance lie in your customer-supplier relationship from a supply chain management perspective? Customer's king (laugh) OK, so how does that have an impact on your relationship? I would say that from a plant point of view everyone that has a relationship where they have to interface with the customer it's really important that they understand that and that we have to be respectful of their demands but not necessarily agree to them all the time, so we need to understand their requests if we're going to have difficultly achieving them we can't just say yes and do it if there's a cost associated to it we have to make them aware of that, and we've really just got to keep the channels of communication going in order to get through the day to day business I would say. OK
27	How do OEMs influence location decision-making upstream, and can you provide some operational examples? I'll go back to the beginning of our time here in Washington, so we've been here 26 years now and for sure the OEM did influence the location of this facility at the time and that's mainly due to the size of the products that we manufacture, so we didn't have much of a choice to locate here in order to be able to supply them just-in-time conditions and they are influencing the sourcing of the replacement business because they are basically insisting on a high percentage of local content in order to not have the discussion about exchange rate as I mentioned earlier. Are you able to say how much percentage of local sourcing? They've actually asked for 60%, yeah. Which is pretty significant. I know.
28	How might the OEM operational influence have encouraged or discouraged supply chain reshoring?

	So I would say that obviously competitiveness is key so depending on the economic climate at the time would I guess depend on whether the OEM would encourage or discourage it and obviousy currently they are encouraging it and I would also say that environmental requirements are also important to some of the OEMs as well. IN what way? From a reduction in emissions, so one of our previous OEMs was pretty into 14001 and were really encouraging the reduction in distance for transport so that we weren't omitting obviously fuel to the atmosphere etc. So did that have any practical implications, did that actually encourage reshoring or was it just a consideration? NO it was just a consideration, it didn't actually mean we did something as a result of that. OK
29	Is customer-supplier relationship hampered by geographical separation within the automotive manufacturing industry and why? So I would say that possibly, so I would say that, so again closeness encourages communication and face-to-face is more productive than alternative methods. And locating close to the customer makes it quicker to basically respond to change and again there's no language or cultural barriers, we speak the same language we have the same understanding for sure
30a b	How far upstream do you believe the OEM has influence on supply chain reshoring, and why? It's difficult this one, it's really difficult to measure em, but I would say again it's all down to the competitiveness element so in order to win new business you need to be competitive so ultimately that's the challenge of the commercial team really so I guess if you base it on the fact you need to be competitive to get new business then yeah they have a big influence. How far do you think that influence spreads? I would say it would spread right through the structure. What power mechanisms may be used to encourage reshoring upstream? I would say it's about competitiveness so a simple on would be target price so we're going through the acquisition phases now for the new business now and ultimately, we're given a target price to achieve and it's purely down to that and how you can achieve it. OK
Theme 5	
31	Do you believe your plant is a lean, agile or leagile plant, and why? I would say we are lean due to the fact that we are pulling product through the system, our demand is pretty stable, and basically the whole focus of the plant really is to eliminate waste in order to improve efficiency.
32a b	What lean, agile or leagile techniques are implemented in your plant? So we do 5S, kaizen activities, JIT, tact-time control, pull system, production levelling, standardised work, there just some examples. Interruption from 3rd party. What lean, agile or leagile techniques are implemented at the OEM you supply? Same, all of the above.
33	Why might being lean, agile or leagile have an influence on supplier proximity? I would say it depends on the need for flexibility, so my understanding of agile is that it requires to be flexible in order to respond to volatile demand, so responsiveness is key therefore its really important for suppliers to be close.
34a	Do you visualise geographically distant suppliers as problematic in lean and agile environments?

b	Yes because basically they are not able to respond quickly to changes in requirements, and also theres quicker recovery, em it takes them longer to recover in case of a supply chain disruption, so for sure. What are the operational impacts? Higher inventory levels, so we need to protect ourselves from those situations so because of the longer lead-times obviously in those situations you need to be protected and higher inventory levels would be a definite impact. Then obviously the cost associated with that because your tying up cash.
35	How do OEM techniques filter upstream and what impact or influence has this had on your reshoring activity (directly or indirectly)? So OEMs obviously demand high quality cost and delivery performance, em so we need to be geared up to ensure that we can delivery those levels of performance, and I think another one which is coming back to the reason why we are here as a plant is the fact that OEMs went through a phase of rather than manufacturing or assembling components internally they went through a phase of outsourcing the production of bulky components so here I'm thinking of things like centre-consoles so really they pushed that would out to the tier-1s which is why they ended up with a business park close to their plant, with suppliers ultimately carrying out assembly work that they used to do. So I would say that they've pretty much got a significant influence on what tier-1s are doing today?
36	Are there any techniques coming downstream influencing the OEM reshoring? So I'm a bit stuck on this one (laugh), give me some ideas So is there anything that the tier-2s or that the tier-1s are doing that might encourage the OEMs to reshore, as oppose to the influence of the OEM filtering upstream? Do you know, I would say not, well certainly not in my experience because its pretty much the OEMs that are in charge really they are the ones who have the balance of power and we react to what they require rather than them being influenced by us, certainly that's our experience, maybe not necessarily the experience in other countries but certainly what we are going through. OK
Theme 6	
37a b	Can you identify the main barriers and limitations which have or may potentially inhibit your supply chain reshoring? Yes so currently we have a high percentage of supply coming from our sister plants so obviously theres got to be a strategic decision made as to whether we can afford to lose that business for Faurecia, and again coming back to the fact that there's a known lack of suppliers in the UK capable of producing like-for-like parts. Em so again coming back to being unable to meet the technical specification and not having the capacity, so that's obviously going to become an issue. How and why have these factors become barriers and limitations?
38	Do you believe the OEM could inhibit supply chain reshoring upstream, and if so why? So yes they need to remain competitive and no the right infrastructure exists in the UK to support all of the OEMs needs from tier-1 which again when you think about it could result in price increased, so the tier-1 that we have who are capable who have got the capacity are fishing in a small pond and ultimately that could have a negative impact on prices so we could end up with a price increase.
39	How could these barriers be overcome and what would be required? Again we need investment in SMEs, we need development in world-class infrastructure, probably we need better information probably making buyers and sellers aware of each other and aware of whats available in terms of funding and resources.
40	To what extent have you engaged with the Automotive Council for reshoring supply and how have these initiatives helped to overcome any barriers? We haven't

	No? Is it something that you would consider looking into? Again that comes back to the whole information things doesn't it, so the fact that we are not really aware of it, we're not delving into that pot if you like. Why is that the case? Why is it that you haven't used the information or looked into it as possible avenues, is there a fundamental reason or I guess it wouldn't really be us at plant level that would be doing that, it would be the purchasing team and to be honest I don't really know whether they have or what the blocking points would be, but I can just go off kind of my own experience really and it's not the same but it's quite similar, but we tend to be quite, we tend not to delve into things like that as an organisation, so recently I managed to gain a grant from the council on the basis of the additional headcount that we were bringing into the plant, and the amount of red tape that we had to go through as an organisation to get the approval for us to receive the money was absolutely incredible, so I think because we are part of such a large organisation they don't tend to like being associated with funding opportunities and things like that from a publicity point of view. OK
Theme 7	
41	How do you foresee Britain leaving Europe impacting the UK automotive manufacturing sector and the security of future car models being built in the UK? So I think it's having a much bigger impact than I ever for saw to be honest, so I think the biggy is the exchange rate impact for sure, obviously we all know what is happening with inflation now, so it hit 3% last month for the first time in 5 years and I think it's purely this whole problem of uncertainly, we just don't know what the future holds, em and I keep being asked in these meeting that I referred to before about what do I think is going to happen, what do I think the position is going to be at the end of the year, what is next year going to bring, and I seriously think it's, we are going through quite a transition and I don't think, it's not clear and I think you know gone are the days where we can just keep talking about the fact that the big Japanese OEMs that we have in the UK are going to continue to be here because the government will always want them here, I'm no longer convinced that that is the case, so I think that we are definitely entering into a period of uncertainty and its quite concerning for a plant in our geographical location because from a divisional point of view we only have 3 UK plants and if we are going to be creating issues associated with profitability its quite concerning how interested they'll be in supporting the plants to win new acquisitions, so it's a worrying period to be fair.
42	What do you anticipate the impact on reshoring might be? It's completely unknown, for sure.

Appendix F: Ethics Forms

RESEARCH **ORGANISATION** INFORMED CONSENT FORM

Faculty of Business and Law

University of Northumbria

Completion of this form is required whenever research is being undertaken by Business and Law staff or students within any organisation. This applies to research that is carried out on the premises, or is about an organisation, or members of that organisation or its customers, as specifically targeted as subjects of research.

The researcher must supply an explanation to inform the organisation of the purpose of the study, who is carrying out the study, and who will eventually have access to the results. In particular issues of anonymity and avenues of dissemination and publications of the findings should be brought to the organisations' attention.

Researcher's Name:_____Mrs Michelle Upton_____

Student ID No. (if applicable):___13044729_____

Researcher's Statement:

The research you have been asked to engage with will explore the emerging reshoring phenomenon within UK automotive manufacturing. The objectives of this research are to critically evaluate the key motives driving the reshoring phenomenon within UK automotive supply chains; determine how far into the automotive tier structure the power of the customer (OEM) influences supplier location and relocation upstream; and build a theoretical framework to underpin UK automotive manufacturing supply chain reshoring from a resource dependency theoretical lens.

Your organisation will be part of a multiple case study involving several OEMs, tier 1 and tier 2 automotive suppliers across the UK.

The researcher, Michelle Upton is a PhD student (part-time) at Newcastle Business School, Northumbria University; with an industrial background in production control and logistics in tier 1 automotive manufacturing, prior to making the transition to academia.

All data collected from your organisation will be treasured and respected, and under no circumstanced will any data be shared with any individual, organisation or party. All data files including a code key, will be protected and held on Northumbria University systems for the upmost security. Following completion of this research project, all data files will be deleted and audio recordings will be destroyed.

Anonymity is offered to all organisations partaking in this research, thus the organisation's details will not be disclosed in any reports, transcripts or thesis, and will be replaced by a code (for example: T1a, T1b, T2a etc.). Data will only be accessible to the individual organisation to which it relates, and the researcher's examination panel on completion of the doctoral thesis, after which time all data will be destroyed as stated.

My doctoral thesis will be published in the public domain (i.e. British Library, University Library etc.), in addition, the data collected may be used to support research publications in academic journals and conferences, during which full anonymity will be maintained as agreed.

Any organisation manager or representative who is empowered to give consent may do so here:

Name: _____

Position/Title: _____

Organisation Name: _____

Location: _____

If the organisation is the Faculty of Business and Law please completed the following:

Start/End Date of Research / Consultancy project:	Start: End:
Programme Year Sample to be used: seminar group, entire year etc.	
Has Programme Director/Leader, Module Tutor being consulted, informed.	

Anonymity must be offered to the organisation if it does not wish to be identified in the research report. Confidentiality is more complex and cannot extend to the markers of student work or the reviewers of staff work, but can apply to the published outcomes. If confidentiality is required, what form applies?

[ ] No confidentiality required

[ ] Masking of organisation name in research report

[ ] No publication of the research results without specific organisational consent

[ ] Other by agreement as specified by addendum

Signature: _____ Date: _____

This form can be signed via email if the accompanying email is attached with the signer's personal email address included. The form cannot be completed by phone, rather should be handled via post.

Faculty of Business and Law
Informed Consent Form for research participants

Title of Study:	**Emerging reshoring phenomenon in UK automotive manufacturing – underpinning a resource dependence framework within the tier structure.**
Person(s) conducting the research:	Mrs Michelle Upton
Programme of study:	PhD (P/T)
Address of the researcher for correspondence:	24 St. Johns Terrace Dipton Stanley Co. Durham DH9 9DT
Telephone:	07950151131
E-mail:	Michelle.upton@northumbria.ac.uk
Description of the broad nature of the research:	My research aims to explore the emerging reshoring phenomenon within UK automotive manufacturing. The objectives of this research are to critically evaluate the key motives driving the reshoring phenomenon within UK automotive supply chains; determine how far into the automotive tier structure the power of the customer (OEM) influences supplier location and relocation upstream; and build a theoretical framework to underpin UK automotive manufacturing supply chain reshoring from a resource dependency theoretical lens.

Description of the involvement expected of participants including the broad nature of questions to be answered or events to be observed or activities to be undertaken, and the expected time commitment:	The participant (Senior level within Purchasing, Supply Chain Management and Plant Manager) is requested to engage in a one-to-one semi-structured interview with the researcher (Michelle Upton) at the host organisation's premises. The interview process is anticipated to take 60-90 minutes, allowing time for clarification of questions and in-depth answers. Interview questions are based around themes directly related to the research objectives including the conceptualisation of reshoring, motivational factors, location management, power relationships, leagility, barriers and limitations to reshoring and the impact from Brexit.
Description of how the data you provide will be securely stored and/or destroyed upon completion of the project.	Anonymity will be given for each participant, thus no personal data will be shared or published within this research, and reference will be made only to a participant code. All data including interview recordings and transcripts will be held in protected files and stored on Northumbria University systems to ensure the upmost data security. Sharing of raw data in any format or by any means will be strictly prohibited. Following completion of my project, all electronic data files will be deleted from the University system and interview audio recordings destroyed.

Information obtained in this study, including this consent form, will be kept strictly confidential (i.e. will not be passed to others) and anonymous (i.e. individuals and organisations will not be identified *unless this is expressly excluded in the details given above*).

Data obtained through this research may be reproduced and published in a variety of forms and for a variety of audiences related to the broad nature of the research detailed above. It will not be used for purposes other than those outlined above without your permission.

Participation is entirely voluntary and participants may withdraw at any time.

By signing this consent form, you are indicating that you fully understand the above information and agree to participate in this study on the basis of the above information.

Participant's signature: **Date:**

Student's signature: **Date:**

Please keep one copy of this form for your own records

References

Ahlstrom, P., Danese, P., Hines, P., Netland, T.H., Powell, D., Shah, R., Thurer, M. & van Dun, D.h. (2021). Is lean a theory? Viewpoints and outlook. *International Journal of Operations and Production Management,* 41(12) 1852-1878.

Alvesson, M. & Blom, M. (2021). The hegemonic ambiguity of big concepts in organization studies. *Human Relations*, ahead of print, 1-29, doi: 10.1177/0018726720986847.

Ancarani, A., & Di Mauro, C. (2018). Reshoring and Industry 4.0: how often do they go together?. *IEEE Engineering Management Review*, 46(2), 87-96.

Ancarani, A., Di Mauro, C., Fratocchi, L., Orzes, G., & Sartor, M. (2015). Prior to reshoring: A duration analysis of foreign manufacturing ventures. *International Journal of Production Economics*, 169, 141-155.

Ancarani, A., Mauro, C., Virtanen, Y., & You, W. (2021). From China to the West: Why manufacturing locates in developed countries. *International Journal of Production Research*, 59(5), 1435-1449.

Andreewsky, E. & Bourcier, D. (2000). Abduction in language interpretation and law making, *Kybernetes* 29(7/8), 836-45.

Arik, M. (2013). Framing the Offshoring and Re-shoring Debate: A Conceptual Framework, *The Journal of Global Business Management,* 9(3), 73-83.

Argote, L. (2011). Organizational learning research: past, present and future. *Management Learning,* 42(4), 439-446.

Arlbjorn, J. & Halldorsson, A. (2002). Logistics knowledge creation: reflections on content, context and processes. *International Journal of Physical Distribution & Logistics Management,* 32(1), 22-45.

Arlbjorn, J. S. & Mikkelsen, O. S. (2014). Backshoring manufacturing: notes on an important but under-researched theme. *Journal of Purchasing & Supply Management,* 20, 60-62.

Arlbjorn, J.S. & Luthje, T. (2012). Global operations and their interactions with supply chain performance. *Industrial Management Data Systems*, 112(7), 1044-1064.

Arrigo, E. (2020). Global sourcing in fast fashion retailers: Sourcing locations and sustainability considerations. *Sustainability* (Basel, Switzerland), 12(2), 508.

Arunyanart, S., Sureeyatanapas, P., Ponhan, K., Sessomboon, W., & Niyamosoth, T. (2021). International location selection for production fragmentation. *Expert Systems with Applications,* 171, 114564.

Ashby, A. (2016). From global to local: reshoring for sustainability. *Operations Management Research,* Springer June 2016.

Bailey, D., Corradini, C., & De Propris, L. (2018). 'Home-sourcing' and closer value chains in mature economies: The case of Spanish manufacturing. *Cambridge Journal of Economics,* 42(6), 1567-1584.

Bailey, D., & De Propris, L. (2014). RESHORING: OPPORTUNITIES AND LIMITS FOR MANUFACTURING IN THE UK - THE CASE OF THE AUTO SECTOR. Revue *D'économie Industrielle,* (145), 45.

Bailey, D. & De Propris, L. (2014b). Manufacturing reshoring and its limits: the UK automotive case. *Cambridge Journal of Regions, Economy and Society,* 7(3), 379-395.

Bailey, D. & De Propris, L. (2016). *Engineering Globalization Reshoring & Nearshoring: Management & Policy Issues.* Singapore: World Scientific.

Bailey, D., Driffield, N., & Kispeter, E. (2019). Brexit, foreign investment and employment: Some implications for industrial policy? *Contemporary Social Science*, 14(2), 174-188.

Bals, L., Tate, W., & Ellinger, A. (2017). *Outsourcing/Offshoring Insights: Going Beyond Reshoring to Rightshoring. In Outsourcing/Offshoring Insights: Going Beyond Reshoring to Rightshoring* (pp. Outsourcing/Offshoring Insights: Going Beyond Reshoring to Rightshoring, 2017-01-26). Bradford, West Yorkshire: Emerald Publishing Limited.

Barbieri, Boffelli, A., Elia, S., Fratocchi, L., & Kalchschmidt, M. (2022). How does Industry 4.0 affect international exposure? The interplay between firm innovation and home-country policies in post-offshoring relocation decisions. *International Business Review,* 31(4). https://doi.org/10.1016/j.ibusrev.2022.101992

Barbieri, P., Boffelli, A., Elia, S., Fratocchi, L., Kalchschmidt, M., & Samson, D. (2020). What can we learn about reshoring after Covid-19? *Operations Management Research*, 13(3-4), 131-136.

Barbieri, P., Ciabuschi, F., Fratocchi, L., & Vignoli, M. (2018). What do we know about manufacturing reshoring? *Journal of Global Operations Strategic Sourcing,* 11:79–122.

BBC News, (2010). Election 2010, retrieved from http://news.bbc.co.uk/1/hi/8676607.stm

BBC News, (2016). May: Brexit will 'enhance' Scotland's global standing, retrieved from http://www.bbc.co.uk/news/uk-scotland-scotland-politics-37472910

BBC News, (2016). Nicola Sturgeon: UK faces Brexit ‘lost decade’, retrieved from http://www.bbc.co.uk/news/uk-scotland-scotland-politics-37358584

BBC News, (2016). UK 'heading for full Brexit', retrieved from http://www.bbc.co.uk/news/live/business-37520631

Bennett, D. & Klug, F. (2012). Logistics supplier integration in the automotive industry, *International Journal of Operations and Production Management*, 32(11), 1281-1305.

Benstead, A. V., Hendry, L. C., & Stevenson, M. (2018). Horizontal collaboration in response to modern slavery legislation: *An action research project. International Journal of Operations & Production Management*, 38(12) 2286-2313.

Bergman, R. & Ramachandran, G. (2010). Right-shoring: New insights for the post-meltdown economy, *Logistics Management,* 49(3), 34-37.

Birnie, E., Drame, B., Hawksworth, J., Kupelian, B. & Robinson, T. (2014, March). Reshoring – a new direction for the UK economy. *UK Economic Outlook*, pp. 25/33.

Bishop, M. L. (2011). Reshoring Garment Production: China to the United States: The Tipping Point, *Fashion Institute of Technology,* November 2011.

Blaikie, N. (2010). *Designing Social Research* (2nd edn). Cambridge: Polity.

Blair, C., David, A., Ford, S., Fravel, D., Kitzmiller, J., Leary, J., Stanton-Geddes, M. & Torsekar, M., (2014). Post-recession onshoring: an examination of the U.S. Computer and Electronics Sector. *U.S. International Trade Commissioner Office of Industries Paper,* No. ID-038.

Balzer, W.K., Brodke, M.H., Kluse, C. & Zickar, M.J. (2019). Revolution or 30-year fad? A role for I-O psychology in lean management. *Industrial and Organizational Psychology*, 12(3), 215-233.

Blome, C. & Schoenherr, T. (2011). Supply chain risk management in financial crises-A multiple case-study approach. *International Journal of Production Economics*, 134, 43-57.

Boer, H., Holweg, M., Kilduff, M., Pagell, M., Schmenner, R. & Voss, C. (2015). Making a meaningful contribution to theory. *International Journal of Operations and Production Management*, 35(9), 1231-1252.

Brandao, M., Godinho Filho, M., & Da Silva, A. (2021). Luxury supply chain management: A framework proposal based on a systematic literature review. *International Journal of Physical Distribution & Logistics Management*, 51(8), 859-876.

Branicki, L., Sullivan-Taylor, B., & Brammer, S. (2021). Towards crisis protection(ism)? COVID-19 and selective de-globalization. Critical Perspectives on International Business, 17(2), 230-251.

Braun, V., & Clarke, V. (2014). What can "thematic analysis" offer health and wellbeing researchers?. *International journal of qualitative studies on health and well-being*, 9, 26152. doi:10.3402/qhw.v9.26152

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101.

Bresnahan, T. F., & Trajtenberg, M. (1995). General purpose technologies 'Engines of growth'?. *Journal of econometrics*, 65(1), 83-108.

Brouthers, L. E., Gao, Y., & Napshin, S. (2014). Keiretsu centrality—profits and profit stability: A power dependence perspective. *Journal of Business Research, 67*(12), 2603–2610.

Bryson, J. R. & Mulhall, R. (2014, January 9). A British Manufacturing Renaissance? The Reshoring of British Manufacturing. *The Birmingham Brief*.

Buckley, P.J. & Casson, M. (1998). *A Theory of Cooperation in International Business*, Lexington: Lexington Books.

Butollo, F. (2021). Digitalization and the geographies of production: Towards reshoring or global fragmentation? *Competition & Change*, 25(2), 259-278.

Capello, R., & Caragliu, A. (2021). Regional growth and disparities in a post-COVID Europe: A new normality scenario. *Journal of Regional Science*, 61(4), 710-727.

Caniels, M.C.J. & Gelderman, C.J. (2005). Purchasing Strategies in the Kraljic Matrix – A power and dependence perspective, *Journal of Purchasing and Supply Management*, 11(2) 141-155.

Caniels, M.C.J. & Roeleveld, A. (2009). Power and dependence perspectives on outsourcing decisions. *European Management Journal*, 27, 402-417.

Casciaro, T. & Piskorski, M. (2005). Power imbalance, mutual dependence, and constraint absorption:A closer look at resource dependence theory, *Administrative Science Quarterly*, 50(2), 167-199.

Cassell, C. & Symon, G. (2004). Essential Guide to Qualitative Methods in Organisational Research, London: Sage Publications Ltd.

Chen, Y. S., Su, H. C., & Ro, Y. K. (2017). The co-evolution of supplier relationship quality and product quality in the US auto industry: A cultural perspective. *International Journal of Production Economics*, 184, 245–255.

Collins, R. & Bechler, K. (1999). Outsourcing in the chemical and automotive industries: Choice or competitive imperative? *Journal of Supply Chain Management*, 35(4), 4-11.

Collins, R., Bechler, K. & Pires, S. (1997). Outsourcing in the automotive industry: from JIT to modular consortia. *European Management Journal*, 15(5), 498-507.

Colotla, I., Shi, Y., & Gregory, M. J. (2003). Operation and performance of international manufacturing networks. *International Journal of Operations & Production Management*, 23(10), 1184-1206. doi: doi:10.1108/01443570310496625

Corbin, J. & Strauss, A. (2007). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks, California: Sage.

Cosimato, S. & Vona, R. (2021). Digital Innovation for the Sustainability of Reshoring Strategies: A Literature Review. *Sustainability* (Basel, Switzerland), 13(7601), 7601.

Cox, A. (2004). Relationship management in the power regimes and supply chains, *Supply Chain Management: An International Journal*, 9(5), 346-356.

Crino, R. (2010). *The Effects of Offshoring on Post-displacement Wages: Evidence from the United States.* Oxford: Blackwells Publishing Ltd.

Creswell, J.W. (2013). *Qualitative Inquiry and Research Design: Choosing Amongst Five Approaches*. Thousand Oaks California: Sage Publications Inc.

Crossan, F. (2003). Research philosophy: towards an understanding, *Nurse Researcher*, 11(1), 46-55.

Crossan, M.R., Maurer, C.C. & White, R.E. (2011). Reflections on the 2009 AMR Decade Award: do we have a theory of organizational learning?. *Academy of Management Review*, 36(3), 446-460.

Crotty, M. (1996a). *Phenomenology and Nursing Research*. Melbourne: Churchill Livingstone.

Crotty, M. (1996b). '*Doing Phenomenology' Qualitative Research Practice in Adult Education*. Eds. Willis & Neville. Melbourne: David Lovell Publishing.

Crotty, M. (2003). *The Foundations of Social Research*. London: Sage Publications.

Cséfalvay, Z. (2021). As "robots are moving out of the cages"–toward a geography of robotization. *Eurasian Geography and Economics*, 1-31.

Danese, P., Manfe, V. & Romano, P. (2018). A systematic literature review on recent lean research: state-of-the-art and future directions. *International Journal of Management Reviews*, 20(2), 579-605.

Da Silveira, G. J. C. (2014). An empirical analysis of manufacturing competitive factors and offshoring. *International Journal of Production Economics*, 150, 163-173. doi: http://dx.doi.org/10.1016/j.ijpe.2013.12.031

Dachs, B. & Kinkle, S. (2013). Back-shoring of production activities in European manufacturing. Evidence from a large scale survey. Paper presented at EROMA – European Operations Management Association, 7-12 June, 2013, Dublin Ireland.

Dachs, B., Kinkel, S., Jäger, A., & Palčič, I. (2019). Backshoring of production activities in European manufacturing. *Journal of Purchasing and Supply Management*, 25(3), 100531.

Dana, L., Hamilton, R. & Pauwels, B. (2007). Evaluating offshore and domestic production in the apparel industry: the small firm's perspective, *Journal of International Enterprise*, 5(34), 47-63.

Danese, P., Manfe, V. & Romano, P. (2018). A systematic literature review on recent lean research: state-of-the-art and future directions, *International Journal of Management Reviews*, 20(2), 579-605.

Danermark, B. (2001). *Explaining Society: An Introduction to Critical Realism in Social Science*. Routledge, Florence, KY.

Davis, C. & Naghavi, A. (2011). Offshoring production: a simple model of wages, productivity and growth, *Economic Inquiry,* 49(2), 334-348.

De Angelis, R., Howard, M., & Miemczyk, J. (2018). Supply chain management and the circular economy: Towards the circular supply chain. *Production Planning & Control*, 29(6), 425-437.

De Backer, K., DeStefano, T., Menon, C., & Suh, J. R. (2018). Industrial robotics and the global organisation of production.

Deineko, L., Tsyplitska, O., Kushnirenko, O., & Deineko, O. (2019). An institutional mechanism for integrating domestic manufacturing into global value chains. *Problems and Perspectives in Management*, 17(3), 438-451.

Denning, S. (2013). Boeing's offshoring woes: seven lessons every CEO must learn. *Strategy & Leadership*, 41(3), 29-35. doi: doi:10.1108/10878571311323190.

Denzin, N.K. (1978). The methodological implications of symbolic interactionism for the study of deviance, *Contemporary Social Theories*, ed. A. Wells, Goodyear, Santa Monica, 99-108.

Denzin, N.K. & Lincoln, Y.S. (2011). *The SAGE Handbook of Qualitative Research*, USA: Sage Publications Inc.

Drauz, R. (2014). Re-insourcing as a manufacturing-strategic option during a crisis-Cases from the automobile industry, *Journal of Business Research,* 64, 346-353.

Dubois, A. & Gadde, L.E. (2002). Systematic combining an abductive approach to case research, *Journal of Business Research,* 55, 553-560.

Dunning, H.J. (1993). *Multinational Enterprises and the Global Economy*. Addison-Wesley. Harlow

Dunning, J.H. & Lundan, S.M. (2008). *Multinational enterprises and the global economy*, Cheltenhan: Edward Elgar.

Easterby-Smith, m., Thorpe, R. & Jackson, P.R. (2008). *Management Research* 3rd Edition, London: Sage.

Edh Mirzaei, N., Hilletofth, P., & Pal, R. (2021). Challenges to competitive manufacturing in high-cost environments: Checklist and insights from Swedish manufacturing firms. *Operations Management Research*, 14(3-4), 272-292.

EEF (2009). *Manufacturing Advantage: How Manufacturers Are Focusing Strategically in an Uncertain World*. London: EEF.

EEF (2014, March). Reshoring – a new direction for the UK economy. UK Economic Outlook, 36-38.

Eisenhardt, K.M. (1989). Building Theories from Case Study Research. *Academy of Management Review*, 14(4), 532-550.

Ellram, L. M., Tate, W. L., & Petersen, K. J. (2013). Offshoring and Reshoring: An Update on the Manufacturing Location Decision. *Journal of Supply Chain Management*, 49(2), 14-22.

Emerson, R. M. (1962). Power-Dependence Relations. American Sociological Review, 27(1), 31-41.

Faurecia.com, (2017). 'Our Three Business Groups', Retrieved 09/03/17 from http://www.faurecia.com/en.

Feagin, J., Orum, A., & Sjoberg, G. (1991). *A Case for Case Study*. Chapel Hill, NC: University of North Carolina Proess.

Fielding, N. G. & Lee, R. M. (1998). *Computer Analysis and Qualitative Research.* Thousand Oaks, California: Sage Publication.

Fink, R.C., William, L.J. & Hatten, K.J. (2011). Customer perceptions of dependencies in customer-supplier relationships, *Journal of Strategic Marketing,* 19(1), 73-89.

Fjellstrom, D., Fang, T., & Chimenson, D. (2019). Explaining reshoring in the context of Asian competitiveness: Evidence from a Swedish firm. *Journal of Asia Business Studies*, 13(2), 277-293.

Flaeschner, O., Wenking, M., Netland, T., & Friedli, T. (2020). When should global manufacturers invest in production network upgrades? An empirical investigation. *International Journal of Operations & Production Management*, 41(1), 21-53.

Flint, D.J. & Mentzer, J.T. (2000). Logisticians as marketers': their rile when customers' desired value changes, *Journal of Business Logistics,* 21(2)19-45.

Foerstl, K., Reuter, C., Hartmann, E., & Blome, C. (2010). Managing supplier sustainability risks in a dynamically changing environment—Sustainable supplier management in the chemical industry. *Journal of Purchasing and Supply Management*, 16(2), 118-130.

Foerstl, K., Kirchoff J.F. & Bals, L. (2016). Reshoring and insourcing: drivers and future research directions. *International Journal of Physical Distribution and Logistics Management*, 46(5).

Fonseca, L., & Rocha, A. (2021). Rethinking Offshoring and International Marketing Strategies during the COVID-19 Pandemic. Revista De Administração Contemporânea, 25(Spe), 1-12A.

Fratocchi, L., Barbieri, P., Di Mauro, C., Nassimbeni, G. & Vignoli, M. (2013). Manufacturing Back-reshoring – An Exploratory Approach for Hypothèses Development, Paper presented at the RSA AiLG, Milan, October 17-18.

Fratocchi, L., Di Mauro, C., Barbieri, P. & Nassimbeni, G. (2014). When manufacturing moves back: Concepts and questions, *Journal of Purchasing & Supply Management*, 20, 54-59.

Fratocchi, L., & Di Stefano, C. (2020). Do industry 4.0 technologies matter when companies backshore manufacturing activities? An explorative study comparing Europe and the US. *Knowledge Management and Industry 4.0: New Paradigms for Value Creation*, 53-83.

Frigant, V. & Lung, Y. (2002). Geographical proximity and supplying relationships in modular production. *International Journal of Urban and Regional Research*, 26(4), 742-755.

Gallas, D. (2016). Carlos Ghosn discussing Brexit and impact for Nissan, retrieved from http://www.bbc.co.uk/news/business-36981182

Gereffi, G. & Lee, J. (2012). Why the world suddenly cares about global supply chains. *Journal of Supply Chain Management*, 48(3), 24-32.

Gill, J. & Johnson, P. (2010). *Research Methods for Managers (4th edn)*. London: Sage.

Gillham. B. (2000). *Case Study Research.* London:Continuum.

Glaser, B.G. & Strauss, A.L. (1967). *The Discovery of Grounded Theory*. Aldine: Chicargo, IL.

Goldratt, E.M. & Cox, J. (1984). *The Goal: Excellence in Manufacturing*, North River Press, New York, NY.

Gomm, R. (2009). *Key Concepts in Social Research Methods.* Chippenhan and Eastbourne: Palgrave Macmillan.

Gray, G.V., Skowranski, K., Esenduran, G. & Rungtusanatham, M. J., (2013). The Reshoring Phenomenon: What Supply Chain Academics Ought to Know and Should Do. *Journal of Supply Chain Management,* 49(2), 27-33.

Guba, E.G. & Lincoln, Y.S. (1989). *Fourth Generation Evaluation.* Newbury Park: Sage – (1994). 'Competing paradigms in qualitative research' *Handbook of Qualitative Research*. Eds. N.K. Denzin & Y.S. Lincoln, Thousand Oaks: Sage, pp.105-117.

Gylling, M., Heikkilä, J., Jussila, K., & Saarinen, M. (2015). Making decisions on offshore outsourcing and backshoring: A case study in the bicycle industry. *International Journal of Production Economics,* 162, 92-100. doi: http://dx.doi.org/10.1016/j.ijpe.2015.01.006

Hansen, Z.N. & Rasmussen, L.B. (2013). Outsourcing relationships: Changes in power and dependency, *European Management Journal*, 31, 655-667.

Harding, S. (1987). *Introduction: is there a feminist method? In S.Harding (Ed.) Feminism and methodology: Social science issues (pp. 1-14).* Bloomington: Indiana University Press.

Harris, J., Sunley, P., Evenhuis, E., Martin, R., Pike, A., & Harris, R. (2020). The Covid-19 crisis and manufacturing: How should national and local industrial strategies respond? *Local Economy*, 35(4), 403-415.

Hatonen, J. & Erikson, T. (2009). 30+ years of research and practice of outsourcing-exploring the past and anticipating the future, *Journal of International Management,* 15, 142-155.

Herceg, I.V., Kuč, V., Mijušković, V.M., & Herceg, T. (2020). Challenges and Driving Forces for Industry 4.0 Implementation. Sustainability (Basel, Switzerland), 12(4208), 4208.

Hedenstierna, C., Disney, S., Eyers, D., Holmström, J., Syntetos, A., & Wang, X. (2019). Economies of collaboration in build-to-model operations. *Journal of Operations Management,* 65(8), 753-773.

Heikkilä, J., Martinsuo, M., & Nenonen, S. (2018). Backshoring of production in the context of a small and open Nordic economy. *Journal of Manufacturing Technology Management,* 29(4), 658-675.

Henisz, W.J. & Delios, A. (2001). Uncertainty, imitation and plant location: Japanese Multinational Corporations. *Administrative Science Quarterly*, 46(3), 443-475.

Herriot, R.E. & Firestone, W.A. (1983). Multiple qualitative policy research: Optimizing description and generalizability. *Education Researcher*, 12, 14-19.

Hickie, D., & Hickie, J. (2021). The impact of Industry 4.0 on supply chains and regions: Innovation in the aerospace and automotive industries. *European Planning Studies*, 29(9), 1606-1621.

Hirsch, P.M. & Levin, D.Z. (1999). Umbrella advocates versus validity police: a life-cycle model. *Organization Science*, 10(2), 199-212.

Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: Software of the mind*. London: McGraw-Hill.

Holweg, M., Reichhart, A. & Hong, E. (2011). On risk and cost in global sourcing. *International Journal of Production Economics*, 131(1), 333-341.

Holweg, M., Davies, P., & Pospolny, D. (2009). *The competitive status of UK automotive industry. Buckingham*: PICSIE Books.

Holweg, M., Davies, P., & Wood, M. (2017). Growing the Automotive Supply Chain; Local Vehicle Content Analysis. Automotive Council UK.

Hopp, W.J. & Spearman, M.L. (2021). The lenses of lean: visioning the science e and practice of efficiency. *Journal of Operations Management*. 67(5), 610-626.

Huges, J. (1994). *The Philosophy of Social Research*. Essex: Longman.

Hughes, L., Dwivedi, Y., Rana, N., Williams, M., & Raghavan, V. (2020). Perspectives on the future of manufacturing within the Industry 4.0 era. *Production Planning & Control*, 1-21.

Hunt, S.D. (1993). Objectivity in Marketing Theory and Research, *Journal of Marketing*, 57(2), 76.

Huq, F., Pawar, K., & Subramanian, N. (2021). Disturbances to the supply chains of high-value manufacturing firms: Comparison of the perceptions of product managers and supply chain managers. *International Journal of Production Research*, 59(13), 3916-3934

Iden, J. & Eikebrokk, T. R. (2013). Implementing IT Service Management: A systematic literature review. *International Journal of Information Management,* 33, 512-523.

Izqyuierdo, C.C. & Cillan, J.G. (2004). The interaction of dependence and trust in long-term industrial relationships, *European Journal of Marketing,* 38, 974-994.

Jabbour, L. (2010). *Offshoring and Firm Performance: Evidence from French Manufacturing Industry*. Oxford: Blackwells Publishing Ltd.

Jang, H. (2018). *Association of SME and Government Policy Factors with the Creation of New Employment: Manufacturing Industry in Korea.* Social Sciences (Basel), 7(6), 100.

Jayaram, J., & Vickery, S. (2018). The role of modularity in the supply chain context: Current trends and future research directions. *International Journal of Production Research*, 56(20), 6568-6574.

Jensen, P. D. O. & Pedersen, T. (2012). Offshoring and international competitiveness: antecedents of offshoring advanced tasks, *Journal of the Academy of Marketing Science*, 40, 313-328.

Johansson, M., & Olhager, J. (2018). Manufacturing relocation through offshoring and backshoring: The case of Sweden. *Journal of Manufacturing Technology Management*, 29(4), 637-657.

Juergensen, J., Guimón, J., & Narula, R. (2020). European SMEs amidst the COVID-19 crisis: Assessing impact and policy responses. *Economia E Politica Industriale*, 47(3), 499-510.

Kaivo-Oja, J., Knudsen, M.S., & Lauraéus, T. (2018). Reimagining Finland as a manufacturing base: The nearshoring potential of Finland in an industry 4.0 perspective.

Business, Management and Education, 16(1), *Business, management and education*, 2018-07-01, 16 (1).

Kampstra, R.P., Ashayeri, J. & Gattorna, J.L. (2006). Realities of supply chain collaboration, *The International Journal of Logistics Management*, 17(3), 312-330.

Kang, M., Choi, Y., Kim, J., Lee, K., Lee, S., & Park, I.(2020). COVID-19 impact on city and region: What's next after lockdown? *International Journal of Urban Sciences*, 24(3), 297-315.

Kapletia, D., Phillips, W., Medcalf, N., Makatsoris, H., McMahon, C., & Rich, N. (2019). Redistributed manufacturing - challenges for operations management. *Production Planning & Control*, 30(7), 493-495.

Kennedy, R.E. & Sharma, A. (2009). *The Services Shift: Seizing the Ultimate Offshore Opportunity*, Upper Saddle River, NJ: Pearson Education.

Kim, Y. G. & Chung, B. D. (2022). *Closed-loop supply chain network design considering reshoring drivers*. Omega (Oxford), 109.

Kinkel, S. & Maloca, S. (2009). Drivers and antecedents of manufacturing offshoring and backshoring – A German perspective. *Journal of Purchasing and Supply Management*, 15(3), pp. 154-165.

Kinkel, S. & Zanker, C. (2013). New patterns of German production relocation and backshoring activities after the global economic crisis? Paper presented at the European Operations Management Association, Dublin, Ireland. 7-12th June.

Kinkel, S. (2012). Trands in production relocation and back-shoring activities: changing patterns in the course of the global economic crisis, *International Journal of Operations Production Management,* 32(6), 696-720.

Kinkel, S. (2014). Future and impact of backshoring-Some conclusions from 15 years of research on German practices, *Journal of Purchasing and Supply Management,* 20, 63-65.

Kirkeby, O.F. (1990). *Abduktion,* in Andersen, H. (Ed.), *Vetenskapsteori och metodlara. Introduktion,* (translated by Luingman, C.G.). Studentlitteratur, Lund.

Kitchenham, B. (2004). *Procedures for performing systematic reviews.* Keele University.

Krenz, A., Prettner, K., & Strulik, H. (2021). Robots, reshoring, and the lot of low-skilled workers. *European Economic Review*, 136, 103744.

Krenz, A., & Strulik, H. (2021). Quantifying reshoring at the macro-level—Measurement and applications. *Growth and Change,* 52(3), 1200-1229.

Lampón, & Rivo-López, E. (2022). The effect of the industry technology intensity on the drivers of manufacturing backshoring. *Journal of Manufacturing Technology Management*, 33(1), 1–21. https://doi.org/10.1108/JMTM-03-2021-0071.

Laplume, A. O., Petersen, B., & Pearce, J. M. (2016). Global value chains from a 3D printing perspective. *Journal of International Business Studies*, 47, 595-609.

Lewin A.Y. & Peeters, C. (2006). Offshoring work: business hype or the onset of fundermental transformation? *Long Range Planning,* 39, 221-239.

Lewin, A.Y. & Couto, V. (2007). *Next Generation Offshoring: The Globalization of Innovation, Raleigh:* Duke University, The Fuqua School of Business.

Lewin, A.Y., Massini, S. & Peeters, C. (2009). Why are companies offshoring innovation? The emerging global race for talent, *Journal of International Business Studies,* 40(6), 9001-925.

Li, H., Li, L.L., Wu, B. & Xiong, Y. (2008). Transformational offshore outsourcing innovation: empirical evidence from the alliance in China, *Journal of Operations Management*, 26, 257-274.

Li, H., Li, L.L., Wu, B. & Xiong, Y. (2012). The End of Cheap Chinese Labour, Journal of Economic Perspectives, 26(4), 57-74.

Lloyd, C., & Payne, J. (2019). Rethinking country effects: Robotics, AI and work futures in Norway and the UK. *New Technology, Work, and Employment*, 34(3), 208-225.

Magableh, G. (2021). Supply Chains and the COVID-19 Pandemic: A Comprehensive Framework. *European Management Review*, 18(3), 363-382.

Maloni, M. & Benton, W.C. (2000). Power influences in the supply chain, *Journal of Business Logistics*, 21(1), 49-73.

Manello, A., & Calabrese, G. (2019). The influence of reputation on supplier selection: An empirical study of the European automotive industry. *Journal of Purchasing and Supply Management*, 25(1), 69-77.

Mann, C. (2012). Supply chain logistics, trade facilitation and international trade: A macroeconomic policy review. *Journal of Supply Chain Management*, 48(3), 7-14.

Manning, S., Massini, S. & Lewin, A. Y. (2008). A dynamic perspective on the next-generation offshoring: the global sourcing of science & engineering skills, *Academy of Management Journal*, 49(5), 942-959.

Manufacturing reshoring giving an investment push; Politics, taxes and trade could spur U.S. plant moves. (2020). Automotive News, 94(6946), Automotive news, 2020-08-10, 94 (6946).

Marabelli, M. & Newell, S. (2014). Knowing, Power and Materiality: A Critical Review and Reconceptualization of Absorptive Capacity. *International Journal of Management Reviews*, 16, 479-499.

Mathieu, J.E. (2016). The problem with [in] management theory. *Journal of Organizational Behavior*, 37(8), 1132-1141.

Martinez-Mora, C. & Merino, F. (2014). Offshoring in the spanish footwear industry: a return journey? *Journal of Purchasing and Supply Management*, 20, 225-237.

Martínez-Mora, C., & Merino, F. (2020). Consequences of sustainable innovations on the reshoring drivers' framework. *Journal of Manufacturing Technology Management*, 31(7), 1373-1390.

Martínez-Mora, C., & Merino, F. (2021). Extending the offshoring literature to explain backshoring: An application to the Spanish footwear industry. *Growth and Change*, 52(3), 1230-1250.

MAS. (2014). Reshore UK. *Manufacturing Advisory Service.* Retrieved May 22, 2014 from http://www.mymas.org.

Maskell, P., Pedersen, T., Petersen, B. & Dick-Nielsen, J. (2007). Learning paths to offshore outsourcing: From cost reduction to knowledge seeking, *Industry & Innovation*, 14(3), 239-257.

Mathiyazhagan, K., Rajak, S., Sampurna Panigrahi, S., Agarwal, V., & Manani, D. (2021). Reverse supply chain management in manufacturing industry: A systematic review. *International Journal of Productivity and Performance Management*, 70(4), 859-892.

McCarthy, I. & Anagnostou, A. (2004). The impact of outsourcing on the transaction costs and boundaries of manufacturing. *International Journal of Production Economics*, 88(1), 61-71.

McIvor, R. (2013). Understanding the manufacturing location decision: The case for the transaction cost and capability perspectives, *Journal of Supply Chain Management*, 49(2), 23-26.

Mead, G.H. (1934). *Mind, Self and Society, Chicargo: University of Chicargo Press.*

Merino, F., Di Stefano, C., & Fratocchi, L. (2021). Back-shoring vs near-shoring: A comparative exploratory study in the footwear industry. *Operations Management Research*, 14(1-2), 17-37.

Michel, B. & Rycx, F. (2012). Does offshoring of material and business services affect employment? Evidence from a small open economy, *Applied Economics*, 44(2), 229-251.

Micheler, S., Goh, Y.M., & Lohse, N. (2019). Innovation landscape and challenges of smart technologies and systems – a European perspective. *Production & Manufacturing Research*, 7(1), 503-528.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook.* Thousand Oaks, CA: SAGE.

360

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook*. Thousand Oaks, CA: SAGE

Mitchell, J.C. (1977). *The logic and methods of sociological inquiry, Introducing Sociology*, 2nd Edn. P.Worsley, Penguin, Harmondsworth, 73-121.

Moradlou, H., Fratocchi, L., Skipworth, H., & Ghadge, A. (2020). Post-Brexit back-shoring strategies: What UK manufacturing companies could learn from the past? *Production Planning & Control*, 1-18.

Moradlou, H., Reefke, H., Skipworth, H., & Roscoe, S. (2021). Geopolitical disruptions and the manufacturing location decision in multinational company supply chains: A Delphi study on Brexit. *International Journal of Operations & Production Management*, 41(2), 102-130.

Moradlou, H., & Tate, W. (2018). Reshoring and additive manufacturing. *World Review of Intermodal Transportation Research*, 7(3), 241-263.

Morales-Contreras, M., Leporati, M., & Fratocchi, L. (2021). The impact of COVID-19 on supply decision-makers: The case of personal protective equipment in Spanish hospitals. *BMC Health Services Research*, 21(1), 1-1170.

Moretto, A., Patrucco, A., & Harland, C. (2020). The dynamics of reshoring decisions and the role of purchasing. *International Journal of Production Research*, 58(19), 5929-5944.

Moutray, C. (2020). In recovery mode: Manufacturers try to bounce back after COVID-19 disruptions. Business Economics (Cleveland, Ohio), 55(4), 240-252.

Mukhin, A., Ganina, G., Mozgin, S., Ostrovskiy, Y., & Yakovleva, A. (2019). The multifaceted role of material production in society. IOP Conference Series. Materials Science and Engineering, 589(1), 12024.

Murp, M. (2014). Reshoring: Strong Regions Will Determine Where, How. *Brookings Advanced Industries Series*, No.42, Washington DC, The Brookings Institution.

Nachum, L. & Zaheer, S. (2005). The persistence of distance? The impact of technology on MNE motivations for foreign investment, *Strategic Management Journal,* 26(8), 747-767.

Narula, R. & Dunning, J. (2000). Industrial development, globalisation and multinational enterprises: new realities for developing countries. *Oxford Development Studies*, 28(2), 141-167

Nordman, R. & Tolstoy, D. (2014). Does relationship psychic matter for the learning processes of internationalizing SMEs? *International Business Review*, 23(1), 30-37.

Nujen, B.B., Solli-Saether, H., Mwsiumo, D. & Hammer, B. (2012). Reputational risk as a factor in the offshoring location choice. *Journal of Purchasing and Supply Management,* 27(2), doi.org/10.1016/j.pursup.2021.100682.

Oka, C. (2013). *Beyond the Keiretsu*, Pressbooks.

Okoli, C. & Schabram, K. (2010). A guide to conducting a systematic literature review of information systems research. *Sprouts: Working Papers on Information Systems,* 10(26), 1-49.

Panwar, R., Pinkse, J. & De Marchi, V. (2022). The Future of Global Supply Chains in a Post-COVID-19 World. *California Management Review*, 64(2), 5-23.

Patton, M. (1990). *Qualitative evaluation and research methods,* Beverly Hills, CA: Sage.

Patton, M. (2002). *Qualitative research and evaluation methods* (3rd ed). Thousand Oaks, CA: Sage.

Peirce, C.S. (1931-58). *The Collected Papers of Charles Sanders Peirce*, 1-6 Eds. Hartshorne, C. & Weiss, P. 7-8, ed. Burks, A. Cambridge: University Press.

Pellicelli, M. (2018). Gaining Flexibility and Innovation through Offshore Outsourcing. *Sustainability* (Basel, Switzerland), 10(5), 1672.

Petersen, B., Pedersen, T. & Lyles, M.A. (2008). Closing knowledge gaps in foreign markets. *Journal of International Business Studies*, 39, 1097-1113.

Petersen, H. L., & Lemke, F. (2015). Mitigating reputational risks in supply chains. *Supply Chain Management: An International Journal*, 20(5), 495-510.

Pfeffer, J. & Salancik, G. R. (1978). *The external control of organisations.* Harper and Row, New York.

Pferrer, J. & Salancik, G. (1978). *The external control of organizations: A resource dependence perspective,* New York: Harper and Row.

Phillips, D. (1990). *Post-positivism science myths and realities.* In Guba, E. (Ed) *The Paradigm Dialogue*, Newbury Park: Sage.

Piatanesi, B., & Arauzo-Carod, J. (2019). Backshoring and nearshoring: An overview. *Growth and Change*, 50(3), 806-823.

Piazza, A. & Abrahamson, E. (2020). Fads and fashions in management practices: taking stock and looking forward. *International Journal of Management Reviews*, 22(3), 264-286.

Pla-Barber, J., Villar, C., & Benito-Sarriá, G. (2020). Configurational Theory in Traditional Manufacturing Industries: A New Model of High-Performing Small and Medium-Sized Enterprises. *Sustainability (*Basel, Switzerland), 12(6818), 6818.

Plakoyiannaki, E. (2016). Using a Computer-Assisted Qualitative Data Analysis software (CAQDAS)... In. Leeds: NARTI workshop 15-01-2016.

Podrecca, M., Orzes, G., Sartor, M., & Nassimbeni, G. (2021). Manufacturing internationalization: From distance to proximity? A longitudinal analysis of offshoring choices. *Journal of Manufacturing Technology Management*, 32(9), 346-368.

Poole, K. (2019). Strengthening Manufacturing: More Focus on How Research Can Inform Public Policy. *Economic Development Quarterly*, 33(1), 3-5.

Pourhejazy, P., & Ashby, A. (2021). Reshoring decisions for adjusting supply chains in a changing world: A case study from the apparel industry. *International Journal of Environmental Research and Public Health*, 18(9), 4873.

Radi, D., Lamantia, F., & Italo Bischi, G. (2021). OFFSHORING, RESHORING, UNEMPLOYMENT, and WAGE DYNAMICS in A TWO-COUNTRY EVOLUTIONARY MODEL. *Macroeconomic Dynamics*, 25(3), 705-732.

Raza, W., Grumiller, J., Grohs, H., Essletzbichler, J., & Pintar, N. (2021). Post Covid-19 value chains: Options for reshoring production back to Europe in a globalised economy.

Rescher, N. (1995). '*Pragmatist' The Oxford Companion to Philosophy,* ed. Honderich, T. Oxford: University Press, 710-713.

Rhodes, C. (2015). The motor industry: statistics and policy. *Briefing Paper*, House of Commons Library, Number 00611, 5th October 2015.

Ritchie, J., Lewis, J., McNaughton Nicholls, C. & Ormston, R. (2014). *Qualitative Research Practice: A Guide for Social Science Students & Researchers (2nd Ed)*, London: Sage Publications Ltd.

Robinson, P., & Hsieh, L. (2016). Reshoring: A strategic renewal of luxury clothing supply chains. *Operations Management Research*, 9(3-4), 89-101.

Rose A.N.M, Ab Rashid M.F.F, Nik Mohamed N.M.Z, & Ahmad H. (2017). Similarities of lean manufacturing approaches implementation in SMEs towards the success: Case study in the automotive component industry. MATEC Web of Conferences, 87, 02024.

Qamar, A., & Hall, M. (2018). Can Lean and Agile organisations within the UK automotive supply chain be distinguished based upon contextual factors? *Supply Chain Management*, 23(3), 239-254.

Sako, M. (2005). Governing Automotive Supplier Parks: Leveraging the Benefits of Outsourcing and Co-location. *Working Paper*, Oxford: Said Business School.

Salancik, G. R., & Pfeffer, J. (1977). Who gets power — and how they hold on to it: A strategic-contingency model of power. *Organizational Dynamics*, 5(3), 3-21. doi: http://dx.doi.org/10.1016/0090-2616(77)90028-6.

Saldana, J. (2016). *The Coding Manual for Qualitative Researchers*. London: SAGE

Publications Ltd.

Sandberg, J. (2004). The Rhetoric of Positivism Versus Interpretivism: A Personal View. *MIS Quarterley*, 28(1), iii-xii.

Sarkis, J., Zhu, Q., & Lai, K.-h. (2011). An organizational theoretic review of green supply chain management literature. *International Journal of Production Economics*, 130(1), 1-15. doi: http://dx.doi.org/10.1016/j.ijpe.2010.11.010

Saunders, M., Lewis, P. & Thornhill, A. (2012). *Research Methods for Business Students.* Essex: Pearson Education Limited.

Scalabre, O. (2016). The next manufacturing revolution is here, retrieved from http://www.ted.com/talks/olivier_scalabre_the_next_manufacturing_revolution_is_here/transcript?language=en

Schramm, W. (1971, December). *Notes on case studies of instrumental media projects.* Working paper for the Academy of Education Development, Washington, DC.

Schwandt, T.A. (2001). *Dictionary of qualitative inquiry* (2nd ed.). Thousand Oaks, CA: Sage.

Settanni, E. (2020). Those who do not move, do not notice their (supply) chains—inconvenient lessons from disruptions related to COVID-19. *AI & Society*, 35(4), 1065-1071.

Shih, W.C. (2014). What It Takes To Reshore Manufacturing Successfully. *MIT Sloan Management Review*, 56(1), 55-62.

Silveira, G. J. C. (2014). An empirical analysis of manufacturing competitive factors and offshoring, *International Journal of Production Economics*, 260, 163-173.

Simchi-Levi, D., Peruvankal, J.P., Mulani, N., Read, B. & Ferreira, J. (2012). It is time to rethink your manufacturing strategy. *Sloan management Review*, 53(2), 20-22.

Sirkin, H.L., Zinser, M., Hohner, D & Rose, J. (2012). U.S. manufacturing nears the tipping point: Which industries, why and how much? *BCG Perspectives*, March 22.

Slepniov, B., Waehrens, B. V. & Johansen, J. (2014). Dynamic roles and location of manufacturing, *Journal of Manufacturing Technology Management*, 25(2), 198-217.

Sodhi, M., & Tang, C. (2021). Supply Chain Management for Extreme Conditions: Research Opportunities. *The Journal of Supply Chain Management*, 57(1), 7-16.

Stake, R.E. (2000). *Case studies,* in N.K. Denzin & Y.S. Lincoln (Eds.), *The Sage handbook of qualitative research*, 2rd Ed. Thousand Oaks, CA: Sage.

Stake, R.E. (2005). *Qualitative case studies*, in N.K. Denzin & Y.S. Lincoln (Eds.), *The Sage handbook of qualitative research*, 3rd Ed. Thousand Oaks, CA: Sage.

Stentoft, J., Rajkumar, C., & Madsen, E. S. (2017). *Industry 4.0 in Danish industry: an empirical investigation of the degree of knowledge, perceived relevance and current practice*. Syddansk Universitet.

Stopford, J.J. & Wells, L.T. (1972). *Managing the multinational orgainsations of the firm and overlap of subsidiaries*, New York: Basic Books.

Sunley, P., Evenhuis, E., Harris, J., Harris, R., Martin, R., & Pike, A. (2021). Renewing industrial regions? Advanced manufacturing and industrial policy in Britain. *Regional Studies*, 1-15.

Svensson, G. (2000). A conceptual framework for the analysis of vulnerability in supply chains. *International Journal of Physical Distribution and Logistics Management*, 30(9), 731-749.

Szász, L., Demeter, K., & Boer, H. (2018). Global interactions – closing the loop. *Journal of Manufacturing Technology Management*, 29(4), 630-636.

Tate, W. L, Ellram, L. M, Schoenherr, T. & Petersen, K. J. (2014). Global competitive conditions driving the manufacturing location decision, *Business Horizons* (2014), 57, 381-390.

Tate, W. L. (2014). Offshoring and reshoring: U.S. insights and research challenges, *Journal of Puchasing & Supply Management*, 20, 66-68.

Taylor, S.S, Fisher, D. & Dufresne, R.L. (2002). The aesthetics of manabement storytelling: a key to organisational learning. *Management Learning*, 33(3), 313-330.

The continuous striving for improvement: Looking at critical operations capabilities to improve competitiveness. (2020). *Strategic Direction* (Bradford, England), 36(11), 27-28.

Theyel, G., & Hofmann, K. (2021). Manufacturing location decisions and organizational agility. *Multinational Business Review*, 29(2), 166-188.

Thomas, H. (2016). Looming Brexit headache for Nissan's Sunderland plant, retrieved from http://www.bbc.co.uk/news/business-37024707

Thun, J.H. & Hoenig, D. (2011). An empirical analysis of supply chain risk management in the German automotive industry, *International Journal Production Exonomics*, 131, 242-249.

Thurer, M., Tomasevic, I. & Stevenson, M. (2017). On the meaning of 'waste': review and definition. *Production Planning and Control*, 28(3), 244-255.

Thürer, M., Tomašević, I., Stevenson, M., Blome, C., Melnyk, S., Chan, H., & Huang, G. (2020). A systematic review of China's belt and road initiative: Implications for global supply chain management. *International Journal of Production Research*, 58(8), 2436-2453.

Tokar, T., & Swink, M. (2019). Public Policy and Supply Chain Management: Using Shared Foundational Principles to Improve Formulation, Implementation, and Evaluation. *The Journal of Supply Chain Management*, 55(2), 68-79.

Tsui, T., Peck, D., Geldermans, B., & Van Timmeren, A. (2021). The Role of Urban Manufacturing for a Circular Economy in Cities. *Sustainability* (Basel, Switzerland), 13(23), 23.

Touboulic, A., Chicksand, D. & Walker, H. (2014). Managing Imbalanced Supply Chain Relationships for Sustainability: A Power Perspective. *Decision Sciences*, 45(4), 577-619.

Tsimiklis, P., & Makatsoris, C. (2019). Redistributing food manufacturing: Models for the creation and operation of responsive and agile production networks. *Production Planning & Control*, 30(7), 582-592.

Turner, C., Moreno, M., Mondini, L., Salonitis, K., Charnley, F., Tiwari, A., & Hutabarat, A. (2019). Sustainable Production in a Circular Economy: A Business Model for Re-Distributed Manufacturing. *Sustainability* (Basel, Switzerland), 11(16), 4291.

Túry, G. (2019). Electromobility in the Automotive Industry. What Role Does Technology Change Play in the Geographic Pattern of Production? *Global Economic Observer*, 7(2), 112-120.

Ulrich, D. & Barney, J. B. (1984). Perspectives in organizations-resource dependence, efficiency, and population. *Academy of Management Review*, 9(3), 471-481.

Vanchan, V., Mulhall, R., & Bryson, J. (2018). Repatriation or Reshoring of Manufacturing to the U.S. and UK: Dynamics and Global Production Networks or from Here to There and Back Again. *Growth and Change*, 49(1), 97-121.

Van Hoek, R., & Dobrzykowski, D. (2021). Towards more balanced sourcing strategies – are supply chain risks caused by the COVID-19 pandemic driving reshoring considerations? *Supply Chain Management*, 26(6), 689-701.

Veit, C., Lambrechts, W., Quintens, L., & Semeijn, J. (2018). The Impact of Sustainable Sourcing on Customer Perceptions: Association by Guilt from Scandals in Local vs. Offshore Sourcing Countries. *Sustainability* (Basel, Switzerland), 10(7), 2519.

Vivek, S.D., Glenn, R.R. & Dalela, V. (2009). A longitudinal examination of partnership governance in offshoring: A moving target, *Journal of World Business,* 44(1), 16-30.

Voss, C, Tsikriktsis, N & Frohlich, M. (2002). Case Research-case research in operations management. *International Journal of Operations and Production Management,* 22(2), 196-219.

Voss, C, Tsikriktsis, N & Frohlich, M. (2002). Case Research-case research in operations management. *International Journal of Operations and Production Management,* 22(2), 196-219.

Webster, J. & Watson, R.T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterley,* 26(2), xii-xxiii.

Webster, J. & Watson, R.T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterley,* 26(2), xii-xxiii.

Wheeler, B. & Hunt, A. (2016). Brexit: all you need to know about leaving the EU, retrieved from http://www.bbc.co.uk/news/uk-politics-32810887

White, W. & Borchers, A. (2016). Motivation Behind Reshoring Decisions in Manufacturing. *Operations and Supply Chain Management*, 9(3), 205-209.

Witt, M.A., Li, P., Välikangas, L., & Lewin, A. (2021). De-globalization and Decoupling: Game Changing Consequences? *Management and Organization Review*, 17(1), 6-15.

Wu, X. & Zhang, F. (2014). Home or overseas? an analysis of sourcing decisions under competition. *Management Science,* 60(5), 1223-1240.

Yang, H., Ou, J. & Chen, X. (2021). Impact of tariffs and production cost on a multinational firm's incentive for backshoring under competition. *Omega*, 105(2021) 102500.

Yin, R. K. (1993). *Applications of Case Study Research*. London: Sage Publications.

Yin, R. K. (1994). *Case Study Research Design and Methods.* California: Sage Publications.

Yin, R. K. (2009). *Case Study Research: Design and Methods*. London: Sage Publications.

Publications.

Yin, R. K. (2014). *Case Study Research Design and Methods*. California: Sage Publications.

Zhang, F., Wu, X., Tang, C., Feng, T., & Dai, Y. (2020). Evolution of Operations Management Research: From Managing Flows to Building Capabilities. *Production and Operations Management*, 29(10), 2219-2229.

Zheng, M., Shunko, M., Gavirneni, N., Shu, Y., & Wu, K. (2019). Reactive production with preprocessing restriction in supply chains with forecast updates. *IISE Transactions*, 51(12), 1402-1436.

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