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Doctoral dissertation

DISCOVERING AND UNDERSTANDING THE NEW AND UNEXPLORED TRENDS ABOUT MANUFACTURING RELOCATION DECISION

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ACKNOWLEGDEMENTS

ALL THE WAY FROM MY HEART ❤

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I still believe, 'the best is yet to achieve'.

Prayers!

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1. EXECUTIVE SUMMARY

Over the past decade, the trending decision of manufacturing relocation as reshoring has been the center of attraction for researchers, specialists, and policymakers within operations and management. Although reshoring research has gained momentum over the last decade, and many uncovered and untouched dimensions of reshoring have been notified within the research stream, this phenomenon is still exploratory. Recently reshoring is defined as ***"a voluntary corporate strategy regarding the home-country partial or total relocation of (in-sourced or out-sourced) production to serve local, regional, or global demands"*** (Fratocchi et al. 2014; Barbieri et al. 2019) In the last few years, researchers have seriously taken up the reshoring research with its different aspects and dimensions. However, there is still a need to consolidate the research on reshoring decisions.

Since 2018, the reshoring research has gained momentum, and to date, in 2023, the consensus on one definition of reshoring is yet to be achieved. Since the reshoring decision is considered as the backbone of the reshoring literature, this research focused on reshoring decision-making and other dimensions related to this decision. The reshoring is not only an operational decision within supply chains but also one of the efforts/strategy to redesign and restructure the supply chains. The relocations decisions sometimes labelled as reshoring, backshoring and nearshoring within the literature. After COVID-19, Brexit, the Ukraine-Russia war, trade tensions, and climate change, the businesses are pushed to rethink their supply chains, and reshoring is considered as one of the effective practices for restructuring the existing supply chains. Therefore, this research aimed to fill the gaps and connect the disconnected dots within reshoring literature.

This thesis's first essay was designed to inquire about the list of reshoring/backshoring motivations and drivers and update the previously listed drivers through the systematic literature review of previously available scholarly articles. This essay employed a systematic literature review methodology to investigate the research on manufacturing backshoring in the last fifteen years since the first publication on backshoring drivers. The most researched issue in reshoring/backshoring is motivations and reshoring decision-making. The systematic review includes the content analysis of 137 articles focused on the presence and discussion of backshoring drivers. These articles help synthesize the 62 backshoring drivers and motivations for manufacturing relocation decisions. The drivers are categorized as "*forgotten*", "*question mark*", "*evergreen*", and "*trending*". The trending motivations lead to the future research areas,

and these categories help map the drivers identified in the research as a checklist for assessing the manufacturing relocation decisions.

The second essay connects the dots of supply chain redesigning and achieving supply chain resilience after the disruptions faced by supply chains during and post-COVID-19 pandemic, through reshoring and nearshoring. This essay proposes the concept of parallel supply chains through manufacturing location decisions to maintain ambidexterity as a trade-off between cost (efficiency) and flexibility (responsiveness) during supply chain disruptions. Based on a qualitative research approach, the study consists of 22 field interviews with eight cases from multiple countries, specifically from the textile and apparel industry. In this research, triangulation is achieved through interview data from case companies, conducting cross-industry focus groups with 28 participants, and secondary sources such as company annual reports and website information. This essay also contributes to ambidexterity theory by introducing the approach of structural ambidexterity in supply chains, which leads to parallel supply chains. The outcome of this work claims the partition and relocation of the production width-wise as a specific product line and depth-wise as specific production activities to create parallel supply chains. The research explains how different companies' offshore production facilities, which are low-margins and restore or near-shore production facilities, need short lead time and quick response. The supply chain ambidexterity is enabled by swapping production volumes to create parallel supply chains to attain efficiency and flexibility simultaneously. The managerial implication of this essay is to seek guidance from the step-by-step framework for the development of parallel supply chains.

The third essay is significant for the supplier's perspective towards manufacturing location decisions as these decisions affect the entire supply chain and all the stakeholders are directly affected by such decisions. This study emphasizes the supplier's involvement in reshoring decisions, how it affects the overall success of the decision implementation, and the supplier's social and economic sustainability. As in the reshoring literature, the supplier's side has not been explored, there is still a need to inquire about this unveiled dimension of reshoring. This essay is trying to uncover the supplier's approach and strategies towards the reshoring decision. In particular, four suppliers of European firms that previously offshored their manufacturing facilities, now reshoring their productions to their homeland and nearby markets, are interviewed on the current phenomenon. The research approach utilized in this essay is qualitative, and the interviews with the representatives of case companies within apparel and textile industry are conducted twice at intervals of one year to check the variation in the results.

This longitudinal study gives the outcome of the different strategies based on cost, technologies, knowledge, relationship, and market to counteract reshoring decisions and their effects on the supplier's end. This essay will prove to be the pioneering research concerning the supplier's side within the reshoring literature.

Finally, the last essay, "*Manufacturing relocation decisions: the role of key enabling technologies*," continues the reshoring decision research with the role of key enabling technologies in manufacturing relocation decisions. A multiple case study approach was used to explore the technologies' role in relocation decisions. Previously available literature claims the involvement in reshoring decisions of different technologies, including Additive manufacturing, Automation, Cloud, Digital Tools, IoT, Information Technology, Machine Tools, industry 4.0, Robotic Process Automation, Artificial Intelligence, Machine Learning, Data Science, Hybrid cloud platforms, and blockchain. The research aims to highlight the role of technology in manufacturing relocation decisions. The nature of the research is exploratory, so the best-suited method is multiple case studies, developed through semi-structured interviews. The four cases are selected among reshoring companies from the apparel/textile and fashion industry that have already offshored their productions and have or are currently making decisions to relocate their manufacturing activities, and they have been asked to reflect on how the implementation of the technology influences their decision. European Reshoring Monitor's data served as a guide for the initial selection of potentially interesting cases. Choosing multiple companies and inquiring about the same phenomenon will enhance the internal validity. Triangulation will be achieved through multiple sources of information, such as companies' documents, websites, news articles, and interview data.

This dissertation contributes towards the effort of exploring the unexplored and contemporary trends with in literature of manufacturing relocation decisions as it uncovers the different dimension of these relocation decisions and also start new debates which can lead the future research studies. Also global supply chains reconfigurations needs attention with the reshoring strategies and this dissertation stresses on the partial and selective reshoring of previously offshored activities to constitute the parallel supply chains. The parallel supply chains facilities and enable the firms being flexible/responsive and efficient at the same time. In addition, the discussion on supplier's involvement in reshoring decision making bring the attention of academia and industry towards the effective imprints of the suppliers role in success and implementation of the manufacturing relocation decisions. In the end the dissertation also put an effort to discuss the key enabling technologies in reshoring activity and there must be more

untouched dimensions still needs the attention of researchers to enrich the content on manufacturing relocation decisions.

2. INTRODUCTION

2.1 Purpose

Over the last few decades, businesses have been redesigning and rethinking their existing supply chains due to natural calamities, the COVID-19 outbreak, the Ukraine-Russia war, and multiple supply chain disruptions. Businesses are also rethinking the manufacturing relocation decisions because of global business dynamics and global changing trends and businesses' own internal strategies and competitive advantages and industry's competitive forces along with the management of total cost of economies. A few decades ago, businesses adopted a trend of outsourcing and offshoring to different continents to attain competitive advantages through cost reduction and financial gain by improving profit margins (Jiang et al. 2006). The increased competition also caused by globalization has forced companies around the World to follow a significant trend of outsourcing internationally to avoid being left out of the market and to remain competitive. Initially, the trend was outsourcing with some of the production activities like packaging and processing for sales. Still, later on, outsourcing shifted to entire operations and complete productions in low-cost regions of the world (Contractor et al. 2010). Then the outsourcing and offshoring activities became globalization strategies, and the concept of global supply chains emerged in the early 1990s (Feenstra 1998; Blinder 2006; Hätönen and Eriksson 2009; Moradlou and Backhouse 2016). The reversal of the location decisions is also dependent on firm specific factors and also linked with the governance style of the reshoring firms (McIvor, R. and Bals, L. 2021).

Deciding where to locate manufacturing is one of the most important decisions companies make (Moore et al., 2018), and, in the past, the movement of manufacturing locations was primarily to low-cost countries (Ellram 2013). Now that economic conditions are changing significantly, many companies are questioning whether their previous decision to outsource to low-cost countries really supports an optimal supply chain configuration and reconsidering their location strategies, taking into account different perspectives, therefore relocating some of their international suppliers (Uluskan et al. 2016). The literature shows the potential disadvantages of offshoring, irrespective of its financial benefits and cost-saving aspects, as it makes the global supply chain more complex, and coordination problems emerge as a result (Asmussen et al. 2016).

In the context of supply chain management, manufacturing relocation decisions are considered critical as they affect not only cost management, risk mitigation, and market responsiveness

but also the overall sustainability of the supply chains. Manufacturing relocation decisions contribute to a business's competitiveness, create value chains globally and support the restructuring and redesigning of businesses to achieve sustainability and competitiveness along with the business strategic goals. The ultimate goal of businesses is to survive and be sustainable with cost-effectiveness.

Over the past decades, firms have started rethinking their business strategies and planning to bring back their already offshored productions. The decision to bring back manufacturing is labelled as "reshoring"[1]. There are lots of motivations behind this initiative, the so-called drivers and motivations of reshoring (Barbieri et al., 2018; Fratocchi et al. 2016; Stentoft et al. 2016; Wiesmann et al. 2017; Kinkel and Maloca 2009; Martínez-Mora and Merino 2020). A lot of work has been done concerning reshoring decision criteria (Hilletofth et al. 2021; Eriksson et al., 2018; Benstead et al., 2017), and all the reshoring research available has been discussing the reshoring decision-making and implementation according to decision initiators' perspective (Benstead et al. 2017; Boffelli and Johansson 2020; Eriksson et al., 2021). It is important to know that in global supply chains, different players are involved throughout the chain, as one global supply chain player making a relocation decision may affect the others.

One of the insights from Wiesmann et al. (2017) is that reshoring will not precisely result in the "re-industrialization" of economies. It is rather expected a re-distribution of manufacturing around the world, with a presence of both local and international manufacturing options that provide at the same time more flexible solutions to their customers. The latest update on reshoring literature is presented in Casadei and Iammarino (2023) in the form of an analysis of antecedents, contingencies, decisions, and its implementation and results, which are valuable for policymakers to understand the complexity of the multi-faced nature of reshoring.

[1] Reshoring here is meant to the activity for bring back production and manufacturing from the previously outsourced production facilities. Different synonyms for reshoring are used alternatively as near shoring, home shoring, right shoring, back shoring etc. in previous literature. Different terminologies are detailed discussed with years in the next section. The widely accepted definition of reshoring is by Fractochi et al. 2014: "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" (p. 56). The detail discussion on definition of reshoring and alternate terminologies is given in the Section 2.2. The evolution of the reshoring definitions is also discussed in detail since 2009 to till to date (2023) within section 2.2.

In the previous research, there is still a gap available in terms of reshoring's interactions with other operational aspects of supply chains and reshoring as a supply chain restructuring strategy, and one of the gaps is identified as 'the supplier's perspective on reshoring phenomenon' is never highlighted in the available research. As little information is available on the above phenomenon, the methodology utilized is a qualitative approach with case study research. The case study methodology helps to understand the complexity of the matter and gives insight into the issue in discussion (Voss et al. 2002). In this research dissertation the focus of all four essays is on the cases of reshoring firms from Textile and Apparel industry as the reshoring is trending in this sector so the getting the relevant data is bit accessible.

The research essays presented in the next chapters are the main body of the dissertation, and before presenting research essays, the previous literature is presented in the next section. After the background and previous literature, the research objectives and research designs are presented in detail.

2.2 Background and literature

2.2.1 Reshoring definitions and terminologies

Manufacturing relocation decisions mean to decide where to relocate the production facilities. It includes different operational movements of productions fully or partially offshored away from the parent company or the opposite of offshoring, bringing productions back from the outsourced location to the home country or nearby. The importance of manufacturing relocation decisions is linked with business sustainability, resilience, and competitiveness of supply chains.

In this dissertation, the manufacturing relocation decisions are named reshoring and backshoring, nearshoring, and right-shoring, thus these terminologies are used in this dissertation in different essays, and also these terminologies are used for manufacturing relocation decisions it is evident from the past studies.

Other terms used to explain the movement of production facilities in previous literature are 'back shoring' (Kinkel 2009; Arlbjorn and Luthje 2012; Stentoft et al. 2016; Ancarani et al. 2019), 'reshoring' (Gray et al. 2013; Arik 2013; Bailey and de Propis 2014; Gylling 2015; Boffelli et al. 2021), 'insourcing' (Bals, 2016), 'in-shoring', 'on-shoring' (Gao et al. 2015; Kazmer 2014), 'home-shoring', 'repatriating manufacturing' (Moradlou and Backhouse 2014;

Kinkel 2012), ‘near shoring’, ‘near reshoring’ (Jensen et al. 2009; Fratocchi 2014; Ellram et al., 2013), ‘back-reshoring’ (Fratocchi et al., 2014; Fratocchi et al. 2015; Bellego 2014) ‘redistributed manufacturing’, ‘right shoring’ (Tate 2014; Bals et al. 2016), ‘selective reshoring’ (Baraldi et al. 2018), ‘reverse offshoring’ and ‘green shoring’.

In this dissertation, the reshoring and other terms are being used in different essays based on the need to clarify the concept. As there is not a consensus on a common definition of reshoring the most widely accepted definition which is also used in this thesis is reported by Boffelli et al. (2021) as: ***“a voluntary corporate strategy regarding the home-country partial or total relocation of (in-sourced or out-sourced) production to serve local, regional, or global demands”*** (Fratocchi et al. 2014; Barbieri et al. 2019). Table 2.1 is summarizing the evolution of reshoring definitions along with the terminologies used for manufacturing relocation decisions.

In the past few decades, scholars have defined reshoring according to geographical or activity-based variables. Thus, different definitions of reshoring decisions revolve around the type of ownership (make or buy) and location (home or host countries) within the literature. Another concept recently introduced is “intelligent sourcing”, which refers to continuously evaluating and seeking the maximum efficiency and the best prices available from suppliers (Uluskan et al. 2016).

Previous authors have differentiated between reshoring types according to governance mode (i.e. in-sourced or out-sourced) (Brandon-Jones et al., 2017; Ellram et al. 2013; Gray et al. 2013). Fratocchi et al. (2014) include an important element in their definition related to the partial relocation of production back to home markets. Baraldi et al. (2018) further expanded on this idea through their concept of “selective reshoring”, indicating that there are different degrees of reshoring, moving across a spectrum from all production being located overseas to all production being relocated to the home country. Fratocchi and Di Stefano (2019) further distinguish between two types of selectivity: in terms of width, when only some product lines are reshored, and in terms of depth, when only some production phases are reshored.

Table 2.1 Reshoring Definition Evolution-(Compiled by Author)

Terminologies	References	Definition
Back shoring	Kinkel, 2009 Holz, 2009 Pisano and shih, 2012 Arlbjorn and Luthje, 2012 Arlbjon, 2014 Lavissiere, 2016 Stentoft et al. 2016 Nujen et al. 2019 Di Mauro et al., 2018 Ancarani et al. 2019 Boffelli et al. 2021	-Based on geographical aspects -The geographical relocation of a functional, value creating operation from a location abroad back to the domestic country of the company. Pg. 156 -Linked back shoring in production process that tightly couple design and manufacturing -Back shoring is the opposite of offshoring the pair-wise opposite movement of manufacturing locations many be labelled as globalization strategies
Reshoring	Gray et al. 2013 Ellram et al. 2013 Canham and Hamilton, 2013 Arik, 2013 Bailey and de Propis, 2014 Tate, 2014 Bellego, 2014 Fratocchi et al. 2014 Gylling, 2015 Ancarani et al. 2015 Grappi et al. 2015 Lavissiere, 2016 Ashby, 2016 Bals, 2016 Foerstl, 2016 Uluskan et al. 2016 Nujen et al. 2018 Wiemann et al. 2017 Barbieri et al. 2018 Moretto et al. 2019 Boffelli et al. 2021	-Reverse of offshoring -Insourcing , outsourcing -Back shoring is the relocation of a company's own foreign activities back to the location of the origin. Moving manufacturing back to the country of its parent company. -Reshoring perceived as corrective action to an existing failed offshoring decision. -The reversal of previously business activities -Reshoring indicates the decision by multinational firms to bring back to the home economy some of their previously offshored activities. -Back-reshoring -"*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*" (p. 56). -Demand side perspective in reshoring -Action in response to previously offshore production activities -Reshoring as back shoring and nearshoring- reverse of offshoring -Previously done experience of failure offshoring into reverse action (as back shoring, nearshoring) -Reshoring as the activities that takes place when a buyer company relocates its outsourcing activities from international suppliers back to domestic suppliers. -Define reshoring as a location decision as moving back manufacturing previously offshored decision to its original location. -Refer as On shoring, Back sourcing and Back shoring -Reshoring as bringing product back or close to domestic country, it is bi-dimensional decision changing both location and ownership.
Near shoring	Jensen et al. 2009 Ellram et al. 2013 Fratocchi, 2014 Stentoft et al. 2016 Ancarani et al. 2015	-Moving activities with in the region or neighboring countries of the company -Back shoring is the relocation of a company's own foreign activities back to the location of the origin. Moving manufacturing back to the country of its parent company.
Repatriation of manufacturing	Kinkel, 2012 Gray et al. 2013 Moradlou and Backhouse, 2014	-Reshoring tends to consider repatriations a mere correction mechanism. -Reverse of offshoring -Insourcing , outsourcing -Repatriation of manufacturing activities to western countries can be seen as an opportunity to further employ production strategies

On shoring	Kazmer, 2014 Gao, 2015	
Back reshoring	Fratocchi, 2014 Fratocchi, 2015	-Reverse of offshoring
Right shoring	Tate and Bals, 2014 Bals et al., 2015 Joubioux and Vanpoucke,2016 Tate and Bals, 2017	-Relocation decision can be driven by the need to modify previous off shoring strategies that turn out to be unsatisfactory for firms. -Decision of right balance of moving manufacturing out and back. -Activity of sourcing and decision of sourcing geographically and 'right' shore is consider as actually domestic.
In sourcing	Bals, 2016 Foerstl, 2016	-Reshoring as back shoring and nearshoring- reverse of offshoring -Previously done experience of failure offshoring into reverse action (as back shoring, nearshoring)

The research on reshoring phenomenon is growing since more than a decade and the previously the focus was on concept building and defining the issue with identification of drivers etc. but now many publications show trends of manufacturing relocation research related to Covid-19 (Handfield et al. 2020; Van Hoek 2020), new supply chain governance modes (Kano and Oh 2020; Verbeke, 2020) or the whole relocation of production (Barbieri et al. 2020; Strange 2020).

To elaborate, the reshoring research trend in previous literature is shown in the form of a graph in Figure 2.1 below. The data source is based on the set of articles used in the research essay one from chapter three[2] , and the graph shows that reshoring research has been gaining momentum since 2018, and after COVID-19 it is further triggered.

[2] Chapter three is explaining in detail the data source and set of articles used in the systematic literature review based on 137 research articles from 2007 to 2023. The further descriptive on the data set is presented in the chapter 3.

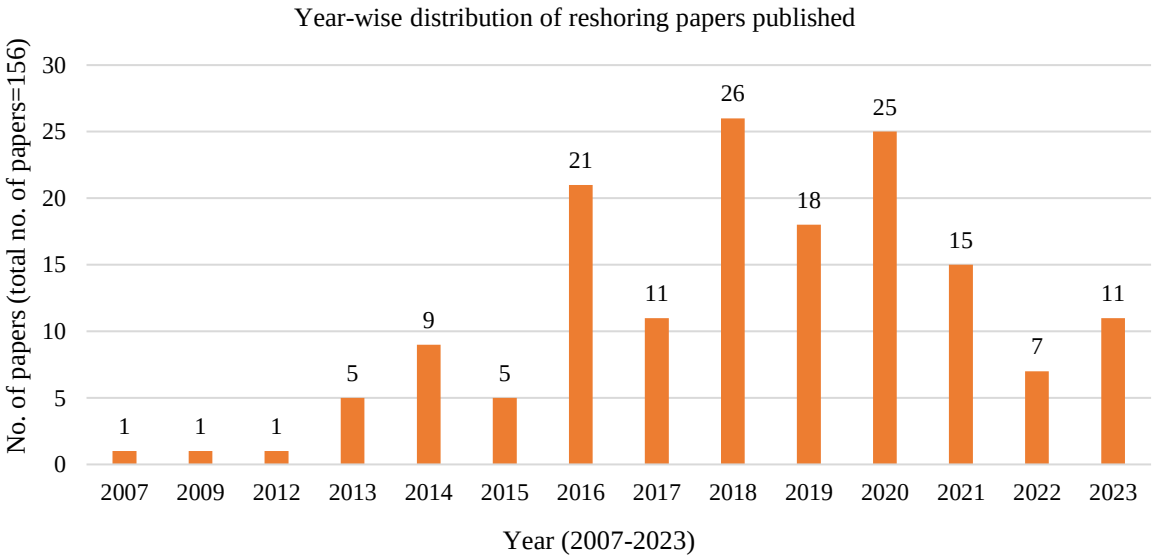


Figure 2.1 Year-wise distribution of reshoring articles

The yearly distribution of reshoring articles shows the importance and relevancy in the current scenario and supply chain disruptions, pushing scholars to explore this phenomenon even more. Despite this, reshoring still needs detailed research to further explain different dimensions of the reshoring concerning the latest debates in the academic literature, i.e. Sustainability, zero-carbon emission, reshoring decision-making and implementation, reshoring's impact on global supply chains, and restructuring of supply chains. Many scholars are working on exploring the new trends and new dimensions of the reshoring/backshoring phenomenon and contributing to manufacturing relocation decisions.

2.2.2 Reshoring motivations/drivers

The most researched and highlighted area within the reshoring literature is reshoring motivations and drivers. Most of the previous studies revolve around discovering the reshoring drivers and reasons. Thus, this is still an evolving area, and with the transitions of time, new and different drivers are appearing in the literature. Different scholars categorize different drivers in different contexts, as seen in Barbieri et al.'s latest reshoring literature review (2018). Various authors have called for further research on new emerging drivers, e.g., Covid-19 (Barbieri et al. 2020; Strange 2020), geopolitical tensions (Moradlou et al. 2021; Roscoe et al. 2020), digitalization (Ancarani et al. 2019; Ancarani and Di Mauro 2018; Dachs et al. 2019; Fratocchi 2018; Moradlou and Tate 2018) and sustainability (Fratocchi and Di Stefano 2019; Orzes and Sarkis 2019; Engström et al., 2018; Moradlou et al. 2021). Thus, this dissertation is also exploring these new drivers, and the new research areas are highlighted as gaps that this

study is trying to fill. The first essay in this dissertation is an extensive and detailed document of reshoring/backshoring motivations and drivers. The literature reviews previously conducted in academia are focused towards the importance of the region/geographical location (Ellram et al. 2013), conceptual framework and definition formation (Fratocchi et al. 2014), motivations and drivers of reshoring are compiled to enhance the literature (Fratocchi et al. 2016; Srai and Ane 2016; Stentoft et al, 2016, Barbieri et al. 2018) and driver and barriers (Wiesmann et al. 2017). The last literature review on reshoring motivations was conducted in 2018 and needs an update post-COVID-19. COVID-19 is said to be a significant trigger event after 'made in effect' for reshoring initiatives, according to recent literature (Barbieri et al. 2020).

2.2.3 Reshoring decisions' theoretical backing

Some theoretical perspectives have been used in reshoring literature. Among others, Dunning's ownership, location, and internalization model (OLI) (Dunning 1998), the transaction cost economics theory (TCE) (Williamson 1979), the resource-based view (RBV) (Barney 1991), dynamic capabilities theory and the factor market rivalry concept (Wiesmann et al. 2017). Different studies are trying to explain the reshoring phenomenon in the light of different theories, and scholars are trying to explain the location decisions with theoretical support. The summary of the different theories used in the reshoring literature is presented in Figure 2.2, based on the latest reshoring research by Casadei and Iammarino (2023).

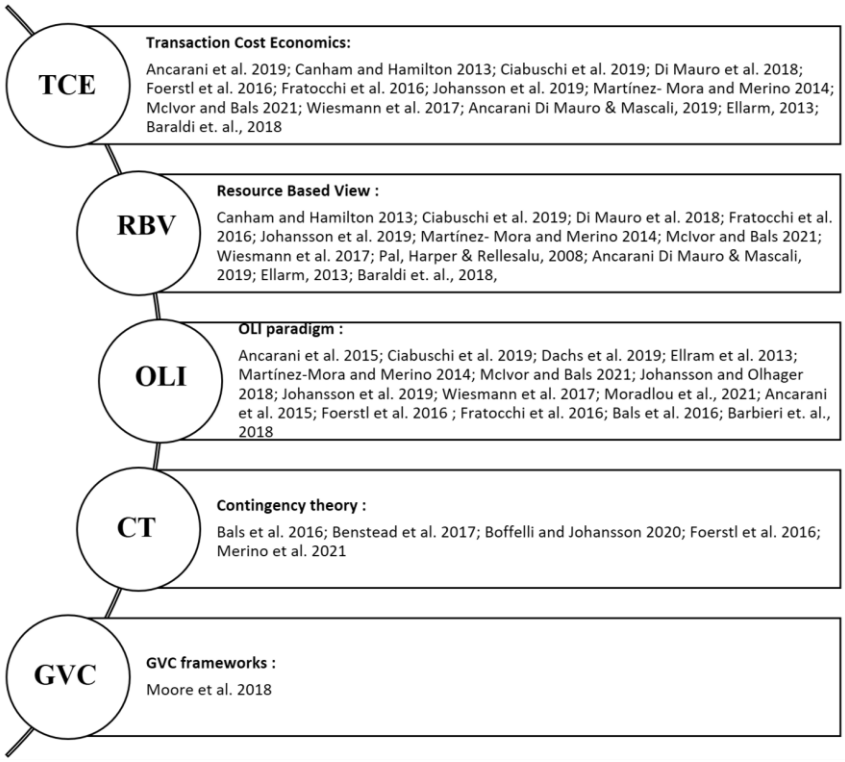


Figure 2.2 Adapted from (Casadei and Iammarino, 2023)

As different theories are backing the reshoring decisions, the framework from (McIvor, R. and Bals, L. 2021) gives the best explanation of stages of reshoring decision and its backing with the theoretical considerations. As presented in the figure the 2.3 below McIvor and Bals used the multi-theory approach to explain the reshoring decision with theoretical depth. This framework proposed two critical factors on international business research which are location choices and governance styles. Also the reshoring decisions are combinations of location specific and firm specific and process specific factors which are also supported by the theories in this framework.

The resource based view (RBV) theory along with the total cost of economies (TCE) is supporting all the stages of decision making from drivers identification and exit analysis to relocation analysis and implementation stage as indicated in the figure 2.3 below.

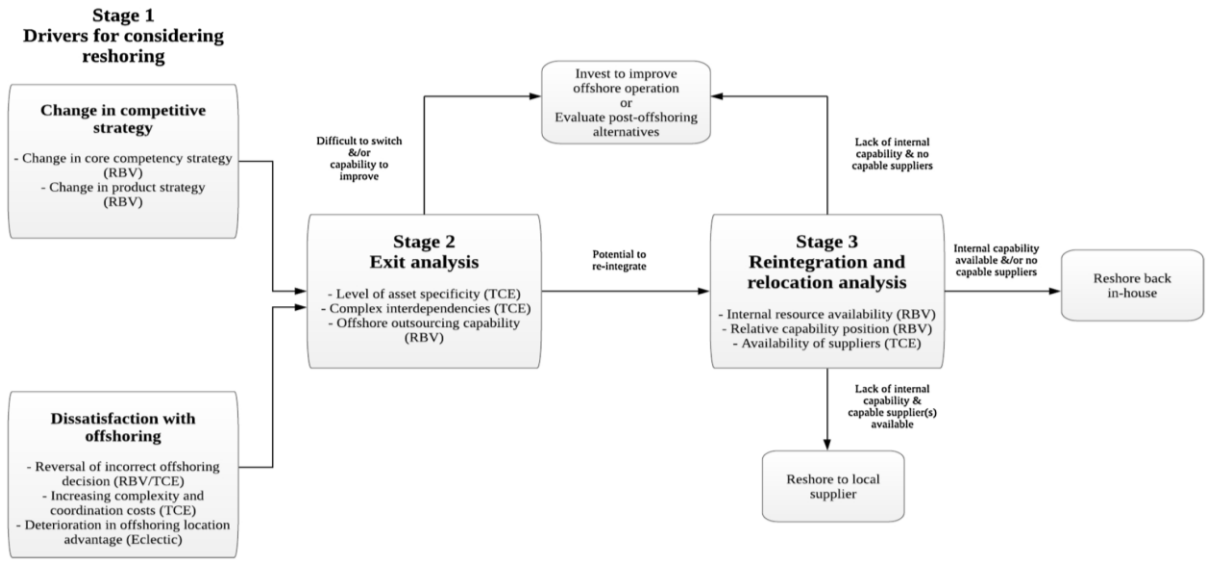


Figure 2.3 A framework for reshoring decision (McIvor, R. and Bals, L. 2021)

2.2.4 Gap & Future of reshoring research

In the light of previous literature which is conducted in detail in the third chapter of this dissertation, along with the previous literature reviews by Ellram et al. (2013), Fratocchi et al. (2014), Stentoft et al. (2016), Wiesmann et al. (2017), Barbieri et al. (2018) and Casadei and Iammarino (2023) the following gaps are identified as:

- The literature on reshoring is still not saturated and needs exploration of different aspects and dimensions as multi-disciplinary research.

- The main areas other than reshoring motivation highlighted in the literature that need attention are mainly the reshoring decisions implementation and the nature of reshoring decisions as each reshoring decision is unique in its type, and thus there is no standard process or recipe to follow.
- The knowledge about the involvement and role of the different technologies and innovations within reshoring initiatives is very limited (Casadei and Iammarino 2023). Thus, the role of the technologies (Industry 4.0), key enabling technologies, industry and innovations in production processes must be researched to fill this gap.
- Firm and Industry level contingencies that are involved in reshoring decisions are not much discussed in the literature and need effort to be explored further in the future.
- There is also insufficient knowledge available on the effects of reshoring on all levels of supply chains.
- The theoretical basis of the reshoring is also at the seedling stage and needs further theoretical development.
- The gaps identified as future potential research areas are related to the supply chain disruptions and supply chain redesigning as the role and presence of reshoring activity should be studied as a strategy to redesign the supply chain.
- The hot research topics in academia are sustainability and supply chain resilience, and reshoring phenomenon needs to researched with in domain of sustainability.

2.3 Research objectives

2.3.1 Research Goal

The main research aim and goal of the dissertation by connecting the essays presented in this dissertation is "To fill gaps highlighted in the previous literature, also enhancing and elevating reshoring literature with practical approaches, with the insight in reshoring phenomenon; keeping in view the reshoring motivations and stakeholders of reshoring process and supply chain reconfigurations to achieve sustainability in their value chains. Exploring the uncovered areas of the reshoring literature". Thus, the dissertation is organized to achieve the overall research goal along the four research articles; each one is aimed to enhance the literature on reshoring.

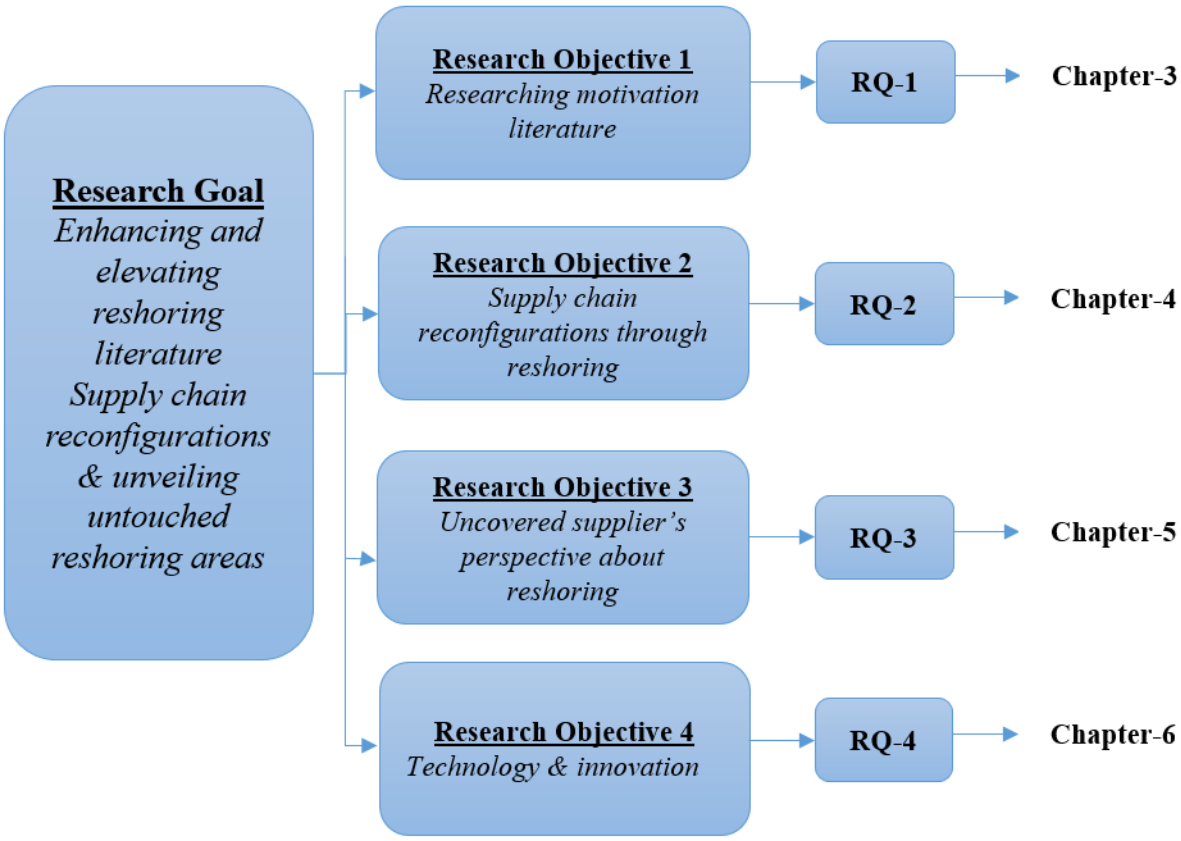


Figure 2.4 Research Breakdown Structure

The above-mentioned research goal can be divided into the following research sub-objectives i) Researching motivation literature ii) Supply chain reconfigurations through reshoring iii) Uncovered supplier's perspective about reshoring and role of technology and innovation within reshoring decision before and after the decision and specifically and generally. These classification of goals and research objectives are presented in Figure 2.4. The figure shows the research breakdown structure with the connection of research questions to achieve research objectives and the link with this dissertation's chapters.

The research objectives were achieved with multiple case studies methods and only the chapter 3 is following the systematic literature approach as this is a review study. The chapters are based on the multiple case study approach as the purpose of the study is exploration and the choice of the methods are based on usefulness of method according to the purpose of the studies.

Research Question: 1

RQ1: *In the context of manufacturing, how do the drivers considered during the decision-making process leading to backshoring evolve?*

Chapter 3 presents the first research question by reporting the previous literature and conducting the systematic literature review on the motivations to advance the knowledge on reshoring and their relevance in the reshoring decision-making and implementation for future work. This Systematic Literature Review highlights the research gaps, which concludes with the future research avenues. The rest of the research questions in this dissertation are designed to fill the gaps identified.

Research Question: 2

RQ2 (a): *How can the manufacturing location decision support the development of structural ambidexterity in the supply chain?*

RQ2 (b): *To what degree does supply chain structural ambidexterity provide firms with efficiency and flexibility benefits?*

The two research questions are addressed in the second research essay, which is trying to provide the solution to create structural ambidexterity within supply chains. This can be done by balancing offshored and reshored manufacturing location decisions. This balance can be managed by creating parallel supply chains, and this conclusion is well explained in chapter 4.

Research Question: 3

RQ3 (a): *What is the perspective of suppliers of developing countries towards reshoring?*

RQ3 (b): *Would reshoring be affecting the supplier-buyer relationship according to the supplier's perspective?"*

RQ3 (c): *What are the best practices to avoid suppliers being left behind in the reshoring process?*

The third research question is related to another research gap and constitutes chapter 5 of this dissertation. The emphasis in this chapter is on the supplier's perspective and involvement of the supplier in reshoring decisions and implementation. The focal firms usually make manufacturing relocation decisions for themselves and independently without the involvement of suppliers. It is also a fact that the relocation decisions are impacting the complete supply

chain and all stakeholders are getting impacted. This research essay emphasizes the involvement of suppliers as stakeholders in the supply chain. This is an important debate and has not been discussed in the previous literature.

Research Question: 4

RQ 4: *How are the key enabling technologies (KETs) contributing to the manufacturing relocation decisions?*

With the technological advancement universally every aspect of life and businesses are getting affected by technology's multifaceted roles, thus after the identification of the technology as one of potential motivation of relocation decisions for manufacturing, it is very important to explore on technology's role with reshoring to understand the depth of the decisions.

It is mandatory to study the role of the key enabling technologies in reshoring decision-making and implementation. In addition, how the technologies triggered the reshoring decisions or the reshoring decisions pushes the businesses to adopt the latest technologies. Thus for this purpose, the reshoring phenomenon is studies with key enabling technologies and reported in chapter 6.

2.4 Research design

The main step to start the research was the initial literature review to look deep into the reshoring area in a broad sense and it helped to define and refine the research questions. As the research is exploratory and "what" and "how" questions are inquired, the multiple case studies method is used to get in-depth knowledge.

As previously mentioned in the figure 2.4 the research breakdown is further expanded for the explanation of the research questions in the figure 2.5 and shows the research objectives and different approaches are used for the purpose of the studies. The overall research methodology used in this study is multiple case study approach and only the research objective 2 is aimed to achieve through the systematic literature review as it is the review study so based on the previous studies and literature. The research objective 2, 3 and 4 are achieved through the multiple case study approach as it gives the opportunity to study and explore the different cases and gives in-depth insight on the phenomena.

The preference was to get as many cases as possible to study so the results can be validated. The research methods are slightly vary with the approaches as in the essay 3 the longitudinal

study conducted with the interval of one year and it helps to validate the results and make the study robust.

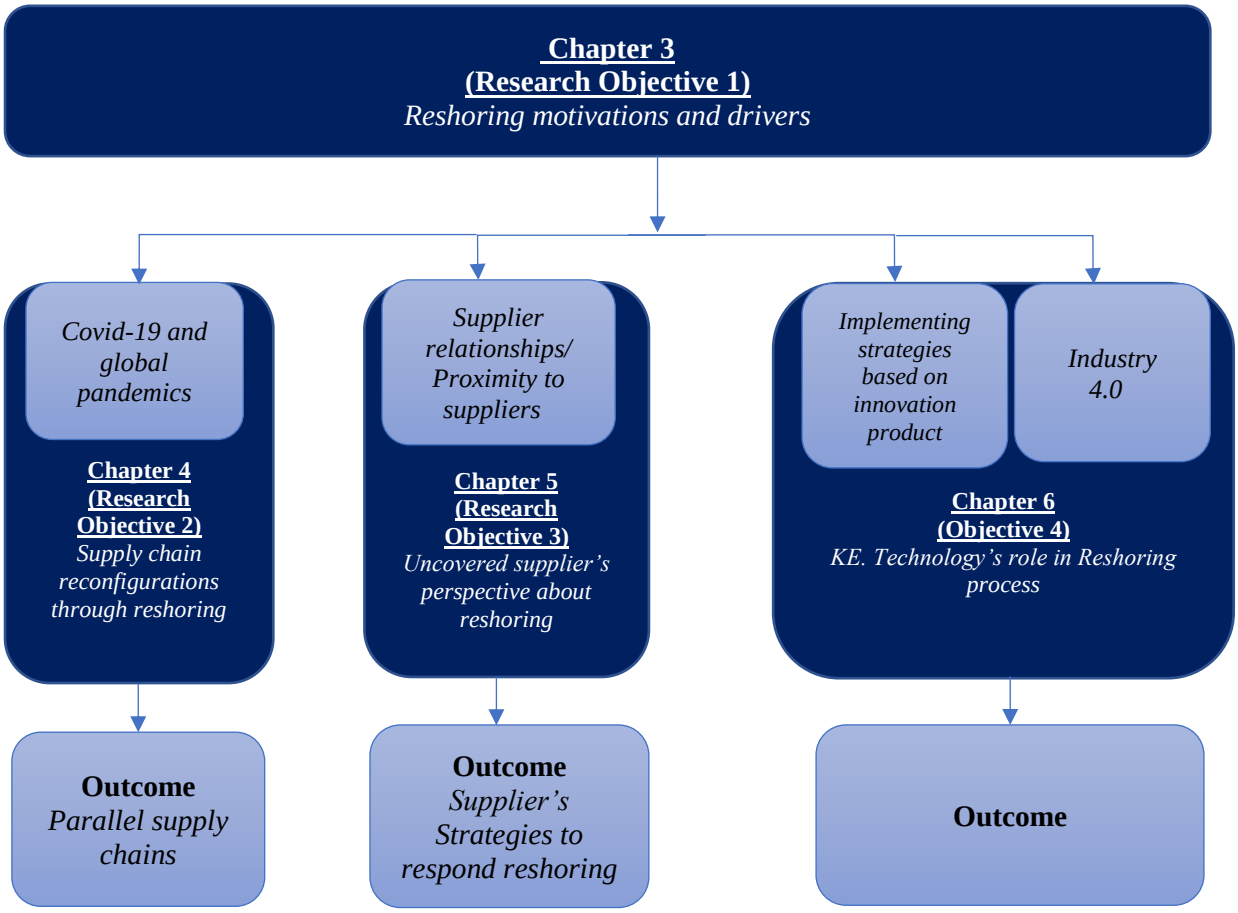


Figure 2.5 Overall Conceptual Framework and positioning of the dissertation chapters

The research focus starts with a detailed structured literature review on reshoring motivations and drivers. The detailed literature review is reported in chapter 3. The research is designed around the gaps identified in the chapter three and then leads to the further chapters as the presented in the figure 2.5. The future research avenues identified are domains which are not new trends and needs to be cover in the future studies like covid-19 and future pandemics and directly influences the supply chain reconfigurations and answered in the chapter 4 and by presenting parallel supply chains. The other research avenues which are suppliers relationship and proximity to suppliers which allows to explore the supplier's perspective in reshoring which is linked with the study in chapter 5. The innovation and implementation of innovative production strategies are new avenues to explore with reshoring domain thus this trend is covered in the study which is presented in chapter 6.

The above mentioned new trends are highlighted as gaps and new discussions are started in this dissertation which will lead further for future research studies. The studies covered in each chapter are fulfilling research gaps regarding the new trends with reshoring domain.

Finally dissertation is presented after the introduction as follows: Chapter 3 presents the first essay entitled "*Manufacturing backshoring drivers: A systematic literature review of 15 years of research*", in response to the first research question to deep dig for the literature and make an extensive list of available drivers for reshoring decision making.

Chapter 4 reports the second research essay titled "*Building Parallel Supply Chains: How the manufacturing location decision influences supply chain ambidexterity*", this chapter explains how businesses can achieve parallel supply chains by reshoring partial manufacturing to achieve the ambidexterity with supply chains, which supports the second research questions with the contribution in the reconfiguration of supply chains in the times of disruptions. Chapter 5 includes "*How to avoid reshoring? Disentangling the supplier's perspective*", this chapter tries to answer the third research question in order to explore the dark side of reshoring and unveil the areas that are untouched in the reshoring literature. Chapter 6 titled as "*Manufacturing relocation decisions - the role of key enabling technologies*" is reporting the reshoring decisions and technology's specific and general role by conducting a literature review with the terms based on technology and manufacturing relocation decisions and similar concepts, which highlighted the status of literature on key enabling technologies and innovations with the reshoring decisions. Chapter 7 concludes the dissertation with the discussion and conclusions with limitations of the research work along with the possible future work.

3. MANUFACTURING BACKSHORING DRIVERS: A SYSTEMATIC LITERATURE REVIEW OF 15 YEARS OF RESEARCH

Acknowledgement: *This chapter is derived from the article "Boffelli A., Fratocchi L., Khayyam S., Moradlou H. (2021). Manufacturing Backshoring Drivers: a Systematic Literature Review of 15 Years of Research" Presented at the 11th EDSI Annual Conference online in June 2021 titled as "Manufacturing reshoring: Archetypes development through a systematic literature review." I am personally responsible for any changes and amendments from the last version until the publication process is completed.*

I am very thankful to my supervisors for their kind guidance throughout the research process. I show my gratitude to my collaborative team members Prof. Luciano Fratocchi from Department of Industrial and Information Engineering & Economics, University of L'Aquila, Italy and Prof. Hamid Moradlou from Warwick Manufacturing Group, University of Warwick, UK. Furthermore, it was great learning to go through the reshoring literature and in depth study of reshoring motivations.

3.1 Introduction and background

Manufacturing location decisions continue to be critical for companies to achieve structural flexibility in response to a dynamic business environment and emerging disruptions such as geopolitical tensions, pandemics, and environmental concerns. Starting from the 1980s, due to intense competition, many companies offshored low-value-added activities to other countries (Kinkel et al. 2007; Schmeisser 2013), predominantly to reduce the cost of production and focus on their core competencies, also known as the smiling curve (The Economist 2013; Manning 2014; Jain et al. 2016). It can be argued that the drivers for offshoring mainly tend to be the reduced labour costs driven by the difference between two nations' economic development, capacity bottlenecks, potential markets in other countries, customer location, taxes, and government incentives (Kinkel and Maloca 2009). Driven by these motivations, offshoring has primarily been a West-to-East movement, mainly to China and other Asian countries. While many questions remain about offshoring's effects and ethics (Robertson et al. 2010), the practice has undoubtedly had a considerable global impact. Recent literature has indicated hidden costs associated with offshoring (Carnahan et al. 2010; España 2015). Offshoring decisions made without careful consideration or complete information, such as the total cost of offshoring, have had unexpected consequences (España 2015; Gylling et al. 2015). There is an emerging sentiment that some businesses may have offshored too eagerly (Kinkel and Maloca 2009).

Global changes, such as digitalization, geopolitical tensions, and Covid-19, have driven many firms to revise their manufacturing location decisions to mitigate these disruptions' impacts. For instance, supply chains worldwide have experienced an unprecedented shock resulting from the Covid-19 virus outbreak (Ivanov 2020). Similarly, recent geopolitical disputes, such as the US-China trade war and Brexit in the UK, have caused significant supply chain disruptions (Roscoe et al. 2020). The same applies to the recent invasion of Ukraine by the Russian Federation (Kilpatrick 2022). The unpredictable nature of these disruptions has meant that some companies had no prior planning or mitigation strategy in place and were exposed to significant risks (Roscoe et al. 2020). According to Fine, over the past decade, "the big names at the end of the chain have come to realise that the lowest price can mean highest risk and highest risk can mean high total costs" (Fine 2013, p. 6). Geopolitical and economic challenges and diminishing advantages of offshoring in certain countries have contributed to the contraction of many manufacturing supply chains (Wiesmann et al. 2017; Barbieri et al. 2020; Strange 2020; UNCTAD 2021). Some scholars even argue that we may begin to move

toward more “localized” modes of production, with some manufacturing now in China moving back to the US, the European Union (EU), and South America to increase flexibility (Van Hoek 2020). In the US, the government intends to encourage domestic production with incentives such as job-training programs and business loans, public-private partnerships, and the federal procurement process for more American-made purchases (Elia et al. 2021; Leary and Thomas 2021). This strategy, which is the reverse of offshoring, is called backshoring (Gray et al. 2013). Multiple terms and definitions are associated with backshoring, such as reshoring, back-reshoring, and onshoring. This paper uses the term ‘backshoring’ to describe the decision to move all or some manufacturing activity back to a business’ home country using insourced or outsourced governance modes (Fratocchi et al. 2014).

While academics have investigated decisions regarding moving manufacturing to other countries, there is a need to categorize the drivers for the reverse systemically. Backshoring is still a relatively new area of research, and recently, scholars have pointed out the need to deeply analyse and model the decision-making and implementation process (Boffelli and Johansson 2020). The decision-making, in particular, is activated by a trigger (Benstead et al. 2017), which induces companies to analyse the opportunity of relocation widely; therefore, a specific set of drivers is considered. Even if the drivers have been widely studied (Fratocchi et al. 2016; Stentoft et al. 2016b; Wiesmann et al. 2017; Barbieri et al. 2018; Merino et al. 2020), there is no consensus on the complete set of drivers that lead to such a decision.

Over the years, many authors have attempted to categorize the drivers, but with different and sometimes contrasting results (Fratocchi et al. 2016; Srai and Ané 2016; Stentoft et al. 2016a; Wiesmann et al. 2017). Also, since the last systematic literature review (SLR) conducted by Barbieri et al. (2018), several trends/disruptions have emerged that act as drivers for backshoring. Various authors have called for further research on these drivers, e.g., Covid-19 (Barbieri et al. 2020; Strange 2020), geopolitical tensions (Roscoe et al. 2020; Moradlou et al. 2021b, a), digitalization (Ancarani and Di Mauro 2018; Fratocchi 2018; Moradlou and Tate, 2018; Ancarani et al. 2019; Dachs et al. 2019a), and sustainability (Engström et al. 2018a; Fratocchi and Di Stefano 2019; Orzes and Sarkis 2019).

Hence, this study aims to synthesize the literature over the past 15 years incorporating the above trends. This paper conducts a rigorous SLR of 137 peer-reviewed journal papers to consolidate the current academic literature on backshoring drivers and outline the future research agenda. The study has provided a classification of drivers into “forgotten”, “question

mark", "evergreen", and "trending", with the latter representing the ones that emerged recently but were nevertheless widely debated.

The remainder of the paper is structured as follows. First, the SLR methodology and the choices made in each step are explained. The results section reports the main insights obtained from the descriptive and thematic analysis of the retrieved papers. The categorization of backshoring drivers leads the way for the development of future research avenues. Discussion and conclusions end the article.

3.2 Methodology

This paper relies on the SLR methodology. Denyer and Tranfield (2009, p. 671) define a systematic review as: "a specific methodology that locates existing studies selects and evaluates contributions, analyses and synthesizes data, and reports the evidence in such a way that allows reasonably clear conclusions to be reached about what is and is not known". In their seminal work, they highlight two crucial characteristics of systematic reviews:
the systematic review is itself a research project and should aim to answer a clearly defined research question; the systematic review should uphold "distinct and exacting principles" (Denyer and Tranfield 2009) to maintain transparency, relevance, quality, and robustness.
The reasons why a systematic review methodology is suitable for this paper are multifold. First, backshoring research is relatively recent but is gaining momentum. While the topic is in its infancy, it is receiving increasing attention from various fields of academic research, each with unique approaches, definitions, and outcomes. While backshoring research remains in this state, the systematic review can effectively gather and analyse the current research from different perspectives, providing unbiased consensus on various matters. Second, although rigorous and lengthy, the systematic review process allows a structured approach to using secondary data to answer a research question. This study follows the stages of an SLR proposed by Denyer and Tranfield (2009), as the following paragraphs explain.

3.2.1 Question formulation

A systematic review requires a specific research question. This process is a crucial step for a systematic review, as the quality of the research question will directly affect the result of the study. Denyer and Tranfield (2009) state that research questions that only explain what has happened are inadequate. Why something occurs, the process involved, and the broader context of factors must be considered, especially in business and management studies.

In the end, the following research question was formulated:

RQ: In the context of manufacturing, how do the drivers considered during the decision-making process leading to backshoring evolve?

3.2.2 Locating studies

The systematic review uses secondary data as its primary data source, so the quality of the papers in use is paramount to the final quality of the research. Therefore, the source of the papers has a considerable influence on the overall result. The sources must be trustworthy, comprehensive, and practical. Two scholarly databases were used to retrieve the sample of papers in this study: Web of Science and Elsevier Scopus. They are extensive databases partially used by other researchers in the field of backshoring (Stentoft et al. 2016b; Barbieri et al. 2018; Boffelli and Johansson 2020).

This study only required one search string because the backshoring topic has a precise set of vocabulary. Most keywords are different words for the same or similar concepts. As a result, the following search string was used: (reshor* OR backshor* OR homeshor* OR rightshor* OR nearshor* OR "re-shor*" OR "back-shor*" OR "home-shor*" OR "right-shor*" OR "near-shor*" OR "back-reshor*" OR "back-sourc*" OR "redistributed manufactur*") AND (manufactur* OR production).

3.2.3 Study selection and evaluation

The search was conducted in December 2021. The result of the first search in the two databases included 4,236 articles. After exporting the selected set of papers to Microsoft Excel, we removed all the duplicates. To this set of articles, specific selection criteria were applied to improve the relevance and quality of data extraction. In particular, we only selected papers published in academic peer-reviewed journals, written in English and related to the academic fields of management, economics, decision sciences and engineering.

After applying the selection criteria and removing duplicates, 174 papers remained to undergo screening criteria. The first screening of titles and abstracts removed obvious examples of articles outside the scope of the paper. The remaining 147 papers were assessed based on their full text; each article was read and compared against the full-text evaluation criteria.

The final number of selected articles was 137 after applying all the exclusion criteria, as shown in Figure 3.1, which reports an overview of the selection and evaluation process.

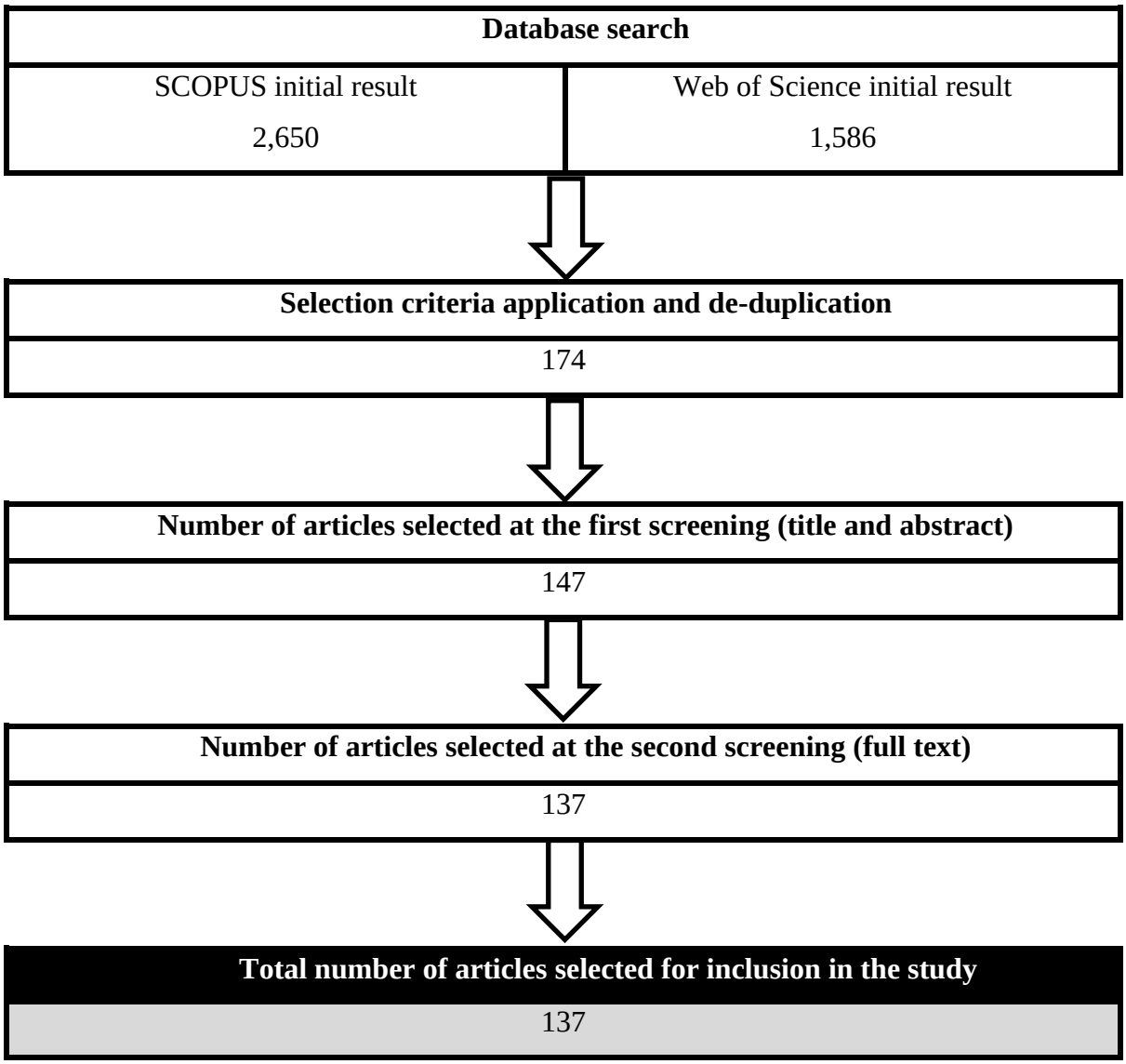


Figure 3.1 Overview of the selection and evaluation process

A summary of the applied selection criteria is reported in Table 3.1.

Selection criteria	Level of application	Pass	Fail
Language	First level selection	The paper is written in English	The paper is written in any other language
Document type	First level selection	The paper is a peer-reviewed article from an academic journal.	Anything other than pass criteria.
Research area	Title and abstract	The paper contributes to backshoring research.	The focus of the article is outside the scope of this paper.
Content	Full text	The article includes and discusses at least one driver of backshoring.	The article does not explicitly mention any driver.

Table 3.1 Selection criteria

3.2.4 Analysis and synthesis

Mendeley reference management software was employed to manage the references for the final set of papers. This process ensured that a complete set of meta-data about each article was obtained and easily edited if incorrect. The documents were exported from Mendeley to the qualitative database and analysis tools Microsoft Excel and NVivo to manage the descriptive and thematic analyses.

A total of 69 journals were identified in which these 137 articles have been published. Figure 3.2 represents the journals contributing with more than one article and the respective number of articles. The result shows that the highest number of papers regarding backshoring are published in the Journal of Purchasing and Supply Management, followed by Operations Management Research.

Figure 3.2 Frequency of articles by journal

Figure 3.3 shows a growing number of papers as time progresses. There seems to be a pattern of increasing documents every two years, with 2016, 2018, and 2020 being the dominant years. It would be interesting to see if this pattern continues in the future. Perhaps this pattern reflects a time lag between when similar authors produce and release articles.

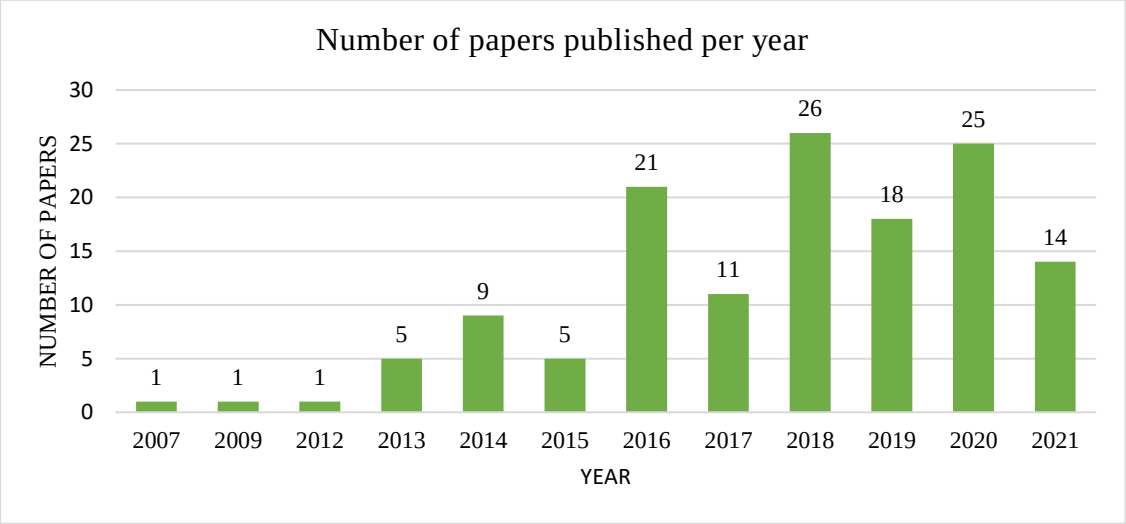


Figure 3.3 Chronological distribution of articles

Figure 3.4 shows the methods used in the 137 papers in this study. Backshoring research is led by using case studies, surveys, conceptual research, mathematical modelling and database analysis.

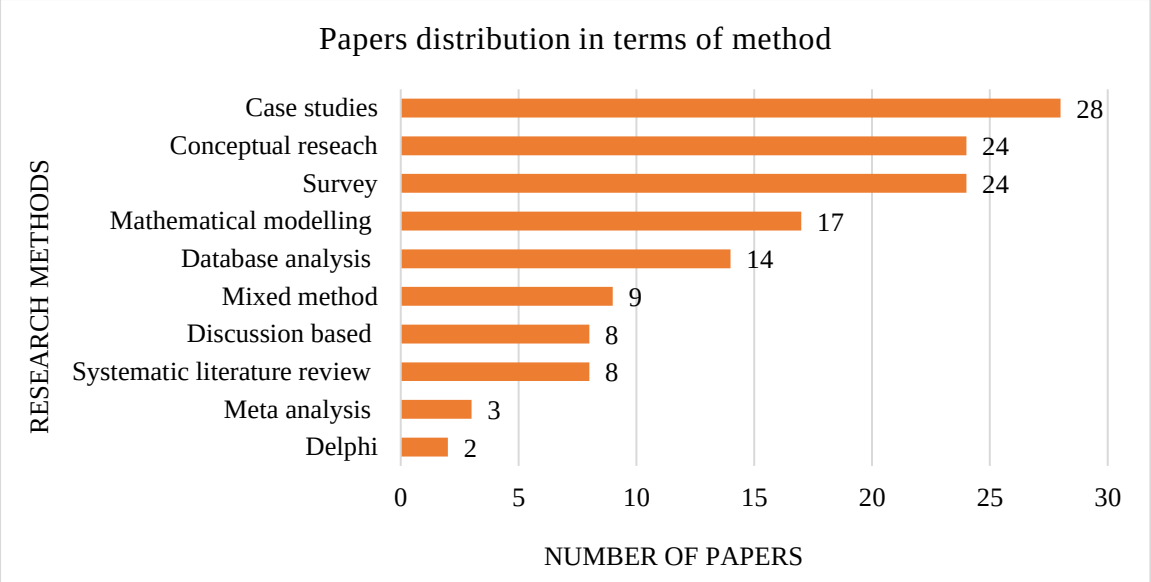


Figure 3.4 Methods used in the sample articles

3.3 Results of the thematic analysis on backshoring decision-making

Concerning the decision-making process, sampled authors highlight that backshoring decision-making is reactionary, sometimes activated by one or more trigger events, and therefore suffers because of time-related factors (Bals et al. 2016; Hartman et al. 2017). When backshoring, there is sometimes a reliance on emotional or heuristic decision-making, which Boffelli et al. (2020) and Gray et al. (2017) point out can be problematic. Backshoring decision-making is often flexible, staggered, segmented and merged with the implementation process (Gray et al. 2017; Boffelli et al. 2018, 2020; Lampón and González-Benito 2019; Boffelli and Johansson 2020). Boffelli et al. (2020) found that when backshoring was of a medium-high complexity, firms adopted a decision-making approach that was intuitive, emotional, or based upon the firm's collective experience. Instead, high complexity in the decision induced firms to adopt a flexible approach to backshoring decision-making. Yet, when the backshoring process was more straightforward, firms employed more rational, data-driven decision-making. Particularly in this type of rational and data-driven decision-making, it is necessary to have a full knowledge of the set of potential drivers.

To identify the drivers considered in backshoring decision-making, we started from the list of drivers provided by Barbieri et al. (2018), being it still the most updated in the extant literature. Similarly to what they proposed, we then categorized the drivers into *managerial mistake*, *external environment*, and *internal environment*. In addition, we added the category *"Global trends"* to include new drivers that emerged after the literature review conducted by

Barbieri et al. (2018), namely *socio-political issues*, *Industry 4.0*, *Covid-19*, and *environmental sustainability* and *social sustainability* as separate entities[3]. Therefore, we have a total amount of 62 backshoring drivers, divided as shown in Table 3.2 (more details about the single paper level categorization are provided in Appendix A).

Table 3.2 Number of citations and categories of drivers

Category	# of papers	ID	Driver	# of citations
Managerial mistake (7 drivers)	44	1	Miscalculation of actual cost/Adoption of new cost accounting methods	16
		2	Mistake correction	24
		3	Lack of knowledge on host country	9
		4	Lack of systematic location planning	14
		5	Bandwagon effect/Overhasty off-shoring effect	14
		6	Bounded rationality	10
		7	Opportunism	2
Internal environment (30 drivers)	124	8	Lack of skilled workers in host country/Availability in home country	56
		9	Untapped production capacity at home/Capacity bottleneck in the host country	24
		10	Union pressure in the home country	7
		11	Labour costs' gap reduction	72
		12	Logistics costs	71
		13	Energy costs and shortage	30
		14	Home labour market flexibility	15
		15	Increased home country productivity	23

[3] Barbieri et al. (2018) found only a generic reference to "Firm's aims in terms of environmental and social sustainability". In contrast, in the 82 new documents, the two drivers clearly emerged as separated entities, sometimes further specified in specific items (e.g. "reduction of the firm's carbon footprint", "high unemployment rates in the home country"; Fratocchi and Di Stefano, 2019)

		16	Total cost of sourcing	40
		17	Freight costs	31
		18	National subsidies for relocation/government support	44
		19	Payment terms	4
		20	Excessive paperwork/Administrative costs	9
		21	Customs duties (including uncertainty)	22
		22	Poor products quality in the host country/Better products quality in the home country	88
		23	Made-in effect/Brand reputation	50
		24	Customers' gratitude and willingness to buy	13
		25	High inventory levels	23
		26	Loss of know-how in the host country/IP risks (including brand counterfeiting)	51
		27	Technology/Industrial clusters (in the home country) and spillover benefits	13
		28	Exchange rate risk	32
		29	Global supply chain risks	44
		30	Demand volatility	9
		31	Physical distance/Intercultural criticalities	34
		32	Political social risk (including legislation)	18
		33	Production and delivery time impact	60
		34	Lack of infrastructure in the host country	17
		35	Supplier relationships/Proximity to suppliers	21
		36	Raw material availability	15
		37	Raw material dimension (e.g. size)	1
External environment (20 drivers)	118	38	Coordination and communication costs	59
		39	Host market size reduction/Other market growth	18
		40	Penalties for late orders	5
		41	Hidden costs	12
		42	Reduced responsiveness to customer demand/Customer proximity (including collaboration)	64
		43	Need to increase customer satisfaction/Customers' requests	30

		44	Co-location of manufacturing and other high value adding activities (innovation potential and reduction of time to market)	60
		45	Implementation of strategies based on product/process innovation	26
		46	Emotional elements (e.g. patriotism/loyalty)	17
		47	Change in firm's business strategy (e.g. new business area, vertical integration, ..)	24
		48	Firm's global reorganization	9
		49	Firm's aims in terms of sustainability (general)	18
		50	Focus on core activity	9
		51	Automation of production process	46
		52	Lean manufacturing	10
		53	Engineering technology of production process	8
		54	Adoption of moveable factories	1
		55	Reduced operational flexibility	49
		56	Purchase order rigidity (also in terms of minimum order)	8
		57	Redefinition of the global supply chain also to gain control	25
Global trends (5 drivers)	41	58	Industry 4.0	12
		59	Geopolitical issues	4
		60	Covid-19	11
		61	Environmental sustainability	20
		62	Social sustainability	11

The *managerial mistake* category, including seven drivers, appeared to be the least addressed in the literature. In this category, *mistake correction* (24 citations out of 137 documents) and *miscalculation of actual cost/adoption of new cost accounting methods* (16) are the most represented drivers. Such findings are consistent with previous evidence by Barbieri et al. (2018), even if the gap between the first two drivers became larger (the previous one was 12 vs. 11), with only 5 of the 82 new sources citing the *miscalculation of actual cost/adoption of new cost accounting methods*, such result is coherent with the evolution of the conceptualization of the backshoring phenomenon, from a mere mistake correction (Kinkel and Maloca, 2009; Kinkel, 2014) to a more strategic decision deriving from external (Martinez-Mora and Merino, 2014) and internal issues (Di Mauro et al., 2018).

Specifically referring to the external and internal environment, it emerges that amongst the 20 *external environment* drivers, *product quality* (88), *labour cost gap reduction* (72), *logistics costs* (71), and *production and delivery time* (60) were the most cited in the literature. Considering the 30 *internal environment* drivers, the most represented ones were *reduced responsiveness to customer demand or customer proximity* (64), *co-location of manufacturing and other high value adding activities* (60), and *coordination and communication costs* (59). Finally, concerning the five *global trends* drivers, even if they were generally relatively recent, the most cited drivers were *environmental sustainability* (20), *industry 4.0* (12), *Covid-19* (11), and *Social Sustainability* (11). The latter drivers were all newly identified after the previous SLR conducted by Barbieri et al. (2018).

Overall, *external environment* drivers were the most discussed and cited in the literature, covering about 59% of the citations, followed by the *internal environment*, with 32%.

3.4 Timewise analysis of backshoring drivers

To better understand the evolution of backshoring drivers over time, we assessed the following elements (the detailed data for each driver are provided in Appendix B):

- Year of first citation: the year a driver first appeared in the literature, to understand when it emerged as relevant for scholars;
- Number of years since the first citation: the elapsed time (in terms of number of years) between the first citation and 2021 (when data on publications were retrieved), important to highlight the novelty of the driver;
- Number of years with citations: the number of years a driver was actually cited within the elapsed time, to assess whether the driver was considered relevant by scholars over time or abandoned;
- Frequency of citations: the ratio between the number of years a driver was actually cited and the number of years from the first citation, to further evaluate the relevance of the driver over time; differently from the previous indicator, this variable also considers the novelty of the driver, thus excluding the years it wouldn't be able to receive citation;
- How many citations a driver received in total, an indicator of the absolute magnitude of the driver;
- The average number of citations, namely the ratio between the total number of citations and the number of years since the first citation.

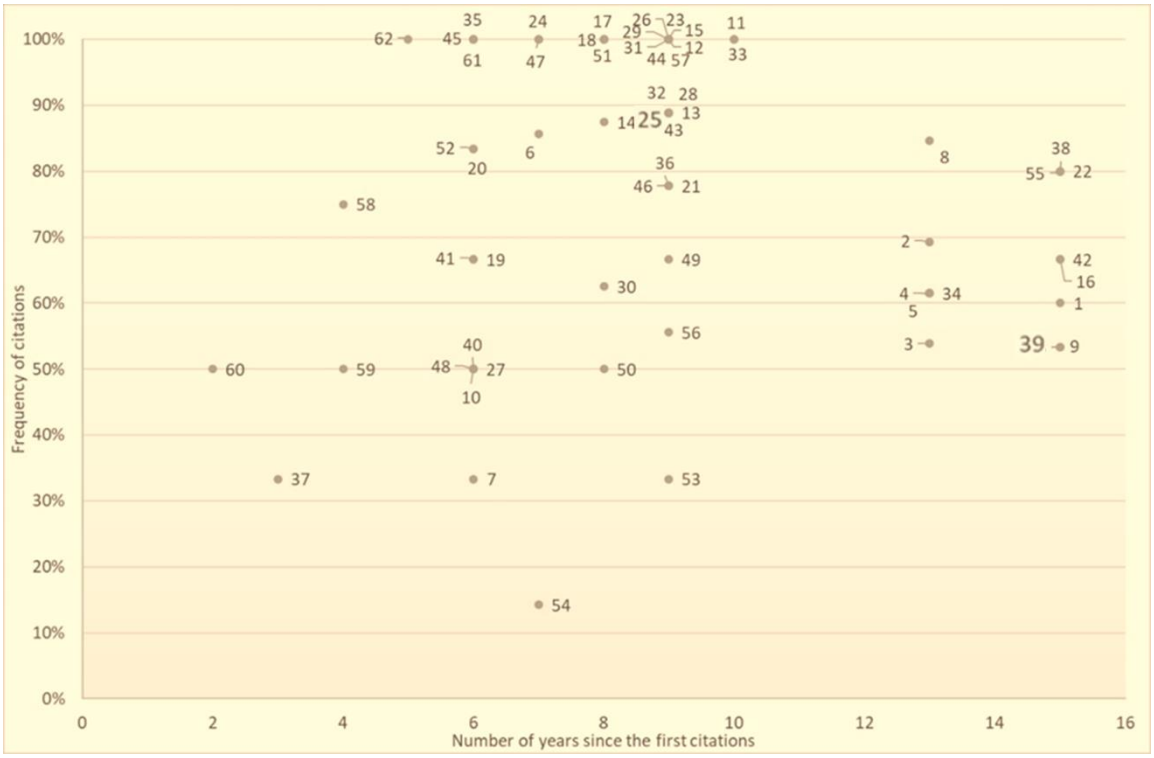


Figure 3.5 Frequency of citations of the driver

First, we wondered whether the drivers that emerged first in the literature were also the most cited on average. Looking at Figure 3.5, it appears clear that this is not the case. More specifically, only some of the drivers first mentioned after 2013 were re-cited in all the subsequent years. This result could be partially explained by the fact that initial contributions were focused only on German data; moreover, they were based only on the mistake correction conceptualization of the backshoring decision (Kinkel et al. 2007; Kinkel and Maloca 2009; Kinkel 2012). As clearly found by Wan et al. (2019), backshoring is a phenomenon where each country has its own peculiarities. In this respect, it is worth noting that the two oldest drivers less re-cited in the following years are *untapped production capacity at home/capacity bottleneck in the host country* (coded as 9) and *host market size reduction/Other market growth* (25). The drivers on sustainability deserve a special note since while the initial driver *firm's aims in terms of environmental and social sustainability* (49) has been cited since 2013, after a while scholars started to cite the drivers *environmental sustainability* (coded as 61 and initially cited in 2016) and *social sustainability* (coded as 62 and initially cited in 2017) separately. These drivers were re-cited in at least one publication in each of the following years.

To further investigate the evolutionary dynamics of the 62 sampled drivers, we grouped them according to two variables:

- The number of years since the first citation. Based on such a variable, we differentiated drivers proposed within the medium-term (we consider a cut-off period of five years, commonly regarded as the medium-term horizon in strategic decisions) and long-term (more than five years). In this respect, it is worth noting that up to 17 out of 62 sampled backshoring drivers were proposed in the medium term. This finding assumes a special meaning, given that backshoring drivers have been considered the most investigated topic in the extant literature (Barbieri et al., 2018; Fratocchi et al., 2016). More specifically, it clearly shows that backshoring drivers actively influence the academic debate, given the novelty of the topic, when compared to other international business and supply chain research topics.
- The annual average number of citations each driver received since the first year. For this second variable, we choose the median of the number of yearly citations (2.2), the number dividing the set of drivers into exactly two groups, as the cut-off value.

We defined a two-by-two matrix based on such two variables, as depicted in Figure 3.6. In the higher right quadrant – labelled "Evergreen drivers" – we found 25 drivers, of which ten have a citation ratio at least double with respect to the cut-off value (2.2). It is worth noting that while the most cited driver is *poor products quality in the host country/better products quality in the home country* (coded as 22, 88 citations out of the 137 sampled publications with an average citation ratio of 5.9), the highest citation ratios belong to the *logistics costs* (coded as 12, average 7.9) and *labour costs' gap reduction* (coded as 11, average 7.2). Among the Evergreen drivers, the *national subsidies for relocation* (18) issue deserves a special note, especially when considering the post-Covid-19 industrial policies implemented by industrialized countries to support their national companies to repatriate manufacturing activities, especially in critical industries such as medical devices, pharmaceuticals, and personal protection equipment (Barbieri et al. 2020; Elia et al., 2021).

Within the lower right quadrant labelled "Forgotten drivers", we found 20 backshoring drivers, including six out of the seven belonging to the *managerial mistake* category proposed by Barbieri et al. (2018). This finding is relevant considering that correcting a prior managerial mistake was highlighted as the only possible explanation for the backshoring phenomenon until 2014 – when Martínez-Mora and Merino (2014) proposed the external environment perspective.

The lower left quadrant includes the 11 "Question mark drivers", the ones first cited since 2016 and having less than 2.2 citations per year. Even if they did not heavily attract the scholars' interest, they should be carefully evaluated since they could emerge as relevant soon. In this respect, the *geopolitical issue* (59) deserves a special note – introduced by the authors since it was not included in the Barbieri et al. (2018) literature review. In particular, two of the three citations belong to articles published in the first quarter of 2021, considering the consequences of Brexit. Given the growing relevance of geopolitical issues – such as the advent of the new US administration of President Biden and the Ukraine-Russia war – it is pretty likely that this issue will attract the attention of scholars.

Finally, in the higher left quadrant, six trending drivers are located, including four of the five emerging drivers (namely, *industry 4.0*, coded as 58; e*nvironmental sustainability*, coded as 61, *social sustainability*, coded as 62, and *Covid-19*, coded as 60), introduced by the authors since they emerged after the Barbieri et al (2018) structured literature review, and two of the old drivers (namely, *supplier relationships/proximity to suppliers*, coded as 35, and *implementation of strategies based on product/process innovation*, coded as 45).

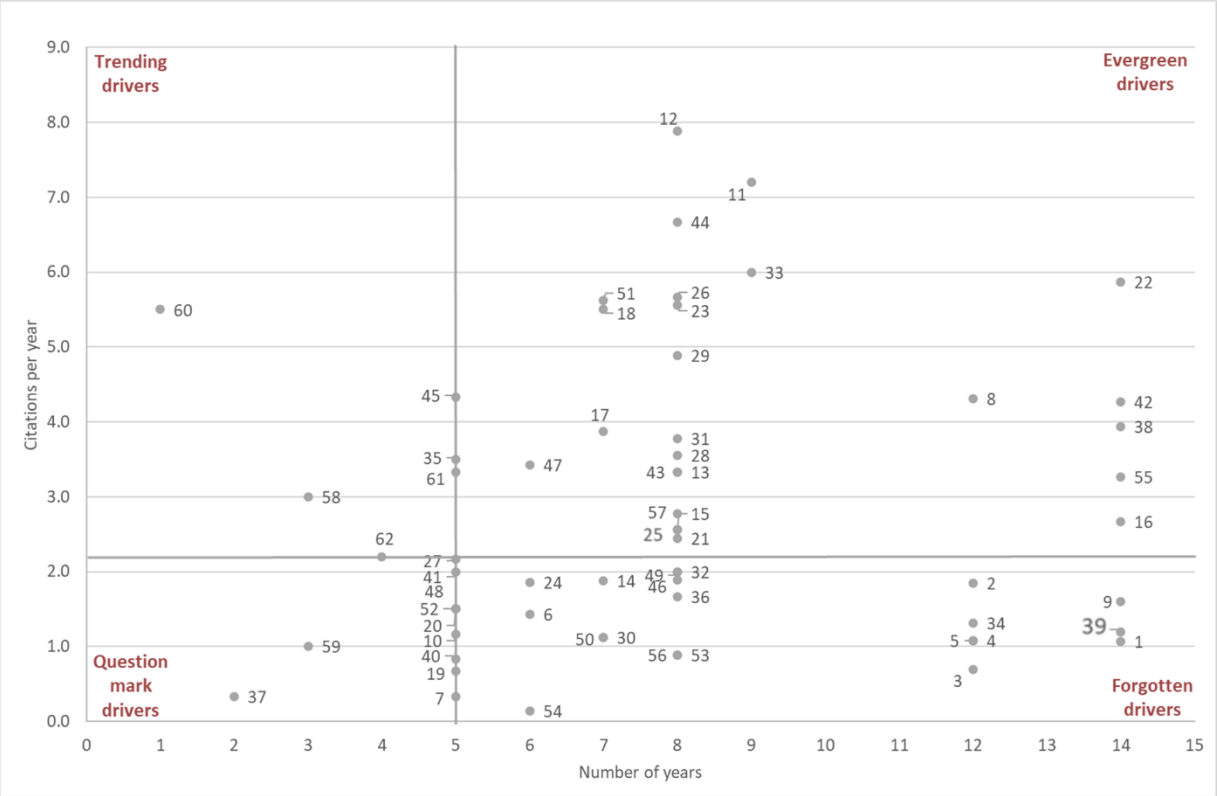
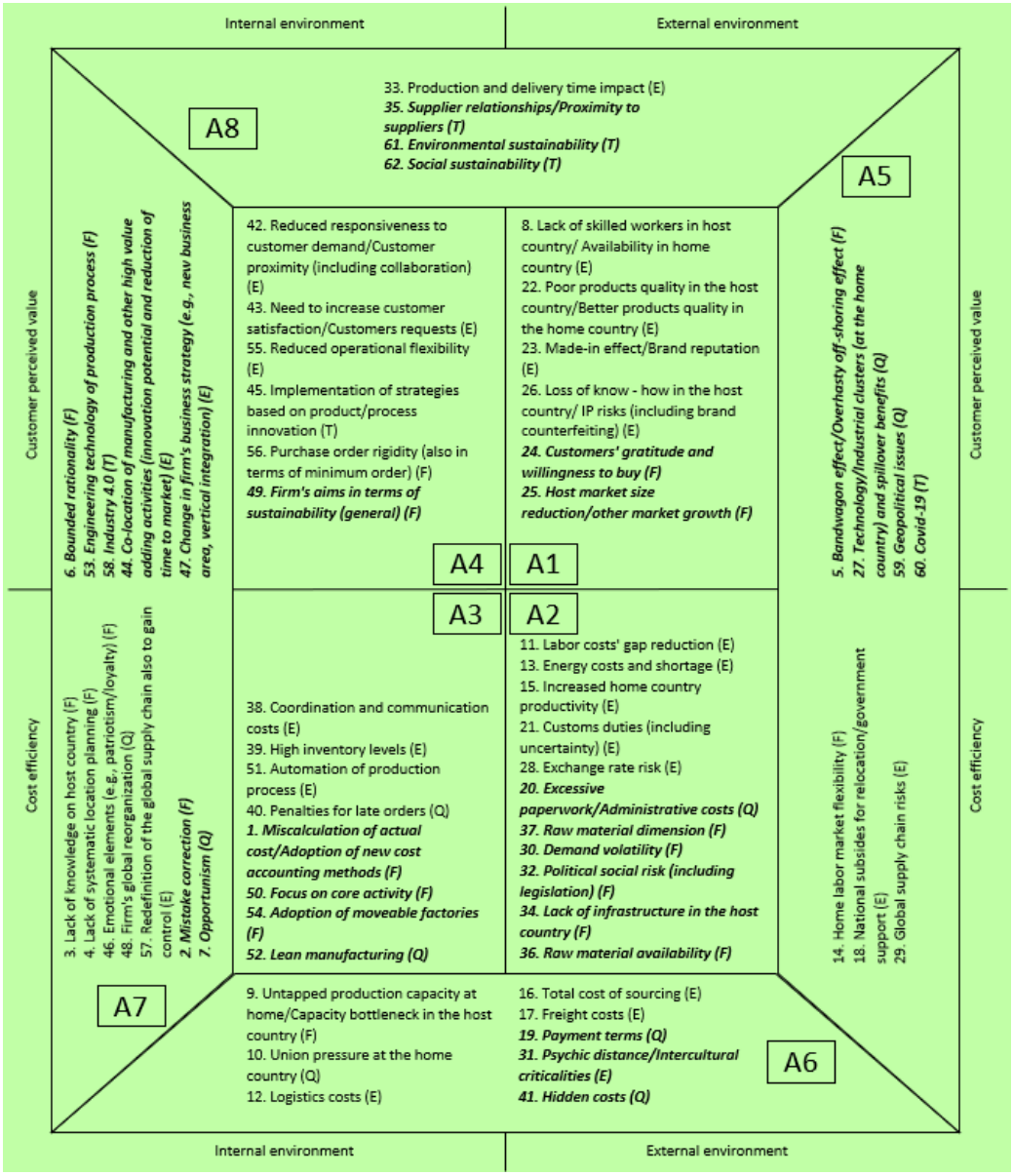


Figure 3.6 Matrix of drivers

3.5 An updated framework of backshoring drivers

The review of the literature on backshoring has allowed us to identify the comprehensive list of drivers mentioned at least once by scholars. Starting from the framework developed by Fratocchi et al. (2016), we can now provide an updated version of the framework, as depicted in Figure 3.7, by highlighting the drivers' categories in terms of time-wise evolution.



(Fratocchi et al. 2016) drivers vs. ***Newly updated motivations***

E=Evergreen drivers, F=Forgotten drivers,

Q=Question mark drivers, T=Trending drivers

Figure 3.7 The updated framework of backshoring drivers (updated from Fratocchi et al., 2016)

The framework divides the drivers according to two dimensions:

- Internal (A3 and A4) vs external environment (A1 and A2) vs both (A6 and A8): the level of analysis that may be firm-specific (referring to the internal environment), country-specific (referring to the external environment), or ambiguous (referring to both the internal and external environment);
- Cost efficiency (A2 and A3) vs Customer perceived value (A1 and A4) vs both (A5 and A7): the goal of the firm in implementing the backshoring strategy is either to achieve or protect the critical attributes that drive or influence the customer preferences or to pursue lower costs or both.

From the framework, it is interesting to notice how, after 2016, when the framework was ideated and published for the first time, scholars have identified as many as 31 new drivers belonging to all the areas of the framework (the underlined drivers in Figure 3.7). Interestingly, all the trending drivers (identified with T in Figure 3.7) are not purely related to cost efficiency, as none fall in A2 or A3, where the company's goal is directed towards cost efficiency. This evidence means that all the drivers that were emerging recently and were highly cited shifted from the pure cost efficiency perspective to also considering the customer perceived value. The importance of the customer perceived value as an overall objective guiding the companies' relocation decisions is also evidenced by the fact that A8, reflecting motivations connected to customer perceived value orientation both from an internal and external environment, only includes "evergreen" or "trending drivers", meaning drivers frequently discussed in papers either since a long time or recently.

3.6 Future research agenda and conclusions

The result of a rigorous and replicable SLR on backshoring motivations over the last 15 years has highlighted a number of emerging drivers, the so-called *global trends*, impacting the repatriation of manufacturing activities to the home country. Following a content analysis of 137 papers and synthesizing the motivations behind backshoring decisions, we could identify, among the old and new ones, the "trending drivers", i.e., the ones that have captured and are still capturing most of the attention of scholars. In sum, we can now define future avenues to guide researchers dealing with manufacturing relocations, particularly backshoring.

The first research avenue, which is a trending driver, is connected to ***Environmental and Social Sustainability as separate but interconnected entities*** **(FRA1).** Collected evidence

shows that the attention given to the impact of environmental and social sustainability issues on backshoring decisions has increased in recent years (Benstead et al. 2017; Engström et al. 2018b; Fratocchi and Di Stefano 2019a; Moradlou et al. 2021a). However, the development of academic literature on this topic has been relatively slow. For instance, Orzes and Sarkis (2019) assert "the relationship between backshoring and sustainability is a foundational unexplored relationship" (p. 482). With stakeholders becoming more concerned with sustainability, companies could improve their environmental sustainability and address customer concerns when backshoring since product development and manufacturing are closer, leading to better cooperation (Engström et al. 2018b).

Similarly, a study by Moradlou, Fratocchi, et al. (2021) shows that backshoring decisions enable companies to obtain performance outcomes related to sustainability. However, Fratocchi and Di Stefano (2019) argue that while backshoring manufacturing activities to the home country can contribute to environmental sustainability by reducing transportation, it may harm social sustainability by impacting the host country's employment levels. This can result in a dichotomy in environmental and social sustainability motivations. Hence, we call for future research to explore the relationship between backshoring decisions and the different pillars of sustainability to comprehensively understand the implications and development of tools to support managerial decisions.

Supplier relationships/Proximity to suppliers has been identified as a trending driver and second future research avenue **(FRA2).** Even though this driver was not new and had already appeared in Barbieri et al.'s (2018) list of drivers, it appeared among the trending drivers from our analysis. Many authors have discussed in various ways about supplier relationships or proximity to suppliers being drivers of backshoring decisions (Fratocchi et al. 2016; Srai and Ané 2016; Fratocchi and Di Stefano 2019a; Johansson et al. 2019; Theyel and Hofmann 2020; Moradlou et al. 2021b). Fratocchi et al. (2016) were the first to refer to the termination of the relationship with a supplier as a motivation to reshore. After that, this driver went through a steady growth in terms of citations, reaching its peak in 2018. This result was easy to predict, given the strict relationship between location and ownership decisions (Gray et al. 2013; Foerstl et al. 2016). More recently, Theyel and Hofmann (2020) mentioned the access to specialized suppliers enabled by global suppliers' management capabilities. Instead, Moradlou et al. (2021b) refer to the problems that supply chain disruption risks may generate in developing new relationships with suppliers. We expect supplier relationships and proximity to suppliers to play an extremely relevant role in the post-pandemic world, as companies are

now aware of the risks that a global supply chain exposes them to. It is time to recognize intelligent SCM importance in diversifying and mitigating risks.

A third trending driver and future research avenue is ***Industry 4.0*** **(FRA3)**. Our analysis indicates that another emerging area of interest in the extent of backshoring literature is the advent of Industry 4.0 (Ancarani and Di Mauro 2018; Fratocchi 2018; Moradlou and Tate 2018; Ancarani et al. 2019; Dachs et al. 2019a). The categorization of this driver as trending is made even stronger when considering that other supporting drivers, namely automation of production processes and implementation of strategies based on product/process innovation, are the only two drivers that increased their relevance with respect to the previous literature review by Barbieri et al. (2018). Dachs et al. (2019) argue that the current literature has almost completely ignored this motivation, despite its impact on manufacturing location decisions. Industry 4.0 can be considered an umbrella term referring to a new generation of technologies, ranging from additive manufacturing to intelligent robotics, big data, and the internet of things (IoT) (Moradlou and Tate 2018). The study by Dachs et al. (2019) shows that Industry 4.0 can be seen as an enabler of backshoring decisions because first, it improves productivity by neutralizing the cost advantages of offshoring, and second, it promises more flexibility in production, which offers an incentive for firms to locate production close to their European customers. Similarly, Ancarani et al. (2019) suggest that backshoring is associated with adopting Industry 4.0 when the firm's priorities are high quality and the reduction of costs tied to non-conformance. While both Dachs et al. (2019) and Ancarani et al. (2019) shed light on the relationship between backshoring and Industry 4.0 by conducting large-scale surveys, the current empirical evidence, in terms of in-depth case studies, so far, seems to be very limited. Some studies, such as Fratocchi (2018) and Moradlou and Tate (2018), have investigated the contribution of additive manufacturing technologies to backshoring through shorter lead-time, responsiveness to the product and market changes, lower transportation costs, fewer miscommunications with the suppliers, more customisation options, and fewer products stored in inventory. However, we believe in-depth studies on backshoring and other technologies such as IoT, augmented reality, blockchain and robotics can be considered as potential avenues for future research.

Implementing strategies based on product/process innovation has been identified as the fourth future research avenue **(FRA4)**. Also in this case, the driver, despite not being new, appeared among the trending drivers. It is essential to highlight that it assumed multiple meanings even though innovation was often mentioned as a driver in the literature. Besides the

classical strategic orientation towards new product development (Fratocchi et al. 2016; Bettiol et al. 2017), it was also highlighted as a prerequisite for automation or new technologies introduction (Foerstl et al. 2016; Stentoft et al. 2016a; Martínez-Mora and Merino 2020). Moreover, scholars highlighted the interplay of this driver with many others, such as sustainability (Moradlou et al. 2021a), co-location with R&D activities (Fratocchi et al. 2016; Benstead et al. 2017; Stentoft et al. 2018) and Industry 4.0 (Lund and Steen 2020). Our literature review found product and process innovations essential in fostering many other trends. We believe that, as such, future research will need to identify the mechanisms through which innovation supports and enables other drivers over the relocation processes.

Covid-19 and global pandemics (FRA5) are the fifth research avenue and trending driver. Supply chains worldwide have experienced an unprecedented shock resulting from the Covid-19 global pandemic. Scholars and practitioners have started scrutinizing the global value chain models (Barbieri et al. 2020). Global supply chains are designed to benefit from lower production costs, increasing the vulnerabilities in the current epidemic context (Strange 2020). Similarly, companies have extensively invested in offshoring strategies to pursue efficiency improvement and cost reduction purposes (Tate 2014).

Consequently, the lack of responsiveness to disruptions and demand changes worldwide became evident, as several supply chains failed to get products to the market during the Covid-19 pandemic. This entails organizations being obliged to reconsider their supply chain strategies (in terms of both geographic locations, international diversification vs backshoring, and governance mode, internalization vs externalization) to be able to cope with unforeseen events and assess the impact of the Covid-19 pandemic on firm strategies, in particular, the configuration of firms' global value chains (Strange 2020). The early evidence of backshoring was observed in the pharmaceutical supply chain, which is recognized as a national security need (Gurvich and Hussain 2020). Similarly, Barbieri et al. (2020) acknowledge that Covid-19 can be associated with the role of a trigger for backshoring decisions. They assert, "*we can expect it to foster and accelerate decisions that have not been made yet, even if possible drivers had already been identified"* (Barbieri et al. 2020, p. 132). In light of ongoing research exploring the impacts of Covid-19 on supply chains in general, we call for a specific focus on the implications of global pandemics on backshoring and localization in the context of supply chain resilience.

Among the non-trending drivers, but still recently emerging, the ***Geopolitical issues*** driver deserves special attention and was therefore identified as a future research avenue

(FRA6). The effects of geopolitical disruptions on supply chain location decisions is a theme that is gaining increasing attention in the SCM literature (Roscoe et al. 2020, 2022; Moradlou et al. 2021b). The extant literature has investigated the impact of natural disasters (Srai and Ané, 2016) and artificial disruptions (Ellram et al. 2013) on manufacturing location decisions. However, the impact of geopolitical disruptions on the location of manufacturing activities, particularly backshoring strategies, is largely ignored (Moradlou et al. 2021b). This is a critical omission because geopolitical disruptions grow in severity and frequency. Recent political disruptions, such as the dissolution of NAFTA and the US-China trade war, have seen significant shifts in the location of production facilities (Nerad 2019; Swanson and Tankersley 2020).

Similarly, due to disruptions caused by Brexit, the manufacturing sector in the UK is currently undergoing a significant supply chain transformation. Studies show that Brexit can impact the positioning of supply chain assets, material and information flow, human resource availability, and supplier access (Roscoe et al. 2020; Moradlou et al. 2021b). Managers, therefore, need guidance regarding how to backshore their manufacturing activities in the event of a geopolitical disruption. They may also experience supply delays at border crossings and cost increases from newly imposed tariffs and non-tariff barriers. More recently, the 2022 attack of the Russian Federation on Ukraine has tremendously impacted global supply chains and manufacturing location decisions. The Wall Street Journal (2022) suggests that the countries need to embrace ‘Friend-Shoring’ to secure supply chains during the Russia-Ukraine war. This article posits that the US and its allies are pursuing a new kind of global trade that confines commerce to a circle of trusted nations. Informed by the above argument, we call on future researchers to further investigate the impacts of geopolitical events on backshoring and wider manufacturing location decisions.

Finally, we call for future research exploring the relationship and interaction among the different driver categories to understand better the trade-offs and paradoxes existing among the identified areas. Figure 3.8 depicts and synthesizes the hereby proposed future research avenues.

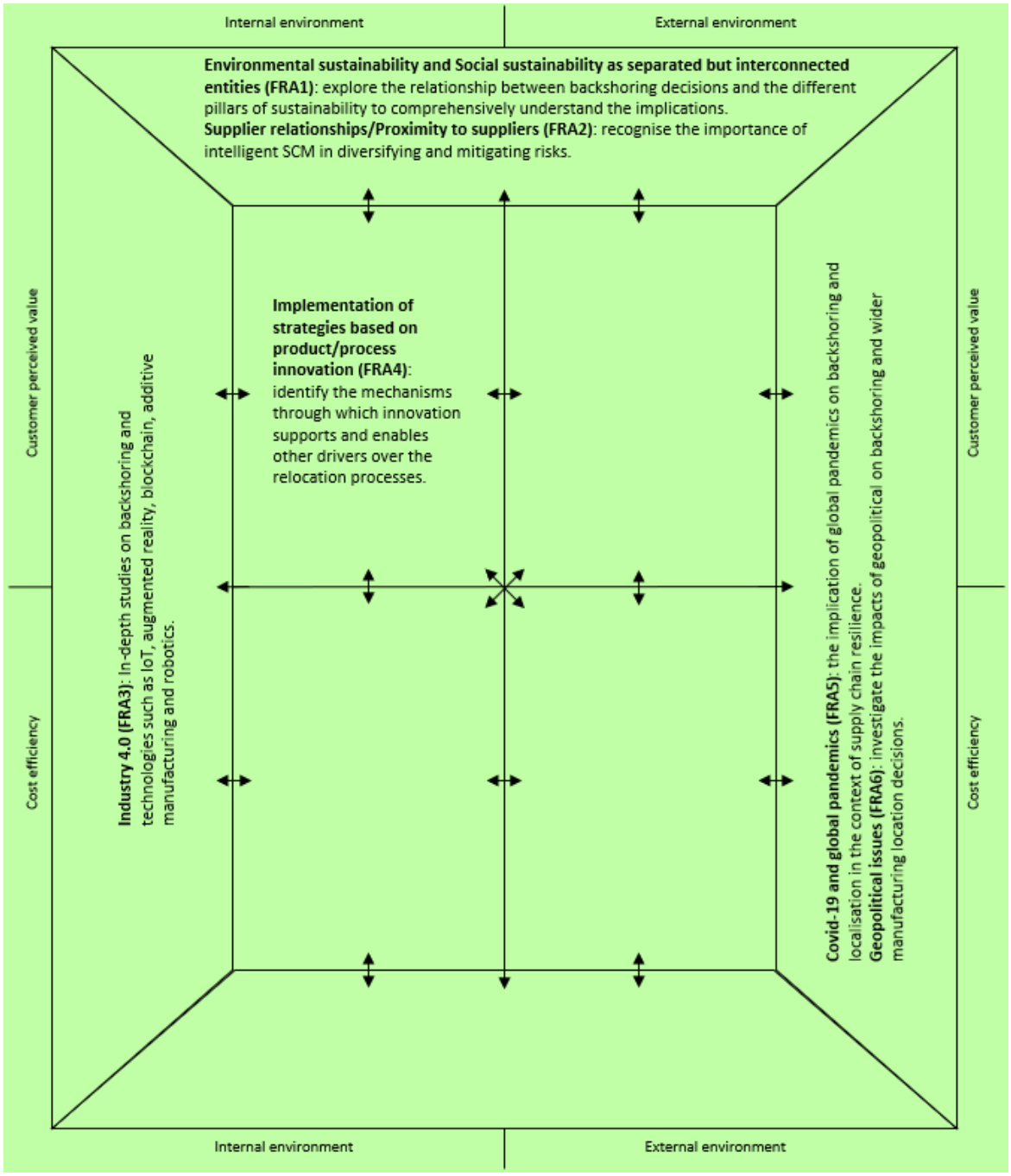


Figure 3.8 Future research avenues inserted in the updated framework of backshoring drivers

This paper has drawn a comprehensive picture of the motivations for backshoring, incorporating some of the latest published articles. Furthermore, collective evidence on decision-making and motivations was provided, thus capturing the current arguments in academic research.

Researchers could build upon the comprehensive list provided in this paper and use it as a starting point for monitoring the drivers' evolution and optimizing the research efforts

towards the most promising, consolidated, and emerging drivers. Furthermore, the future research avenues provided are, per se, a legacy to guide scholars not only involved with backshoring research but also, more generally, with manufacturing location decisions, global value chain reconfiguration and SCM risk and resilience.

In addition, practitioners, especially supply chain managers, may benefit from the research results if properly disseminated. The list of drivers can be considered a checklist when evaluating manufacturing relocation decisions, for which specific key performance indicators comparing different locations, decision-making models, support tools, and simulations may be developed. Moreover, our study has highlighted that backshoring drivers tend to change in their relevance over time, with some exiting and others entering the framework of backshoring drivers. Managers should be aware of this potentially risky effect and, before assessing a backshoring decision, evaluate which drivers still need to be considered and which may have emerged and gained relevance.

Finally, when considering implications for policymakers, it is crucial to reflect on how their decisions can have critical impacts on some of the more relevant drivers. For instance, sustainability-related policies, fostered by the European Green Deal, Industry 4.0 national policies, and industry-specific policies (e.g., the French policy favouring the backshoring of some active pharmaceutical ingredients, the chips act) (Elia et al. 2021; Baraldi et al. 2022).

The SLR methodology facilitates a comprehensive overview of the papers related to the research questions. However, it is limited by the current scope of the research. Therefore, this paper's findings are weighted heavily towards the motivations of backshoring. Furthermore, this paper does not capture the direct decision-making activities that took place across the firms. As many authors in the backshoring literature identify, implementation and outcomes are still under-researched (Boffelli and Johansson 2020; Barbieri et al. 2022), and analysing the drivers still tells only part of the story.

3.7 Appendix 3A Coding of drivers by paper

Table 3A.1. Coding of drivers by paper (1/7)

		1	2	3	4	5	6	7	8	9	10	11
Driver ID	**Driver**	**Kinkel et al., 2007**	**Kinkel and Maloca, 2009**	**Kinkel, 2012**	**Baldwin and Venables, 2013**	**Canham and Hamilton, 2013**	**Denning 2013**	**Ellram et al., 2013**	**Gray et al., 2013**	**Arlbjørn and Mikkelsen, 2014**	**Bailey and De Propris, 2014b**	**Bailey and De Propris, 2014a**
1	**Miscalculation of actual cost/Adoption of new cost accounting methods**	x	x			x	x		x			
2	**Mistake correction**		x				x		x		x	
3	**Lack of knowledge on host country**		x									
4	**Lack of systematic location planning**		x									
5	**Bandwagon effect/Overhasty off-shoring effect**		x						x			
6	**Bounded rationality**											
7	**Opportunism**											
8	**Lack of skilled workers in host country/Availability in home country**		x	x		x		x			x	x
9	**Untapped production capacity at home/Capacity bottleneck in the host country**	x										
10	**Union pressure in the home country**											
11	**Labour costs' gap reduction**			x		x	x	x	x		x	x
12	**Logistics costs**					x	x				x	x
13	**Energy costs and shortage**						x	x				x
14	**Home labour market flexibility**											x
15	**Increased home country productivity**							x				x
16	**Total cost of sourcing**	x					x			x	x	x
17	**Freight costs**											x

18	**National subsidies for relocation/government support**											x
19	**Payment terms**											
20	**Excessive paperwork/Administrative costs**											
21	**Customs duties (including uncertainty)**							x				
22	**Poor products quality in the host country/Better products quality in the home country**	x	x	x		x		x		x	x	
23	**Made-in effect/Brand reputation**					x						
24	**Customers' gratitude and willingness to buy**											
25	**High inventory levels**				x							
26	**Loss of know-how in the host country/IP risks (including brand counterfeiting)**						x	x	x			x
27	**Technology/Industrial clusters (in the home country) and spillover benefits**											
28	**Exchange rate risk**							x	x		x	x
29	**Global supply chain risks**						x	x	x		x	x
30	**Demand volatility**											
31	**Physical distance/Intercultural criticalities**							x				
32	**Political social risk (including legislation)**							x				
33	**Production and delivery time impact**			x		x	x	x		x	x	x
34	**Lack of infrastructure in the host country**		x									
35	**Supplier relationships/Proximity to suppliers**											
36	**Raw material availability**							x				
37	**Raw material dimension (e.g. size)**											
38	**Coordination and communication costs**	x	x	x	x	x			x		x	x
39	**Host market size reduction/Other market growth**	x						x				x
40	**Penalties for late orders**											
41	**Hidden costs**											
42	**Reduced responsiveness to customer demand/Customer proximity (including collaboration)**	x			x	x		x			x	
43	**Need to increase customer satisfaction/Customers' requests**					x		x			x	
44	**Co-location of manufacturing and other high value adding activities (innovation potential and reduction of time to market)**						x		x	x	x	
45	**Implementation of strategies based on product/process innovation**											

46	**Emotional elements (e.g. patriotism/loyalty)**					x						
47	**Change in firm's business strategy (e.g. new business area, vertical integration, ..)**											
48	**Firm's global reorganization**											
49	**Firm's aims in terms of sustainability (general)**						x					
50	**Focus on core activity**									x		
51	**Automation of production process**									x		
52	**Lean manufacturing**											
53	**Engineering technology of production process**				x							
54	**Adoption of moveable factories**											
55	**Reduced operational flexibility**	x	x	x		x		x				x
56	**Purchase order rigidity (also in terms of minimum order)**					x						
57	**Redefinition of the global supply chain also to gain control**							x				x
58	**Industry 4.0**											
59	**Geopolitical issues**											
60	**Covid-19**											
61	**Environmental sustainability**											
62	**Social sustainability**											

Table 3A.2. Coding of drivers by paper (2/7)

	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Driver ID	**Fratocchi et al. 2014**	**Kinkel, 2014**	**Martínez-Mora and Merino, 2014**	**Tate et al. 2014**	**Tate, 2014**	**Wu and Zhang, 2014**	**Ancarani et al. 2015**	**Fox 2015**	**Grandinetti and Tabacco, 2015**	**Grappi, Romani, and Bagozzi 2015**	**Gylling et al., 2015**	**Abbasi 2016**	**Ashby 2016**	**Bals et al., 2016**	**Foerstl et al., 2016**	**Foster 2016**	**Fratocchi et al., 2016**	**Huq, Pawar, and Rogers 2016**	**Joubioux and Vanpoucke, 2016**	**Lavissière, Mandják, and Fedi**	**Mlody 2016**	**Moradlou and Backhouse, 2016**
1		x	x	x							x				x							
2	x	x		x	x								x									
3		x													x		x					
4		x													x		x					
5															x							
6							x								x							
7															x							
8	x	x		x			x							x	x	x	x		x		x	
9		x															x					
10																	x					
11	x	x		x	x	x	x	x				x	x	x	x		x					x
12	x	x		x	x		x		x				x	x	x		x		x	x	x	x
13				x	x								x	x	x		x					x
14																	x					
15							x										x					
16	x		x			x	x		x		x		x			x	x			x		
17									x								x					x
18	x				x		x							x	x		x		x		x	
19																						
20																						

21																	x			x		
22	x	x		x			x				x		x	x	x		x	x	x		x	x
23			x	x			x										x				x	
24										x												
25															x		x		x			
26		x		x	x		x							x	x		x		x		x	x
27																						
28					x		x				x				x		x		x			x
29				x			x						x		x	x	x	x	x		x	x
30			x			x					x											
31		x					x							x	x				x		x	x
32							x												x		x	x
33	x						x		x		x		x	x			x		x			x
34							x														x	
35																	x					
36															x							
37																						
38		x					x		x		x		x	x	x		x	x			x	x
39						x	x										x					
40																	x					
41															x	x			x			
42						x	x		x			x	x	x	x		x		x		x	
43							x							x	x		x		x			
44		x			x		x					x		x	x		x		x		x	
45															x	x	x					x
46																	x					
47									x					x	x			x	x			
48																	x					
49													x	x	x							

50																						
51				x			x					x		x		x	x				x	
52														x								
53																						
54								x														
55	x	x					x						x		x		x		x			
56																	x					
57									x				x				x			x		
58																						
59																						
60																						
61																						
62																						

Table 3A.3. Coding of drivers by paper (3/7)

	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Driver ID	**Robinson and Hsieh, 2016**	**Presley, Meade, and Sarkis 2016**	**Saki 2016**	**Sardar, Lee, and Memon 2016**	**Srai and Ané, 2016**	**Stentoft et al., 2016**	**Stentoft et al., 2016a**	**Stentoft et al., 2016b**	**Uluskan, Joines, and Godfrey 2016**	**Zhai, Sun, and Zhang 2016**	**Benstead et al., 2017**	**Bettiol et al., 2017**	**Brandon-Jones et al. 2017**	**Diaz and Mendoça-Tachizawa, 2017**	**Fel and Griette, 2017**	**Gray et al., 2017**	**Hartman et al., 2017**	**Moradlou, Backhouse, and**	**Tate and Bals, 2017**	**Uluskan, Godfrey, and Joines 2017**	**Wiesmann et al., 2017**	**Ancarani and Di Mauro, 2018**
1						x															x	
2												x			x							
3																					x	
4																	x					
5												x									x	
6																						

7																						
8					x	x		x		x	x			x				x			x	
9						x					x		x				x					
10																						
11			x		x	x		x		x	x				x				x		x	
12			x		x	x		x	x	x	x							x				x
13			x		x	x			x		x							x				
14							x				x										x	
15			x		x	x		x			x						x					
16		x	x	x		x		x	x	x	x				x		x					
17								x	x									x				
18			x		x	x				x		x	x								x	
19					x																	
20			x															x				
21											x											
22		x	x	x	x	x		x	x	x	x	x	x		x	x	x	x				x
23			x		x	x				x	x	x	x							x	x	x
24		x										x										x
25					x					x	x		x									
26					x	x			x	x	x		x								x	x
27					x																	
28			x		x	x			x		x				x						x	
29		x			x	x		x	x		x		x						x		x	
30						x				x												
31		x			x						x			x		x	x				x	
32					x				x		x										x	
33		x		x	x	x		x		x					x						x	
34					x						x											
35					x									x								
36					x						x										x	

37																						
38		x			x	x					x		x	x	x		x					x
39					x	x		x		x						x					x	
40																						
41					x																	
42				x	x	x				x	x				x	x		x				x
43					x	x		x				x		x				x				
44					x	x		x			x	x	x		x					x	x	x
45						x					x	x										
46						x															x	
47	x				x						x				x					x		
48		x																				
49	x				x										x					x	x	
50					x	x																
51			x		x	x		x		x	x								x		x	
52										x					x							
53																						
54																						
55		x			x						x											x
56						x																
57					x					x				x								
58																						x
59																						
60																						
61		x								x	x											
62											x											

Table 3A.4. Coding of drivers by paper (4/7)

	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77
Driver ID	**Bailey, Corradini, and De Propris 2018**	**Baraldi et al. 2018**	**Barbieri et al., 2018**	**Boffelli et al., 2018**	**Cohen et al. 2018**	**Di Mauro et al. 2018**	**Engström, Hilletofth, et al. 2018**	**Engström, Sollander, et al. 2018**	**Fratocchi, 2018**	**Grappi, Romani, and Bagozzi 2018**	**Hasan 2018**	**Heikkilä et al. 2018b**	**Heikkilä, Martinsuo, and Nenonen 2018a**	**Johansson and Olhager, 2018b**	**Johansson and Olhager, 2018a**	**Moore, Rothenberg, and Moser 2018**	**Moradlou and Tate, 2018**	**Nujen et al. 2018**	**Pal, Harper, and Vellesalu 2018**	**Sirilertsuwan, Ekwall, and Hjelmgren 2018**	**Stentoft, J., Mikkelsen, O.S., Jensen, J.K.,**	**Talamo and Sabatino, 2018**
1						x							x									
2			x			x	x	x		x												
3						x																
4			x			x	x	x														
5			x			x						x	x	x								
6			x	x																		
7																						
8			x			x			x			x	x	x	x	x			x		x	x
9			x			x		x	x										x	c		x
10			x			x		x														x
11			x			x			x			x	x	x	x	x			x	x	x	x
12			x			x	x	x	x			x	x	x	x	x	x		x	x	x	x
13			x			x			x				x									
14			x			x		x														
15						x				x			x									
16						x													x			
17			x			x										x	x		x			x
18			x		x	x		x	x			x	x	x		x				x		

19						x																
20			x			x										x						
21			x			x			x			x	x	x							x		
22			x	x		x	x	x				x	x	x	x	x	x		x	x	x	
23		x	x	x		x	x	x	x		x		x								x	x
24			x			x		x		x												
25			x			x											x		x	x	x	
26			x			x	x	x	x				x						x			
27			x			x	x					x		x	x		x					
28						x		x					x	x								
29			x			x	x	x					x	x	x	x						x
30			x			x											x					
31			x			x	x	x	x					x	x	x						
32			x					x														
33			x			x			x			x	x	x	x	x	x		x	x		
34			x			x										x				x		
35			x	x	x	x			x			x			x				x		x	
36						x							x	x		x					x	
37																						
38			x				x		x	x			x	x	x	x			x			
39			x					x	x			x								x		
40			x			x																
41													x			x			x			
42	x		x	x	x	x	x	x	x				x	x			x		x	x	x	x
43	x	x		x		x	x	x	x								x					x
44	x		x	x	x	x		x	x			x	x	x	x				x	x	x	x
45													x					x		x	x	x
46			x	x		x	x		x													
47		x	x	x		x				x						x			x			
48			x			x	x		x													

49						x	x									x			x			
50			x									x	x	x	x							
51			x	x			x	x	x				x			x	x	x	x		x	
52			x				x	x														
53			x				x	x									x	x				
54																						
55			x		x	x	x		x			x	x	x	x		x		x		x	
56						x							x									
57						x											x		x			x
58	x								x								x					
59																						
60																						
61			x				x	x	x													
62			x				x	x														

Table 3A.5. Coding of drivers by paper (5/7)

	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Driver ID	**Theyel, Hofmann, and Gregory 2018**	**Vanchan, Mulhall, and Bryson 2018**	**Yu and Kim, 2018**	**Ancarani et al., 2019**	**Barbieri et al. 2019**	**Ciabuschi et al. 2019**	**Dachs et al. 2019**	**Dachs, Kinkel, and Jäger, 2019**	**Fjellstrom, Fang, and Chimenson 2019**	**Fratocchi and Di Stefano, 2019b**	**Fratocchi and Di Stefano, 2019a**	**Johansson et al., 2019**	**Lampón and González-Benito, 2019**	**Nujen et al. 2019**	**Orzes, G., Sarkis, J., 2019**	**Oshri, Sidhu, and Kotlarsky 2019**	**Piatanesi and Arauzo-Carod, 2019**	**Sayem, Feldmann, and Ortega-Mier 2019**	**Sirilertsuwan, Hjelmgren, and Ekwall 2019**	**Wan, Orzes, Sartor, Di Mauro, et al. 2019**	**Wan et al., 2019b**	**Barbieri et al., 2020**	**Boffelli and Johansson, 2020**
1	x																						
2	x				x					x						x						x	
3									x														
4									x	x												x	
5												x										x	
6						x										x						x	
7																							
8		x					x	x		x		x		x			x	x					x
9								x		x				x									x
10																							
11		x		x			x	x	x	x		x	x	x	x		x	x		x	x	x	x
12		x		x			x	x		x		x		x	x		x		x	x	x		x
13		x							x	x		x											
14							x	x														x	
15		x								x			x				x						

16	x	x											x		x			x					
17		x					x					x							x	x	x		x
18		x										x			x	x	x			x	x	x	x
19																							
20		x								x													
21										x		x							x				
22	x	x		x	x		x	x	x			x	x	x	x	x	x	x	x	x	x	x	x
23		x	x	x					x						x		x			x	x	x	x
24				x																			
25		x	x					x															
26	x	x		x			x	x	x	x							x						x
27																							x
28		x							x			x											
29		x				x		x	x	x		x											x
30																							
31								x	x	x									x				
32		x								x						x							
33	x	x		x					x	x		x		x	x				x	x	x		x
34		x					x			x												x	
35	x	x								x		x							x				
36												x											
37																			x				
38		x		x			x	x		x			x				x					x	
39																							
40																							
41				x									x	x									
42	x	x		x						x		x					x		x	x	x		
43	x								x			x							x				
44	x			x			x	x		x		x						x	x			x	

45	x												x				x	x					
46										x					x				x			x	x
47										x			x						x				
48																							x
49								x			x												
50												x											
51		x							x	x				x	x								
52		x							x														
53		x												x									
54																							
55	x	x	x	x				x		x		x	x				x	x					
56		x																					
57	x	x											x						x	x	x	x	
58		x		x				x															
59		x																				x	
60																							
61		x						x	x	x	x				x				x			x	
62								x		x	x								x			x	

Table 3A.6. Coding of drivers by paper (6/7)

	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122
Driver ID	**Boffelli et al., 2020**	**Butollo 2020**	**Cassia 2020**	**Faber 2020**	**Gharleghi, Jahanshahi, and Thoene 2020**	**Grappi, Romani, and Bagozzi 2020**	**Gurvich and Hussain, 2020**	**Gyarmathy, Peszynski, and Young 2020**	**Harris et al. 2020**	**Jung 2019**	**Kandil, Battaïa, and Hammami 2020**	**Kang et al. 2020**	**Li 2020**	**Lund and Steen, 2020**	**Martínez-Mora and Merino, 2020**	**Merino, Di Stefano, and Fratocchi 2020**	**Moretto, Patrucco, and Harland 2019**	**Rasel et al. 2020**	**Sansone, Hilletofth, and Eriksson 2020**	**Strange, R, 2020**	**Theyel and Hofman, 2020**	**Xu et al. 2020**
1																						
2																					x	
3																						
4																						
5																						
6	x																					
7																						
8			x	x							x			x	x		x	x				
9											x			x	x			x				
10																						
11			x	x	x			x		x	x				x	x	x					
12			x		x			x		x	x			x	x	x	x					
13											x				x			x				
14											x								x			
15											x				x							
16					x						x				x						x	
17					x			x		x	x						x	x				

18					x						x					x	x					
19											x											
20											x											
21															x	x						
22	x		x	x				x						x	x	x		x			x	
23	x		x								x				x	x	x	x				
24	x					x					x											
25								x										x				
26	x		x					x			x				x	x		x			x	
27														x				x			x	
28					x			x			x				x		x	x				
29															x							
30																						
31											x			x	x			x				
32															x							
33								x						x	x	x			x		x	
34			x								x				x							
35																					x	
36					x						x				x							
37																						
38			x					x			x			x	x	x		x				
39																						
40																		x				
41																						
42			x							x				x	x	x			x			
43	x										x											
44	x										x			x	x		x	x			x	
45	x										x			x	x				x			
46	x																					
47	x										x											

48											x											
49																						
50																						
51	x			x							x			x	x			x				
52											x											
53																						
54																						
55			x											x	x		x	x	x			
56																		x				
57					x						x							x				
58		x																				
59																					x	
60							x		x			x	x							x		x
61																						
62																						

Table 3A.7. Coding of drivers by paper (7/7)

	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137
Driver ID	**Ancarani et al. 2021**	**Boffelli et al. 2021**	**Eriksson et al. 2021**	**Hilletofth, Sequeira, and Tate 2021**	**Huq, Pawar, and Subramanian 2021**	**Krenz, Prettner, and Strulik 2021**	**McIvor and Bals, 2021**	**Moradlou et al., 2021a**	**Moradlou et al., 2021b**	**Pla-barber, Villar, and Narula 2021**	**Radi, Lamantia, and Bischi 2021**	**Sequeira, M., Hilletofth, P., Adlemo, A., 2021**	**Van Hoek and Dobrzykowski, 2021**	**Yang, Ou, and Chen 2021**	**Zhang 2021**
1		x													
2		x	x												
3		x						x							
4		x	x												

5		x	x												
6		x							x						
7		x													
8		x					x	x	x				x		
9		x						x					x		
10			x										x		
11	x	x		x			x	x					x		
12	x			x			x	x			x	x	x		
13							x	x					x		
14				x									x		
15		x	x				x						x		
16				x			x		x				x		
17							x	x			x	x	x		
18			x		x		x				x		x		
19								x							
20							x								
21						x	x	x	x				x	x	
22	x		x	x	x	x	x	x		x		x	x		
23	x	x	x				x	x					x		
24								x							
25							x	x					x		
26	x				x		x	x					x		
27							x								
28							x								
29			x						x				x		
30								x							
31		x			x			x							
32			x					x	x						
33	x		x	x			x	x				x	x		
34		x													

35			x						x				x		
36		x													
37															
38	x	x	x		x			x				x	x		
39			x					x							
40													x		
41	x												x		
42	x	x	x	x		x	x	x	x			x	x		
43													x		
44	x	x	x	x				x	x						
45							x	x		x		x	x		
46		x											x		
47							x	x							
48													x		
49			x	x				x							
50															
51	x	x	x		x	x	x			x			x		
52		x													
53															
54															
55				x		x		x					x		
56								x							
57		x											x		
58		x													
59		x	x												
60		x						x							x
61		x	x												
62		x	x												

3.8 Appendix 3 B *Detailed metrics for drivers*

Driver ID	Driver	Number of citations	Year of first citation	No. of years since the first citation	No. of years with citations	Frequency of citations	Average No. of citations	Quadrant
1	Miscalculation of actual cost/Adoption of new cost accounting methods	16	2007	15	9	60%	1.1	Forgotten drivers
2	Mistake correction	24	2009	13	9	69%	1.8	Forgotten drivers
3	Lack of knowledge on host country	9	2009	13	7	54%	0.7	Forgotten drivers
4	Lack of systematic location planning	14	2009	13	8	62%	1.1	Forgotten drivers
5	Bandwagon effect/Overhasty off-shoring effect	14	2009	13	8	62%	1.1	Forgotten drivers
6	Bounded rationality	10	2015	7	6	86%	1.4	Forgotten drivers
7	Opportunism	2	2016	6	2	33%	0.3	Question mark drivers
8	Lack of skilled workers in host country/Availability in home country	56	2009	13	11	85%	4.3	Evergreen drivers
9	Untapped production capacity at home/Capacity bottleneck in the host country	24	2007	15	8	53%	1.6	Forgotten drivers
10	Union pressure in the home country	7	2016	6	3	50%	1.2	Question mark drivers
11	Labour costs' gap reduction	72	2012	10	10	100%	7.2	Evergreen drivers
12	Logistics costs	71	2013	9	9	100%	7.9	Evergreen drivers
13	Energy costs and shortage	30	2013	9	8	89%	3.3	Evergreen drivers
14	Home labour market flexibility	15	2014	8	7	88%	1.9	Forgotten drivers
15	Increased home country productivity	23	2013	9	9	100%	2.6	Evergreen drivers
16	Total cost of sourcing	40	2007	15	10	67%	2.7	Evergreen drivers
17	Freight costs	31	2014	8	8	100%	3.9	Evergreen drivers
18	National subsidies for relocation/government support	44	2014	8	8	100%	5.5	Evergreen drivers
19	Payment terms	4	2016	6	4	67%	0.7	Question mark drivers
20	Excessive paperwork/Administrative costs	9	2016	6	5	83%	1.5	Question mark drivers
21	Customs duties (including uncertainty)	22	2013	9	7	78%	2.4	Evergreen drivers
22	Poor products quality in the host country/Better products quality in the home country	88	2007	15	12	80%	5.9	Evergreen drivers
23	Made-in effect/Brand reputation	50	2013	9	9	100%	5.6	Evergreen drivers
24	Customers' gratitude and willingness to buy	13	2015	7	7	100%	1.9	Forgotten drivers
25	High inventory levels	23	2013	9	8	89%	2.6	Evergreen drivers
26	Loss of know-how in the host country/IP risks (including brand counterfeiting)	51	2013	9	9	100%	5.7	Evergreen drivers
27	Technology/Industrial clusters (in the home country) and spillover benefits	13	2016	6	3	50%	2.2	Question mark drivers
28	Exchange rate risk	32	2013	9	8	89%	3.6	Evergreen drivers
29	Global supply chain risks	44	2013	9	9	100%	4.9	Evergreen drivers

30	Demand volatility	9	2014	8	5	63%	1.1	Forgotten drivers
31	Physical distance/Intercultural criticalities	34	2013	9	9	100%	3.8	Evergreen drivers
32	Political social risk (including legislation)	18	2013	9	8	89%	2.0	Forgotten drivers
33	Production and delivery time impact	60	2012	10	10	100%	6.0	Evergreen drivers
34	Lack of infrastructure in the host country	17	2009	13	8	62%	1.3	Forgotten drivers
35	Supplier relationships/Proximity to suppliers	21	2016	6	6	100%	3.5	Trending drivers
36	Raw material availability	15	2013	9	7	78%	1.7	Forgotten drivers
37	Raw material dimension (e.g. size)	1	2019	3	1	33%	0.3	Question mark drivers
38	Coordination and communication costs	59	2007	15	12	80%	3.9	Evergreen drivers
39	Host market size reduction/Other market growth	18	2007	15	8	53%	1.2	Forgotten drivers
40	Penalties for late orders	5	2016	6	3	50%	0.8	Question mark drivers
41	Hidden costs	12	2016	6	4	67%	2.0	Question mark drivers
42	Reduced responsiveness to customer demand/Customer proximity (including collaboration)	64	2007	15	10	67%	4.3	Evergreen drivers
43	Need to increase customer satisfaction/Customers' requests	30	2013	9	8	89%	3.3	Evergreen drivers
44	Co-location of manufacturing and other high value adding activities (innovation potential and reduction of time to market)	60	2013	9	9	100%	6.7	Evergreen drivers
45	Implementation of strategies based on product/process innovation	26	2016	6	6	100%	4.3	Trending drivers
46	Emotional elements (e.g. patriotism/loyalty)	17	2013	9	7	78%	1.9	Forgotten drivers
47	Change in firm's business strategy (e.g. new business area, vertical integration)	24	2015	7	7	100%	3.4	Evergreen drivers
48	Firm's global reorganization	9	2016	6	3	50%	1.5	Question mark drivers
49	Firm's aims in terms of sustainability (general)	18	2013	9	6	67%	2.0	Forgotten drivers
50	Focus on core activity	9	2014	8	4	50%	1.1	Forgotten drivers
51	Automation of production process	45	2014	8	8	100%	5.6	Evergreen drivers
52	Lean manufacturing	9	2016	6	5	83%	1.5	Question mark drivers
53	Engineering technology of production process	8	2013	9	3	33%	0.9	Forgotten drivers
54	Adoption of moveable factories	1	2015	7	1	14%	0.1	Forgotten drivers
55	Reduced operational flexibility	49	2007	15	12	80%	3.3	Evergreen drivers
56	Purchase order rigidity (also in terms of minimum order)	8	2013	9	5	56%	0.9	Forgotten drivers
57	Redefinition of the global supply chain also to gain control	25	2013	9	9	100%	2.8	Evergreen drivers
58	Industry 4.0	12	2018	4	3	75%	3.0	Trending drivers
59	Geopolitical issues	4	2018	4	2	50%	1.0	Question mark drivers
60	Covid-19	11	2020	2	1	50%	5.5	Trending drivers
61	Environmental sustainability	20	2016	6	6	100%	3.3	Trending drivers
62	Social sustainability	11	2017	5	5	100%	2.2	Trending drivers

4. BUILDING PARALLEL SUPPLY CHAINS: HOW THE MANUFACTURING LOCATION DECISION INFLUENCES SUPPLY CHAIN AMBIDEXTERITY

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This article was also presented as "Moradlou, H., Benstead, A., Boffelli, A., Mweusiumo, D.E., Khayyam, S., Roscoe, S. (2022). Location decisions and their implications on efficiency and flexibility during pandemics" in 6th World Conference on Production and Operations Management P&OM, conference held online from 23rd to 25th August 2022. I am personally responsible for any changes and updates made from last versions.

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4.1 Introduction

Prior to the Covid-19 pandemic, many transnational firms located manufacturing facilities, and sourced from suppliers, in low-wage economies to achieve cost efficiencies (Choudhary et al., 2023). Global supply chains criss-crossed national boundaries, and when governments ordered businesses and borders to close during the pandemic, many supply chains ground to a halt (Verbeke, 2020; Wulandhari et al., 2022). As a result, some companies decided to reshore or nearshore production facilities to avoid persistent disruptions, while ensuring greater flexibility and responsiveness to unpredictable spikes in supply and demand (Handfield, Graham and Burns, 2020; van Hoek,2020). Proponents of nearshoring and reshoring argue that the costs of moving production back home can be offset by building a supply chain that is more flexible/responsive to customer demand (Barbieri et al., 2020; Gillani, Kutaula and Budhwar, 2022). Yet, the challenges of building a supply chain that is both cost-efficient and flexible can seem insurmountable. To find guidelines on how to create such a supply chain, manager scan turn to organizational ambidexterity theory (March, 1991; O'Reilly and Tushman, 2013). This theory argues that by possessing an ambidexterity capability (Park, Pavlou and Saraf, 2020), organizations can pursue two conflicting goals (efficiency/flexibility) at the same time (March, 1991; O'Reilly and Tushman, 2013). Companies achieve this through structural partitioning, where dual organizational structures are established and certain sub-units concentrate on alignment (efficiency/exploitation) activities, while others focus on adaptation (flexibility/exploration) (Adler, Goldoftas and Levine, 1999).

The notion of structural partitioning can be extended to the supply, where a company would partition its product lines, as well as the supply chains that deliver these products to market, based on efficiency or flexibility requirements. For example, one supply chain might focus on exploiting its existing competencies by manufacturing commodity items in low-wage economies and bulk shipping goods to major centres of demand via sea or rail freight. Another supply chain might focus on exploring new opportunities by manufacturing customized products closer to major centres of demand and delivering them quickly to customers via air or road freight (Lee and Rha, 2016; Roscoe and Blome, 2019). An example is Zara, a company that has rapidly expanded its global operations by partitioning its supply chain as part of a 'dual-response' strategy. One supply chain is focused on efficiency, with low-cost operations in Asia making basic styles with stable demand. The other, quick-response supply chain focuses on making high-fashion items, with unpredictable demand, close to major demand centres in Spain, Portugal and Morocco (Financial Times, 2019). This is the idea of 'parallel

supply chains', where companies segment product lines, the location of manufacturing and the mode of delivery, to create efficient and responsive supply chains that operate along-side one another. By implementing parallel supply chains, companies and their suppliers become ambidextrous because costs are minimized for particular product lines, while higher-margin items are delivered quickly to meet customer demand. Supply chain ambidexterity is defined as the ability to simultaneously pursue the seemingly conflicting goals of supply chain exploitation (efficiency) and exploration (flexibility) practices (Kristal, Huang and Roth, 2010, p. 415). Exploitation, in a supply chain context, refers to practices that leverage existing supply chain competencies to achieve lower costs and reliability (Kristal, Huang and Roth, 2010). Exploration, on the other hand, refers to 'practices that develop new supply chain competencies through experimentation and acquisition of new knowledge and resources' (Kristal, Huang and Roth, 2010).

The existing literature has explained how companies develop supply chain ambidexterity by building dynamic capabilities (Aslam et al., 2018; Lee and Rha, 2016) or by balancing exploration and exploitation activities in the purchasing (Gualandris, Legenvre and Kalchschmidt, 2018) and manufacturing function (Tamayo-Torres, Roehrich and Lewis, 2017). Other studies have put forward conceptual models on how emerging technologies (3D printing) can enable ambidextrous supply chains (Roscoe and Blome, 2019).While intriguing, there is limited empirical evidence on how companies can use structural partitioning to create parallel supply chains, and the benefits inherent in doing so. Moreover, the role of the manufacturing location decision in the development of parallel supply chains has yet to be explored. This omission is worth studying because, since the pandemic, some companies are fully reshoring / nearshoring production and supply, some are keeping parts of their production offshored, while others are following a hybrid approach. What remains unclear is how companies actually establish parallel supply chains in practice.

The aim of this paper is to determine how a firm scan achieve supply chain structural ambidexterity and realize the purported benefits of parallel supply chains. To achieve this aim, the paper sets out to answer the following research questions:

RQ1: *How can the manufacturing location decision support the development of structural ambidexterity in the supply chain?*

RQ2: *To what degree does supply chain structural ambidexterity provide firms with efficiency and flexibility benefits?*

We examine these questions through the lens of organizational ambidexterity theory (March, 1991; O'Reilly and Tushman, 2013). Empirical evidence is gathered from eight companies in the apparel and textile industry, selected because of their use of parallel supply chains to deliver both standardized and customized products to customers. Twenty-two semi-structured interviews were conducted with supply chain managers working for apparel companies based in the United Kingdom, Norway and Italy. The interview findings are triangulated using secondary documentation (annual reports, website information and newspaper reports) as well as a practitioner-based focus group.

Evidence is presented on how companies segmented their product lines, in terms of width (meaning that specific product lines were relocated) and in terms of depth (meaning that specific production activities were relocated). These companies established a combination of reshored /nearshored and offshored production facilities and sources of supply to create parallel supply chains. Based on these findings, we develop a managerial framework that depicts an evolving process, where companies continue to exploit existing efficiencies in the manufacturing process, while seeking new knowledge from suppliers' closer-to-home markets. Our framework guides managers on how to embed ambidexterity in the supply chain by building surge capacity into offshored and reshored production facilities. A company's ability to swap production volumes between manufacturing locations helped to embed ambidexterity into the supply chain and granted efficiency and flexibility benefits.

The next section provides an overview of organizational ambidexterity theory, supply chain ambidexterity and the manufacturing location decision literature. The third section provides the choices and relative justifications for the research design. The fourth section presents the findings, while the fifth section compares the findings to the existing literature to derive four theoretically informed propositions. The final section highlights the study's contribution to theory and practice, its limitations and avenues for future research.

4.2 Literature review and theoretical underpinnings

4.2.1 Organizational ambidexterity theory

Organizational ambidexterity theory is rooted in the notion that both exploration and exploitation activities are essential for organizational survival; however, the two practices compete for scarce resources (March, 1991; Nielsen, Mathiassen and Hansen, 2018). Exploration refers to the search for innovative new ideas, experimentation, flexibility and

discovery, while exploitation refers to efficiency, continuous improvement and execution of ideas (March, 1991). The theory argues that adaptive systems that engage in exploration, to the exclusion of exploitation, are likely to suffer the costs of experimentation without gaining its benefits, while those that engage in exploitation to the exclusion of exploration are likely to find themselves trapped in a sub-optimal stable equilibrium (March, 1991). Therefore, maintaining an appropriate balance between exploration and exploitation is essential for system survival and prosperity (Kassotaki, 2022). As organizations learn from experience how to divide resources between exploitation and exploration, the distribution of consequences across time and space affects the lessons learned (Kassotaki, 2022).

Organizations that are able to balance the trade-offs between exploration (flexibility) and exploitation (efficiency) are said to be ambidextrous (Nielsen, Mathiassen and Hansen, 2018; Roscoe and Blome, 2019). Organizational ambidexterity can be achieved through the switching of job roles and the partitioning of organizational structures (Adler, Goldoftas and Levine, 1999). Work is organized so that people switch sequentially between exploration (search, research and development) and exploitation tasks (production, transportation) (Adler, Goldoftas and Levine, 1999). Switching can also be supported by creating 'parallel' organizational structures (Birkinshaw and Gupta, 2013; Gibson and Birkinshaw, 2004), which encourages workers to move between a bureaucratic structure for routine tasks and a more organic structure for non-routine tasks. Partitioning can enhance flexibility without a significant loss of efficiency when the differentiated sub-units coordinate and integrate their efforts. Organizational ambidexterity allows companies to be both efficient in the management of daily business activities and responsive enough to changes in the business environment and disruptions leading to enhanced operational performance (Kassotaki, 2022). Supply chain ambidexterity As with internal organizational functions, the different activities and processes of a supply chain can be divided to focus on exploitation (efficient) or exploration (flexible) tasks (Kristal, Huang and Roth, 2010). For example, a study by Roscoe and Blome (2019) explained how companies can structurally partition the supply chain by exploiting the efficiency of manufacturing in high volumes in a centralized, offshored, manufacturing facility while using emerging technologies (3Dprinting) to manufacture personalized medicines closer to the point of use. Another study by Gualandris, Legenvre and Kalchschmidt (2018) explored how firms can balance and combine exploratory and exploitative activities in the purchasing function in order to match the dynamism of their external environment. Other scholars argue that firms can have both a flexible and an efficient supply chain when underpinned by the

dynamic supply chain capabilities of market sensing (search), supply chain agility and adaptability (Aslam et al., 2018, 2020). Supply chain ambidexterity is said to enhance manufacturing performance by allowing managers to effectively manage the operational trade-offs of quality, speed, flexibility and cost dimensions (Tamayo-Torres, Roehrich and Lewis, 2017). Blome, Schoenherr and Rexhausen (2013) point to relational and contractual governance modes as ways of creating efficiency and flexibility in the supply chain, and identify positive effects on innovation and cost performance. Another, relevant study on the Covid-19 pandemic by Mc-Master et al., (2020) finds that focusing on cost reduction through an efficient supply chain tends to significantly reduce transparency and results in widespread backlash for many firms, whereas agile approaches address this inflexibility by taking inherent uncertainty into account. While the literature on supply chain ambidexterity is increasing, its focus is typically on the efficiency/responsiveness trade-offs of a stand-alone, discrete, supply chain. The notion of creating dual structures in supply chains has received limited attention. At the same time, the ways in which the manufacturing location decision can support supply chain ambidexterity remains an under-researched topic. We address this knowledge gap by examining how the manufacturing location decision affects the efficiency/flexibility mix in firm's supply chain.

4.2.2 The Manufacturing Relocation Decision

The manufacturing location decision is made along two dimensions: geographical location and governance mode (Gray et al., 2013; Moradlou et al., 2021). The decision on where to geographically locate production and supply takes the focal firm's headquarters as its reference point and seeks to modify the country of destination of a previously offshored investment (Barbieri et al., 2020). In particular, offshoring is the starting point of the relocation process and refers to the movement of a business process performed by a company in the home country to the same company in another country (Ellram, Tate and Billington, 2008). Traditionally, the primary motivation for offshoring is cost efficiencies that are achieved by exploiting low labour costs in emerging markets, reducing barriers to trade and accessing economies of scale as components and final products are produced in large, centralized facilities and subsequently shipped to customers around the globe (Ellram, Tate and Petersen, 2013). Reshoring refers to the partial /total relocation of production and supply to the country where the company is headquartered, to service local, regional or global demands (Fratocchi et al., 2014). The decision to reshore production is typically driven by the risks inherent in

long, globalized supply chains as well as a business need to be more responsive to demand in home markets (Benstead, Stevenson and Hendry, 2017; Choudhary et al., 2023; Moradlou, Backhouse and Ranganathan,2017). By being close to major centres of demand, reshored production facilities are less exposed to the vulnerabilities of global supply chains including port closures, climate risks and geopolitical disruptions (Dey et al., 2022; Gupta, Wang and Czinkota, 2021). Baraldi et al. (2018) introduce the term 'selective reshoring' to indicate that there are degrees of reshoring, moving across a spectrum from all production being located overseas to all production being relocated to the home country. Building on this idea, Fratocchi and Di Stefano (2019) further distinguish between two types of selectivity when reshoring: in terms of width, when only some product lines (e.g. only high-end products) are reshored; and in terms of depth, when only some production phases (e.g. only the assembly activities) are reshored (Di Stefano, Fratocchi and Merino, 2018). Some scholars have suggested that the Covid-19 pandemic has led to a resurrection of localized modes of production with a significant proportion of manufacturing, once located in China, moving back to the United States and Europe (Handfield, Graham and Burns, 2020; Van Hoek, 2020).

Nearshoring refers to the relocation of production and supply to a country nearby where the focal firm is headquartered (Piatanesi and Arauzo-Carod, 2019). The primary motivation behind nearshoring is to gain the lower-wage advantages of operating in countries close to major centres of demand (i.e. Mexico for the United States), while maintaining shorter supply chains that can quickly respond to demand spikes. Foroudi et al.(2022)cite a survey of 1200 multi nationals based in the United States, United Kingdom, France, Germany and Italy, and find that less than 15% would consider reshoring, while roughly 50% would relocate some plants to neighbouring countries due to the dual cost savings and flexibility advantages that nearshoring has to offer. The second dimension of the manufacturing location decision is the governance mode; or the decision on whether to outsource production or perform the activity in-house (Ellram, Tate and Billington, 2008; Gray et al., 2013). This aspect of selecting a manufacturing location is rooted in the 'make-or-buy' decision, where a company's strategic competencies are kept in-house and the non-strategically important activities are outsourced (Medina-Serrano et al., 2020). While this creates a myriad of options such as offshored outsourcing and nearshored insourcing, Gray et al. (2013) remind us that governance mode is actually related to ownership choice, as opposed to the manufacturing location decision. As such, this paper focuses on the geographical location, as opposed to ownership aspects of the manufacturing location decision. In particular, this study aims to fill a gap in our collective

knowledge about how the manufacturing location decision affects a firm's ability to embed ambidexterity in the supply chain and create parallel supply chains that are both flexible and efficient. Table 1 further highlights this gap in the literature since none of the studies below investigate the role of manufacturing location decisions.

4.3 Methodology

4.3.1 Research design

The research design is based on a theory elaboration approach, which refers to the development of new theoretical insights by contrasting, specifying or structuring theoretical constructs and relations to account for and explain empirical observations (Fisher and Aguinis, 2017, p. 438). Working abductively, we compared the empirical evidence to organizational ambidexterity theory and, when new concepts and relationships were identified, we elaborated on the existing theory in an effort to achieve broader theoretical generalizations from the findings (Ketokivi and Choi, 2014; Yin, 2014). The study was grounded in the context of companies relocating production facilities, product lines and sources of supply, before and during the Covid-19pandemic. Our unit of analysis is the manufacturing relocation decision.

Empirical evidence was collected from eight companies from the textile and apparel manufacturing industry – selected because it is a sector characterized by globalized supply chains that produce both commodity-type products, requiring an efficient supply chain approach, and high-end fashion products, requiring greater responsiveness and flexibility, thus reflecting the need for ambidexterity. A cross-company comparison was used to provide depth, in terms of within company analysis, as well as breadth, in terms of cross-company analysis. Regarding company selection, we applied purposeful sampling, selecting companies that could provide an in-depth understanding of the subject matter (Dubois and Araujo, 2007). Companies were selected according to whether they had relocated production facilities, product lines or sources of supply from a previously off-shored position to a country where their headquarters were located, while still maintaining the off-shore presence, reflecting a type of ambidexterity capability (Table 2).

Following a replication logic (Yin, 2014), we looked for firms headquartered in countries with strong apparel and textile industries, and found three countries to have particularly strong apparel and textile sectors – Italy, Norway and the United Kingdom. According to Ngai et al. (2014), the textile and apparel supply chain can be divided into three sectors: textile production,

apparel manufacture and distribution/sales. We focus on the first two parts of the supply chain, that is, textile production and apparel manufacture, as these areas are relevant to the manufacturing location decision, which is our unit of analysis.

4.3.2 Data collection

Data collection was based on a triangulation strategy (Yin, 2014) including primary data gathered from 22 field interviews, a focus group and secondary documentation gathered from company annual reports and websites. A total of nine interviews were conducted face-to-face, and 13 were conducted online, both prior to and after the pandemic start. We identified interview informants by selecting senior-level managers with at least three years' experience in their current role. The majority of respondents had more than 10 years' experience in various roles at their company. Due to their seniority and experience, the respondents had a high level of understanding of the relocation of production facilities and suppliers. Each interview lasted between 45 minutes and 1.5 hours. Interviews were conducted in the native language of the company headquarters (Italian, Norwegian or English). If not conducted in English, the interviews were recorded and transcribed verbatim and translated. The interview protocol used for data collection was developed primarily based on the literature review and research gap, and was informed by our initial conversations with the case companies (see Appendix 4A).

	Adler, Goldoftas, and Levine (1999)	Gibson and Birkinshaw (2004)	Patel et al., (2012)	Lee and Rha (2016)	Tamayo-Torres et al., (2017)	Aslam et al., (2018)	Gualandris et al. (2018)	Roscoe and Blome (2019)	Bettiol et al., (2023)	This research
Theoretical Lens	*Organization theory*	*Leadership and organization*	*Absorptive capacity and ambidexterity theories*	*Dynamic capability*	*Organizational ambidexterity*	*Dynamic capabilities*	*Ambidexterity theory*	*Organizational ambidexterity*	*Exploration and exploitation*	*Organizational ambidexterity*
Methodology	*Case study*	*Survey study*	*Survey study*	*Field survey*	*Structural equation Modelling*	*Structural equation modelling*	*Survey study*	*Case Study*	*Case study*	*Field interviews*
Objectives	*Reconceptualize the relationship between flexibility and efficiency*	*Simultaneously achieve alignment and adaptability at a business-unit level*	*Explore the learning capabilities that moderate the environmental uncertainty–manufacturing flexibility–performance relationship*	*Examine organizational ambidexterity as a mitigation strategy for supply chain disruptions*	*Examine the relationship between organizational ambidexterity and manufacturing performance*	*Understand how dynamic supply chain capabilities interrelate and affect supply chain ambidexterity*	*Introduce and define the concept of purchasing ambidexterity*	*Extend operations strategy theory on efficiency and flexibility trade-offs to the emergent phenomenon of redistributed manufacturing*	*Study how ambidexterity could allow manufacturing SMEs to strategically respond to the pandemic-related crisis*	*Examine how managers can develop ‘ parallel’ supply chains to overcome the efficiency/flexibility trade-offs of offshored versus Reshored/nearshored production.*
Key findings	*Production can be simultaneously efficient and flexible if the organization partition itself to allow certain sub-units to specialize in routine tasks whilst the other sub-units specialize in non-routine tasks.*	*Organizations should structurally empower employees to make their own choices as to how they divide their time between alignment (efficient) and adaptability-oriented (flexible) activities*	*Organizations with higher operational ambidexterity capabilities tend to better respond to demand as well as technical and competitive uncertainty due to manufacturing flexibility.*	*Supply chain ambidexterity further enhances manufacturing performance and allows to mitigate the negative impact of supply chain disruptions.*	*There is a significant relationship between Ambidexterity as the basis and enabler for manufacturing performance improvements.*	*Supply chain agility mediates the relationship between supply chain adaptability and supply chain ambidexterity*	*Firms can balance and combine exploratory and exploitative activities in the purchasing function in order to match the dynamism of their external environment.*	*Large firms can structurally partition their manufacturing and supply management functions, with one sub-unit managing centralized production and the other redistributed manufacturing*	*Organizations can benefit from multiple locations and reacted to the pandemic by using company sites to be closer to its customers at its specific location.*	*Companies then use a mix of offshore production facilities to manufacture low-margin, long lead time products as well as reshored/nearshored production facilities to make high-margin, quick response items, which in turn allows companies to exploit efficiency and Flexibility benefits*

Table 4.1 Gap in the literature

	Adler, Goldoftas, and Levine (1999)	**Gibson and Birkinshaw (2004)**	**Patel et al., (2012)**	**Lee and Rha (2016)**	**Tamayo-Torres et al., (2017)**	**Aslam et al., (2018)**	**Gualandris et al. (2018)**	**Roscoe and Blome (2019)**	**Bettiol et al., (2023)**	**This research**
Organizational ambidexterity	*Yes*	Yes	Yes	Yes	*Yes*	yes	Yes	Yes	Yes	*Yes*
Structural ambidexterity	Yes	Yes	*No*	No	No	*No*	Yes	Yes	Yes	*Yes*
Ambidexterity through Manufacturing location decision	*No*	No	No	No	No	No	No	Yes	Yes	*Yes*
Ambidexterity through Offshoring and reshoring	No	No	No	No	No	No	*No*	No	No	*Yes*

Table 4.1 Gap in the literature (continued)

The preliminary results from the interviews were further validated using a focus group that consisted of 28 experienced practitioners from a wide range of industries (Table 3) (Wilkinson, 2004). The purpose of the focus group was to present the outcomes of the interviews and assess the generalizability of the findings. The focus group was con-ducted online as part of an all-day event that was scheduled at quarterly intervals for industry members of a research club at a leading UK university. Four members of the research team participated in the focus group sessions, each facilitating and capturing discussions using the breakout room function of the Zoom software. The theme of the meeting was 'Impacts of global pandemics on supply chains', which hence supported the focus group discussion topic. Drawing upon cross-sectoral expertise, we were able to evaluate the results and discuss our propositions. Any counter-arguments were captured and findings were adjusted. During the focus group, the consensus on the interview findings was discussed with the focus group participants, which allowed us to corroborate, challenge and confirm the responses.

The primary evidence was triangulated with secondary documentation gathered from company annual reports, company websites, newspapers and news databases, including Factiva, Bloomberg and Reuters. This provided important corroboratory evidence on the location of new facilities, and the product lines that were relocated.

4.3.3 Data analysis

The interview and focus group data were analyzed using thematic analysis techniques (Braunand Clarke, 2006). 26 hours of interview recordings were collected and transcribed verbatim, resulting in 120 pages of typed transcripts. Inter-view data was analyzed firstly within the company and then compared across the companies, using NVivo 11 software. During the thematic analysis, a pattern-matching logic was adopted to code the data, with similar passages of text grouped together into codes and then appended to themes (Yin, 2014). When passages of text were identified that did not easily fit the coding scheme, the authors assigned a new coding category and affixed them to a new theme. To enhance inter-rater reliability, a second member of the research team repeated the pattern-matching process (Armstrong et al., 1997). The coding scheme was compared between the members of the research team and altered in an iterative fashion until consensus was reached on the key themes to emerge from the data (Braun and Clarke, 2006). The coding template was revised until the research team arrived at a final template that provided a robust explanation of the findings (Eisenhardt and Graebner, 2007).The secondary documentation was analyzed using content

analysis techniques (Krippendorff, 2012).To enhance the reliability of the findings, the research team established a chain of evidence, including a case study protocol that meticulously documented the steps taken during the data collection and analysis process. After the thematic analysis, the results were presented to a cross-sectoral audience during a focus group event. Although the findings were based on the textile industry, there was consensus across various sectors on the applicability of the main findings in different contexts. Figure 1 presents a data coding tree that shows the data sources and theoretical constructs. It also illustrates the hierarchy of concepts and the connection from one hierarchy to the next by linking the transcribed text to second-order concept and aggregate dimensions. The first-order coding identifies and categorizes data based on theoretical constructs, while emerging themes are based on the patterns in the data. Then each aggregate dimension is linked to a research question.

Focus Group Characteristics	Rationale/Aims/Outcomes
• Participants: 28 • Companies represented: 13 • Duration: 1 hour • Researchers for data collection: 5 • Industries represented by participants: Automotive, food, logistics, consulting, FMCG manufacturing, retail, fashion, aerospace, utilities, healthcare, banking • Supply chain experience of participants: 5-40 years	• Evaluation of the results • Confirmation of the four propositions • Focus on items that were contradicting the results • Elaboration of applicability of findings to different scenarios (industry/supply chain) • Identification and capturing additional comments

Table 4.2 Focus Group Characteristics

Company	Country	Size	Number of interviews	Areas of operation	Interviewee position(s)	Number of years' experience in company	Revenue	Offshoring destination	Relocation destination	Year of relocation
Company1	Italy	Large	2 3	Outerwear	CEO International division manager	45 13	28 million EUR	Romania	Italy	2014
Company2	Italy	Large	3	Sportswear	CEO	14	179 million EUR	China, Turkey Eastern Europe	Italy	2014
Company3	Italy	SME	3	Textile	CEO	22	2 million EUR	China	Italy	2010
Company4	Italy	SME	2	Textile	Member of the board of directors	30	7 million EUR	Hungary	Italy	2011
Company5	Norway	Large	2	Outwear	Production manager	16	27 million EUR	China	Lithuania	2015
Company6	Norway	Large	2	Outwear	Supply chain manager	9	65.5 million EUR	China	Lithuania	2020
Ccmpany7	UK	SME	3	Textile	CEO, Marketing Manager	30 15	8 million GBP	China	UK	2012
Company8	UK	Large	2	Fast Fashion	Deputy Head of Buying	7	202 million GBP	China Pakistan Bangladesh India	UK	2019

Table 4.3 Company information

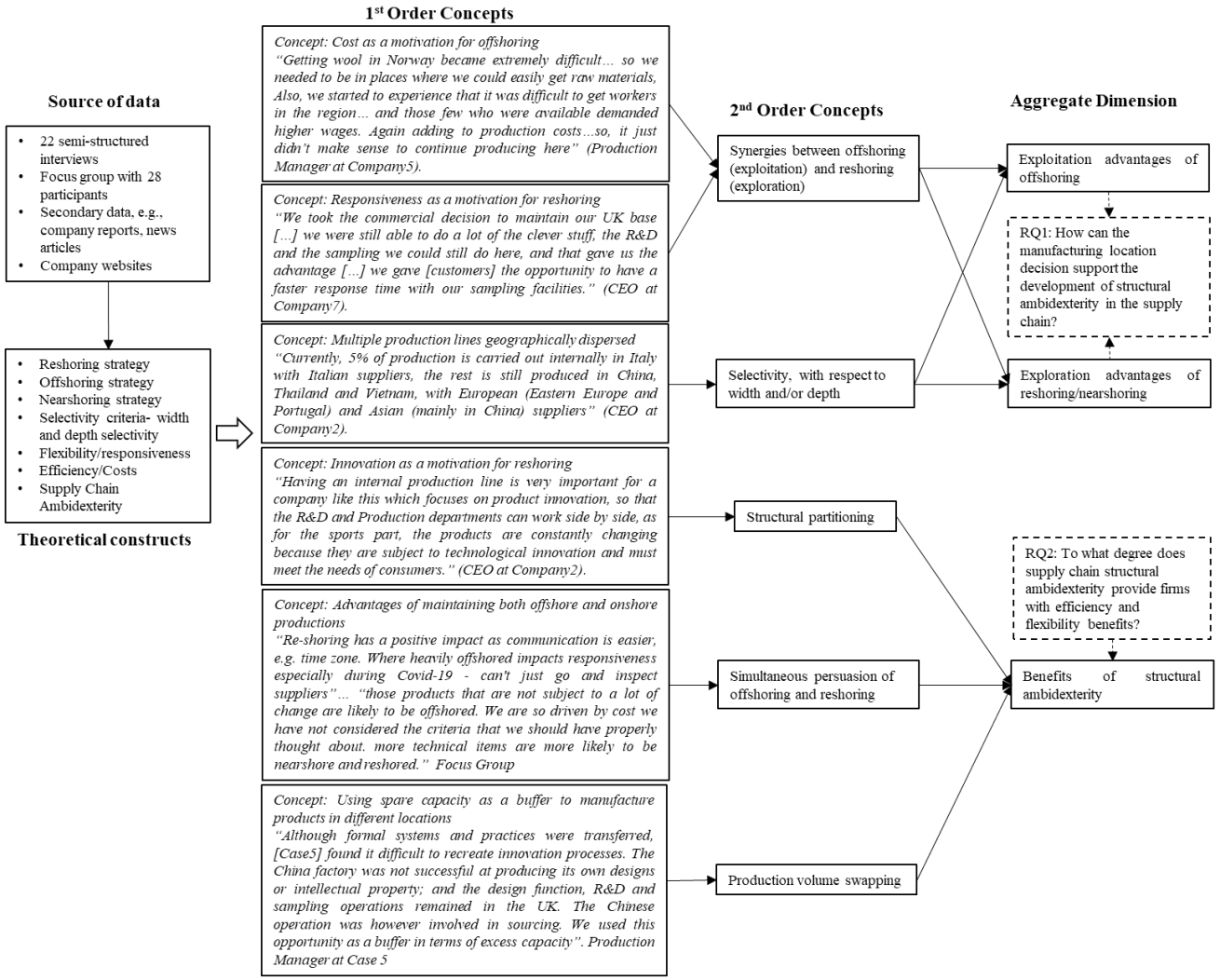

Figure 4.1 Data coding tree

4.4 Findings

4.4.1 Exploitation advantages of offshoring

The findings suggest that, at one point in time, all the companies in our study had followed an off-shoring strategy to achieve efficiency advantages for low labour costs and/or to remain competitive with other companies that had previously off-shored. For example, the production manager at Company5 explained how the high cost of production in Norway was the initial reason for his company offshoring production to China in the early2000s: '[The] cost of production became very high and it was no longer possible for us to compete. Actually, in 2002, we went bankrupt, and moving production to a low-cost country was the only way we could stay in business.' The CEO of Company7expands on the cost drivers to offshore production as follows: 'Chinese selling prices were cheaper than our cost prices' and this was attributed to the favourable exchange rate that meant China-made products were inexpensive, making it difficult for UK production to compete. As a result, Company7 decided to conduct an offshoring trial to assess the feasibility of shifting its production to China, which was later developed into a joint venture with a Chinese company.

Interviewees explained that the significant cost differentials between Western and low-cost countries stem from access to cheap labour and raw materials, lower energy costs and government incentives in the host countries. For instance, the limited supply of raw materials in Western countries was mentioned as an issue by the Production Manager at Company5, as follows:

Getting wool in Norway became extremely difficult... so we needed to be in places where we could easily get raw materials, Also, we started to experience that it was difficult to get workers in the region... and those few who were available demanded higher wages. Again adding to production costs... so, it just didn't make sense to continue producing here. (Production Manager at Company5)

The preceding quotes stress that the efficiency advantages of greater access to human capital and material inputs in low-wage economies was the biggest contributing factor behind offshoring at the time. In addition to the cost of production, the shift in knowledge and expertise to other geographical locations such as China, Turkey and other Eastern European countries was a contributing factor in the offshoring decision. Whilst interviewees admitted that dealing with offshored suppliers can reduce the visibility/transparency in their supply chain, they

explained how efficiency improvements achieved due to the offshoring decision are still a significant part of the companies' decision-making process:

Currently, 5% of production is carried out internally in Italy with Italian suppliers, the rest is still produced in China, Thailand and Vietnam, with European (Eastern Europe and Portugal) and Asian (mainly in China) suppliers. (CEO at Company2)

The above findings were further validated by other industry sectors during the focus group discussion. In contrast to the cost and efficiency motivations for offshoring, the respondents explained how their reshoring and nearshoring decisions were predominantly focused on enhancing the responsiveness and flexibility of their supply chain and operations.

4.4.2 Exploration advantages of reshoring/nearshoring

All of the companies in our study engaged in a partial or complete relocation of production and/or supply, either before or during the Covid-19 pandemic. The relocation decision was related to the physical movement of facilities to a nearshored or onshored location. During the data analysis process, it emerged that the primary motivations behind the partial relocation of production related to the exploration aspects of ambidexterity. Specifically, informants explained that they were motivated by being quicker to market and more responsive to demand, as well as searching for new sources of knowledge and expertise in home markets. The Deputy Head of Buying at Company8claimed:

We are reactive and fast. A lot of our business is now UK-based, which offers speed... It is about demand, if there is demand for a particular color way and we need it fast and we have missed it with our programme in Pakistan that is where the United Kingdom will serve it. (Deputy Head of Buying at Company8)

Due to supply issues with offshoring during the pandemic, Company8 had to try and source woven product (a material input not readily available locally) from the United Kingdom. After significant search activities, Company8 managed to find a local UK factory, who they worked with to meet their product requirements. This new opportunity was referred to as 'invaluable' by the CEO, and the local supplier is now considered of strategic importance in new product development efforts. Similarly, the CEO at Company2 explained his company's reasoning behind partially relocating production during COVID-19 as follows:

Reshoring or proximity sourcing substantially cut lead time, the time elapsed between the product ideas and when the product arrives on the store shelf or via e-commerce. The market is changing, not only from the explosion of e-commerce, so the lead time required is even

shorter. It is 40 days by ship [from China], but from another Italian manufacturer half a day by truck, while from another European manufacturer a couple of days of transport, so it changes a lot. (CEO at Company2)

Importantly, this respondent explained how his company segmented its product line and subsequently partitioned its supply chain to deliver the different product types. For example, his company moved the manufacturing of high-end products to Italy (5% of production), while leaving the rest of production in China:

It allows a segmentation of the product, also offers more refined lines with an ease in segmenting the distribution of the products themselves. An Italian or proximity production also shelters from geopolitical storms rather than storms like today's that hit the logistics part: if they block production in a country and block it even in Italy, little change is noticed. The problem is noticed when reopening; they form logistical funnels that extend previous lead times required with exploding costs. (CEO at Company2)

The Production Manager at Company6 explained how his company followed a similar approach to product-line segmentation. The company allocated the production of low-cost standardized apparel to an offshored facility in China and nearshored the production of high-end fashion products to a location in Lithuania:

Currently, about 75% of our production is in Asia, mainly China. 25% is in Europe. We have just built our factory in Lithuania, which opened in March 2020, just around the lockdown in Norway. We are in a phase where we are moving more and more from Asia to Europe. The idea is not that we will produce everything we have in the collection, but we will produce all the high-end products here in Europe and keep the rest – standard items – in Asia. (Supply Chain Manager at Company6)

Product segmentation is also evident in Company8, where UK-based suppliers are used for quick-to-market products such as mini dresses, coats, leggings, cropped tops for active wear; all trendy products linked to celebrities. For other basic products, such as jogging pants or hoodies, where the cut and product design does not change significantly, suppliers from Pakistan and Bangladesh are mainly used. The CEO at Company1 explained how selective reshoring provided proximity to his end customers, resulting in a significant reduction in delivery lead time. He discussed his company's close collaboration with their major supplier Prada during the pandemic as follows:

We worked with our customer directly for their productions without going through Italy. With the ad-vent of the pandemic, Prada required us to develop sample prototypes directly

here in Italy, because there was the period for the technicians to be able to move initially to Romania, for their made-in-Europe and non-made-in-Europe lines. Since we were already collaborating in Romania, some of their technicians are between Milan and Bergamo, they took the opportunity and came here directly to Silusito sample. From May to October 2020 almost every day we had 2 Prada technicians for the development of new products, new tests, small samples, samples. I have to say this has helped us a lot with important client. (CEO at Company1)

Whilst these aforementioned companies selectively reshored their production and supply, the Production Manager at Company5 explained how his company nearshored parts of their production activities from China to Lithuania during the Covid-19 pandemic, while keeping the production of low-margin, long-lead-time, and products in China. Similarly to the earlier reshoring strategies, nearshoring allowed Company5 to be more flexible to changes in the market and considerably cut down the lead time. Importantly, the move to Lithuania allowed Company5 to increase and de-crease its production and accommodate any volume swapping, depending on fluctuations in supply and demand during the pandemic:

Since our primary market is Norway, having production in China or any Asian country made it difficult for us to respond to changes in demand. But Lithuania is in the middle of the European market with a short distance to the head office in Norway... It makes logistics and communication more efficient. It takes only two days to send a truck from Lithuania to Norway... The total lead time of the production plant is five days+/−one day. The production process can be restructured quickly... A telephone call from the logistics manager in Norway to the plant may stop, change or increase production... The production plant is also flexible in that they can produce in relatively small, specialized quantity and in large quantity. (Production Manager at Company5)

This nearshoring and flexible production strategy allowed Company5 to minimize the demand and supply-side impacts of Covid-19, while its competitors were severely hit by the impacts of lockdowns and closed borders in China. The Production Manager went on to explain how their nearshoring approach gave his company a point of strategic differentiation in the market:

Most of our direct competitors are producing in Asia, during [the] pandemic, they struggled with deliveries. But, that was not a problem for us because we continued with production, and the border in Norway has been open for trucks. As it takes only two days to send a truck from Lithuania to Norway, this meant that we could easily respond to the gap left by our competitors. Most of our competitors have been talking about bringing production back to

Europe in the last 5–6 years, but they have been slow to act. We realized that this is not just about cutting costs, but sustainability, flexibility and quality are also important for us. (Production Manager at Company5)

Respondents discussed another important factor in the exploration dimension of ambidexterity – innovation. Interviewees explained how reshoring provided proximity to a new supply base in the home country and increased opportunities for engagement with suppliers to collaborate on new products and technology development activities. The CEO at Company7 explained how reshoring opened up opportunities to collaborate with UK customers/suppliers on research and development efforts:

We took the commercial decision to maintain our UK base [...] we were still able to do a lot of the clever stuff, the R&D and the sampling we could still do here, and that gave us the advantage [...] we gave [customers] the opportunity to have a faster response time with our sampling facilities. (CEO at Company7)

Similarly, the CEO at Company2 explained how his company undertook exploration activities sat their reshored facility as they had access to highly knowledgeable supplier teams as well as technical expertise from local staff. This permitted buyer–supplier collaboration on new product and technology development projects at the reshored facility:

Having an internal production line is very important for a company like this which focuses on product innovation, so that the Research & Development and Production departments can work side by side, as for the sports part, the products are constantly changing because they are subject to technological innovation and must meet the needs of consumers. (CEO at Company2)

These quotes show how the companies adopted both hybrid offshoring and reshoring/nearshoring strategies simultaneously to benefit from exploration and exploitation advantages. To do so, the companies in our study partitioned their supply chains where cost-sensitive product lines are manufactured offshore to capitalize on efficiency benefits, while the supply and production of time-sensitive products were moved closer to the home country. The benefits of structurally partitioning the supply chain were discussed by the CEO ofCompany1 as follows:

Currently we have seen that we have moments in which production, especially in the face of special requests, must be 'buffered' thanks to Italian production, so our philosophy will remain part Italian and part Romania. That is, more precisely, this return to Italy alongside production in Romania. (CEO at Company1)

The CEO of Company2 also perceived the manufacturing location decision as a dynamic set of strategies that needed to be continuously re-evaluated and examined to ensure fit with a constantly changing external business environment. Interviewees stressed how reshoring was not a final decision, and that it is important to constantly re-evaluate the shoring location, and to build capability to shift/change location:

The reshoring process, as in general the process of geographic localization of the operations and sourcing, is continuous, because the structure of the company, the needs, the distribution structure as well as the situation of the sourcing in the world continuously change: markets that open, sources that open and sources that close. (CEO at Company2)

Table 4 provides a cross-company comparison between various outcomes of both offshoring and reshoring/nearshoring decisions. In accordance with Fratocchi and Di Stefano (2019), we have differentiated the selectivity of the location decision in terms of width (all products vs. some products) and in terms of depth (entire production phases. parts of production phases). Our findings show that the majority of the offshoring decisions, five out of eight cases, were made with 'no selectivity' of product lines or production activities, meaning all manufacturing was relocated to a low-cost country without any particular segmentation. The remaining three cases only offshored the low-cost items, primarily targeting to move low-skilled jobs to developing countries, also depicted by the so-called 'smile curve' (Mudambi, 2008). On the other hand, in terms of reshoring decisions, four companies partially repatriated production in terms of width, whereas two companies reshored in terms of both width and depth, and only one company brought all production back home. The cross-company comparison indicates that product segmentation mainly took place in terms of high-quality/high-end products, and short product lifecycle products versus basic low-cost items. This strategy helped companies to be more flexible and responsive to the supply chain disruptions by allowing better supplier communications, reduced lead time, and increased product innovation, co-location of design and production, and better customization of finished goods.

4.5 Discussion

Our empirical evidence suggests that, despite significant supply chain disruptions such as Covid-19, the offshoring strategy remains a viable option for many companies today, especially for cost-sensitive products. This finding supports Barbieri et al. (2020), who argued that Covid-19 will not render offshoring out-of-date or invalidate the theoretical lenses that we have used in the last 50 years. Hence companies who engage in offshoring continue to benefit from

exploitation by accessing low-cost labor and material inputs. Despite its critics (Sarkis, 2020; Van Hoek, 2020), offshoring continues to be an effective option for low-cost products that experience limited demand fluctuation.

At the same time, Ellram, Tate and Petersen (2013) argue that excessive offshoring can lead to a lack of transparency which impacts both supply chain flexibility and responsiveness capabilities. This finding was supported by the CEO at Company2, who mentioned that while offshoring allowed his company to be cost competitive, it also meant they lost visibility of manufacturing activities underway at suppliers in China. Hilletofth et al. (2019) suggest that companies should not only focus on offshoring or reshoring, but instead find the most appropriate balance by continuously revising their manufacturing setup based on future change. Our evidence supports this approach, as the companies in our study partitioned their supply chains to overcome cost/flexibility trade-offs. The first step in partitioning the supply chain was to segment product lines into cost-sensitive and high-margin, short-lead-time items. This would require companies to identify which activities they want to relocate, width versus depth selectivity (Fratocchi and Di Stefano, 2019). The cost-sensitive items were manufactured by exploiting existing efficiencies at offshored production facilities, while the high-margin, time-sensitive products were manufactured in onshored or nearshored facilities to ensure a flexible response to demand. This leads us to propose the following:

P1a: Companies can achieve the synergistic benefits of offshore efficiency and reshored/nearshored flexibility by first segmenting their product lines into low-margin, long-lead time items and high-margin, short-lead-time items, and then by consideration of selectivity of production.

P1b: Selectivity, with respect to width (by product line) and/or depth (by production phase), is an antecedent for the development of an ambidextrous supply chain.

The companies in our study used structural partitioning to create ‘parallel’ supply chains that de-liver products based on the demand profiles of their products. This finding builds on the work of Roscoe and Blome (2019), by extending the focus from structurally partitioning the manufacturing function to partitioning the supply chain. Moreover, our findings build on a recent study by Güemes-Castorena and Ruiz-Monroy (2020) which identifies that apparel industries can simultaneously capture multiple benefits by strategically segmenting suppliers and managing them differently. We suggest that segmenting product lines and the supply base is a necessary first step, but truly ambidextrous supply chains need to go further by being

structurally partitioned to run in parallel according to product demand characteristics. For example, Company5 maintained a small proportion of manufacturing in China for its low-margin product lines, while moving the bulk of its production to Lithuania in order to service its primary Norwegian market. Doing so allowed the company to avoid border closures and plant shut-downs in China during the Covid-19 pandemic and limited its exposure to transportation blockages along sea and air routes between China and Norway. This leads us to propose:

P2: Parallel supply chains can be developed by structurally partitioning production and supply activities into offshored (efficient) and reshored/nearshored (flexible) activities.

Our empirical evidence, supported by the focus group, indicates that a combination of exploiting experiential learning in offshored manufacturing sites and exploring for new knowledge in reshored /nearshored facilities with suppliers can enhance innovation activities. For example, Com-pany7 transferred the experiential knowledge it gained from manufacturing alongside key suppliers in China and combined this with new learnings gained from research and development (R&D) efforts at its UK plant. These knowledge synergies fed into Company7's R&D process and supported its new product development efforts. Similarly, in Company6, nearshoring gave the company access to a talented labour pool and new suppliers in the home market who became actively engaged in R&D activities. This finding supports earlier work by Stentoft, Mikkelsen and Jensen (2016), Lampón and González-Benito (2020) and Theyel and Hofmann (2020), who found that companies that have reshored manufacturing have invested more in manufacturing innovation and collaboration with suppliers on new product and technology development efforts. The benefits of exploration and knowledge search in home markets are supported by Moradlou et al. (2021), who show that reshoring decisions enable companies to improve performance outcomes and innovative outputs. Our research builds on these studies by finding that it is the intentional combination of off-shored and reshored production that facilitates exploration activities. Specifically, we found that the knowledge and information gained from off-shore manufacturing can be combined with the new ideas and ways of working gained from moving production and sources of supply to home markets. This leads us to propose:

P3: A parallel supply chain design facilitates in-novation activities by achieving synergies be-tween the experiential knowledge gained from exploiting existing ways of working and the exploration advantages of working with new employees and suppliers in home markets.

		Offshored production/suppliers		*Reshored production/supplier*	
Cross-company comparison	**Company Pseudonym**	**Selectivity**	**Outcome**	**Selectivity**	**Outcome**
Italy	Company1	**No selectivity:** All production (design and prototyping kept in Italy)	Reduced labour and production costs	**Width selectivity:** Small batches of high quality and technical products	Flexibility in terms of production volumes, technologies and materials
Italy	Company2	**No selectivity:** All production (design kept in Italy)	Reduced production costs	**Width selectivity:** High-end products are produced in Italy (5% of production)	Reduced time to market. Process and product innovation. Reputation advantage
Italy	Company3	**No selectivity:** All production (storage kept in Italy)	Reduced production costs	**Width and depth selectivity:** High-end items produced in Italy, but components bought in China (lack of suppliers' availability)	Higher quality. Customization opportunities. Shorter delivery times. Reduced logistics costs
Italy	Company4	**Width selectivity:** Lower cost items e.g., thick coloured yarns	Reduced production costs	**No selectivity:** All production is brought back (some production phases were dismissed)	Higher responsiveness. Higher customer loyalty
Norway	Company5	**No selectivity:** All production	Reduced production costs. Uncertain quality	**Width and depth selectivity:** Spinning for regular products is still done in China, and for high-end products in the UK	Increased response to market changes. Increased compliance to sustainability requirements
Norway	Company6	**No selectivity:** All production. (design, prototyping and testing kept in Norway)	Reduced production costs	**Width selectivity:** Only high-end products (25% of production)	Increased response to demand. No significant change in production costs
UK	Company7	**Width selectivity:** Lower cost items (higher value product remained in UK, as well as design and prototyping)	Reduced production costs	**Width and depth selectivity:** Price Points- mid/high range produced in UK. Lower price point remains in China. Market segmentation- Production of products to serve the Eastern Market including Australia and Western USA remains in China. Some bought Chinese fabrics used for some UK production	Increased flexibility and responsiveness, productivity improvements, co-location of design and production, enabling innovation
UK	Company8	**Width selectivity:** Lower cost basic items e.g., loungewear jogging bottoms/hoodies. Products that cannot be made in the UK due to production capabilities e.g. woven products as UK stronger in jersey wear and woven not as readily available	Reduced production costs. Wider variety of products	**Width Selectivity:** Short product life cycle products- reacting to trends/consumer demand (different product types). Woven products reshored due to offshore factory closures and demand requirements during pandemic.	Speed to market, increased flexibility and responsiveness

Table 4.4 Cross-company comparison

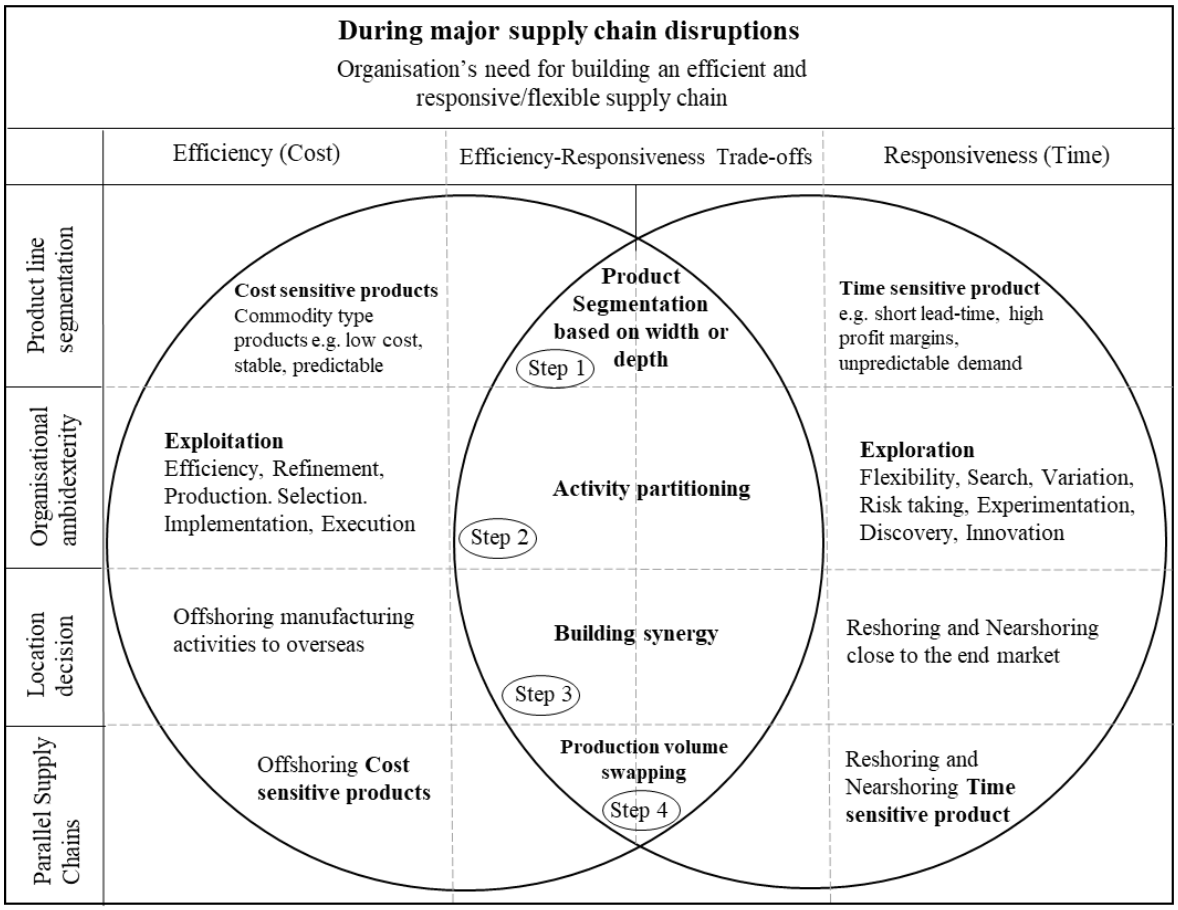

Figure 4.2 Location Ambidexterity Framework

Another interesting finding was how several companies in our study deliberately embedded surge capacity into newly established production facilities to allow the rapid transfer of production volumes in the event of facility or border closures. To do so, companies had latent capacity on their production lines that could be switched on during a period of disruption (such as Covid-19). For example, we found that Company1 buffered its production volumes in Romania by using excess capacity in its Italian facilities during the pandemic. By building in 'surge capacity' in both plants, Company1 could actively transfer production volumes between plants when one location shut down due to COVID-19 restrictions. In this example, production volume swapping acted as a 'bridge' between the offshored, efficient supply chain and the reshored, flexible supply chain. Although, in this scenario, the volume swapping occurred from an offshore facility to a reshored facility, depending on the geographical factors – such as location of the final market or place of disruption – and distinct capabilities in each facility, the spare capacities could be utilized and volume swapping can occur in both directions (e.g. from reshored to offshored facilities). Thus, we propose that production volume swapping creates further synergies between parallel supply chains and facilitates supply chain ambidexterity:

***P4: A parallel supply chain design that permits production volume swapping between off-shored and reshored /nearshored facilities allows companies to be responsive to supplier, facility and border closures during disruptive events*.**

Drawing together the four propositions, we now advance an empirically informed framework to illustrate a series of steps for developing a parallel, structurally ambidextrous, supply chain de-sign (Figure 2). The first step in the framework is to partition the company's product line into low-cost commodity items and high-margin, short-lead-time items. This can be both in terms of width (meaning that specific product lines were relocated) and in terms of depth (meaning that specific production activities were relocated). As the second step, the framework suggests that man-agers can look to structurally partition their manufacturing facilities based on these product lines and characteristics, with efficient, low-cost items made in offshored locations overseas and high-margin, short-lead-time items made in the home country. In the third step, the company can com-bine the experiential learning gained from working with offshore suppliers and combine this knowledge with the novel ideas that come from access to a new pool of labour and suppliers in home markets. We propose that these knowledge synergies facilitate R&D efforts and innovative new product outputs. Finally, in the fourth step, the framework proposes that a company can achieve structural ambidexterity in the supply chain by embedding surge capacity in its offshored and reshored production facilities. Production volume swapping allows companies to move between parallel supply chains to navigate factory and supplier shut-downs and keep production running in at least one facility at a time. By following the four steps outlined here, we propose that companies can achieve structural ambidexterity and build parallel supply chains (Figure 2).

4.6 Conclusions and contributions

Organizational ambidexterity theory asserts that balancing exploitation and exploration activities in a company is a dynamic rather than static (end-state) process (March, 1991). To be ambidextrous, companies must constantly change existing knowledge processes through experimentation and external search (Raischet al., 2009). We found the same to be true for the supply chains in our study. The framework in Figure 2 depicts an evolving process, where companies continue to exploit existing efficiencies in the manufacturing process, while seeking new knowledge from suppliers closer to home markets. To remain competitive, companies need to constantly adapt their sourcing, production and distribution processes in order to re-main flexible and responsive to an ever-changing external business environment. This includes

revising search processes to identify suppliers that possess novel opportunities and new knowledge, while experimenting with innovative products and technologies.

4.6.1 Theoretical contributions

Using a theory elaboration approach, this study has built upon organizational ambidexterity theory in four important ways. First, this paper builds on earlier studies (Adler, Goldoftas and Levine, 1999; Gibson and Birkinshaw, 2004; O'Reilly and Tushman, 2013) regarding structural partitioning within organizational boundaries to overcome cost/flexibility trade-offs. Expanding upon the work of Roscoe and Blome (2019), we suggest that structural partitioning can be extended to the supply chain – allowing companies to overcome the cost/flexibility trade-offs of offshored and reshored /nearshored production. While there have been a number of developments in the supply chain ambidexterity literature (see Table 1), these existing studies do not explain how ambidextrous capabilities are developed through the manufacturing location decision. Our findings therefore address the call by Arlbjørn and Mikkelsen (2014) to provide further information on the relationship between ambidexterity and the manufacturing location decision.

Second, we advance propositions on how companies can structurally partition the supply chain, beginning by segmenting product lines and then matching these product lines to either a low-cost offshored supply chain or a short-lead-time reshored/nearshored supply chain. These findings contribute to a recent study by Bettiol et al. (2023), who suggested that organizations can benefit from multiple locations and react to the pandemic by using company sites that are closer to major centers of demand. Our study further develops this idea by examining how companies can simultaneously pursue both offshoring and reshoring strategies to be more ambidextrous and respond to disruptions. The findings are likely to shape future research in the supply chain management and inter-national business fields because it is evident that the manufacturing location decision is not an either/or choice between offshored or reshored production. Instead, our findings indicate that companies can use combinations of offshored/ reshored and nearshored designs, as well as other hybrid approaches, where achieving an overall service offering that provides flexibility and efficiency becomes the ultimate aim for firms.

Third, we propose that companies can gain knowledge synergies by combining experiential learning from existing offshored production, with the new ideas and ways of working from staff and suppliers in home markets. We propose that these knowledge synergies can lead to

enhanced R&D efforts with suppliers and new product development outputs. This finding answers the call of Roscoe and Blome (2019) to investigate structural ambidexterity across multiple stages in the supply chain.

Finally, we outline how companies can achieve ambidexterity in the supply chain by building surge capacity into offshored and reshored production facilities. We propose that companies can use production volume swapping to move manufacturing volumes between offshored and reshored facilities during disruptive supply chain events, such as factory and border closures during the COVID-19 pandemic.

4.6.2 Managerial implications

Our framework (see Figure 2) suggests that man-agers can partition product lines, and the sup-ply chains that deliver these products to market, in different ways to embed ambidexterity in the supply chain. The framework is important to managers struggling with pressures to reduce costs due to rising inflation around the globe, while needing to deliver products to market quickly to remain competitive in today's turbulent business environment. Managers contending with these issues will be interested in the ideas provided here around segmenting product lines' width and depth and linking these segments to the offshored, nearshored and on shored production facilities. Our findings provide managers with industry examples of how to swap production volumes between parallel supply chains to embed ambidexterity in day-to-day operations, which allows companies to exploit efficiency and flexibility benefits simultaneously. In addition, we suggest that through the knowledge search activities that accompany reshoring/nearshoring initiatives, new R&D collaborations can occur with suppliers in local markets, leading to innovative new product offerings. Operating in home markets creates opportunities to gain from the knowledge spillovers that occur when suppliers collaborate in the new product and technology development process (Lawson and Potter, 2012).

We expect that our framework can change managerial and firm behavior by challenging the widely held notion that the supply chain is a cost center that needs to constantly strive for efficiencies. The Covid-19 pandemic has shown the folly of such an approach because while off-shored production may be cost-efficient, if the company cannot get stock onto store shelves it cannot be sold. Flexibility, responsiveness to demand and resilience are now the key drives of global supply chain designs (Handfield, Graham and Burns, 2020), and our framework

shows managers how to balance flexibility and efficiency to create ambidextrous, and resilient, supply chains capable of handling the next major global disruption.

4.6.3 Limitations and future research agenda

The results of this study should be viewed in light of its limitations. We claim to make analytical, not statistical, generalizations with our findings. Future studies can achieve statistical generalizations by conducting a large-scale survey based on a greater sample of companies in order to test the propositions we have advanced here. This study is limited to investigating the apparel and textile industries, which have unique characteristics, including short product lifecycle, high volatility, a high level of impulse purchase and excessive globalization. We encourage future researchers to examine the validity of our propositions and framework in other industries, such as healthcare and pharmaceuticals, aerospace and automotive, with different supply chain properties, whilst taking into account the external stakeholders and country-level environmental regulations (Sena et al., 2022). Future researchers are also encouraged to conduct replication studies with different companies in different countries to validate or refute our results. It may prove interesting for future studies to explore if other major supply chain disruptions, such as the Ukraine–Russia war and tensions between China and Taiwan (Moradlou et al., 2020, 2021; Roscoe et al., 2020), prompt nearshoring/reshoring or 'friend-shoring' activities and the creation of parallel supply chains with politically allied countries. In particular, scholars are encouraged to investigate the SC resilience from structural ambidexterity perspectives and link it to other emerging topics such as environmental, social and economic (ESG) perspectives (Choudhary et al., 2023; Gupta, Wang and Czinkota, 2021).

4.7 Appendix 4A interview protocol

The interview protocol used for data collection during the follow-up interviews conducted after the start of the Covid-19 pandemic included the following questions:

1. Can you give a brief overview of the evolution of your companies in terms of location and connected make or buy decisions?

2. What were the main factors influencing your decision to reshore?

3. What lessons have been learnt from the reshoring experience?

4. Will the company continue to manufacture offshore and in the HOME COUNTRY?

5. Have you received support from the government to manufacture in the HOME COUN-TRY?

6. Do you think there are enough HOMECOUNTRY-based raw material suppliers to support your HOME COUNTRY business?

7. What are the main benefits and challenges of manufacturing in the HOME COUNTRY?

8. What are the main benefits and challenges of manufacturing offshore?

9. Has offshoring impacted your company's flexibility and efficiency? How?

10. Has reshoring impacted your company's flexibility and efficiency? How?

11. What do you think has been key to the survival of the company?

12. In the last year, a global pandemic has happened, how has your company managed it?

13. Did having reshored before support you in managing the issues created by the global pandemic?

14. Are you considering new relocations (both off-shoring and reshoring) now?

5. SUPPLIER PERSPECTIVE ON RESHORING: A CASE STUDY APPROACH

Acknowledgement: *This chapter is derived from the article "Khayyam, S., Boffelli, A., Kalchschmidt, M. (2022). How reshoring affects the Western buyer- Eastern supplier relationship? Disentangling the supplier's perspective "presented in the 12th Annual EDSI conference held in Dubin, (Ireland) in June 2022, 29th Annual EurOMA conference & 21st EurOMA Doctoral seminar held in Berlin,(Germany) in July, 2022 and 33rd RSA AiIG held in Rome, (Italy) in October, 2022.*

This article further advanced and updated after the considerable comments of participants of conferences and evolved as"Khayyam, S., Boffelli, A., Kalchschmidt, M. (2023). How to avoid reshoring? Disentangling the supplier's perspective" then presented for further feedback in first EDSI doctoral workshop held in Nantes, (France) in June 2023 and 22nd EurOMA Doctoral seminar held in Brussels, (Belgium) in July 2023. I am personally responsible for any changes and updates made from last versions.

I acknowledge the worth this chapter gained after the valuable comments and feedbacks from the participants of the conferences and doctoral seminars. I must thank my supervisors and Department of Management, Information and Production Engineering at University of Bergamo for facilitating the opportunities to present the research work on multiple platforms.

5.1 Introduction

A few decades ago, businesses adopted a trend of outsourcing and offshoring to different continents of the World to attain competitive advantages through cost reduction and financial gain by improving profit margins (Jiang et al. 2006). The increased competition caused by globalisation has forced companies around the World to follow the trend of outsourcing internationally to avoid being left out of the market and to remain competitive.

Deciding where to locate manufacturing is one of the most important decisions that companies take (Moore et al. 2018). In the past, the movement of manufacturing locations was, in most cases, to low-cost countries, with availability of cheap labour and new sourcing markets (Ellram 2013; Kinkel and Maloca 2009; Wiesmann et al. 2017).

The manufacturing relocation decisions are linked with the dichotomous relationship of the buyer-relocation decision-making focal firm and the supplier-offshored firm providing manufacturing supplies or activities[4]. Few research studies appear in the previous literature about the reshoring taking suppliers specific orientation, besides considering the availability and suitability of the suppliers (Baraldi et al. 2018; Engstrom et al. 2018; Nujen et al. 2018). With the changing economies of world, companies are questioning whether their previous decision to outsource to low-cost countries really supports an optimal supply chain configuration and reconsidering their location strategies, taking into account different perspectives, therefore relocating some of their international suppliers (Uluskan et al. 2016). The firms are more concerned about the health of their supply chains nowadays, and for that purpose, they try to take smart moves like reshoring. The ultimate goal is similar to offshoring and relocating manufacturing to other countries. The literature shows the potential disadvantages of offshoring, irrespective of its financial benefits and cost-saving aspects, as it makes global supply chains more complex and coordination problems emerge (Asmussen et al. 2016).

Offshoring is considered as a strategy in businesses since ages and weak offshoring decisions includes the incorrect decision of offshoring with noncompliance activities of selecting wrong suppliers, weak contracts with poor terms and conditions between suppliers and buyers. Sometime in shortsighted offshoring decisions the manufacturing process and procedures are not considered, and also the potential problems (hidden/overhead costs, local regional labour

[4] The companies who took offshoring decisions either to get services from suppliers or take partial manufacturing services or in many cases the focal firms owned their manufacturing plants because of multiple reasons like low cost, cheaper and skilled labor force, availability of cheaper raw materials etc.

laws and geopolitical conditions, strikes/protests and futuristic terms and conditions to switch the business) are not visualized, which leads to the decision of selecting wrong suppliers and failing the offshoring decisions and pushes the focal firms to rethink their previously done decisions as reshoring.

Reshoring the not the universal issue but it is linked with the circumstances of business previous decisions and activities and as it is more of practical issue within industry, thus it needs to be studied more to know all possible aspects related to this reshoring decisions before and after taking this decisions and along with the implementation of this decision. Many studies were initiated to evaluate the long term and short term impacts of this decision and the criteria are evaluated to take this decisions also other interrelated criteria and issues other than cost issues are under discussion.

Over the past decades, firms have started rethinking their business strategies and planning to bring back their already offshored productions. The decision to bring back manufacturing is labelled as "reshoring" in this study. There are many motivations behind this initiative, the so-called drivers of reshoring (Barbieri et al. 2018; Fratocchi et al. 2016; Stentoft et al. 2016; Wiesmann et al. 2017; Kinkel and Maloca 2009; Martínez-Mora and Merino 2020). A lot of work has been done concerning reshoring decision criteria (Hilletofth et al. 2021; Eriksson et al. 2021; Benstead et al. 2017) and all the reshoring research available has been discussing the

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As the focal firm making the reshoring decision is the usual perspective considered in research, while only a few studies discussed the host firms (suppliers) from the Eastern region of the World, the main focus of this research is to highlight the suppliers' perspective towards reshoring and how the relationship between the Western buyer and the Eastern supplier adjust along the process. Western buyers (focal firms) and Eastern suppliers (offshored manufacturers) never unveiled this side of the story. Hardly any research work is available focusing on the supplier's perspective which is also confirmed in one of the latest reshoring literature based on host country perspective (Zhang et al. 2023). Therefore, knowing the supplier's perspective and how to respond the reshoring decision is important. Moreover, no single study emphasises the suppliers' perspective on the reshoring phenomenon and how the relationship can be managed in such circumstances. Hence, the questions under investigation are the following.

RQ1: What is the perspective of suppliers of developing countries towards reshoring?

RQ2: Would reshoring be affecting the supplier-buyer relationship according to the supplier's perspective?

RQ3: What are the best practices to avoid suppliers being left behind in the reshoring process?

This essay will proceed with the following sections. The next section is about the background and literature on the buyer-supplier dyadic relationship and reshoring altogether, which highlights the possible gap present in the literature. The following section explains the research methodology and data collection and all protocols taken. Next, the article will proceed with the results and discussion section. The last section concludes with the contributions and limitations of this study.

5.2 Literature review and background

5.2.1 Reshoring

Reshoring is defined as the reverse of previously done offshoring in the literature (Fratocchi et al. 2014). So it is related to bringing back manufacturing facilities to owned premises in the home country or a relocation of manufacturing activities from one location to another, which may also mean from one supplier to another supplier (Grey et al. 2013).

In previous literature, the focus of research has primarily been on defining the reshoring phenomenon, its drivers and motivations (Barbieri et al. 2018; Fratocchi et al. 2016). Reshoring

drivers are being discussed with aspects of cost-effectiveness in the longer run, Made-in effect, efficiency and flexibility in operations. The reshoring literature widely discussed the reshoring motivations and drivers (Wiesmann et al. 2017; Stentoft et al. 2016; Fratocchi et al. 2016; Barbieri et al. 2018; Martinez-Mora and Merino 2020) along with reshoring definitions (Merino et al. 2021; Martinez-Mora and Merino 2014; Lampon and Gonzalez-Benito 2019) and decisions criteria and implementations process (Benstead et al. 2017; Boffelli and Johansson 2020; Eriksson et al. 2021; Hilletofth et al. 2021) and finally reshoring contingency factors (Benstead et al. 2017; Boffelli and Johansson 2020; Wan et al. 2019; Ancarani et al. 2015).

Significantly less research is available that discusses the perspective of suppliers and their role within reshoring decisions, with discussions focusing on the availability and suitability of the suppliers for the focal firm (Zhang S.Y. 2021) and supplier's opportunistic behaviour (Boffelli et al. 2020), failing to consider the suppliers as a strategic resource.

5.2.2 Supplier-buyer dyadic-relationship in reshoring decisions

Collaboration is a relevant element to consider in a buyer-supplier relationship, as it is proposed in the literature as a strategy to reduce supply chain risks (Van Hoek and Dobrzykowski 2021). As the relocation decisions and activities of reshoring and offshoring are similar within supply chains (Zhang et al. 2023) thus Supplier involvement in buyer's decision-making shows some effects on strategy development in organisations (Xun Tong et al. 2018). Many researchers emphasised the buyer-supplier collaboration's role in decision-making processes (Watson et al., 1991) and compared it with the buyer's centralised decision structure.

Different studies highlighted multiple reasons and driving factors for reshoring decisions made by focal firms (Barbieri et al. 2018; Fratocchi et al. 2016; Stentoft et al. 2016; Wiesmann et al. 2017, Kinkel and Maloca 2009; Martínez-Mora and Merino 2020), these factors are mainly production cost, lead time, innovative technology, delivery time and cultural differences. When suppliers are unable to cover the buyer's needs, the buyer company must decide between different paths and choose the one that fits better its conditions. One option can be to reshore and produce the item previously offshored internally. As an alternative to reshoring, a company can simply switch suppliers, relocate to another offshore region (either in a closer location or not), engage in supplier development programs, and collaborate to develop the current supplier capabilities to cover the buyer's new requirements (Uluskan et al.

2017). Often these alternatives can be effective solutions when reshoring is too complex to execute.

Despite this, buyers also may switch suppliers even when performances are maintained the same. On the contrary, due to the risks that switching suppliers involve, not all buyer companies decide to do the change (Uluskan et al. 2016). One of the insights from Wiesmann et al. (2017) is that reshoring will not precisely result in the "re-industrialisation" of Western economies. It is rather expected a re-distribution of manufacturing around the World, with a presence of both local and international manufacturing options that provide, at the same time, more flexible solutions to their customers.

The literature about business relationships has identified some reasons for relationship termination. Among the most common we have i) the end of a planned strategy, that involves a fixed period after which the relationship with the supplier is terminated, ii) failures that drive lack of satisfaction, iii) changes inside the company like new managers and internalisation of production, in cases where companies seek to regain control of their production (Pick 2010).

Uluskan et al. (2016) showed, using survey data on textile and apparel manufacturers and retail organisations in the United States, that manufacturers give less priority to cost, while retailers and brands do give priority to cost when taking decisions about offshoring.

Mainly due to the tariffs placed on Chinese products, collaborative work has been observed in cases where key suppliers are the ones to move production from China to the USA, solving not only the problem of higher tariffs but also reducing logistic costs and improving time to market (Van Hoek and Dobrzykowski 2021). Another form of strategic collaboration is to work closely with long-standing supplying partners by investing and providing manufacturing equipment. Companies tend to collaborate and help their suppliers improve in different areas, such as quality and performance, to avoid supplier switching cost and to maintain long term relationships with current suppliers (Uluskan et al. 2016).

Understanding the supplier's involvement in reshoring decisions of a focal firm is important to see the dependence of the focal firm on its suppliers. It also means that the relationship type is essential to study as it tells the power balance and strategic role of the supplier in the focal firm's sustainability. On the other hand, how much the supplier is dependent on its customers also reveals the supplier's side of the story. When reshoring happens not only the business is taken away from suppliers, but it is also shrinking and reshaping the supply chain and making existing suppliers lose business and bringing new opportunities for new suppliers. The overall impact of reshoring on suppliers is still unknown (Zhang et al. 2023). As the literature shows

an increasing trend in the reshoring research studies, all the available research is based upon and inclined towards the focal firm's perspectives, which are usually Western companies from developed countries. To the best of our knowledge, only one study by Zhang et al. (2023) published in JMTM explains the supplier's perspective in the reshoring decision. The studies focused on supplier involvement are still arguing buyer's perspective on quality delivered from supplier and cost-related issues that come from considering the foreign suppliers as a driver to make reshoring decisions (Uluskan et al. 2016; Uluskan et al. 2017).

All the theoretical work available in past studies is based on the focal firm's point of view, and the suppliers from the low cost countries are usually overlooked. Based on the initial literature review statistics about manufacturing reshoring and keywords analysis, it is clear that the suppliers were discussed first time in research in 2016, and it is still slowly appearing in the literature. The orientation of research is still towards the focal firm for selecting suppliers.

Casadei and Iammarino (2023) stresses and recommend more research on reshoring effects beyond the firm's boundaries and what effects initiated around the supply chain at supplier's level and customer levels to evaluate where the value is generated and lost.

For this purpose the reshoring decision framework shown in figure 5.1 is adopted from McIvor, R. and Bals, L. (2021) to analyze the supplier's selection and evaluation on each step of decision making. McIvor and Bals (2021) reshoring decision-making framework is based on three stages of evaluation of reshoring decision. The focal firms can start the reshoring process with the evaluation of drivers of reshoring in the effect of intention of either change in the competitive strategy or in result of failed offshore decisions. After this stage the focal firm has to focus on the exit analysis as they have to decide about the exit strategy as focal firms may have facing the two different situations at that node as either it is difficult or not to switch suppliers and difficult to improve capability or not; thus the focal firm initially decide to continue the offshoring decisions with the same suppliers and for that the focal firm has to invest to improve the capability. On the other hand the firm has to decide and relocate the manufacturing locations either back to the home country or shift to nearby countries.

Furthermore at all the decision points and actions taking nodes the suppliers involvement usually is missing, while suppliers must be on board and involved these decisions for the better influence on businesses and dyadic relationships of buyer-suppliers.

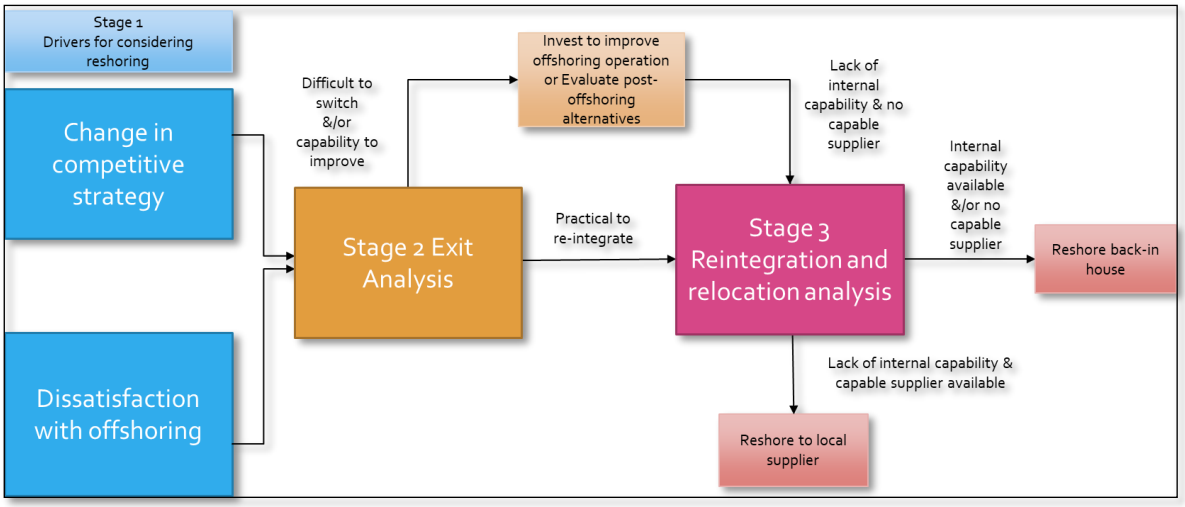

Figure 5.1 Framework for understanding the reshoring decision (McIvor, R. and Bals, L. 2021)

Because selecting the wrong supplier caused the firms to fall into the risk management and weaker law enforcement activities and which result into damages to the firm's reputation.

One of the latest and only study (Zhang et al. 2023) available in the reshoring literature which stresses on the capability of the supplier side on relocation (reshoring) decision of the focal firm actively and effectively. Zhang et al. (2023) come up with the different approaches to respond the reshoring or prevent the reshoring which are i) Cost control strategy "*with the reduction in cost of production and improved efficiency*"; ii) market-expansion strategy "*with the extend to product lines and exploring new markets*"; iii) Knowledge seeking strategy "*with increasing knowledge and adopting new technologies*"; iv) relationship bounding strategy "*by using previous relationships, increasing interactions with the focal firms and creating ownerships"* (Zhang et al. 2023).

Considering the importance of the supplier's role in decision making it is not possible for the researchers to ignore the supplier's side any more for future work in reshoring phenomenon. The response of the suppliers (host countries) may impact the buyer-supplier dyadic relationships while considering the manufacturing relocation decisions.

As the significance of suppliers in supply chain decisions is very high so the reshoring decisions also needs the consideration of suppliers. Thus this study is focused to inquire the supplier's perspective and fill the gap. The figure 5.2 shows the research questions in discussion.

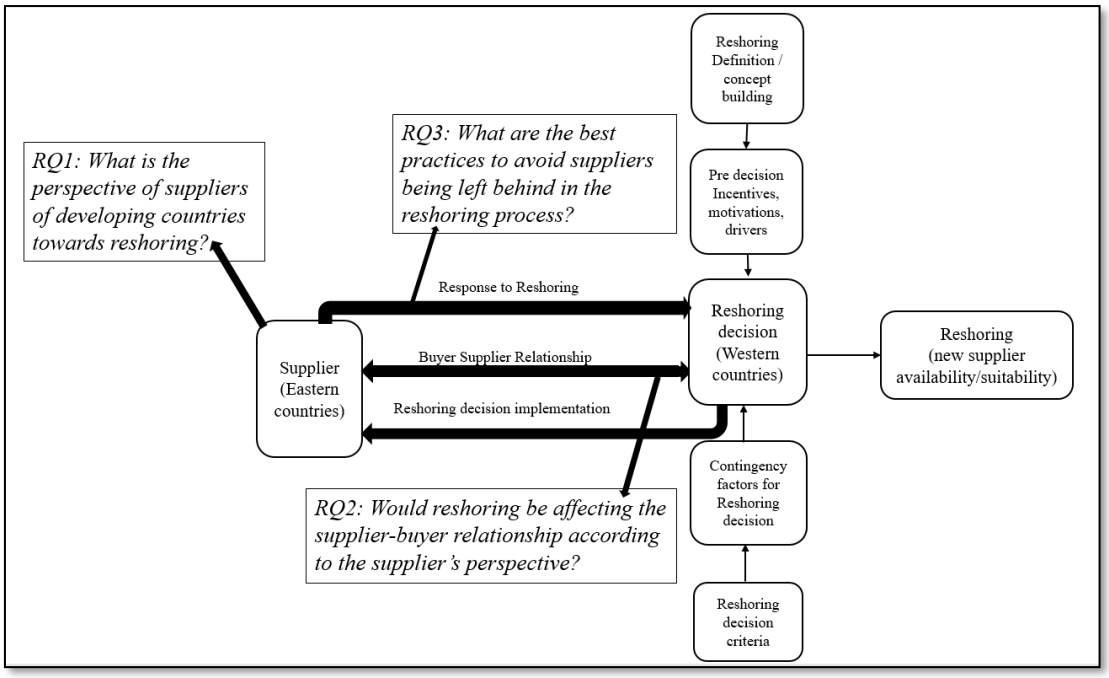

Figure 5.2 Research questions framework

5.3 Methodology

To explore the facts about suppliers' understanding and mindset regarding reshoring, the textile sector is selected as a good source of potential cases. The textile and fashion industry is ever-growing globally and shares most percentages of developing countries exports (Kim et al. 2006). This industry is segmented into different sectors like clothing, household clothing, technical clothing, apparel, fashion clothing, home textiles etc. Because of the higher availability of raw materials and skilled labour, developing countries are the biggest exporter of Western fashion brands in the textile industry, making it suitable for selecting suppliers from developing countries.

5.3.1 Research Design

Because of the exploratory nature of the research, the qualitative research approach is appropriate. As the reshoring research focusing on the buyer-supplier dyadic relationship from the supplier perspective is highly new, the case study method is selected to conduct this research (Yin 2014). A case study research approach helps the researcher to understand the

phenomenon in the real context, and a real-time understanding is achieved (Voss et al. 2002). In this study, the research method employed is multiple case studies. The case studies help investigate the "why" and "how" questions related to Eastern suppliers' relationship with the Western buyers, where researchers have no control over the real World. The longitudinal (Van et al. 1990) case study research design is used as this research is investigating a contemporary phenomenon about which little is known (Yin 2014). For the aim of inquiring the same phenomenon from case suppliers the longitudinal research method allows to observe and record the change in the findings over the period of one year. For this purpose the second round of the interviews were conducted from the same respondents of selected case companies and help to access the changes in the results over time.

5.3.2 Data collection

A sample of four Eastern suppliers from different geographical locations in developing countries is selected to achieve the target of inquiring supplier's perspective on reshoring activity initiated by the buyer. For this purpose, the primary data is collected from semi-structured interviews with case companies' representatives. To take an insight into this current issue and select sample cases from a single industry, a short survey was conducted online with developing countries' suppliers to get the empirical data on reshoring. The findings of this brief survey supported the choice of the textile industry.

The initial efforts were done to select the cases companies of supplier side which have been gone through the reshoring phenomenon, but on the practical grounds the companies which have been reshored by the focal firms with in textile and Apparel industry refused to be part of this research and they refused to share the insights on the issue. Thus this was the limitation and as well the most struggled part of sample cases selection thus after the struggled the plan was modified to get the insight from existing suppliers of focal firm and among them few were reshored from other focal firms but not from the focal firm in this study.

As the supplier switching is very frequent in the textile and apparel industry, thus most of suppliers are aware of the efforts and circumstances faced by them with in industry. The textile industry is dense and clustered in different parts of the developing countries' side geographically, so the business traits and activities are very much similar. Thus to know the perspective the sample cases can depict a real struggle of the suppliers with reshoring era if not suffered with reshoring yet.

This research is conducted through four case studies from different textile and fashion industry manufacturers from developing countries acting as suppliers for a Western big brand. In-depth knowledge is retrieved from the selected cases through semi-structured interviews (the interview protocol is attached in Appendix-5A). The interviews are conducted with representatives of the selected four suppliers, and all the interview protocols are followed to keep the transparency of the data collection process. To achieve the longitudinal research interest, the same sample cases were inquired again with gap of one year period. To thoroughly understand our findings, the individual case analyses are the foundation of the final cross-case analysis.

The profile and detail of the case companies are presented in Table 5.1 and because of the confidentiality, the names are kept anonymous on respondents' request.

	Focal Firm's Suppliers			
Summary of cases / Characteristics	**Case A**	**Case B**	**Case C**	**Case D**
Core business	Garments manufacturing	Garment manufacturing	Wearing apparel and accessories	Footwear products
Date of foundation	1980	2014	2005	2006
Country	Indonesia	Pakistan	Vietnam	India
Turnover (last available)	$695m (2020)	$7.58m (2017)	$52.5m (2020)	$99.7m (2020)
Employees	30,508 (2020)	4,000+ (2022)	6,302 (2020)	14,000+ (2022)
Interviewees' roles	General Manager Factory	Corporate Affairs & Industrial Relationship	Planning Manager Quality Continuous Improvement Manager	Director of People & Sustainability
Supplier level	-Between $100m and $150m business -tier 1 supplier	-95%+ production -Tier 1 supplier	-100% production -Only customer -Operational level -Strategic supplier	-100% production -Only customer -Strategic supplier

Table 5.1 Case companies profile selected in a sample of Eastern supplier countries

To make this research more rigorous, the representative of the big brand (company X) dealing with the sportswear and shoes within the textile and fashion industry and whose supplier are chosen for sample cases is also interviewed to take the buyer's opinion on reshoring effects and then trying to see the gap of visualising the same phenomenon of reshoring from both sides (buyer and supplier).

The brief profile of focal company X is given below in table 5.2

Characteristics	Profile details of Company X
Company Name	Company X
Company products	Sportswear / Shoes / accessories
Headquarters	Germany, Herzogenaurach.
Founded in	since (1924)
Annual Sales	> 20,000 million euros
Number of employees	≈ 60,000 worldwide
International suppliers	Argentina, Bangladesh, Belgium, Brazil, Cambodia, Canada, Chile, China, Colombia, Czech, Egypt, El Salvador, Georgia, Germany, Greece, Honduras, India, Indonesia, Italy, Japan, South Korea, Lithuania, Madagascar, Mauritius, Mexico, Myanmar, Nicaragua, Pakistan, Philippines, Portugal, Romania, Slovenia, South Africa, Spain, Taiwan, Thailand, Tunisia, Turkey, Ukraine, United Kingdom, USA, Vietnam
Carbon footprint	7,687,695 Total emissions (in tons CO2)

Table 5.2 Profile of Focal firm labelled as (Company X)

5.4 Results

The results are extracted from the empirical findings of unstructured interviews from 4 cases which are suppliers of company X. The findings are presented in the two forms as within case analysis and cross case analysis which is later on sum up in the table 5.3 below.

5.4.1 With in case analysis

'Company X' is the focal firm which is a big named brand in the textile and fashion industry in Germany mainly selling the fashion products, for example shoes, clothes and accessories within international markets. The Company X is having the suppliers base around the world specially towards the eastern part of the world. With in the suppliers of company X the suppliers are scattered in developing economies and cases here are selected from the Company X's suppliers are dedicated and specialized and still in business with them. The Company X is currently reshoring their production facilities for multiple reasons. The cases from suppliers selected are not still reshored by the company X and for the perspective of suppliers on

reshoring is more or less similar as the textile industry is very congested and clustered and the industry practices and news are know to all surviving in the industry.

Case A is the supplier to company X based in Indonesia and supplying the sports wear and outdoor clothes for the company X for its high end buyers and case A is claimed that the company X offshored to their production because of the cost cutting and better quality and compliance of the products. As according to the Case A as the major drivers for the companies to reshore are bad quality and compliance, delayed in deliveries and suppliers strength. Case A offered that the short lead times is the best outcome of the reshoring and suppliers usually have no role in the reshoring decision on the focal firm's side and buyers have the full authority to take decision of reshoring and its up to them involve the suppliers in decision making. As far as the impacts of reshoring consider the reshoring pushes the suppliers to look for the other markets if they gets reshored in case or increase their capacity and look for the new buyers. Case A suggested to avoid reshoring and risk mitigation strategies to the reshoring activity as keeping up the quality levels, deliveries on time and try to follow the buyer's specifications and product compliance.

Case B is also tier 1 supplier to Company X and based in eastern part of the world specifically Pakistan and producing 95% of its productions for company X and supply the finish products to the European , far east, and middle east markets of company X. Case B is in the suppliers list of company X because of the best quality along with cost benefit, and Case B suggested the reshoring phenomenon is not beneficial on both sides for buyers and suppliers as the social and economic side gets immediate impact on them. Case B identify the reasons for reshoring as the geopolitical conditions of the suppliers states along with security challenges and skill workforce to meet the customer's specifications. According to them the cost is major issue to reshore and that's why the implementation of reshoring is not as easy as it seems to be. Case B is sure to approach towards the new customers internationally if they get reshored and would

try to look into different business ventures and markets or may be start selling their productions locally to continue the business activity. Case B is already planning to diversify their portfolio to work in backward integration.

Case C is another supplier of company X from Vietnam and responsible of supplying the wearing apparels and accessories to the domestic market Vietnam and Australia, USA, UK, Europe and China. Case C is 100% dedicated manufacturer for the company X. Case C is being selected by the focal company because of better quality standards, online delivery, and lower cost benefits along with the access to the raw materials. Case C commented on the reshoring is a difficult to achieve due to labour cost and material availability as it is a serious matter so implementation is not easy to achieve. The main drivers highlighted by Case C high tax duties, capacity issues, quality and delivery times. Case C also highlighted the benefit of the reshoring as if the companies reshore they can reduce the impacts on supply chains during pandemics and other disasters. On the other hands the reshoring is majorly focal firms decision and usually the suppliers are not taken on board for such decision. Case C is manufacturing only for company X and their business will be hugely affected by the reshoring activity if happed. Thus to avoid the reshoring the Case C is trying to adopt different strategies to maintain the business with the company X by keeping the Quality high and meeting all the requirements of customers and by developing technological advancements. So Case C is not agreeing with the reshoring concepts as they expect they will lose the international connectivity.

Case D is also one of the main supplier of the Company X based in India eastern part of the world. Their 100 % production is for company X and they are supplying the footwears to the Indian markets and Japan. The main reason for offshoring to India cheap labor and cost effectiveness. Case D also claims that the reshoring is not in the favour of the suppliers and if the focal firms want to take such decisions they should take suppliers on board as the suppliers are also stakeholders of their decisions. The main motivations for the reshoring identified by

the ‘Case D’ are wages issues, improper management low efficiencies and less profits along with Quality issues. Case D claims that the suppliers can manage the shock by reshoring as immediately they will get suffer but on the longer run they will survive by adopting different approaches. Case D is suggesting to avoid the reshoring by improving efficiencies and by learning latest skills.

5.4.2 Cross case Analysis

After conducting two sessions of interviews with the gap of one year period, the results are derived from the data collected from the interviews of four suppliers and summarised in Table 5.2. The selected four suppliers are working for the same big brand (company X). All these suppliers know the big brand company X’s reshoring activity and generally happening in the business world. They supplied finished products to company X and claimed they had not faced reshoring yet. The focal firm also shows its understanding of reshoring, so both sides (supplier and buyer) know the phenomenon and the buyer has already made some reshoring decisions. The suppliers are based in the Eastern part of the World and mainly supply finished apparel, sportswear and footwear products to European brands. The suppliers in this sample show the different relationship levels concerning dominance and power balance. The relationship varies from tier 1 supplier (Case B) to strategic supplier (Case C and D). The suppliers show their willingness to participate in the focal firm’s decision, possibly impacting suppliers (All cases). They stress the impacts of reshoring on the financial (Case B and C) and social side (Case C and D) mainly and clarify that the level of buyer-supplier involvement in each other’s business and the status of the suppliers in the focal firm’s business defines well the impact of reshoring (Case A). The same response was received from the focal firm (company X), as they will only consider the supplier in their decision depending upon the position and relevance of the supplier in the focal firm’s operations.

The major reasons suppliers pointed out for reshoring by the focal firm (company X) are cost (Case A, C and D), quality (Case A and C), and delivery time (Case A and C). Others are strategic reasons (Case B and C), customer demands (Case C), technological advancements (Case D), and political and security instability in the region (Case B). All the selected suppliers are convinced that reshoring is not as easy as it seems, so thinking of reshoring and implementation are two separate things. The focal firm’s representative was also confident that reshoring is not as easy as offshoring. Also, reshoring is not based on one particular driver.

Still, the motivation is based on comparisons of flexibility, cost differences, and the cost of freights. The focal firm claims that producing at high-cost sites is still cost-saving in certain situations because of flexibility and localisation of production and seasonality of products.

The operational pattern between the sample suppliers and the focal firm is bound by law, contracts and agreements. The legal contracts make the relationship between the supplier and the buyer complete the term. Moreover, to remain on the list of priority suppliers, the sample suppliers discussed their approaches to respond to the reshoring activity.

Table 5.3 Cross case analysis based on empirical findings from supplier interviews

	Case A	Case B	Case C	Case D
Product distribution regions	Europe, USA, Australia, Canada, Asia, New Zealand.	Europe, Far East, Middle East.	Mainly domestic market (Vietnam), but also Australia, USA, UK, Europe &China.	Japan, Indian Ocean area
Type of buyers	-Luxury fashion & High-end buyers -Sportswear & Outdoor clothing buyers	Few international apparel major brands	One exclusive sportswear buyer	One exclusive sportswear/footwear buyer
Main benefits offered to offshore customers	-Cost advantage -Experience -Quality -Compliance -Financial strength	Good quality	-Quality -On time delivery -Follow buyer policies -Lower cost -Access to raw materials	-Availability of cheap labor -Advantages related to country's labor and environmental regulations
Perspective about reshoring phenomenon	It has some benefits which were highlighted by the COVID pandemic.	Not so beneficial, buyers invest on suppliers, it is not convenient to end the business. Though subject due to social and economic concerns.	Serious matter, but difficult to achieve due to labor costs and materials availability. Foreigners would have to learn from experts in Asia.	It does not work in favor of suppliers. Unsure that buyers would be willing to manufacture themselves, will most likely encounter problems.
Identified reshoring drivers	-Bad quality -Delayed deliveries -Not following compliance -Supplier size -Bad financial situation	-Political instability -Security challenges in the host country -Workforce skills -Cultural issues	-High taxes on imports from Asia -Capacity constraints -Quality issues -Delivery issues	-Wage issues -Improper compliance management (environmental, social, violation of human rights, etc.) -Low efficiency -Quality -Low business profitability
Benefits of reshoring	Shorter lead time	/	Avoiding supply chain impacts as during the pandemic.	/
Identified reshoring barriers/disadvantages	-Increased labor cost /increased garment value -Need to transfer technology -Training operators	-Difficulties to obtain optimal cost in home country -Having strategic suppliers	-Need for strong operational skills -Difficulties in finding technology and machines	-Expensive manpower -Flexibility of supplier due to subsidies and no taxation

The supplier's role in reshoring decisions	-Buyer's responsibility, supplier cannot help or question it -Will not share technology or know-how	Important role, suppliers could provide options to solve the issues that made the buyer consider reshoring.	It is only the buyer's decision, but it must be justified and be a win-win situation. Supplier cannot stop the buyer.	Important to involve the supplier and inform it in advance. It is only right to talk to stakeholders before deciding.
Potential impact of reshoring for the supplier	Big problem if a large customer reshore (more than 2 million business).	Mainly a social and economic impact.	Great impact as they have one exclusive customer, workers would be hugely affected.	-Supplier can absorb impact -Workers would be the most affected in the short term - Chaos, media attention and government pressure
Expected reaction to the reshoring of a customer	-Seeking a different buyer -Reduce capacity -Consider transferring to another country	-To get more international buyers (outside Europe) -Different business venture -Selling locally -Supplying partially finished garments -Trying to work with competitor	-Create strategies to maintain the business -Develop own brand -Change business nature -Produce and distribute for local demand only -Develop technological solutions for the buyer	Moving operations back to Taiwan, China, or Vietnam.
Reshoring expectations for the future	Big customers would not reshore from them.	It could happen, but they are feeling safe because of their technological advancement and the values of the buyer.	Not comfortable with reshoring concept, as it would mean losing international connectivity.	-Aware that reshoring is a possibility, confident that it would only occur due to compliance issues. -Not a threat for the future, supplier is unfazed by the phenomenon.
Type of relationship with buyer X	5-year partnership, renewable.	Close and good relationship, key for successful business. Not a strategic supplier yet.	At operational level, collaboration and cooperation is present.	4C supplier/strategic supplier. Close relationship with constant communication.
Potential countermeasures to avoid customer relocation	-Keep good quality -Deliver perfect product on time -Respect compliance -Follow the buyer's rules	-Already planning to diversify portfolio, established goal for 2027 -Working in backward integration	-Technological innovation -Use capacity of all group factories to ensure on-time delivery and flexibility. -Improving workers' skills -Improving quality	-Increasing production efficiency of workers -Improving workers' skill sets
Main priorities and goals	-Becoming a sustainable company -Work in CRS programs -Continuing to manufacture and grow in Indonesia	-Becoming a strategic supplier and increasing the size of the business -To establish knitting and dyeing facilities -Keep improving quality -To expand in Pakistan	-Be a competitive supplier -Develop firm's culture and improve people's mindset in relation to quality -Pursue single customer focus	-Increasing production to 3 million monthly pairs by 2024 -Expand facilities and continue growing in the three current locations (Vietnam, China, and India)

They provided different possible strategies to respond to the potential reshoring. If this happened, Case A would react by reducing the capacity and reducing the workforce to reduce their costs. Case B and C also explained that they would go for new customers to continue their operations and hunt for new suppliers to cut their production costs along with the improved marketing strategies. They will try to approach new big brands just like the previous reshored brand or their competitors. If the focal firms switch suppliers, the left behind supplier might counteract in the same way by changing the focal firms/customers. Also, the suppliers may have to explore new avenues, mainly in retail sectors or with new product lines. They will attempt to explore new opportunities with increased efficiencies and full-filling local demand by capturing local markets.

The focal firm (company X) explained that after switching supplier, the firm still keeps the relationships with the previous supplier and stressed that it is important to keep the relationship as they both have to work in the same market and industry. There is no point in ignoring each other. So the supplier shows the practices of avoiding reshoring by controlling costs (Case B) and giving a breathing cushion for the focal firm (company X) along with the quality products (Case A). The suppliers are also keeping an eye on the market trends and technological advancements and keep on improving technology levels (Case C) to keep the focal firm (company X) as a loyal customer. Technology is not the only practice these suppliers focus on, but they also train their people to enhance their skill sets and remain competitive in the market with their specialisation (Case C and D).

5.5 Discussion

Uluskan et al. (2016) claimed in their research that the international suppliers in textile industry performed worse and pushed the USA firms to think about reshoring but this is not the findings in this research, as all the respondents claimed that their quality is the most satisfactory element in the international buyer-supplier relationship. The sample suppliers also reported that if their performance were low, it would add a driving element to the focal firm's decision.

Another study (Uluskan et al. 2017) claims that supplier switching is the outcome of the focal firm's competitive strategy and cost focus. Ulkasan et al. (2017) stated in their research that globalisation was an important factor, and it is still relevant even when supplier switching through reshoring is taking place from one supplier to another supplier. But the leading role player is always the decision-making firm. Sometimes the cost, quality, and delivery are

acceptable, but the company may still have long-term strategic plans to reshore and relocate productions.

The comparison of costs between two suppliers while taking a reshoring decision is not the only factor, but there are other factors that the focal firm considers. Mostly company's competitive strategy is the driving force for relocation, thus among all other strategies, the "Made in effect" strategy was the highest-rated.

Siriletsuwan et al. (2019) discuss how developed countries shift their product manufacturing from low-cost countries to high-cost countries. The emphasis is on supplier selection from low to high cost. The most prominent business factors are profit margins, service quality, and delivery for supplier selection (Siriletsuwan et al. 2019). Company X's representative explained that sometimes switching productions to a high-cost country is still cost-saving. In such cases, the emphasis is not only on cost quality and delivery. The suppliers in the sample are also convinced that they are good suppliers for company X, and that is why they have not faced reshoring yet, since the focal firm is satisfied with their costs, quality, and deliveries.

Nujen et al. (2018) discussed reshoring readiness for the Western firms from local to global outsourcing and then back to local suppliers. The reshoring readiness framework emphasises supplier support is relevant in the perspective of supplier suitability (external or domestic) for supplier switching and location decision (Nujen et al. 2018). The low cost country supplier's relationship with Western firms is significant either before reshoring or after reshoring. As there is an assumption that the buyer-supplier relationship can affect the reshoring decision, maybe the reshoring decision can also reflect on the relationship.

The thematic analysis allows the study to produce the list of the different approaches to respond the reshoring decisions taken by the focal firms and also to prevent the reshoring decisions. Although the supplier side cannot control the decisions of focal firms and the control is relevant to the level of ownership with the supply chain but yet the role of supplier may have visible influence on the relocation decision making. The four thematic responses are presented in the figure 5.3 and explained below as:

i) Cost based strategies: *stresses on the efforts to reduce the cost of productions and optimization of costs which help the suppliers to achieve efficiencies and create efficient supply chains make the them attractive for the stakeholders to stay in business.*

ii) Market based strategies: *are focussed with the expansion of the new markets and starting new product lines and also entering into the retailers side from manufacturing or entering into the new industries and sectors*.

iii) Knowledge based strategies: *for the knowledge enhancement the suppliers are motivated to enhance their technological level by acquiring the advanced manufacturing methods. The innovations bring the suppliers in the priority list of focal firms and thus can avoid the reshoring.*

iv) Relationship based strategies: *the better relationships pay offs the suppliers not being reshored and replaced by the focal firms and thus the suppliers are willing to invest on their relationships by creating more interactions and fulfilling their demand and requirements and product specifications. The more negotiations and interactions create better communications between two stakeholders and allows to beat the reshoring decisions.*

Cost based strategies	• Cost optimization • Cost reduction • Increase efficiencies
Market based strategies	• New product development/ different product line • Retailer side • New industry / change in sector
Knowledge based strategies	• Technology enhancement • Advanced manufacturing methods • Innovation
Relationship based strategies	• Negotiations / full fill the contracts • Meet the Product specifications • Improve communications

Table 5.4 Risk mitigation strategies for reshoring (elaborated from Zhang et al. 2023)

Based on the above thematic responses the four future propositions/hypothesis are presented to be tested further in future are presented below:

- **Proposition 1:** ***Reducing and optimizing the costs of productions and increasing efficiencies reduces the risk of getting reshored by the focal firms.***
- **Proposition 2:** ***Developing new products and new markets reduces the chances of reshoring.***
- **Proposition 3:** ***Acquiring new skills sets and knowledge along with the advancing the technological levels prevent the supplier from risk of reshoring.***
- **Proposition 4:** ***Developing strategic buyer-supplier relationships can lead to reduce the risk reshoring in business.***

5.6 Conclusions

After analysing the interviews data and respondents' views along with the focal firm's views towards the reshoring activity, it was clear that there were different drivers which promote the reshoring in the eyes of suppliers. These drivers are cost benefits, delivery times, innovation, technology advancements, government policies, political instabilities, strategic reasons, and quality. The suppliers considered in this research have not gone through the reshoring process, so they are assumed to use the best practices to remain on the list of top suppliers of big brands and avoid reshoring successfully. These best practices keep the cost-effectiveness and quality up to the mark and improve efficiencies and deliveries. The suppliers are also focusing on the implementation of advanced technologies. Moreover, the workers' enhanced skill level and the training of the workforce make the supplier on the top of the list of priority suppliers for the big brand.

The supplier's perspective on reshoring is very clear. The reshoring activity is not as simple as it looks like for the focal firms to implement. The relationship adjustments with the customers are always there as the connection between two supply chain players never dies while working in the same industry. The interdependence is always there in terms of raw material or skilled labour.

So suppliers from the developing countries are always on the priority list of the Western firm because of the best practices they show within the textile industry. The suppliers of one single big brand are chosen from different geographical locations. Still, they all show similar views on reshoring, and their practices are also very similar, which might be because they are dealing with the same customer.

This research provides the first contribution to understanding the suppliers' perspective in reshoring and helps practitioners in developing countries to recognise reshoring as a business strategy. From the buyer's perspective, the research evidence that involving the suppliers in reshoring decision-making and implementation is significant.

This study provides the basis for the new direction on the discussions of supplier's involvement from passive to active role within reshoring literature and theoretical it enhances the dyadic relationship of buyer-supplier from unidirectional to bi-directional. Thus this study is an effort to fill the gap in reshoring literature by providing dyadic relationships of buyer-supplier for better understanding of offshoring and reshoring decisions within manufacturing relocation strategies.

The main limitation of this work is that the interviews were done with cases of no reshoring experience, even if the buyer was experiencing some reshoring decisions. The primary purpose of the research was to learn about the impact of reshoring on suppliers and to check the buyer-supplier dyadic relation dimension in the influence of reshoring. In this research, instead, we were only able to collect the views of the suppliers about reshoring.

However, since the suppliers succeeded in maintaining the relationship with the buyer, even if the buyer was reshoring part of the production, we could assess the best practices to get away with reshoring, which provide another relevant practical contribution. So it is in the future research agenda to investigate the same phenomenon with the suppliers who have suffered reshoring. There are still so many layers to unfold regarding the buyer-supplier dyadic relationship and the effect of reshoring. Many facts are still unknown and underpinned in the literature, and knowing more about reshoring concerning the supplier's perspective would undoubtedly generate a contribution.

5.7 Appendix 5A List of questions for interview

Background

1. Can you introduce yourself, talk about your role in the company and main work activities?

2. Can you give a brief overview of your company, main business, major foreign customers, and business model?

Offshoring experience

3. When did your company start supplying offshored foreign customers?

4. What are the benefits that these customers were expecting from your company's service?

Reshoring experience

5. What is your general opinion on the current reshoring phenomenon?

6. Can you give a brief overview of the reshoring situations your company has encounter (clients who have relocated back to their home country)?

7. Has your company been involved or considered in the reshoring decision process of a customer? Were you a key element for the decision?

8. How long did the reshoring process of your customers take?

9. How was your company involved during this process?

After reshoring

10. How would you consider your customers' reshoring decisions?

11. Do you continue to produce or supply to these customers?

12. How has the relationship between your company and the focal companies changed after the reshoring?

13. Was your company impacted by the reshoring decision of foreign customers? How?

14. What has been learned from the reshoring experiences?

Other

15. How is your company reacting to the reshoring phenomenon?

16. What do you consider that your company can do to avoid the relocation of current buyers?

17. What are your company's current goals for the future?

18. Is your company considering moving its production to another country? Where?

6. MANUFACTURING RELOCATION DECISIONS-THE ROLE OF KEY ENABLING TECHNOLOGIES

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Later the advanced form of article is published in 30th Annual EurOMA conference held in Leuven (Belgium) in July 2023 as "Khayyam, S., Boffelli, A., Wamba, F.S., Kalchschmidt, M. (2023). Manufacturing relocation decisions - the role of key enabling technologies."

Later on this document is submitted in the 15th AIRL-SCM conference, in La Rochelle (Coureilles) campus of Excelia Business School, France, in May2024 as "Khayyam, S., Boffelli, A., Wamba, F.S., Kalchschmidt, M. (2024). Manufacturing relocation decisions - the role of key enabling technologies" for further feedback after advancing the research work. I am personally responsible for any changes and updates made from last versions.

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6.1 Introduction

Over time, manufacturing relocation decisions as reshoring (bringing back home manufacturing and production activities), also known as back-shoring, have gained significant importance in the global economy (Stentoft et al., 2016). Since the last decade, many companies practically adopted reshoring as a business strategy, and the COVID-19 pandemic has accelerated the trend as supply chain disruptions hit businesses globally. After natural calamities and pandemics, the Ukraine-Russia war added more stress to global supply chains and let them experience the peak of supply chain disruptions. These supply disruptions affect humankind globally and force businesses to reassess their manufacturing location decisions and strategies.

The decisions of where to produce and where not to continue the production are often called manufacturing relocation decisions, including reshoring, near-shoring, and back-shoring. The new trend is identified in multiple literature streams as back-shoring (alternatively as back-reshoring or reshoring) and defined as *"a voluntary corporate strategy regarding the home country's partial or total relocation of (in-sourced or out-sourced) production to serve the local, regional or global demands"* (Fratocchi et al., 2014).

The literature provides the researchers with many drivers and motivations (e.g., cost, quality, efficiencies, innovation, labor, and material availability) to reshore manufacturing activities (Fratocchi et al., 2016). In this regard, the significance of technology in relocation decisions is always getting attention, and key enabling technologies (KETs) play a vital role in supporting reshoring decisions. This research also highlights technology as one of the drivers for decision-making and investigates other potential roles played in relocation decisions.

There is a need to know how these KETs are affecting the reshoring decisions. The significance of technology in reshoring decisions is mentioned in different studies, (Fratocchi et al., 2016; Benstead et al., 2017; Johansson and Olhager, 2018; Moore et al., 2018) as it is labeled as one of the drivers for reshoring decisions. However, technology's role in shaping these decisions is still not explored. Few efforts are seen in exploring the interplay of KETs and relocation decisions despite the increased accessibility and availability of these technologies. This study also explores the supporting role of KETs along with potential challenges in reshoring decisions. Concisely this research intended to answer the following research question:

RQ: "How are key enabling technologies contributing to manufacturing relocation decisions?"

This essay will proceed with the following sections. The next section is about the background and literature on the KETs and manufacturing relocation decisions altogether, highlighting the possible gap in the literature. The following section explains the research methodology, data collection, and all the research protocols. Next, the essay will proceed with the results and discussion section. The last section concludes with the contributions and limitations of this study.

6.2 Literature review and background

6.2.1 Manufacturing relocation decisions

Choosing where to locate manufacturing is one of companies' most important decisions (Moore et al., 2018). In the past, manufacturing locations were, in most cases, moved to low-cost countries (Ellram, 2013). In previous literature, the research focus has primarily been defining the reshoring phenomenon, its drivers and motivations (Barbieri et al., 2018; Fratocchi et al., 2016).

There are many motivations behind this initiative, the so-called drivers of reshoring (Barbieri et al., 2018; Fratocchi et al.,2016; Stentoft et al., 2016; Wiesmann et al., 2017; Kinkel & Maloca, 2009; Martínez-Mora & Merino, 2020). A lot of work has been done concerning reshoring decision criteria (Hilletofth et al., 2021; Eriksson et al. 2021; Benstead et al., 2017) and all the reshoring research available has been discussing the reshoring decision-making and implementation according to decision initiators', which are the focal firms taking the decision, namely Western companies, perspective (Benstead et al., 2017; Boffelli & Johansson, 2020). Reshoring drivers are being discussed with aspects of cost-effectiveness in the longer run, Made-in effect, efficiency, and flexibility in operations. The past literature also links the decision-making processes and manufacturing innovations (Stentoft et al., 2016) with technology advancements.

When the reshoring literature is analyzed, the in-depth analysis shows a list of drivers and factors involved in the reshoring decision. Among those drivers, technology, and innovation are prominent factors, as the latest technological advancements not only affect the different parts and operations of the business but also reflect upon the whole business (Barbieri et al., 2018; Engström et al., 2018; Nujen et al., 2018; Martinez-Mora and Merino, 2020; Di Mauro and Ancarani, 2022).

Reshoring initiatives, on the one hand, are considered as the one of the remedy to reduce the unemployment in the focal firm's country (Tate et al. 2012), and promote the re-industrialization (Pisano and Shih 2009), and, on the other hand, reshoring involved with the technological advancement reduce the workforce and labor dependence. One of the empirical updated reshoring motivation framework by Fratocchi et al. (2016) presented 21 motivations identified by academia and 12 motivations given by practitioners and the innovation is identified as the third most important reshoring motivations. Reshoring initiatives are perceived to have different effects of different industries as it is relative to the old manufacturing practices and advanced technological methods; thus the technology's presence as motivation and driver results into the different outcomes of reshoring in different industries (Lee 2022).

6.2.2 Key enabling technologies (KETs)

Different studies highlighted multiple reasons and driving factors for relocation decisions made by the firms (Barbieri et al., 2018; Fratocchi et al.,2016; Stentoft et al., 2016; Wiesmann et al., 2017, Kinkel & Maloca, 2009; Martínez-Mora & Merino, 2020), these factors are mainly production cost, lead time, innovative technology, delivery time and cultural differences.

In reshoring literature, the KETs are listed in different context and include Additive manufacturing technologies (Fratocchi 2018; Calignano and Mercurio 2023; Stentoft et al. 2016), Automation, Cloud / Cybersecurity, Digital Tools / Digitalization (Ancarani et al. 2019), IoT (Saki 2016), Industry 4.0 (Ancarani and Di Mauro 2018), Robotic Process Automation (RPA), (Dachs et al. 2019), Artificial Intelligence(AI) (Hoque et al. 2022), Machine Learning(ML), Big Data Science (Kamp and Gibaja 2021), digital twin (Qi et al. 2021), Traceability and blockchain (Marfia and Degli Esposti 2017) and 3D printing (Fratocchi 2018). The above mentioned technologies are categorized as new Information technologies since 2000's onwards and getting digitalization evolution to the industry level as shown in figure 6.1 (Qi et al. 2021).

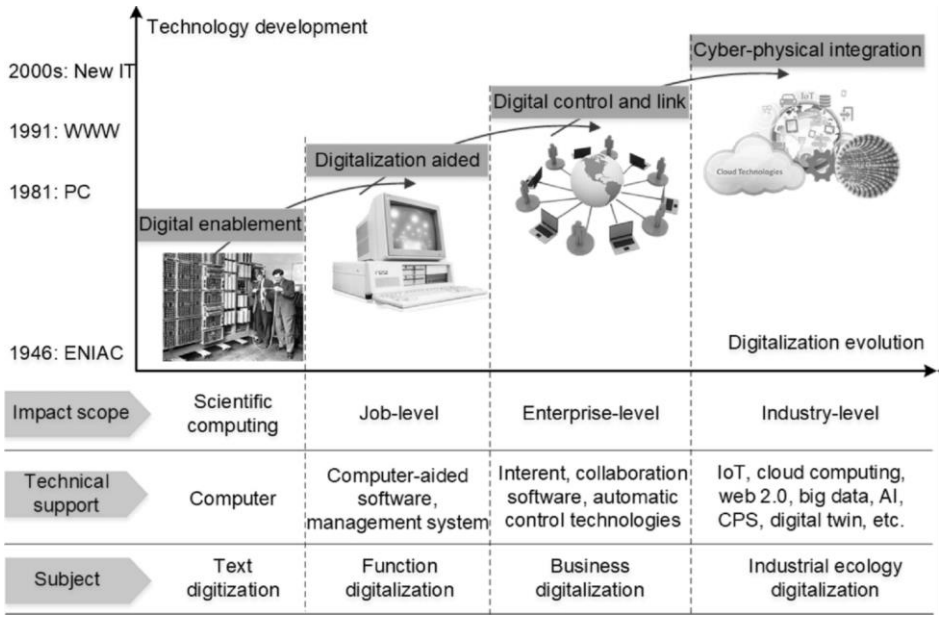

Figure 6.1 Technological evolution - Adapted from Qi et al. (2021)

Individually the role of technologies in societal advancement in the modern times are studied a lot in the literature and each technology and technical tool has its own spectrum to benefit the world. Technological content and local adaptation of technologies is classified as the one of the six categories of contingency factors[5] prompting offshoring decisions (Zorzini et al. 2014).

The key enabling technologies are presented in figure 6.2, adopted by Tao et al. (2014), which is trying to elaborate on the relationship of cloud computing, Internet of things and cloud manufacturing for better understanding of key enabling technologies.

[5] The contingency factors includes the "i) product features (technological content and local adaptation), ii) production cost structure (import duties), iii) local economic conditions (currency exchange rates and local economic instability), iv) local regulations (trade agreements), v) local infrastructure and vi) subsidiary size." These contingency factors are proposed by Benstead et al. (2017) and advocated for the research on these contingency factors by Bals et al. (2016) and Tate et al. (2014).

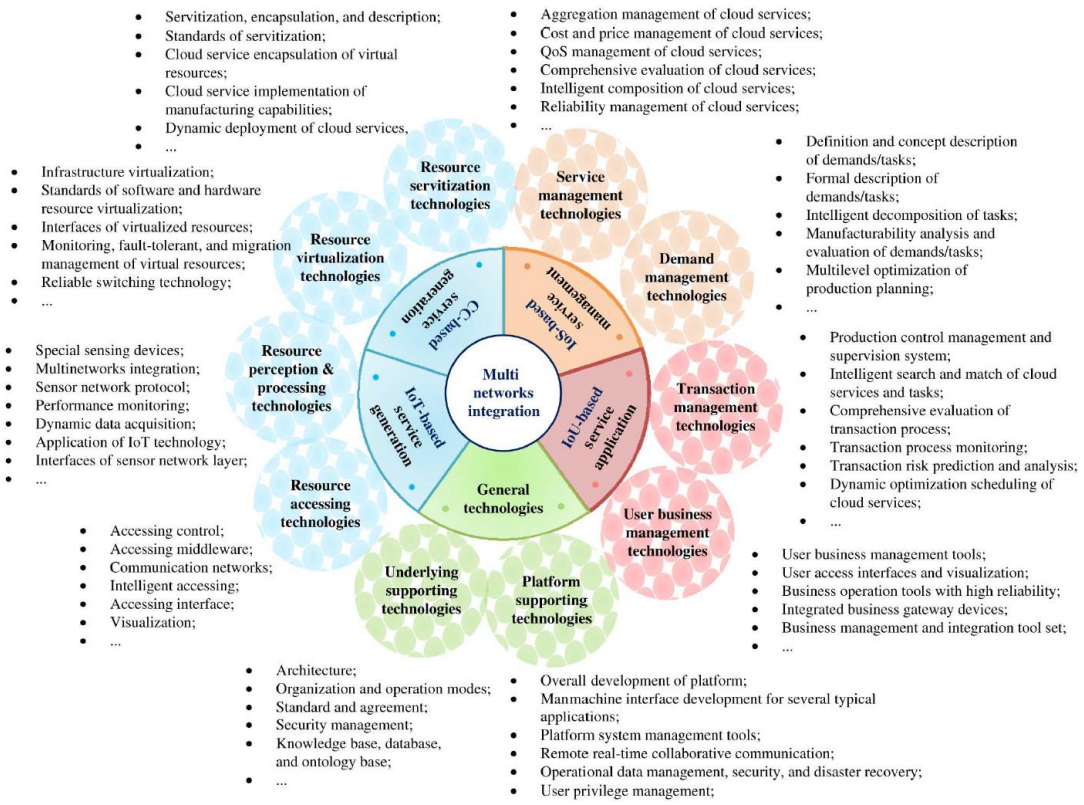

Figure 6.2 Key enabling technologies of CCIoT-CMfg (adopted from (Tao et al. 2014)

6.2.3 Interplay between key enabling technologies and manufacturing relocation decisions

Within reshoring and relocation decision literature, the KETs are discussed in different context and their presence in literature is witnessed only as drivers and motivations of reshoring decisions. When the manufacturing relocation is in discussion then all the members of the supply chains must be included with their technological levels as the low cost developing countries has low level of technology and less adoption rate thus the frameworks for technologies' adoption is also consider to play role for the low cost countries to be equipped with KETs like RFID (Khayyam et al. 2022) and industry 4.0.

Along with the reshoring initiative through technological advancement and innovation, the home countries increase jobs opportunity in home ground, the FDI on the other hand enable the home countries to develop and adopt the technologies in host countries and increases the jobs and increases the ownership of focal firms on host countries (Suyanto and Salim 2012). According to Roblek et al. (2016) stresses that the information technologies and electronics can transform the industries to automate and digitalize the processing in manufacturing in

several ways which are *"i) Digitization of production – information systems for management and production planning ii) Automation – systems for data acquisition from the production lines and using machines, iii) Linking manufacturing sites in a comprehensive supply chain – Automatic, iv) Data Interchange"* (Moore et al. 2018).

Different studies in literature shows the effort to express a harmonious relationship between reshoring activity and different form of technological innovations in manufacturing specifically with the use of industry 4.0 (Bals et al. 2016; Moradlou et al. 2017 and Barbieri et al. 2018). The next manufacturing research is supposed to intricate the connection between reshoring and nearshoring manufacturing in the context of high cost environments and technological advancement as investments in robotics can slow down the trend of offshoring and help in promoting reshoring (De Backer et al. 2018).

Technological developments with reshoring initiatives enable the trade-offs regarding localizations and customizations by reducing the wastes and over productions (Andersson 2018). Technology role is not only direct but indirect as well within manufacturing relocation decisions by balancing of customization and resource allocations (Andersson 2018; Fratocchi and Di Stefano 2019). Thus the strategic consideration is required by the manufacturers to create a balance in the resource allocation, customer's customization and digital technologies to minimize the complexity of supply chains. The technology adoptions and efficiency improvement both costs the businesses very high and make the firms to face more challenges of other decisions factors.

As the literature shows an increasing trend in the reshoring research studies, all the available research work is mostly related to identifying the drivers and motivations of the reshoring decision (Cannavacciuolo et al. 2023), and few are related to itself decision-making process and implementation, but the little work is done on the technology's role in the reshoring decision making. Moreover, how these technologies make this reshoring decision happen is not clear.

The significance of technology in reshoring decisions is mentioned in different studies as it is labelled as one of the driver for reshoring decisions. However, few efforts are seen in exploring the interplay of enabling technologies and relocation decisions, despite the increased accessibility and availability of key enabling technologies (KETs). This study is also an effort to review the previous literature about this issue and to highlight possible available linkages and mechanisms of technology affecting relocation decisions.

6.3 Methodology

6.3.1 Research Design

This study utilized a qualitative research design to explore the facts about enabling technologies' involvement in manufacturing relocation decisions. As the research is exploratory, qualitative research is an appropriate approach for investigating complex social phenomena, such as decision-making processes in the manufacturing industry, where the focus is on understanding the meaning and interpretation of experiences and perspectives. As the research on technology-involvement within reshoring decision-making is new, the case study method is selected to conduct this research (Yin et al. 2014). The qualitative methodology employed in this study involved data collection through semi-structured interviews and content analysis. A case study approach helps the researcher understand the phenomenon in the real context, and a real-time understanding is achieved (Voss et al., 2002). In this study, the research method employed is multiple case studies. The case study research design is used to investigate a contemporary phenomenon about which little is known (Yin et al. 2014). The research was carried out in three phases presented in the data sources section of research design presented in figure 6.3 below:

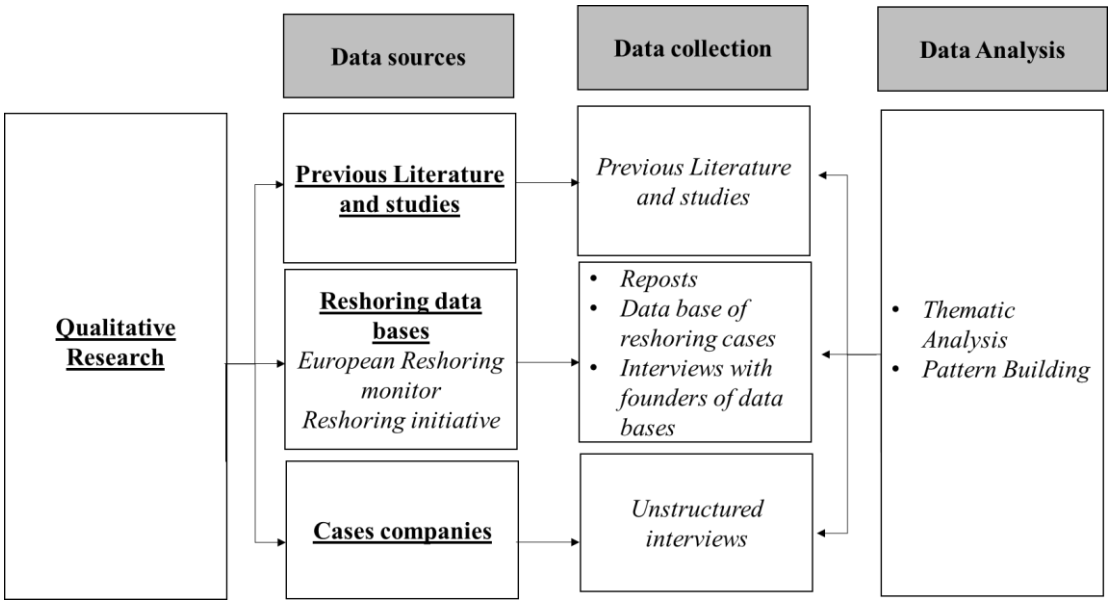

Figure 6.3 Research design

Phase 1 involves the exploration of past studies in the form of detail literature review and for that purpose finding the articles within reshoring literature discusses the involvement of technology with the decision, for that purpose all the possible key terms are used for manufacturing relocation decisions and key enabling technologies as the research string is presented in the table 6.1 below:

Research String		
Manufacturing location decision		**Key enabling technologies**
("manufacturing relocation decision*" OR "manufacturing location decision*" OR "production location decision*" OR "manufacturing location*" OR "manufacturing relocation" OR "manufacturing decision*" OR "relocation decision*" OR "location decision*" OR "reshor*" OR "re-shor*" OR "back shor*" OR "back-shor*" OR "backshor*" OR "nearshor*" OR "near-shor*" OR "near shor*") *"	AND	("technolog*" OR "enabling technolog*" OR "key enabling technolog*" OR "innovation*" OR "automation*" OR "digital*" OR "industry 4*" OR "additive manufacturing" OR "artificial intelligence" OR "blockchain" OR "robot*" OR "3D printing" OR "smart manufacturing" OR "cloud computing" OR "machine learning")

Table 6.1 Research string

Articles selection The articles were initially retrieved from the two search engines Scopus and Web of Sciences by using above mentioned research string and after removing duplication the selection criteria is applied which includes the journal articles, published in the field of operations management, decision science and social science and also in English language.

The articles were finally selected to include in the study are 38 after applying selection/ deletion criteria which are presented in the table 6.2 below:

	Activities **Selection / deletion criteria**	**Scopus**	**Web Of Science**	**Final selection**
Research string				
	Initial research	2593	4681	7274
	Applying selection criteria Removing duplication	91 73	103 79	194 152
	Title, keywords, Abstract scanning Round -1 Round -2	29 23	33 25	62 48
	Full article evaluation	19	19	38
38 papers selected				

Table 6.2 Article selection after selection criteria

As the literature shows an increasing trend in the reshoring research studies, all the available research is based upon and inclined towards the focal firm's perspectives, thus the articles included talks about the technology's role on focal firm's side while taking manufacturing relocation decisions. The list of papers included is given in the appendix 6A.

Phase 2 includes the analysis of secondary data in the form of reports and different databases like "European Reshoring Monitor" (https://reshoring.eurofound.europa.eu/) and "Reshoring Initiative" (https://www.reshorenow.org/). In these databases, the cases are reported for their experience of manufacturing relocation decisions. In addition, the interviews of the founders of these databases Professor Harry Moser from USA and Professor Luciano Fratocchi from Italy are conducted to take their vivid comments on the current issue in discussion. After looking at the databases the list of cases were shortlisted with technology as their reshoring motivation. The information on cases was also confirmed through different news and case companies' websites and social media platforms as they reported multiple times about their ongoing reshoring experiences on these platforms, giving the on-hand information of their reshoring projects. In addition, the involvement of technology in their reshoring decisions was also confirmed through the different media reports like *Forrester report*, *Eurofound* and *MAKERS* from the Reshoring Initiative. There are more than 200 reshoring cases of production and manufacturing reported in the European Reshoring Monitor, out of these, 63 reshoring cases claim and report that their reason for reshoring is technology and technological advancements.

In ***Phase 3***, the case companies were selected from the information available in the reshoring databases. The intension was to select cases as sample out of 10 cases companies within the textile, apparel and fashion industry whose reshoring project was backed by technological adoption and advancement according to the European Reshoring Monitor's sources. Thus the 5 case companies from European Reshoring Monitor and one case company from USA, in total six cases were approached, and the interviews were conducted with their representatives. The respondents in this study are selected through purposive sampling, which aimed to ensure that the sample included individuals with diverse perspectives and experiences related to manufacturing relocation decisions. The participants shortlisted for interviews are professionals with expertise in manufacturing operations, supply chain management, and technology implementation, including executives, managers, and engineers from manufacturing case companies from textile and apparel industry that had previously undergone relocation decisions.

Table 6.3 reports the basic information about the cases.

	Technology based Reshoring companies					
Cases / Characteristics	**Case A**	**Case B**	**Case C**	**Case D**	**Case E**	**Case F**
Core business	Sports shoes	technical, protective & security work-wear	Sports shoes & accessories	Textile Footwear t-shirt accessories	Luggage bags suitcases	Sports shoes
Date of foundation	1947	1921	1980	1948	1914	1906
Country of origin	France	France	Germany	Italy	UK	USA
Offshore country	Asia China Vietnam	Tunisia Asia	China Asia Vietnam	China Thailand Vietnam	China	Asia
Reason for offshoring	Costs	Costs	Costs &labor	Costs	Cost	Cost
Relocation country	France	France	Germany	Italy	UK	USA
Reasons for relocation	Reducing carbon foot print, Automated productions	Production plant automation, Production sustainability	Automated and robot operated plant, process innovation, delivery time, rising costs	Product / process innovation, Made in effect	automotive manufacturing, rising costs overseas, Made in effect	Made in effect, product quality, competitive advantage
No of interviews done	-	2	2	1	-	1
Secondary material	News, Social media posts, White papers	Reshoring monitor, News	Reshoring monitor, News, Articles	Industry News, Reshoring monitor	News, Articles, Reshoring monitor	Company reports Conference presentation

Table 6.3 Case companies profile selected in a sample of reshoring based on technology

For the privacy reason the identity of the companies and the respondents is kept confidential and label as confidential in table 6.3 above.

The validity of data is triangulated through different sources like previous studies confirms the importance of the technology as driver for relocation decisions and also the founders of the reshoring databases provided us their candid observations on the matter and also we consulted different news and latest reports on the technology's role in reshoring decisions.

6.3.2 Data collection

Initially the results are compiled based on the in-depth literature review, white papers, news, reports from reshoring databases and consulting groups. Then to take the latest on hand literature comments the interviews with the founders of reshoring data bases of Europe and USA are consulted. To collect in-depth data online semi-structured interviews are conducted as described in the methodology. The interviews were conducted online through conferencing

and the record is kept to keep the transparency of data. This phase of interviewing has already started and is planned to finish soon. A few interviews have already been conducted with Case B, Case C, Case D, and Case F. Each interview is planned for 45 minutes and the audio recording will be taken with the permission of the respondents, also notes will be taken. The interviews will be transcribed as to follow the protocol. The interview protocol is provided in the Appendix 6B.

6.3.3 Data Analysis

The data collected from the interviews have been analysed using thematic analysis, which involved identifying patterns, themes, and categories in the data. To enhance the rigor of the analysis, at least two researchers have been involved in the coding process to ensure inter-coder reliability, one researcher additionally played the role of devil's advocate. Also triangulation (i.e., using multiple data sources: reshoring report, News, and companies' websites) has been be applied (Voss et al. 2002).

This study adhered to ethical guidelines for research as informed consent will be obtained from all participants before the interviews, and they will be assured of their confidentiality. The qualitative methodology employed in this study provided a robust approach to explore the role of key enabling technologies in manufacturing relocation decisions. The use of semi-structured interviews and content analysis allowed for in-depth data collection and analysis. The analysis is planned for the next phase with constant comparison of the data to identify similarities and differences, and to refine and develop emerging themes. Data management software, such as NVivo and Excel are selected for data organization and coding.

6.4 Findings

6.4.1 Findings from literature

The findings from the initial stage show the list of the KETs identified in the literature on relocation decisions, as listed in the tables 6.5 below. Moreover, major evidence of KETs involvement in the reshoring decision is discussed generally. The results regarding the KET's role in reshoring decisions from secondary data available show some main points to lead the next phase of research. The technological needs are different for different industries, so the dependence of relocation decisions varies accordingly. A major outcome is that technology

involvement and technological advancements appear as one of the drivers and motivations for the reshoring decisions (see Table 6.4 and Table 6.5)

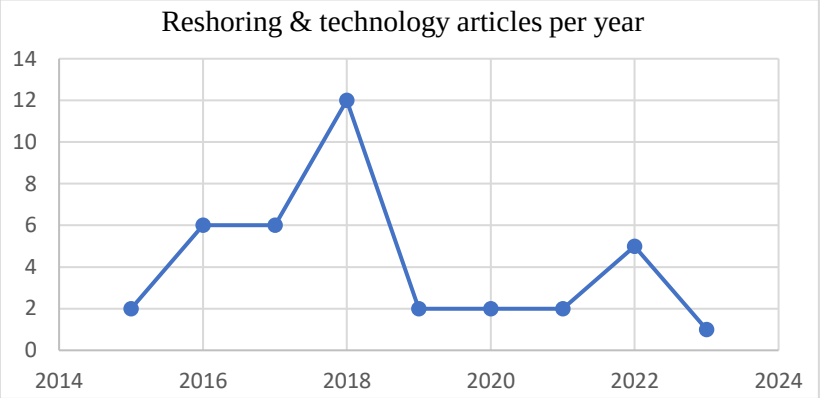

Figure 6.4 Year-wise distribution of articles based on reshoring & technology

The findings show the year 2018 is having highest number of published articles regarding technology as a driver of reshoring in manufacturing relocation literature. Figure 6.4 shows the frequency of publications.

Different KETs are linked up with the reshoring decision generally and playing its supportive role in the relocation decisions presented in Table 6.4, but the in-depth mechanism of how they support and promote such decision is not explained. The KETs are making possible the elimination of the middleman to shorten the supply chains and reduce the logistics and transportation costs hence it promotes the reshoring decisions (Calignano and Mercurio 2023).

Supply chain innovation achieved by adopting, for example, additive manufacturing make the production possible in the home country and thus contributing towards the reshoring and backshoring of productions (Stentoft et al. 2016).

Among the many technologies, only a few will be trending till 2025 and become the breakthrough technologies in the textile industry which are 3D printing, advanced materials and IoT to create the prototypes, digital models which helps to create long lasting light weight productions and concept of smart factories, also made possible because of these enabling technologies (Saki 2016).

The general role of key enabling technologies in the relocation decisions have multifaceted role as the technology needs are different for the different industries. The adoption of the key enabling technologies facilitates the reshoring decisions by enabling the focal firms to be efficient in producing by themselves and by reducing the dependence of the offshored suppliers.

Technology	Role of technology	References
Generic technology	• The more high tech firms reshore more as compare to the les high tech firms • Also high tech firms take initiatives early to reshore than the other firms • Technology is one of the driver for reshoring • Technologies/ ICT and globalization is trigger for reshoring • Technological advancement also lead to reshoring initiative • Technology advancement creates different business environment to facilitates the reshoring activity • Technology appears as one of the factor for location decisions • Location decisions appears to be having interdependence on technology • Automation is also a reason for reshoring • Technology is consider as enabling motivation for reshoring • High technological innovation business models are also one of the key reason for the reshoring • New technologies and access to latest technologies are also consider as the reshoring driver.	Gylling et al. 2015 Ancarani et al. 2015 Fratocchi et al. 2016 Gerbl et al. 2016 Bals et al. 2016 Tate and Bals 2017 Albertoni et al. 2017 Benstead et al. 2017 Moradlou et al. 2017 Ketokivi et al.,2017 Heikkila et al. 2018 Johansson and Olhager 2018a Moore et al. 2018 Barbieri et al. 2018 Engström et al. 2018b Nujen et al. 2018 Johansson and Olhager 2018b Hasan 2018 Martinez-Mora and Merino 2020 Di Mauro and Ancarani 2022 Ancarani et al. 2022 Lampón and Rivo-López 2021

Table 6.4 Technology' s generic role in reshoring literature

Usually in reshoring cases the technology adoption enables the focal firms to initiate and plan the reshoring process but in some cases the firms took reshoring initiative and the technology adoptions is the end product of the reshoring project. The reshoring decisions are mostly cost focused and adopting new technologies eventually increase the overall cost of production and which is critical for reshoring project's success.

The table 6.5 shows the list of the specific technologies and which are showing its specific role by the adoption of the respective technology.

The findings of facts from the cases B, C, D and F are compiled and listed in the Table 6.6 and recorded as per interview protocol.

Technology	Role of technology	References
Specific technology	• Additive manufacturing • Computer-aided design-CAD • Computer-aided manufacturing -CAM • 3D printing	Stentoft et al. 2016
	• Advanced manufacturing machinery	Foster 2016
	• 3D printing / IOT • Smart production	Saki 2016
	• Block chain, Sensors • Recognition technology • IOT –RFID , QR Codes	Marfia and Degli Esposti 2017
	• Industry 4.0, • Advance manufacturing techniques	Kaivo-Oja et al. 2018
	• Additive manufacturing(AM) • Industry 4.0	Moradlou and Tate 2018
	• Industry 4.0 • 3Dprinting • Robotics automation	Ancarani and Di Mauro 2018
	• Additive manufacturing technologies • 3 D printing	Fratocchi 2018
	• AMT (Additive manufacturing technologies) • Industry 4.0 • 3D printing • Digital manufacturing	Fratocchi 2018
	• Industry 4.0 • Robotics /IOT • AMT (Additive manufacturing Technology) • 3-D Printing, • Big Data Analytic • Digitalization / digital tools	Ancarani et al. 2019
	• sensors, actuators, horizontally and vertically • integrated production, robots, additive manufacturing	Dachs et al. 2019b
	• Digitalization, 3D, additive manufacturing	Lampon and Gonzalez-Benito 2019
	• Industry 4.0 , autonomous robots/ Robotics • Cloud Technologies • Big Data Analytics / 3D Printing • Virtual Simulation Systems • Augmented Reality / Cybersecurity • Artificial Intelligence (AI)	Kamp and Gibaja 2021
	• Industry 4.0	Stentoft et al. 2021
	• Additive manufacturing	Ysabel et al. 2022
	• Industry 4.0 / Robots • Artificial Intelligence (AI)	Hoque et al. 2022

Table 6.5 Technology' s specific role in reshoring literature

6.4.2 Findings from cases from databases

After conducting the detail literature review on the role of technology, the case companies' representatives were inquired about their reshoring initiatives based on technological innovations. The interviews with founders of the two databases were purposefully done for the better understanding of the topic in discussion. The findings are presented in the form of within case analysis and cross-case analysis below:

6.4.2.1 Within case analysis

Case B is well known company French based company dealing with manufacturing and technical, protective and security wear with in textile and apparel industry. Case B outsourced the manufacturing to Asia and Tunisia for costs advantages. And in 2016 the Case B reshored its manufacturing with the product line jeans and vintage work wear. The Case b has invested in millions of euros in automation the manufacturing plants for reshoring project. The technology and automation of manufacturing plant was the backbone of the reshoring project with in case B. The other motivation for reshoring was the sustainability goal. The Case B claimed that the technology plays a vital role in the reshoring decision. As the company already acquired the technology and then planned for the reshoring decision. Technology helps the Case B in product designing and manufacturing. Apparently the automation and technology acquiring was costed but at the end the overall cost of productions were decreased. Thus the technology was the backbone the reshoring project.

Case C is also one of the well-known and leading brand within textile and apparel sector dealing with manufacturing of shoes and fashion products and based in Germany. The company outsourced China, Asia and Vietnam for cost advantages and availability of skilled labour. The reshoring is done with the efforts of installing new technology and robots and automated plants which reduces the delivery times and the costs were increased a bit for the shorter term and expected to decrease in the longer term. The main technologies facilitated the reshoring project were 3D printing and additive manufacturing which is also confirm from the literature review. Case C collaborated with the suppliers and manage to train the suppliers with the new technologies.

Case D is one of the Italian company and it is very old family business acquiring the new technologies to reshore the manufacturing previously offshored to Vietnam, China and Thailand. The main motivation of reshoring is cost efficiencies. Diadora is specialized in manufacturing shoes and planned to reduce the costs and technology was the main trigger to

start the reshoring project. Case D implemented the reshoring project by introducing the new technologies and plant automation. The main technologies Case D used to carried out their reshoring project was industry 4.0 and the installation was step by step. The Case D started producing in home ground in small customized batches and small groups.

Case F is a famous leading brand from United States of America and dealing with majorly high quality shoes for athletes and also fashion accessories. Case F is previously offshored its manufacturing to Asia and main driver to motivate the reshoring decision was cost and made in effect. The professional team at Case F was dedicated and committed to carryout the reshoring project during the time of pandemic. The Case F acquired the technological expertise first and then they tried to utilized the current technology to kick start the reshoring process by manufacturing it's the most difficult product part at home plant. As the Case F also advanced the level of technology to get the competitive advantage in the industry and lead the industry in taking reshoring steps for the already set plans. Thus the Case F wanted to hide the exact level and type of the technology from being imitated so early, but they still mentioned the use of RFID technology along with the automation of the manufacturing. The reshoring team was supper committed and dedicated with the reshoring implementation.

6.4.2.2 Cross case analysis

The cases interviewed in this research were Case B, C, D and F. There were few similar trends seen in the empirical findings as all the cases were reported with the use of technologies specifically the 'Case B' reported that they used automated manufacturing and digitalization, 'Case C' reported 3 D printing and additive manufacturing Technologies (AMT), 'Case D' reported use of industry 4.0 to reduce the cost and carried out the reshoring and 'Case F' is keeping the technology secret what they are actually using but they mentioned the use of RFID in their manufacturing.

The cases studied in the research are all carried out their reshoring missions with technology involvement and technology was the main reason to trigger the reshoring decision. The role of technology highlighted by the all cases were as facilitation and supportive. Along with the technology supportive and specific role the commitment and dedication of the technology was also very important . As the presence and relevance of specific technology and its supportive role the teams carrying out the implementation of the reshoring is also very important. The summary of the cross case analysis is presented in Table 6.6 in detail.

	Case B	Case C	Case D	Case F
Technology drives reshoring /reshoring drives technology	Technology was already there, and technology motivated to go for reshoring	The technology has to be acquired to complete the reshoring, which is trigged for other reasons	After planning reshoring, the company has to install and acquire the technology to implement the reshoring project successfully.	The company already s the required technology, and it is better equipped with the latest technology than its offshored suppliers.
Technology facilitation at the operational level	Designing and manufacturing through Digitalization and IOT technologies	Production with the latest manufacturing techniques like additive manufacturing and 3D printing for designing the prototypes	it used the latest techniques for manufacturing, like implementing industry 4.0 technologies to enhance production and reduce costs.	The latest techniques are manufacture with the previously used raw materials, and new skills and techniques were developed with the latest available technologies.
Effect on cost / total cost of ownership	Overall cost is decreased	The costs are reduced	The costs are decreased	Overall cost of production increased but the company is stable enough to bear that increase in cost.
Technology in collaborations with other motivations of reshoring (Reshoring motivations)	Other than technology, the made in effect and sustainability was the main motivations..	The costs reduction is main motivation in collaboration with technology as driving reshoring.	Made in effect and reducing the costs were the main motivations along with technology.	Only main motivation was made in effect
Execution of reshoring with technology involvement	Resilient and sustainability of reshoring project	Collaborations with the suppliers as they share the technologies and shared the skills by training the employees.	The manufacturing were started as small part of production with specific product and gradually the productions were moved as the productions planned gradually the technologies were acquired to	The reshoring teams were very resilient and with their dedication and commitments and continuous experimentation with courage, they managed to execute the reshoring with available technologies.

Table 6.6 Cross Case Analysis from empirical findings / interviews

6.4.3 Literature Versus Practices Analysis

As this research is carried out in two phases, first phase is linked with the literature review of technology involvement in the manufacturing reshoring and the second phase is carried out with the empirical study carried out by conducting unstructured interviews. Both phases of research shows some similar trends of identifying the specific technologies and general role of technologies in reshoring.

Literature Versus Empirical Findings		
	Literature based	**Empirical findings**
Specific technology	• Additive manufacturing • Computer-aided design-CAD • Computer-aided manufacturing -CAM • 3D printing / IOT RFID , QR Codes • Block chain, Sensors / Cloud Technologies • Industry 4.0, / Virtual Simulation Systems • Robotics automation/ Digitalization • Big Data Analytic • Digitalization / digital tools • Artificial Intelligence (AI) (Stentoft et al. 2016, Foster 2016, Saki 2016, Marfia and Degli Esposti 2017, Moradlou and Tate 2018, Ancarani and Di Mauro 2018, Fratocchi 2018, Ancarani et al. 2019, Dachs et al. 2019b, Lampon and Gonzalez-Benito 2019, Kamp and Gibaja 2021, Stentoft et al. 2021, Ysabel et al. 2022, Hoque et al. 2022)	• Additive manufacturing • Industry 4.0 • Digitalization / digital tools • 3D printing • IOT RFID (Based on interviews with Case B, C, D, F & founders of two databases)

Table 6.7 Literature Versus Empirical Findings Analysis (Specific Technology)

Table 6.8 Literature Versus Empirical Findings Analysis (General Technology)

Literature Versus Empirical Findings		
	Role of technology	**Empirical findings**
Generic technology	• The more high tech firms reshore more as compare to the less high tech firms • Also high tech firms take initiatives early to reshore than the other firms • Technology is one of the driver for reshoring • Technologies/ ICT and globalization is trigger for reshoring • Technological advancement also lead to reshoring initiative • Technology advancement creates different business environment to facilitates the reshoring activity • Technology appears as one of the factor for location decisions • Location decisions appears to be having interdependence on technology • Automation is also a reason for reshoring • Technology is consider as enabling motivation for reshoring • High technological innovation business models are also one of the key reason for the reshoring • New technologies and access to latest technologies are also consider as the reshoring driver. (Gylling et al. 2015, Ancarani et al. 2015, Fratocchi et al. 2016, Gerbl et al. 2016, Bals et al. 2016, Tate and Bals 2017, Albertoni et al. 2017, Benstead et al. 2017, Moradlou et al. 2017, Ketokivi et al.,2017, Heikkila et al. 2018, Johansson and Olhager 2018a, Moore et al. 2018, Barbieri et al. 2018, Engström et al. 2018b, Nujen et al. 2018, Johansson and Olhager 2018b, Hasan 2018, Martinez-Mora and Merino 2020, Di Mauro and Ancarani 2022, Ancarani et al. 2022, Lampón and Rivo-López 2021)	• Technology is identified as the main motivation and driver for the reshoring. • Innovation plays a vital role to get success in the reshoring projects. • Automation is also add an element to achieve success in reshoring. • Technologies role increases the overall cost of reshoring project but eventually decrease the total cost of production and adds on to reshoring success. • Technology advancement also facilitates the reshoring implementation. • Technology involvement during the reshoring activities also speedup the implementation and make the process effective. (Based on interviews with Case B, C, D, F & founders of two databases)

6.5 Conclusion & Discussion

The trending research topic reshoring is getting noticed in many conferences and special issues of many journals, as the need to explore this issue is vital for the supply chain innovation and sustainability. As the researchers enriched the literature with the exhaustive list of drivers and motivations for reshoring initiatives, the next requirement is to see the roles played by these technologies. As one of the interview with founder of reshoring initiative claims that the technology adoption is not the guarantee of success of reshoring activity as the focus is now shifted towards the total cost of production for the reshoring activity. And some time having state of the art technology still does not mean that your reshoring project is a big win. To explore the in depth behaviour of technology with reshoring activity alone and also along with the other motivations is mandatory for future research.

However, the interviews that have been conducted to get insight from the case companies showed that the respondents were reluctant to open up about the success and failure of their reshoring projects.

On the other hand the following findings were collected and almost all the cases companies shows the similarities in their responses:

- The interviews are done till now are showing certain trends in the findings that the technology is playing its role as the technology is improving the reshoring projects by creating resilient supply chains and by enhancing skills of the workforce and redesigning the workforce, which results in increased production. The technology's involvement also improved quality control, which not only improved productivity but also helped to reduce the costs. The top approaches of technology towards reshoring: automation, digitalization, innovation, smart manufacturing and industry 4.0. Industry 4.0 technologies here includes (AI, robotics, 3 D printing, digital twin, big data analytics, Block chain, 5 G-Technology, cloud based technologies.
- All the cases were showing the same response on the dependence of the reshoring decision because technological advancement is directly related to the costs and the cost evaluation is critical at the time of selection of suitable key enabling technologies.
- The cases adopted the specific technologies before initiating the reshoring decisions thus heavy costs were involved in the technology adoption.
- The most important finding was that the technology appears as the reshoring motivation before and the reason was the current suppliers were at the low level of technological

knowledge. The focal firms are also trying to educate their previous suppliers and after shutting down productions with them the firms are having good terms with them.

- After the reshoring projects in implementation the firms are having slight management issues and disbalance in managing the human resources and technological intervention in processes.
- The case companies avoided to share the inside on the problems faced by them during the reshoring decision implementation because of company policy and confidentiality aspects.
- They claim that there is not a single recipe or technology for success of reshoring project, thus there are always different other factors which work in a combination for the success of the project and which is again depending on the company's scale and level of technological adoption and depending on the need of technology for the specific technology.
- For the future perspective the case companies were equally motivated to adopt the latest Amt to improve the manufacturing processes.
- Also the technologies which were highly ranked according to its importance in business and relocation decisions facilitation were AMT, Robotics, Block chain and industry 4.0 for future.
- The cases were sure to improve technological level of their previous suppliers as the acquiring the latest technologies not fully served the efforts to achieve the efficiencies so they have to rely on the previous suppliers for certain issues and partial productions.

Within reshoring high-tech products are reshored more that the low-tech products as the risk is less in reshoring high tech products. By exploring the literature it comes to the notice that few technologies are more prominent within businesses like 3D printing, Industry 4.0, Additive manufacturing (AMT), Internet of things, robotics and blockchain. So the research is going on within reshoring in relation to these technologies. Further impact and role playing research is needed to discuss exact interpretation of technology in reshoring.

Research proposition: ***is the technology driver alone capable of achieving success in reshoring initiative or a combination of drivers may lead to successful implementation of reshoring?***

As the drivers are reported in many research work but not studied as their individual and group impacts on reshoring initiatives. It is important to study different drivers alone and in different combinations of drivers must be studied with specific case studies for better insight on how different drivers impact on different cases on different firm levels within different industries.

6.6 Limitations

The findings were mainly depending on the literature review and databases of reshoring initiatives along with the interviews conducted for the data collection and the respondents were much reluctant to share the insight of their reshoring initiative and the findings are based on their discussion during interviews. Collecting the comments and experiences of the case companies who committed reshoring activities is important and it is suggested to conduct one more round of the interviews after rephrasing the research questions so more and more insight can be collected about the reshoring initiative. The technology is only verified as the driver and factor of the relocation decision. Moreover, it will be important to check the influence of technology and the other reshoring decision factors in future.

6.7 Appendix 6A List of papers

	Authors	Year	Article Title
1	Gylling M; Heikkilä J; Jussila K; Saarinen M. 2015	2015	Making decisions on offshore outsourcing and backshoring: A case study in the bicycle industry
2	Ancarani A; Di Mauro C; Fratocchi L; Orzes G; Sartor M. 2015	2015	Prior to reshoring: A duration analysis of foreign manufacturing ventures
3	Fratocchi, L; Ancarani, A; Barbieri, P; Di Mauro, C; Nassimbeni, G; Sartor, M; Vignoli, M; Zanoni, A. 2016	2016	Motivations of manufacturing reshoring: an interpretative framework
4	Stentoft J; Mikkelsen O.S; Jensen J.K. 2016	2016	Offshoring and backshoring manufacturing from a supply chain innovation perspective
5	Gerbl, M; McIvor, R; Humphreys, P. 2016	2016	Making the business process outsourcing decision: why distance matters
6	Foster K. 2016	2016	A prediction of U.S. knit apparel demand: Making the case for reshoring manufacturing investment in new technology
7	Saki Z. 2016	2016	Disruptive innovations in manufacturing – an alternative for re-shoring strategy
8	Bals L; Kirchoff J.F; Foerstl K. 2016	2016	Exploring the reshoring and insourcing decision making process: toward an agenda for future research
9	Tate W.L; Bals L. 2017	2017	Outsourcing/offshoring insights: going beyond reshoring to rightshoring
10	Marfia, G; Degli Esposti, P	2017	Blockchain and Sensor-Based Reputation Enforcement for the Support of the Reshoring of Business Activities
11	Albertoni, F; Elia, S; Piscitello, L. 2017	2017	Complementing the Reshoring of Manufacturing Activities: The Relocation of Business Functions
12	Benstead, AV; Stevenson, M; Hendry, LC. 2017	2017	Why and how do firms reshore? A contingency-based conceptual framework
13	Moradlou H; Backhouse C; Ranganathan R. 2017	2017	Responsiveness, the primary reason behind re-shoring manufacturing activities to the UK: An Indian industry perspective
14	Ketokivi, M; Turkulainen, V; Seppala, T; Rouvinen, P; Ali-Yrkko, J. 2017	2017	Why locate manufacturing in a high-cost country? A case study of 35 production location decisions
15	Heikkila, J; Martinsuo, M; Nenonen, S. 2018	2018	Backshoring of production in the context of a small and open Nordic economy
16	Johansson, M; Olhager, J. 2018	2018	Comparing offshoring and backshoring: The role of manufacturing site location factors and their impact on post-relocation performance
17	Moore, ME; Rothenberg, L; Moser, H. 2018	2018	Contingency factors and reshoring drivers in the textile and apparel industry
18	Kaivo-Oja, J; Knudsen, MS; Lauraeus, T. 2018	2018	REIMAGINING FINLAND AS A MANUFACTURING BASE: THE NEARSHORING POTENTIAL OF FINLAND IN AN INDUSTRY 4.0 PERSPECTIVE
19	Barbieri, P; Ciabuschi, F; Fratocchi, L; Vignoli, M. 2018	2018	What do we know about manufacturing reshoring?
20	Engström G; Hilletofth P; Eriksson D; Sollander K. 2018	2018	Drivers and barriers of reshoring in the Swedish manufacturing industry
21	Nujen B.B; Halse L.L; Damm R; Gammelsæter H. 2018	2018	Managing reversed (global) outsourcing – the role of knowledge, technology and time
22	Johansson M; Olhager J. 2018	2018	Manufacturing relocation through offshoring and backshoring: the case of Sweden
23	Moradlou H; Tate W. 2018	2018	Reshoring and additive manufacturing

24	Ancarani A; Di Mauro C. 2018	2018	Reshoring and industry 4.0: How often do they go together?
25	Hasan R. 2018	2018	Reshoring of U.S. apparel manufacturing: Lesson from an innovative north carolina based manufacturing company
26	Fratocchi L. 2018	2018	Additive manufacturing technologies as a reshoring enabler: A why, where and how approach
27	Ancarani, A; Di Mauro, C; Mascali, F. 2019	2019	Backshoring strategy and the adoption of Industry 4.0: Evidence from Europe
28	Dachs, B; Kinkel, S; Jager, A. 2019	2019	Bringing it all back home? Backshoring of manufacturing activities and the adoption of Industry 4.0 technologies
29	Lampon, JF; Gonzalez-Benito, J. 2020	2020	Backshoring and improved key manufacturing resources in firms? home location
30	Martinez-Mora, C; Merino, F. 2020	2020	Consequences of sustainable innovations on the reshoring drivers' framework
31	Kamp, B; Gibaja, JJ. 2021	2021	Adoption of digital technologies and backshoring decisions: is there a link?
32	Stentoft J; Wickstrøm K.A; Haug A; Philipsen K. 2021	2021	Cost-driven motives to relocate manufacturing abroad among small- and medium-sized manufacturers: The influence of Industry 4.0
33	Di Mauro, C; Ancarani, A. 2022	2022	A taxonomy of back-shoring initiatives in the US
34	Ancarani, A; Di Mauro, C; Gitto, S. 2022	2022	An empirical analysis of the profitability of backshoring initiatives to Europe
35	Ysabel, N; Joren, N; Lucass, P. 2022	2022	The impact of additive manufacturing on production location decisions: a case study in Belgium and the Netherlands
36	Hoque M.A; Rasiah R; Furuoka F; Kumar S. 2022	2022	Linkages among automation, job displacement and reshoring: evidence from the Bangladeshi apparel industry
37	Lampón J.F., Rivo-López E. 2021	2021	The effect of the industry technology intensity on the drivers of manufacturing backshoring
38	Castañé G., Dolgui A., Kousi N., Meyers B., Thevenin S., Vyhmeister E., Östberg P.-O. 2023	2023	The ASSISTANT project: AI for high level decisions in manufacturing

6.8 Appendix 6B Interview protocol for technology role in reshoring decision

Sections: 1 Current situation about the company (real facts)

a. Company's profile
b. Product lines
c. Turnover / no. of employees
d. Overview of operations
e. Role of interviewee(no. of years working with company)
f. Main priorities of company (cost /customer/ value / service/ flexibility)
g. Currently implanted technologies
h. An overview of relocation decision (partial / full / product specific)

Sections: 2 Overview of the reshoring decision already made (real facts)

a. Can you briefly explain your reshoring initiative
b. The reasons / drivers / motivations for reshoring decision?
c. What are the problems faced during the process of reshoring?
d. How did you sorted those issues during that phase?
e. How technology was helping the decision?
f. Up to what extent the decision was dependent on technologies?
g. Any key enabling technologies you want to list down which appeared to be significant?
h. Which key enabling technologies were present in the company before taking reshoring decision?
i. Which new technologies you adopt to carry out the decision?
i. Which product or which part of production you re-shored?
j. Are you still working with your previous suppliers?
k. Can you elaborate the level of technology your previous suppliers had?
l. Did you communicate the decision to the suppliers?
m. Was cost associated with the reshoring process high or moderate?
n. Awareness of key enabling technologies (names/uses/benefits & issues)
o. Potential risks associated with KET in location decision
p. Did you have deep understanding of local regulations and cultural norms when considering relocating their operations to a new region?
q. How did you balance the benefits of automation and other enabling technologies with the need for human expertise and oversight in your operations?
r. How did availability and cost of energy and other resources influence your decision to relocate your operations, and how did technology help mitigate these concerns?
s. Role of technology in relocation decision making of company?
t. do you think technology is driving the reshoring decision or technology is outcome of reshoring decision
u. How do you rank technology in reshoring motivations?
v. Which are the other motivations you considering during reshoring decision?
w. How is the success of the reshoring decision depend on technology?
x. Which technologies were important during your reshoring decision process, Are you planning to implement others and why?

Sections: 3 Future plans and perspectives

a. Can you describe some of the key enabling technologies that commonly used in manufacturing today, and explain how they can influence relocation decisions?
b. How might the use of automation and robotics influence a manufacturer's decision to relocate their operations?
c. In your opinion, what are some of the potential risks associated with relying heavily on technology in manufacturing, and how might these risks impact relocation decisions?
d. How do you see emerging technologies like 3D printing and augmented reality affecting the future of manufacturing relocation decisions?
e. In your opinion, what role do you see technology playing in the future of manufacturing relocation decisions, and how might these decisions evolve over time?
f. Which of the following key enabling technologies you rank top as of their significance
    i. Additive
    ii. Automation
    iii. Cloud
    iv. Cybersecurity
    v. Digital Tools
    vi. Emerging Technologies
    vii. Energy
    viii. IIoT
    ix. Information Technology
    x. Machine Tools
    xi. Robotic Process Automation (RPA)
    xii. Artificial Intelligence (AI)
    xiii. Le Machine Learning (ML)
    xiv. Data Science (or data science)
    xv. Les Hybrid cloud platforms
    xvi. Traceability and block chain.

News resources

- Forrester report
- Eurofound
- EPRS | European Parliamentary Research Service
- Tech target articles
- MAKERS from reshoring initiative
- Report / white papers from Porsche Consulting
- News from The Washington Post
- BOF (the business of fashion)

7. CONCLUSION

This dissertation main theme revolves around the phenomenon of 'reshoring', which entails manufacturing relocation activities from offshore countries back to the home countries. This phenomenon has been getting immense attention within scholarly research as a result of natural calamities, pandemics, supply chain disruptions, trade wars, the Ukraine invasion by Russia, and climate change. More and more companies are thinking and taking the initiative to bring their manufacturing facilities back to their home countries or nearby countries to achieve their strategic goals

The main goal of this dissertation was to explore the unexplored and untouched dimensions of reshoring. This has to be done through the systematic literature review, which identified gaps as the unexplored areas within reshoring. The dissertation aims to highlight and explore the dark sides of reshoring, which are presented as research objectives in chapter 2 in introduction. The research objectives are achieved by answering the research questions mentioned below and presented in Figure 7.1 as well.

- ***RQ1:*** *In the context of manufacturing, how do the drivers considered during the decision-making process leading to backshoring evolve*? (Answered in the first essay reported in chapter 3)
- ***RQ2 (a):*** *How can the manufacturing location decision support the development of structural ambidexterity in the supply chain?* ***(b):*** *To what degree does supply chain structural ambidexterity provide firms with efficiency and flexibility benefits?* (RQ2 is answered in the second essay which is reported in chapter 4)
- ***RQ3 (a):*** *What is the perspective of suppliers of developing countries towards reshoring?* ***(b):*** *Would reshoring be affecting the supplier-buyer relationship according to the supplier's perspective?"* ***(c):*** *What are the best practices to avoid suppliers being left behind in the reshoring process?* (RQ3 is answered in chapter 5 in the third essay)
- ***RQ4:*** *How are key enabling technologies contributing to manufacturing relocation decisions?* (RQ4 is answered in the fourth essay which is reported in chapter 6)

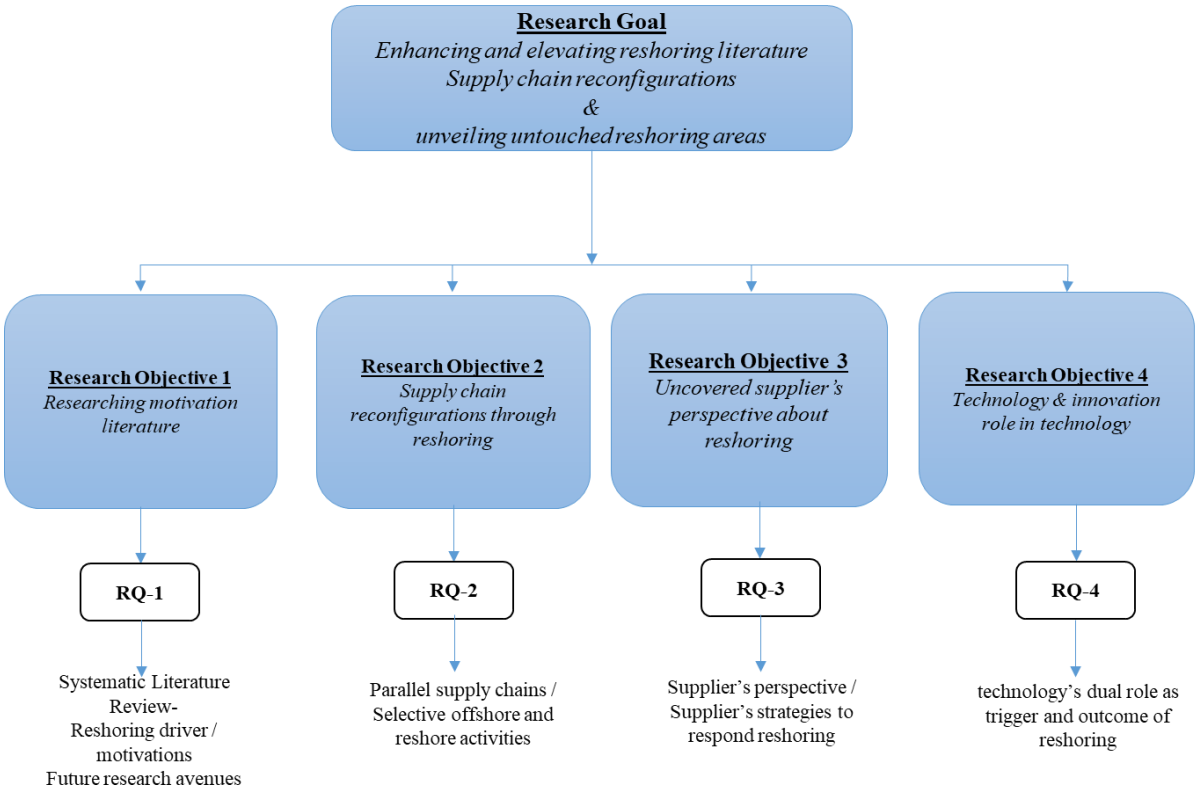

Figure 7.1 Research breakdown structure and outputs

The first research question **(RQ1)** was answered in the first essay, entitled "Manufacturing back-shoring drivers: A systematic literature review of 15 years of research" in the form of a systematic literature review with the updated list of backshoring drivers and motivations. In the end, the review identified a comprehensive list of drivers and motivators along with the future new avenues and new trends within reshoring literature. The identified gaps in the answer to the first research question provide the basis for the upcoming research questions.

The *first* future research avenue is linked with "Environmental and Social Sustainability". In fact, the research on backshoring decisions has increased in the last few years but the relationship and interaction with sustainability is still unexplored (Benstead et al. 2017; Engström et al. 2018; Fratocchi and Di Stefano 2019; Moradlou et al. 2021).

The *second* future research avenue is labelled as "Supplier relationships and Proximity to suppliers" which is addressed in chapter 5. This motivation imply that the involvement of suppliers is significant, and this was easy to predict, given the strict relationship between location and ownership decisions (Gray et al., 2013; Foerstl et al. 2016). So, the supplier's perspective is explored in research essay three and presented in chapter 5. The *third* and *fourth* future research avenues are related to industry 4.0 and implementing strategies based on

product/process innovation, which are discussed in the fourth essay presented in chapter 6. The role of technology and innovation is important to study and this gap is filled by inquiring about the reshoring decisions which involve technological motivations. The fifth research future avenue is related to COVID-19, and the disruptions caused by this trigger of the reshoring decisions which is addressed in chapter 2 of the dissertation. So, the first research question supports in exploring the new trends and unexplored areas, and also detail research work in other research questions helps to fill the gaps after identifying the future avenues.

Answer to the second question **(RQ2.a, RQ2.b)** was presented as second essay in chapter 4. The research focuses the achievement of ambidexterity in supply chains and for this the firms are proposed with the selective reshoring. The ambidexterity theory suggests the balance of achieving exploitation and exploration. By offshoring manufacturing firms get cost optimization, and by reshoring manufacturing they get flexibility. Achieving ambidexterity, i.e. balancing optimization and flexibility, firms can achieve parallel supply chains. The propositions advanced on how companies can structurally partition the supply chain, beginning by segmenting product lines and then matching these product lines to either a low-cost offshored supply chain or a short-lead-time reshored/nearshored supply chain. It is proposed that companies can achieve ambidexterity in the supply chain by building surge capacity into offshored and reshored production facilities. Moreover, companies can use production volume swapping to move manufacturing volumes between offshored and reshored facilities during disruptive supply chain events, such as factory and border closures during the COVID-19 pandemic. Reshoring some of the production volumes makes the firm flexible and more responsive. Thus, the parallel supply chains are created through reshoring, making supply chains more ambidextrous.

The third question **(RQ3.a, RQ3.b, RQ3.c)** is related to the unexplored dimension of reshoring decisions, namely the involvement of suppliers, narrated in essay 3 presented in chapter 5. The suppliers are one of the main stakeholders of supply chains. The reshoring decisions are usually focused towards focal firms, and when these reshoring decisions are implemented, the effect is translated throughout the supply chain partners. Thus, as all the members of the supply chains are affected, they should express their points of view and suggestions on the reshoring decisions taken by the focal firms.

The results collected after interviewing the suppliers of the reshoring showed that the suppliers are pretty well aware that the western world is reshoring their manufacturing facilities. The suppliers for the Western world are usually the low-cost countries, which is why big brands

offshore their production to these countries to get cost efficiencies and cost advantages. The suppliers highlighted different motivations for reshoring initiatives: cost, quality, lead times, geopolitical conditions and import/export restrictions within that region. The suppliers' arguments provided us with the suppliers' strategies to respond to the reshoring projects initiated by the focal firms. Getting to know the supplier's social and financial sustainability issues in the effect of reshoring and the supplier's involvement in these decisions is still a vast discussion.

The supplier's approaches are categorized as: "cost-based strategy", which focuses on cost optimization and cost reduction to increase efficiencies; "market-based strategy", which focuses on new product development, entering the retailer side and new industries to survive in the market. Other approaches are the "knowledge-based strategy", focusing on technology enhancement and adoption of advanced manufacturing methods with innovation, and the "relationship-based strategy" focusing on negotiations and fulfilling the contracts, meeting product specifications and improving communications within supply chain partners. The suppliers chosen in the research are not being experienced with reshoring but the nature of the textile and apparel industry is very clustered and all the industry players and suppliers are aware of the experiences and circumstances faced after reshoring. Thus the suppliers are relevant source of information on the reshoring perspective.

Finally, the fourth research question **(RQ4)** was addressed in the fourth essay presented in chapter 6. With the increasing innovations and ever-changing trends in technology, every aspect of life is being affected by technology. In reshoring decisions, technology involvement is also playing its role in implementing and succeeding in this reshoring initiative. It is important to understand the multifaced role of technology within reshoring activity.

The outcomes show that the key enabling technologies have different roles as specific technologies interact differently with the reshoring decisions and general technologies impact reshoring decisions differently. Thus, the different key enabling technologies impact differently based on the nature of reshoring decisions. For this purpose, knowing the reshoring decision type in terms of location, ownership level, and decision implementation phases is essential. Each technology has different influences on different reshoring decisions and level of implementation of these decisions. The companies who carried out their reshoring projects based on the technological advancements have different experiences on implementation and success of the reshoring initiatives. Technology is one of the prominent driver of the reshoring and the current literature mention and report the drivers but the each driver has its relationship

and effects on the reshoring initiatives. Fourth Research Question is summed up as the after conducting literature review and the facts are reconfirm by conducting the interviews and the data is analyzed by given as literature versus practices analysis, which validates the findings. This study helps to understand the role of prominent driver "technology" with in the implementation and success of the reshoring initiatives taken by the big brands.

7.1 Research Implications

The research implications are discussed at two different levels: theoretical and managerial. These implications are reported in each essay individually, and finally, they are summarized as follow.

7.1.1 Theoretical implications

This dissertation is an effort to unveil and explore new trends with the reshoring literature to enrich the existing literature. Each research essay supports the dissertation's ultimate goal to shed light on the hidden aspects of the reshoring. There are different debates initiated in different research essays to highlight new trends in reshoring phenomena in chapter 3 and the new debates are also initiated in the form of answers given to research essays 2, 3 and 4.

With respect to the essay 1 the effort is done to highlight the new avenues for future research and thus this study matures the existing list of reshoring motivations and enrich the literature by proposing the parallel supply chains in essay 2 to respond the market disruptions; this is also one the novel debate within the reshoring literature that how partial reshoring and intelligent shoring create ambidextrous supply chains.

With respect to the essay 3 the most important factor is there is no study available in the literature to discuss the role and involvement of the suppliers in the reshoring initiative. And this is the very first effort to stat the debate on the supplier's perspective on the reshoring phenomenon. At the end the essay 4 is taking the discussion on the technological role in relocation decisions to the different levels by assessing its specific and supportive role not just defining and explain the technologies itself.

7.1.1 Implications for managers and policy makers

The research also has implications for managers and policymakers. This comprehensive study provides a checklist of all the possible available motivations to managers while planning and initiating the reshoring. This list of drivers and the updated framework of Fratocchi et al.

(2016) serve as the guide. The updated list of the reshoring motivations will provide a clear picture of the reshoring reasoning and help the mangers to identify the relevant reasons for their specific firm's situation. This research also helps the managers to understand the role of reshoring in redesigning and reshaping the supply chains through reshoring and in the result of any disruptions how supply chains can survive.

Finally this dissertation is first attempt to emphasize the role of the suppliers in reshoring decisions. This is the first time the research focuses the supplier side rather than the firms taking reshoring decisions. This study (chapter 5) also suggests that for making such big decisions of reshoring managers should take onboard and consider the inputs of all the stakeholders in the supply chains, especially suppliers. It will not only help the managers to make better reshoring decisions but also help in the implementation process and ensure the success of the reshoring project. Regarding the success of the reshoring project, understanding the role of the technologies in the reshoring decisions making and implementations is important to evaluate and understand, as reported in chapter 6. It is important for policy makers to consider latest and new trends while taking decisions and relocating manufacturing facilities.

7.2 Limitations and future research suggestions

As with all the research studies, this dissertation also has a few limitations due to different circumstances, the specific nature of the research essays, and the selection of research designs. As in chapter 3, the study does not collect the firms' direct decision-making activities. As many authors in the backshoring literature identify, implementation and outcomes are still under-researched (Boffelli and Johansson 2020; Barbieri et al. 2022) and analyzing the drivers still tells only part of the story. For chapter 4, the study suggests that future work should be done to generalize the result by conducting the same study as a large-scale survey. Also, to develop the future studies to test the propositions presented in the essay 2. As this dissertation work is limited to one industry, textile and apparel, and this work should be replicate on other industries to check the variations in the findings.

The research objectives proposed different future research ideas in the form of prepositions and direct the future researcher to look into these avenues in detail. These prepositions are summed up in the Table 7.1 below:

Table 7.1 Research Prepositions for Future

Research Objectives	Research Prepositions
Systematic Literature Review – Reshoring drivers & motivations	*Environmental and Social Sustainability as separate but interconnected entities*
	Supplier relationships/Proximity to suppliers
	Industry 4.0
	Implementing strategies based on product/process innovation
	Covid-19 and global pandemics
	Geopolitical issues
Parallel supply chains / selective reshore activities	*Companies can achieve the synergistic benefits of offshore efficiency and reshored/nearshored flexibility by first segmenting their product lines into low-margin, long-lead time items and high-margin, short-lead-time items, and then by consideration of selectivity of production*
	Selectivity, with respect to width (by product line) and/or depth (by production phase), is an antecedent for the development of an ambidextrous supply chain.
	Parallel supply chains can be developed by structurally partitioning production and supply activities into offshored (efficient) and reshored/nearshored (flexible) activities.
	A parallel supply chain design facilitates in-novation activities by achieving synergies be-tween the experiential knowledge gained from exploiting existing ways of working and the exploration advantages of working with new employees and suppliers in home markets.
	A parallel supply chain design that permits production volume swapping between off-shored and reshored /nearshored facilities allows companies to be responsive to supplier, facility and border closures during disruptive events.
Supplier perspective on reshoring & risk mitigation strategies	*Reducing and optimizing the costs of productions and increasing efficiencies reduces the risk of getting reshored by the focal firms.*
	Developing new products and new markets reduces the chances of reshoring.
	Acquiring new skills sets and knowledge along with the advancing the technological levels prevent the supplier from risk of reshoring.
	Is strategic buyer-supplier relationships can lead to reduce the risk reshoring in business.
Technology's role in reshoring initiatives	*Is the technology driver alone capable of achieving success in reshoring initiative or a combination of drivers may lead to successful implementation of reshoring?*
Unexplored future research avenues on reshoring	*Reshoring for restructuring supply chains*
	Reshoring for zero carbon emission and Reshoring & Sustainability (Green shoring)
	Reshoring as a supply chain strategy

It is a suggestion to future researchers to examine the validity of our propositions and framework in other industries, such as healthcare and pharmaceuticals, aerospace and automotive, with different supply chain properties, whilst taking into account the external stakeholders and country-level environmental regulations (Sena et al. 2022). In particular, scholars are encouraged to investigate SC resilience from structural ambidexterity perspectives and link it to other emerging topics as environmental, social and economic (ESG) perspectives (Choudhary et al. 2022; Gupta, Wang and Czinkota 2021). It may prove interesting for future studies to explore if other major supply chain disruptions, such as the Ukraine–Russia war and tensions between China and Taiwan (Moradlou et al. 2021; Roscoe et al. 2020).

The main limitation of chapter 5 is the sample selection and convincing those suppliers which are reshored and giving them confidence to open up about their experiences after being reshored. The limitation of essay 3 is also that the active suppliers are involved in the research study but the reshored suppliers are reluctant to come up and speak up about their sentiments. Also the study only enable to collect the perspective and failed to collect the impact of reshoring on supplier's sustainability because of unavailability of reshored suppliers as sample. There are still so many layers to unfold regarding the buyer-supplier relationship and the effect of reshoring. Many facts are still unknown and underpinned in the literature, and knowing more about reshoring concerning the supplier's perspective would undoubtedly generate a contribution.

This dissertation was an effort to explore new trends, and many dimensions are tried to explore to understand the issue related to reshoring. The dissertation shed light on many issues like restructuring and redesigning supply chains through ambidexterity and parallel supply chains in the shadow of reshoring selecting manufacturing activities, suppliers' perspective and technology and innovation's role in manufacturing relocation decisions. Thus still many dimensions are unturned and not debated yet, which include reshoring as a supply chain strategy not just a manufacturing relocation decision, reshoring initiatives' role in achieving sustainability goals and may be labelled as green-shoring in future and impact of reshoring on reducing carbon footprints and achieving zero carbon emission goals by firms.

The dimensions presented in figure 7.2 are still unexplored under the umbrella of manufacturing relocation decisions and needs to be researched and must be a motivation for future researchers.

Firstly ***"Reshoring for restructuring supply chains"*** potentially needs to be explored in future to help the practitioners, earlier the restructuring of supply chain was to respond the market forces but after the Covid-19 (McMaster et al. 2020; Shih 2020) the rethinking trend is increased to next level. Thus the post pandemic the effects on global supply networks will motivate the researcher and academia to highlight this aspect.

Secondly ***"Reshoring for zero carbon emission"*** global climate changes and threats to the planet pushing the scientists and researchers to evaluate the existing carbon foot printing of the businesses and how can the carbon foot prints be reduced by reshoring strategies thus this aspect should also be come into discussion in future. Along with that ***"Reshoring & Sustainability (Green shoring)"*** is must be highlighted and brought to be on the top of the discussions as sustainability is the high topic in the researcher's community and studied individually but the role of reshoring in achieving sustainable goals is never come under radar thus it is urged to study these aspects together in future.

Thirdly ***"Reshoring as a supply chain strategy"*** must be visualized not only just a sourcing activity but as a supply chain strategy to achieve not only efficiencies but flexibilities, competitive advantages and also improving supply chain stakeholders relationships in business environments.

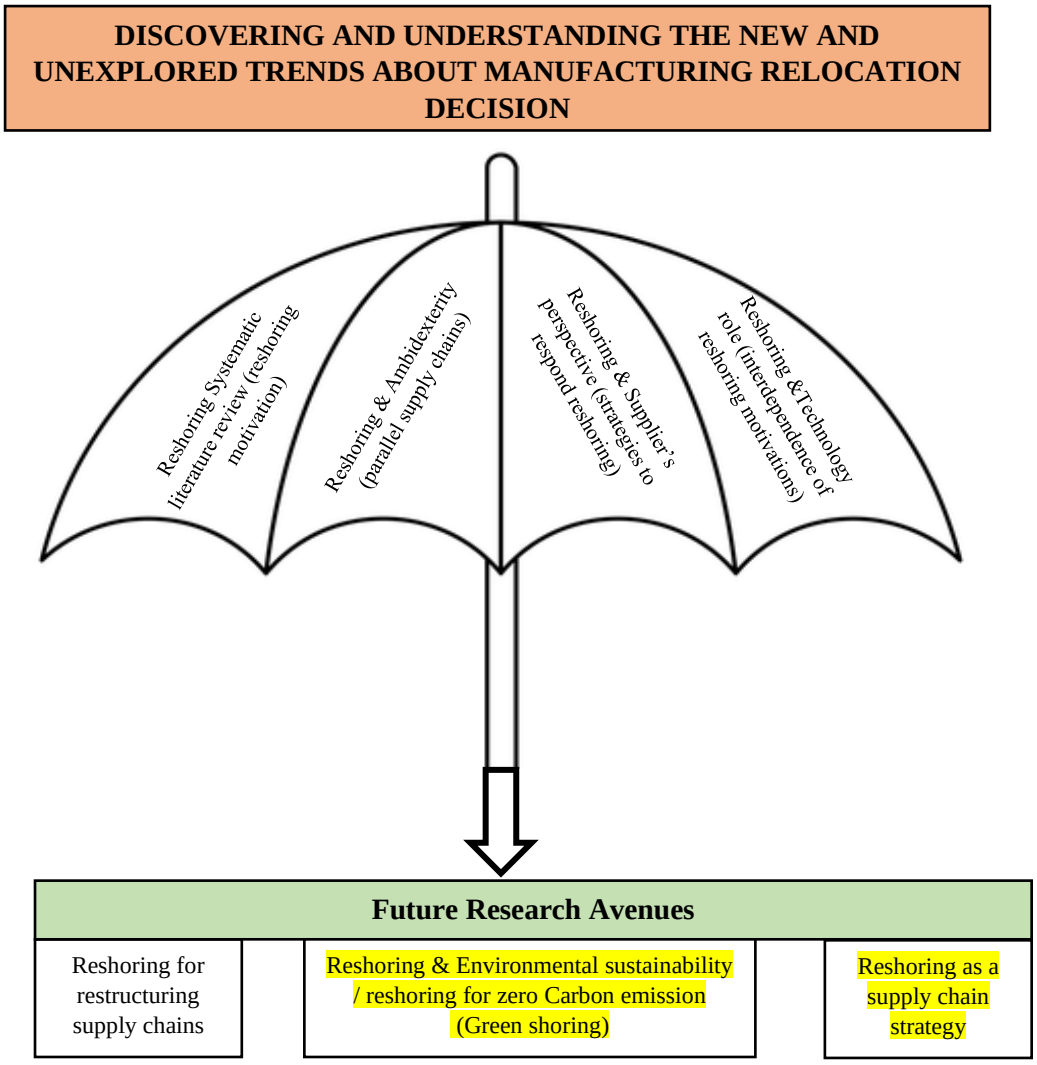

Figure 7.2 Future research suggestions

8. REFERENCES

- Abbasi, M. H. (2016). It's not offshoring or reshoring but right-shoring that matters. *Journal of Textile and Apparel, Technology and Management*, *10*(2).
- Adler, P. S., Goldoftas, B., & Levine, D. I. (1999). Flexibility versus efficiency? A case study of model changeovers in the Toyota production system. Organization science, 10(1), 43-68. https://doi.org/10.1287/orsc.10.1.43
- Albertoni, F., Elia, S., Massini, S., & Piscitello, L. (2017). The reshoring of business services: Reaction to failure or persistent strategy?. Journal of World Business, 52(3), 417-430. https://doi.org/10.1016/j.jwb.2017.01.005
- Ancarani, A., Di Mauro, C., & Mascali, F. (2019). Backshoring strategy and the adoption of industry 4.0: Evidence from Europe. *Journal of World Business*, *54*(4), 360–371. https://doi.org/10.1016/j.jwb.2019.04.003
- 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. https://doi.org/10.1109/emr.2018.2833475
- 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. https://doi.org/10.1016/j.ijpe.2015.07.031
- Ancarani, A., Mauro, C. D., Virtanen, Y., & You, W. (2020). From China to the west: Why manufacturing locates in developed countries. International Journal of Production Research, 59(5), 1435–1449. https://doi.org/10.1080/00207543.2020.1824083
- Andersson, G. (2018). Internet interventions: past, present and future. Internet interventions, 12, 181-188. https://doi.org/10.1016/j.invent.2018.03.008
- Arik, M. (2013). Framing the offshoring and re-shoring debate: a conceptual framework. Journal of Global Business Management, 9(3), 73.
- Arlbjørn, J. S., & Mikkelsen, O. S. (2014). Backshoring Manufacturing: Notes on an important but under-researched theme. Journal of Purchasing and Supply Management, 20(1), 60–62. https://doi.org/10.1016/j.pursup.2014.02.003
- Arlbjørn, J. S., & Lüthje, T. (2012). Global operations and their interaction with supply chain performance. Industrial Management & Data Systems, 112(7), 1044–1064. https://doi.org/10.1108/02635571211255014
- Armstrong, D., Gosling, A., Weinman, J., & Marteau, T. (1997). The place of inter-rater reliability in qualitative research: An empirical study. Sociology, 31(3), 597–606. https://doi.org/10.1177/0038038597031003015
- Ashby, A. (2016). From global to local: Reshoring for Sustainability. Operations Management Research, 9(3–4), 75–88. https://doi.org/10.1007/s12063-016-0117-9
- Aslam, H., Blome, C., Roscoe, S., & Azhar, T. M. (2018). Dynamic Supply Chain Capabilities. International Journal of Operations & Production Management, 38(12), 2266–2285. https://doi.org/10.1108/ijopm-09-2017-0555

- Aslam, H., Blome, C., Roscoe, S., & Azhar, T. M. (2020). Determining the antecedents of dynamic supply chain capabilities. Supply Chain Management: An International Journal, 25(4), 427–442. https://doi.org/10.1108/scm-02-2019-0074
- Asmussen, C. G., Larsen, M. M., & Pedersen, T. (2016). Organizational adaptation in offshoring: The relative performance of home- and host-based learning strategies. Organization Science, 27(4), 911–928. https://doi.org/10.1287/orsc.2016.1060
- De Backer, K., DeStefano, T., Menon, C., & Suh, J. R. (2018). Industrial robotics and the global organisation of production. https://doi.org/10.1787/18151965
- Bailey, D., & De Propris, L. (2014a). Manufacturing reshoring and its limits: The UK automotive case. Cambridge Journal of Regions, Economy and Society, 7(3), 379–395. https://doi.org/10.1093/cjres/rsu019
- Bailey, D., & De Propris, L. (2014b). Reshoring: Opportunities and limits for manufacturing in the UK – the case of the Auto Sector. Revue d'économie Industrielle, (145), 45–61. https://doi.org/10.4000/rei.5732
- 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. https://doi.org/10.1093/cje/bey020
- Baldwin, R., & Venables, A. J. (2013). Spiders and snakes: Offshoring and agglomeration in the global economy. Journal of International Economics, 90(2), 245-254. https://doi.org/10.1016/j.jinteco.2013.02.005
- Bals, L., Kirchoff, J. F., & Foerstl, K. (2016). Exploring the reshoring and insourcing decision making process: Toward an agenda for future research. Operations Management Research, 9(3–4), 102–116. https://doi.org/10.1007/s12063-016-0113-0
- Baraldi, E., Ciabuschi, F., & Fratocchi, L. (2022). The Pros and cons of reshoring to address the problems of shortages in global pharmaceutical value chains: The case of antibiotics. Journal of Global Operations and Strategic Sourcing, 16(3), 618–640. https://doi.org/10.1108/jgoss-11-2021-0092
- Baraldi, E., Ciabuschi, F., Lindahl, O., & Fratocchi, L. (2018). A network perspective on the reshoring process: The relevance of the home- and the host-country contexts. Industrial Marketing Management, 70, 156–166. https://doi.org/10.1016/j.indmarman.2017.08.016
- 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. https://doi.org/10.1007/s12063-020-00160-1
- Barbieri, P., Ciabuschi, F., Fratocchi, L., & Vignoli, M. (2018). What do we know about manufacturing reshoring? Journal of Global Operations and Strategic Sourcing, 11(1), 79–122. https://doi.org/10.1108/jgoss-02-2017-0004
- Barbieri, P., Dosi, C., & Vignoli, M. (2022). Implementing reshoring: Insights and principles from a longitudinal case study in the E-bike industry. Operations Management Research, 16(2), 555–573. https://doi.org/10.1007/s12063-022-00334-z

- Barbieri, P., Elia, S., Fratocchi, L., & Golini, R. (2019). Relocation of second degree: Moving towards a new place or returning home? Journal of Purchasing and Supply Management, 25(3), 100525. https://doi.org/10.1016/j.pursup.2018.12.003
- Barney, J. (1991). Firm Resources and sustained competitive advantage. Journal of Management, 17(1), 99–120. https://doi.org/10.1177/014920639101700108
- Benstead, A. V., Stevenson, M., & Hendry, L. C. (2017). Why and how do firms Reshore? A contingency-based Conceptual Framework. Operations Management Research, 10(3–4), 85–103. https://doi.org/10.1007/s12063-017-0124-5
- Bettiol, M., Burlina, C., Chiarvesio, M., & Di Maria, E. (2017). From delocalisation to backshoring?: Evidence from Italian industrial districts. Investigaciones Regionales= Journal of Regional Research, (39), 137-154.
- Bettiol, M., Capestro, M., Di Maria, E., & Micelli, S. (2023). Ambidextrous strategies in turbulent times: The experience of manufacturing smes during the COVID-19 pandemic. International Journal of Physical Distribution & Logistics Management, 53(2), 248–272. https://doi.org/10.1108/ijpdlm-10-2021-0422
- Birkinshaw, J., & Gupta, K. (2013). Clarifying the distinctive contribution of ambidexterity to the field of organization studies. Academy of Management Perspectives, 27(4), 287–298. https://doi.org/10.5465/amp.2012.0167
- Blinder, A. S. (2006). Offshoring: The next industrial revolution? Foreign Affairs, 85(2), 113. https://doi.org/10.2307/20031915
- Blome, C., Schoenherr, T., & Rexhausen, D. (2013). Antecedents and enablers of supply chain agility and its effect on performance: A dynamic capabilities perspective. International Journal of Production Research, 51(4), 1295–1318. https://doi.org/10.1080/00207543.2012.728011
- Boffelli, A., Fratocchi, L., Kalchschmidt, M., & Silva, S. C. (2021). Doing the right thing or doing things right: What is better for a successful manufacturing reshoring? Operations Management Research, 14(1–2), 1–16. https://doi.org/10.1007/s12063-021-00183-2
- Boffelli, A., Golini, R., Orzes, G., & Dotti, S. (2020). Open the box: A behavioural perspective on the reshoring decision-making and implementation process. Journal of Purchasing and Supply Management, 26(3), 100623. https://doi.org/10.1016/j.pursup.2020.100623
- Boffelli, A., & Johansson, M. (2020). What do we want to know about reshoring? towards a comprehensive framework based on a meta-synthesis. Operations Management Research, 13(1–2), 53–69. https://doi.org/10.1007/s12063-020-00155-y
- Boffelli, A., Orzes, G., & Dotti, S. (2018). “how to Reshore”: Some evidence from the apparel industry. IEEE Engineering Management Review, 46(4), 122–127. https://doi.org/10.1109/emr.2018.2886183
- Brandon-Jones, E., Dutordoir, M., Frota Neto, J. Q., & Squire, B. (2017). The impact of reshoring decisions on shareholder wealth. Journal of Operations Management, 49–51(1), 31–36. https://doi.org/10.1016/j.jom.2016.12.002

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa
- Butollo, F. (2020). Digitalization and the geographies of production: Towards reshoring or global fragmentation? Competition & Change, 25(2), 259–278. https://doi.org/10.1177/1024529420918160
- Bellego, C. (2014). Reshoring: a multifaceted decision involving much more than just labour costs. Les, 4, 1-4.
- Calignano, F., & Mercurio, V. (2023). An overview of the impact of additive manufacturing on supply chain, reshoring, and Sustainability. Cleaner Logistics and Supply Chain, 7, 100103. https://doi.org/10.1016/j.clscn.2023.100103
- Canham, S., & T. Hamilton, R. (2013). SME internationalisation: Offshoring, "backshoring", or staying at home in New Zealand. Strategic Outsourcing: An International Journal, 6(3), 277–291. https://doi.org/10.1108/so-06-2013-0011
- Cannavacciuolo, L., Ferraro, G., Ponsiglione, C., Primario, S., & Quinto, I. (2023). Technological Innovation-Enabling Industry 4.0 Paradigm: A systematic literature review. Technovation, 124, 102733. https://doi.org/10.1016/j.technovation.2023.102733
- Carnahan, S., Agarwal, R., Campbell, B. A., & Franco, A. (2010). The effect of firm compensation structures on employee mobility and employee entrepreneurship of extreme performers. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.1555659
- Casadei, P., & Iammarino, S. (2023). Backshoring, offshoring and staying at home: Evidence from the UK textile and Apparel Industry. Operations Management Research. https://doi.org/10.1007/s12063-023-00394-9
- Cassia, F. (2020). 'manufacturing is coming home': Does reshoring improve perceived product quality? The TQM Journal, 32(6), 1099–1113. https://doi.org/10.1108/tqm-11-2019-0260
- Choudhary, N. A., Ramkumar, M., Schoenherr, T., Rana, N. P., & Dwivedi, Y. K. (2022). Does reshoring affect the resilience and sustainability of Supply Chain Networks? the cases of Apple and Jaguar Land Rover. British Journal of Management, 34(3), 1138–1156. https://doi.org/10.1111/1467-8551.12614
- Ciabuschi, F., Lindahl, O., Barbieri, P., & Fratocchi, L. (2019). Manufacturing reshoring: A strategy to manage risk and commitment in the logic of the internationalization process model. European Business Review, 31(1), 139–159. https://doi.org/10.1108/ebr-02-2018-0046
- Cohen, M. A., Cui, S., Kouvelis, P., Lee, H. L., Matsuo, H., & Steuber, M. (2018). Benchmarking global production sourcing decisions: Where and why firms offshore and Reshore. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2791373
- Contractor, F. J., Kumar, V., Kundu, S. K., & Pedersen, T. (2010). Reconceptualizing the firm in a world of outsourcing and offshoring: The Organizational and geographical relocation of high-value company functions. Journal of Management Studies, 47(8), 1417–1433. https://doi.org/10.1111/j.1467-6486.2010.00945.x

- Dachs, B., Kinkel, S., & Jäger, A. (2019a). Bringing it all back home? Backshoring of manufacturing activities and the adoption of Industry 4.0 Technologies. Journal of World Business, 54(6), 101017. https://doi.org/10.1016/j.jwb.2019.101017
- Dachs, B., Kinkel, S., Jäger, A., & Palčič, I. (2019b). Backshoring of production activities in European manufacturing. Journal of Purchasing and Supply Management, 25(3), 100531. https://doi.org/10.1016/j.pursup.2019.02.003
- Denning, S. (2013). Boeing's offshoring woes: Seven lessons every CEO must learn. Strategy & Leadership, 41(3), 29–35. https://doi.org/10.1108/10878571311323190
- Denyer D, Tranfield D (2009) Producing a Systematic Review. In: Buchanan D, Bryman A (eds) The SAGE Handbook of Organizational Research Methods. SAGE, London, pp 671–689
- Dey. L, B., Alwi, S. F., Babu, M. M., Roy, S. K., & Muhammad, S. S. (2022). Brexit or brand it? the effects of attitude towards Brexit and reshored brands on Consumer Purchase Intention. British Journal of Management, 34(3), 1215–1237. https://doi.org/10.1111/1467-8551.12663
- Di Mauro, C., & Ancarani, A. (2022). A taxonomy of back-shoring initiatives in the US. International Business Review, 31(5), 102006. https://doi.org/10.1016/j.ibusrev.2022.102006
- Di Mauro, C., Fratocchi, L., Orzes, G., & Sartor, M. (2018). Offshoring and backshoring: A multiple case study analysis. Journal of Purchasing and Supply Management, 24(2), 108–134. https://doi.org/10.1016/j.pursup.2017.07.003
- Di Stefano, C., Fratocchi, L., & Merino, F. (2018). Manufacturing relocations in the footwear industry: A comparison between Italy and Spain. Advance Manufacturing Technologies, 32, 455-460.
- Diaz, A., & Mendoça-Tachizawa, E. (2017). Locating operations in high labor cost countries – evidence from Spain. Journal of Operations and Supply Chain Management, 10(1), 3–16. https://doi.org/10.12660/joscmv10n1p3-16
- Dubois, A., & Araujo, L. (2007). Case research in purchasing and Supply Management: Opportunities and challenges. Journal of Purchasing and Supply Management, 13(3), 170–181. https://doi.org/10.1016/j.pursup.2007.09.002
- Dunning, J. H. (1998). Location and the multinational enterprise: A neglected factor? The New Economic Analysis of Multinationals. https://doi.org/10.4337/9781843766995.00011
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. Academy of Management Journal, 50(1), 25–32. https://doi.org/10.5465/amj.2007.24160888
- Elia, S., Fratocchi, L., & Barbieri , P. (2021). Post-pandemic reconfiguration from global to domestic and regional value chains: The role of Industrial Policies. Transnational Corporations, 28(2), 67–96. https://doi.org/10.18356/2076099x-28-2-3
- Ellram, L. M. (2013). Offshoring, reshoring and the Manufacturing Location Decision. Journal of Supply Chain Management, 49(2), 3–5. https://doi.org/10.1111/jscm.12023

- Ellram, L. M., Tate, W. L., & Billington, C. (2008). Offshore outsourcing of professional services: A transaction cost economics perspective. Journal of Operations Management, 26(2), 148–163. https://doi.org/10.1016/j.jom.2007.02.008
- 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. https://doi.org/10.1111/jscm.12019
- Engström, G., Sollander, K., Hilletofth, P., & Eriksson, D. (2018). Reshoring drivers and barriers in the Swedish manufacturing industry. Journal of Global Operations and Strategic Sourcing, 11(2), 174–201. https://doi.org/10.1108/jgoss-06-2017-0014
- Eriksson, D., Hilletofth, P., Tate, W., & Gothager, M. (2021). Critical manufacturing prerequisites for successful reshoring. Operations and Supply Chain Management: An International Journal, 249–260. https://doi.org/10.31387/oscm0450300
- Eriksson, D., Sollander, K., Engström, G., & Hilletofth, P. (2018). Drivers and barriers of reshoring in the Swedish Manufacturing Industry. World Review of Intermodal Transportation Research, 7(3), 195. https://doi.org/10.1504/writr.2018.10014263
- España, J. (2015). Offshoring costs: A comprehensive model. Journal of Business and Behavioral Sciences, 27(2), 81.
- Faber, M. (2020). Robots and reshoring: Evidence from Mexican Labor Markets. Journal of International Economics, 127, 103384. https://doi.org/10.1016/j.jinteco.2020.103384
- Feenstra, R. C. (1998). Integration of trade and disintegration of production in the global economy. Journal of Economic Perspectives, 12(4), 31–50. https://doi.org/10.1257/jep.12.4.31
- Fel, F., & Griette, E. (2017). Near-reshoring your supplies from China: A good deal for financial motives too. Strategic Direction, 33(2), 24–26. https://doi.org/10.1108/sd-11-2016-0150
- Financial Times (2019). 'How extreme agility put Zara ahead in fast fashion'. Available at: https://www.ft.com/content/ 3f581046-cd7c-11e9-b018-ca4456540ea6 [Accessed 30 March 2013].
- Fine, C. (2013). Intelli-sourcing to replace offshoring as supply chain transparency increases. Journal of Supply Chain Management, 49(2), 6–7. https://doi.org/10.1111/jscm.12018
- Fisher, G., & Aguinis, H. (2017). Using theory elaboration to make theoretical advancements. Organizational Research Methods, 20(3), 438–464. https://doi.org/10.1177/1094428116689707
- 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. https://doi.org/10.1108/jabs-07-2016-0106
- Foerstl, K., Kirchoff, J. F., & Bals, L. (2016). Reshoring and insourcing: Drivers and Future Research Directions. International Journal of Physical Distribution & Logistics Management, 46(5), 492–515. https://doi.org/10.1108/ijpdlm-02-2015-0045

- Foroudi, P., Marvi, R., Cuomo, M. T., Bagozzi, R., Dennis, C., & Jannelli, R. (2022). Consumer perceptions of sustainable development goals: Conceptualization, Measurement and contingent effects. British Journal of Management, 34(3), 1157–1183. https://doi.org/10.1111/1467-8551.12637
- Foster, K. (2016). A prediction of US knit apparel demand: making the case for Reshoring manufacturing investment in new technology. Journal of Textile and Apparel, Technology and Management, 10(2).
- Fox, S. (2015). Moveable factories: How to enable sustainable widespread manufacturing by local people in regions without manufacturing skills and infrastructure. Technology in Society, 42, 49–60. https://doi.org/10.1016/j.techsoc.2015.03.003
- Fratocchi, L. (2018). Additive Manufacturing Technologies as a reshoring enabler: A why, where and how approach. World Review of Intermodal Transportation Research, 7(3), 264. https://doi.org/10.1504/writr.2018.10014292
- Fratocchi, L., Ancarani, A., Barbieri, P., Di Mauro, C., Nassimbeni, G., Sartor, M., ... & Zanoni, A. (2015). Manufacturing back-reshoring as a nonlinear internationalization process. In The future of global organizing (pp. 365-403). Emerald Group Publishing Limited. https://doi.org/10.1108/S1745-886220150000010011
- Fratocchi, L., Ancarani, A., Barbieri, P., Di Mauro, C., Nassimbeni, G., Sartor, M., Vignoli, M., & Zanoni, A. (2016). Motivations of manufacturing reshoring: An interpretative framework. International Journal of Physical Distribution & Logistics Management, 46(2), 98–127. https://doi.org/10.1108/ijpdlm-06-2014-0131
- Fratocchi, L., & Di Stefano, C. (2019). Manufacturing reshoring in the Fashion Industry: A Literature Review. World Review of Intermodal Transportation Research, 8(4), 338. https://doi.org/10.1504/writr.2019.10024864
- Fratocchi, L., & Di Stefano, C. (2019a). Does sustainability matter for reshoring strategies? A literature review. Journal of Global Operations and Strategic Sourcing, 12(3), 449–476. https://doi.org/10.1108/jgoss-02-2019-0018
- Fratocchi, L., Di Mauro, C., Barbieri, P., Nassimbeni, G., & Zanoni, A. (2014). When manufacturing moves back: Concepts and questions. Journal of Purchasing and Supply Management, 20(1), 54–59. https://doi.org/10.1016/j.pursup.2014.01.004
- Gao, W., Zhang, Y., Ramanujan, D., Ramani, K., Chen, Y., Williams, C. B., ... & Zavattieri, P. D. (2015). The status, challenges, and future of additive manufacturing in engineering. Computer-Aided Design, 69, 65-89.
- Gerbl, M., McIvor, R., Loane, S., & Humphreys, P. (2015). A multi-theory approach to understanding the business process outsourcing decision. Journal of World Business, 50(3), 505–518. https://doi.org/10.1016/j.jwb.2014.08.009
- Gharleghi, B., Jahanshahi, A. A., & Thoene, T. (2020). Locational factors and the reindustrialisation process in the USA; reshoring from China. International Journal of Business and Globalisation, 24(2), 275. https://doi.org/10.1504/ijbg.2020.105173
- Gibson, C. B., & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of Organizational Ambidexterity. Academy of Management Journal, 47(2), 209–226. https://doi.org/10.5465/20159573

- Grandinetti, R., & Tabacco, R. (2015). A return to spatial proximity: Combining global suppliers with local subcontractors. International Journal of Globalisation and Small Business, 7(2), 139. https://doi.org/10.1504/ijgsb.2015.071189
- Grappi, S., Romani, S., & Bagozzi, R. P. (2015). Consumer stakeholder responses to reshoring strategies. Journal of the Academy of Marketing Science, 43(4), 453–471. https://doi.org/10.1007/s11747-015-0432-y
- Grappi, S., Romani, S., & Bagozzi, R. P. (2018). Reshoring from a demand-side perspective: Consumer reshoring sentiment and its market effects. Journal of World Business, 53(2), 194–208. https://doi.org/10.1016/j.jwb.2017.11.001
- Gray, J. V., Esenduran, G., Rungtusanatham, M. J., & Skowronski, K. (2017). Why in the world did they reshore? examining small to medium-sized manufacturer decisions. Journal of Operations Management, 49–51(1), 37–51. https://doi.org/10.1016/j.jom.2017.01.001
- Gray, J. V., Skowronski, K., Esenduran, G., & Johnny Rungtusanatham, M. (2013). The reshoring phenomenon: What supply chain academics ought to know and should do. Journal of Supply Chain Management, 49(2), 27–33. https://doi.org/10.1111/jscm.12012
- Gualandris, J., Legenvre, H., & Kalchschmidt, M. (2018). Exploration and exploitation within supply networks. International Journal of Operations & Production Management, 38(3), 667–689. https://doi.org/10.1108/ijopm-03-2017-0162
- Gupta, S., Wang, Y., & Czinkota, M. (2021). Reshoring and Sustainable Development Goals. British Journal of Management, 32(3). https://doi.org/10.1111/1467-8551.12500
- Gurvich, V. J., & Hussain, A. S. (2020). In and beyond COVID-19: US academic pharmaceutical science and engineering community must engage to meet critical national needs. AAPS PharmSciTech, 21(5). https://doi.org/10.1208/s12249-020-01718-9
- Gyarmathy, A., Peszynski, K., & Young, L. (2020). Theoretical Framework for a local, agile supply chain to create innovative product closer to end-user: Onshore-offshore debate. Operations and Supply Chain Management: An International Journal, 108–122. https://doi.org/10.31387/oscm0410256
- 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. https://doi.org/10.1016/j.ijpe.2015.01.006
- Güemes, D. C., & Monroy, B. C. (2020). Ambidexterity in the supply chain: Studying the apparel industry. International Journal of Agile Systems and Management, 13(2), 130. https://doi.org/10.1504/ijasm.2020.107904
- Handfield, R. B., Graham, G., & Burns, L. (2020). Corona virus, tariffs, Trade Wars and Supply Chain Evolutionary Design. International Journal of Operations & Production Management, 40(10), 1649–1660. https://doi.org/10.1108/ijopm-03-2020-0171
- 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: The Journal of the Local Economy Policy Unit, 35(4), 403–415. https://doi.org/10.1177/0269094220953528

- Hartman, P. L., Ogden, J. A., Wirthlin, J. R., & Hazen, B. T. (2017). Nearshoring, reshoring, and insourcing: Moving beyond the total cost of ownership conversation. Business Horizons, 60(3), 363–373. https://doi.org/10.1016/j.bushor.2017.01.008
- Hasan, R. (2018). Reshoring of US apparel manufacturing: lesson from an innovative North Carolina based manufacturing company. Journal of Textile and Apparel, Technology and Management, 10(4).
- Heikkilä, J., Martinsuo, M., & Nenonen, S. (2018a). Backshoring of production in the context of a small and open Nordic economy. Journal of Manufacturing Technology Management, 29(4), 658–675. https://doi.org/10.1108/jmtm-12-2016-0178
- Heikkilä, J., Stentoft, J., Olhager, J., & Nenonen, S. (2018b). Manufacturing relocation abroad and back: Empirical evidence from the Nordic countries. World Review of Intermodal Transportation Research, 7(3), 221. https://doi.org/10.1504/writr.2018.10014279
- Hilletofth, P., Eriksson, D., Tate, W., & Kinkel, S. (2019). Right-shoring: Making resilient offshoring and reshoring decisions. Journal of Purchasing and Supply Management, 25(3), 100540. https://doi.org/10.1016/j.pursup.2019.100540
- Hilletofth, P., Sequeira, M., & Tate, W. (2021). Fuzzy-logic-based support tools for initial screening of manufacturing reshoring decisions. Industrial Management & Data Systems, 121(5), 965–992. https://doi.org/10.1108/imds-05-2020-0290
- Hoque, M. A., Rasiah, R., Furuoka, F., & Kumar, S. (2021). Linkages among automation, job displacement and reshoring: Evidence from the Bangladeshi apparel industry. Research Journal of Textile and Apparel, 26(4), 515–531. https://doi.org/10.1108/rjta-04-2021-0044
- Huq, F., Pawar, K. S., & Rogers, H. (2016). Supply Chain Configuration Conundrum: How does the pharmaceutical industry mitigate disturbance factors? Production Planning & Control, 1–15. https://doi.org/10.1080/09537287.2016.1193911
- Huq, F., Pawar, K. S., & Subramanian, N. (2020). 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. https://doi.org/10.1080/00207543.2020.1756503
- Hätönen, J., & Eriksson, T. (2009). 30+ years of research and practice of outsourcing – exploring the past and anticipating the future. Journal of International Management, 15(2), 142–155. https://doi.org/10.1016/j.intman.2008.07.002
- Ivanov, D. (2020). Viable supply chain model: Integrating agility, resilience and Sustainability Perspectives—lessons from and thinking beyond the COVID-19 pandemic. Annals of Operations Research, 319(1), 1411–1431. https://doi.org/10.1007/s10479-020-03640-6
- Jain, N. K., Kothari, T., & Kumar, V. (2016). Location Choice Research: Proposing New Agenda. Management International Review, 56(3), 303–324. https://doi.org/10.1007/s11575-015-0271-6
- Jensen, P. D. Ø. (2009). A learning perspective on the offshoring of advanced services. Journal of International Management, 15(2), 181–193. https://doi.org/10.1016/j.intman.2008.06.004

- Jiang, B., Frazier, G. V., & Prater, E. (2006). Outsourcing effects on firms' operational performance. International Journal of Operations & Production Management, 26(12), 1280–1300. https://doi.org/10.1108/01443570610710551
- Johansson, M., & Olhager, J. (2018). Comparing offshoring and backshoring: The role of manufacturing site location factors and their impact on post-relocation performance. International Journal of Production Economics, 205, 37–46. https://doi.org/10.1016/j.ijpe.2018.08.027
- Johansson, M., & Olhager, J. (2017). Manufacturing relocation through offshoring and backshoring: the case of Sweden. Journal of Manufacturing Technology Management, 29(4), 637–657. https://doi.org/10.1108/jmtm-01-2017-0006
- Johansson, M., Olhager, J., Heikkilä, J., & Arlbjørn, J. S. (2019). Offshoring versus backshoring: Empirically derived bundles of relocation drivers, and their relationship with benefits. Journal of Purchasing and Supply Management, 25(3), 100509. https://doi.org/10.1016/j.pursup.2018.07.003
- Joubioux, C., & Vanpoucke, E. (2016). Towards right-shoring: a framework for off-and re-shoring decision making. Operations Management Research, 9(3–4), 117–132. https://doi.org/10.1007/s12063-016-0115-y
- Jung, S. H. (2019). Offshore versus Onshore Sourcing: Quick Response, Random Yield, and Competition. Production and Operations Management, 29(3), 750–766. https://doi.org/10.1111/poms.13135
- Kaivo-oja, J. R. L., & Lauraeus, I. T. (2018). The VUCA approach as a solution concept to corporate foresight challenges and global technological disruption. foresight, 20(1), 27-49. https://doi.org/10.1108/FS-06-2017-0022
- Kamp, B., & Gibaja, J. J. (2021). Adoption of digital technologies and backshoring decisions: is there a link? Operations Management Research, 14(3–4), 380–402. https://doi.org/10.1007/s12063-021-00202-2
- Kandil, N., Battaïa, O., & Hammami, R. (2020). Globalisation vs. Slowbalisation: a literature review of analytical models for sourcing decisions in supply chain management. Annual Reviews in Control, 49, 277–287. https://doi.org/10.1016/j.arcontrol.2020.04.004
- Kang, M., Choi, Y., Kim, J., Lee, K. O., Lee, S., Park, I. K., Park, J., & Seo, I. (2020). COVID-19 impact on city and region: what's next after lockdown? The International Journal of Urban Sciences, 24(3), 297–315. https://doi.org/10.1080/12265934.2020.1803107
- Kano, L., & Oh, C. H. (2020). Global value chains in the post-COVID world: Governance for reliability. Journal of Management Studies, 57(8), 1773–1777.
- Kazmer, D. O. (2014). Manufacturing outsourcing, onshoring, and global equilibrium. Business Horizons, 57(4), 463–472. https://doi.org/10.1016/j.bushor.2014.03.005
- Ketokivi, M., & Choi, T. Y. (2014). Renaissance of case research as a scientific method. Journal of Operations Management, 32(5), 232–240. https://doi.org/10.1016/j.jom.2014.03.004

- Ketokivi, M., Turkulainen, V., Seppälä, T., Rouvinen, P., & Ali-Yrkkö, J. (2017). Why locate manufacturing in a high-cost country? A case study of 35 production location decisions. Journal of Operations Management, 49–51(1), 20–30. https://doi.org/10.1016/j.jom.2016.12.005
- Khayyam, S., Ramish, A., Rehman, K. U., & Syed, A. R. (2022). Strategizing Radio frequency identification (RFID) in the retail supply chains of Pakistan: a multiple case study. Operations and Supply Chain Management, 27–40. https://doi.org/10.31387/oscm0480328
- Kim, J., Traoré, M., & Warfield, C. L. (2006). The textile and apparel industry in developing countries. Textile Progress, 38(3), 1–64. https://doi.org/10.1533/tepr.2006.0003
- Kilpatrick, J. (2022). Supply chain implications of the Russia-Ukraine conflict. Deloitte Insights.
- Kinkel, S. (2012). Trends in production relocation and backshoring activities. International Journal of Operations & Production Management, 32(6), 696–720. https://doi.org/10.1108/01443571211230934
- Kinkel, S., Lay, G., & Maloca, S. (2007). Development, motives and employment effects of manufacturing offshoring of German SMEs. International Journal of Entrepreneurship and Small Business, 4(3), 256. https://doi.org/10.1504/ijesb.2007.013251
- Kinkel, S., & Maloca, S. (2009). Drivers and antecedents of manufacturing offshoring and backshoring—A German perspective. Journal of Purchasing and Supply Management, 15(3), 154–165. https://doi.org/10.1016/j.pursup.2009.05.007
- Krenz, A., Prettner, K., & Strulik, H. (2021). Robots, reshoring, and the lot of low-skilled workers. European Economic Review, 136, 103744. https://doi.org/10.1016/j.euroecorev.2021.103744
- Krippendorff, K. (2012). The semantic turn: a new foundation for design . Walter de Gruyter.
- Lampón, J. F., & González-Benito, J. (2019). Backshoring and improved key manufacturing resources in firms' home location. International Journal of Production Research, 58(20), 6268–6282. https://doi.org/10.1080/00207543.2019.1676479
- Lampón, J. F., & López, E. (2021). 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
- Lasi, H., Fettke, P., Kemper, H. G., Feld, T., & Hoffmann, M. (2014). Industry 4.0. Business & information systems engineering, 6, 239-242. https://doi.org/10.1007/s12599-014-0334-4
- Lavissière, A., Mandják, T., & Fedi, L. (2016). The key role of infrastructure in backshoring operations: the case of free zones. Supply Chain Forum, 17(3), 143–155. https://doi.org/10.1080/16258312.2016.1215522

- Lawson, B., & Potter, A. (2012). Determinants of knowledge transfer in inter-firm new product development projects. International Journal of Operations & Production Management, 32(10), 1228–1247. https://doi.org/10.1108/01443571211274530
- Leary A, Thomas K (2021) Biden Proposes Buy American Rule for Government Procurements. In: The Wall Street Journal. https://www.wsj.com/articles/biden-to-propose-buy-american-rule-for-government-procurements-11627462800?mod=Searchresults_pos3&page=1. Accessed 8 Jun 2022
- Lee, S. M., & Rha, J. S. (2016). Ambidextrous supply chain as a dynamic capability: building a resilient supply chain. Management Decision, 54(1), 2–23. https://doi.org/10.1108/md-12-2014-0674
- Lee, E. (2022). Re-globalisation and supply chain reshoring: Motivation and performance of global companies in Korea. *Asia-Pacific Journal of Convergent Research Interchange*, *8*(2), 1–12. https://doi.org/10.47116/apjcri.2022.02.01
- Li, J. (2020). Grow local manufacturing along US/Mexico border region for an integrated supply chain in the Post COVID-19 era. Smart and Sustainable Manufacturing Systems.
- Lund, H. B., & Steén, M. (2020). Make at home or abroad? Manufacturing reshoring through a GPN lens: A Norwegian case study. Geoforum, 113, 154–164. https://doi.org/10.1016/j.geoforum.2020.04.015
- Manning, S. (2014). Mitigate, tolerate or relocate? Offshoring challenges, strategic imperatives and resource constraints. Journal of World Business, 49(4), 522–535. https://doi.org/10.1016/j.jwb.2013.12.006
- March, J. G. (1991). Exploration and exploitation in organizational learning. Organization Science, 2(1), 71–87. https://doi.org/10.1287/orsc.2.1.71
- Marfia, G., & Esposti, P. D. (2017). Blockchain and Sensor-Based Reputation Enforcement for the support of the reshoring of business activities. In Measuring operations performance (pp. 125–139). https://doi.org/10.1007/978-3-319-58883-4_6
- Martínez-Mora, C., & De Lucas, F. M. (2020). Consequences of sustainable innovations on the reshoring drivers' framework. Journal of Manufacturing Technology Management, 31(7), 1373–1390. https://doi.org/10.1108/jmtm-12-2019-0426
- Martínez-Mora, C., & Merino, F. (2014). Offshoring in the Spanish footwear industry: a return journey? Social Science Research Network. https://papers.ssrn.com/sol3/Delivery.cfm?abstractid=2482252
- Martínez-Mora, C., & Merino, F. (2020). Consequences of sustainable innovations on the reshoring drivers' framework. Journal of Manufacturing Technology Management, 31(7), 1373-1390. https://doi.org/10.1108/JMTM-12-2019-0426
- McIvor, R., & Bals, L. (2021). A multi-theory framework for understanding the reshoring decision. International Business Review, 30(6), 101827. https://doi.org/10.1016/j.ibusrev.2021.101827
- McMaster, M., Nettleton, C., Tom, C., Xu, B., Cao, C., & Qiao, P. (2020). Risk Management: Rethinking fashion supply chain management for multinational corporations

in light of the COVID-19 outbreak. Journal of Risk and Financial Management, 13(8), 173. https://doi.org/10.3390/jrfm13080173

- Medina-Serrano, R., González-Ramírez, R., Gascó, J. L., & Llopis, J. (2020). Strategic sourcing: Developing a progressive framework for make-or-buy decisions. Journal of Industrial Engineering and Management, 13(1), 133. https://doi.org/10.3926/jiem.2858
- Merino, F., Di Stefano, C., & Fratocchi, L. (2020). Back-Shoring vs. Near-Shoring: A Comparative Study. In IOS Press eBooks. https://doi.org/10.3233/atde200201
- Młody, M. (2016). Backshoring in light of the concepts of divestment and de-internationalization: similarities and differences. Entrepreneurial Business and Economics Review, 4(3), 167–180. https://doi.org/10.15678/eber.2016.040312
- Moore, M. E., Rothenberg, L., & Moser, H. (2018). Contingency factors and reshoring drivers in the textile and apparel industry. Journal of Manufacturing Technology Management, 29(6), 1025–1041. https://doi.org/10.1108/jmtm-07-2017-0150
- Moradlou, H., Backhouse, C., & Ranganathan, R. (2017). Responsiveness, the primary reason behind re-shoring manufacturing activities to the UK: an Indian industry perspective. International Journal of Physical Distribution & Logistics Management, 47(2/3), 222-236.
- Moradlou, H., & Backhouse, C. (2014). Re-shoring UK manufacturing activities, supply chain management & postponement issues. In 18th Annual Cambridge International Manufacturing Symposium (pp. 344-354).
- Moradlou, H., & Backhouse, C. (2016). A review of manufacturing re-shoring in the context of customer-focused postponement strategies. Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture, 230(9), 1561–1571. https://doi.org/10.1177/0954405415623486
- Moradlou, H., Fratocchi, L., Skipworth, H., & Ghadge, A. (2021). Post-Brexit back-shoring strategies: what UK manufacturing companies could learn from the past? Production Planning & Control, 33(14), 1319–1336. https://doi.org/10.1080/09537287.2020.1863500
- 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. https://doi.org/10.1108/ijopm-07-2020-0465
- Moradlou, H., & Tate, W. L. (2018). Reshoring and additive manufacturing. World Review of Intermodal Transportation Research, 7(3), 241. https://doi.org/10.1504/writr.2018.10014280
- Moretto, A., Patrucco, A. S., & Harland, C. (2019). The dynamics of reshoring decisions and the role of purchasing. International Journal of Production Research, 58(19), 5929–5944. https://doi.org/10.1080/00207543.2019.1661534
- Mudambi, R. (2008). Location, control and innovation in knowledge-intensive industries. Journal of Economic Geography, 8(5), 699–725. https://doi.org/10.1093/jeg/lbn024
- NERAD, J. (2019). Auto Execs Say US Mexico Canada Trade Pact Will Have Positive Effects.

- Ngai, E. W., Peng, S., Alexander, P., & Moon, K. K. (2014). Decision support and intelligent systems in the textile and apparel supply chain: An academic review of research articles. Expert Systems With Applications, 41(1), 81–91. https://doi.org/10.1016/j.eswa.2013.07.013
- Nielsen, J. A., Mathiassen, L., & Hansen, A. M. (2018). Exploration and exploitation in Organizational Learning: A critical application of the 4I Model. British Journal of Management, 29(4), 835–850. https://doi.org/10.1111/1467-8551.12324
- Nujen, B. B., Halse, L. L., Damm, R., & Gammelsæter, H. (2018). Managing reversed (global) outsourcing – the role of knowledge, technology and time. Journal of Manufacturing Technology Management, 29(4), 676–698. https://doi.org/10.1108/jmtm-02-2017-0023
- Nujen, B. B., Mwesiumo, D., Solli-Sæther, H., Slyngstad, A. B., & Halse, L. L. (2019). Backshoring readiness. Journal of Global Operations and Strategic Sourcing, 12(1), 172–195. https://doi.org/10.1108/jgoss-05-2018-0020
- O'Reilly, C. A., & Tushman, M. L. (2013). Organizational ambidexterity: past, present, and future. Academy of Management Perspectives, 27(4), 324–338. https://doi.org/10.5465/amp.2013.0025
- Orzes, G., & Sarkis, J. (2019). Reshoring and environmental sustainability: An unexplored relationship? Resources Conservation and Recycling, 141, 481–482. https://doi.org/10.1016/j.resconrec.2018.11.004
- Oshri, I., Sidhu, J. S., & Kotlarsky, J. (2019). East, west, would home really be best? On dissatisfaction with offshore-outsourcing and firms' inclination to backsource. Journal of Business Research, 103, 644–653. https://doi.org/10.1016/j.jbusres.2017.11.008
- Pal, R., Harper, S., & Vellesalu, A. (2018). Competitive manufacturing for reshoring textile and clothing supply chains to high-cost environment. The International Journal of Logistics Management, 29(4), 1147–1170. https://doi.org/10.1108/ijlm-10-2017-0270
- Park, Y., Pavlou, P. A., & Saraf, N. (2020). Configurations for Achieving Organizational Ambidexterity with Digitization. Information Systems Research, 31(4), 1376–1397. https://doi.org/10.1287/isre.2020.0950
- Patel, P. C., S. Terjesen and D. Li (2012). 'Enhancing effects of manufacturing flexibility through operational absorptive capacity and operational ambidexterity', Journal of Operations Management, 30, pp. 201–220. https://doi.org/10.1016/j.jom.2011.10.004
- Pedroletti, D., & Ciabuschi, F. (2023). Reshoring: A review and research agenda. Journal of Business Research, 164, 114005. https://doi.org/10.1016/j.jbusres.2023.114005
- Piatanesi, B., & Arauzo-Carod, J. (2019). Backshoring and nearshoring: An overview. Growth and Change, 50(3), 806–823. https://doi.org/10.1111/grow.12316
- Pick, D. (2010). Never Say Never—Status Quo and Research Agenda for relationship termination in B2B markets. Journal of Business Market Management, 4(2), 91–108. https://doi.org/10.1007/s12087-010-0034-4
- Pisano, G. P., & Shih, W. C. (2009). Restoring american competitiveness. Harvard business review, 87(7/8), 114-125.

- Pla-Barber J., Villar, C., & Narula, R. (2021). Governance of global value chains after the Covid-19 pandemic: A new wave of regionalization? BRQ Business Research Quarterly, 24(3), 204–213. https://doi.org/10.1177/23409444211020761
- Presley, A., Meade, L., & Sarkis, J. (2016). A strategic sourcing evaluation methodology for reshoring decisions. Supply Chain Forum, 17(3), 156–169. https://doi.org/10.1080/16258312.2016.1215852
- Qi, Q., Tao, F., Hu, T., Anwer, N., Liu, A., Wei, Y., Wang, L., & Nee, A. Y. C. (2021). Enabling technologies and tools for digital twin. Journal of Manufacturing Systems, 58, 3–21. https://doi.org/10.1016/j.jmsy.2019.10.001
- Radi, D., Lamantia, F., & Bischi, G. I. (2021). Offshoring, reshoring, unemployment, and wage dynamics in a two-country evolutionary model. Macroeconomic Dynamics, 25(3), 705-732. https://doi.org/10.1017/S1365100519000385
- Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. L. (2009). Organizational ambidexterity: balancing exploitation and exploration for sustained performance. Organization Science, 20(4), 685–695. https://doi.org/10.1287/orsc.1090.0428
- Rasel, M. A., & Win, S. (2020). Microfinance governance: A systematic review and future research directions. Journal of Economic Studies, 47(7), 1811-1847. https://doi.org/10.1108/JES-03-2019-0109
- Robertson, C. J., Lamin, A., & Livanis, G. (2010). Stakeholder perceptions of offshoring and outsourcing: The role of embedded issues. Journal of Business Ethics, 95(2), 167–189. https://doi.org/10.1007/s10551-009-0353-0
- Robinson, P. K., & Hsieh, L. (2016). Reshoring: a strategic renewal of luxury clothing supply chains. Operations Management Research, 9(3–4), 89–101. https://doi.org/10.1007/s12063-016-0116-x
- Roblek, V., Meško, M., & Krapež, A. (2016). A complex view of industry 4.0. Sage open, 6(2), 2158244016653987. https://doi.org/10.1177/2158244016653987
- Roscoe, S., Aktaş, E., Petersen, K. J., Skipworth, H., Handfield, R., & Habib, F. (2022). Redesigning global supply chains during compounding geopolitical disruptions: the role of supply chain logics. International Journal of Operations & Production Management, 42(9), 1407–1434. https://doi.org/10.1108/ijopm-12-2021-0777
- Roscoe, S., & Blome, C. (2019). Understanding the emergence of redistributed manufacturing: an ambidexterity perspective. Production Planning & Control, 30(7), 496–509. https://doi.org/10.1080/09537287.2018.1540051
- Roscoe, S., Skipworth, H., Aktaş, E., & Habib, F. (2020). Managing supply chain uncertainty arising from geopolitical disruptions: evidence from the pharmaceutical industry and brexit. International Journal of Operations & Production Management, 40(9), 1499–1529. https://doi.org/10.1108/ijopm-10-2019-0668
- Saki, Z. (2016). Disruptive Innovations in Manufacturing – An Alternative for Re-shoring Strategy. Journal of Textile and Apparel Technology and Management, 10(2). https://ojs.cnr.ncsu.edu/index.php/JTATM/article/download/9861/4924

- Sansone, C., Hilletofth, P., & Eriksson, D. (2020). Evaluation of critical operations capabilities for competitive manufacturing in a high-cost environment. Journal of Global Operations and Strategic Sourcing, 13(3), 229–250. https://doi.org/10.1108/jgoss-10-2019-0055
- Sardar, S., Lee, Y. H., & Memon, M. S. (2016). A sustainable outsourcing strategy regarding cost, capacity flexibility, and risk in a textile supply chain. Sustainability, 8(3), 234. https://doi.org/10.3390/su8030234
- Sarkis, J. (2020). Supply chain sustainability: learning from the COVID-19 pandemic. International Journal of Operations & Production Management, 41(1), 63–73. https://doi.org/10.1108/ijopm-08-2020-0568
- Sayem, A., Feldmann, A., & Ortega-Mier, M. (2019). Investigating the influence of network-manufacturing capabilities to the phenomenon of reshoring: An insight from three case studies. BRQ Business Research Quarterly, 22(1), 68–82. https://doi.org/10.1016/j.brq.2018.07.001
- Schmeisser, B. (2013). A Systematic review of literature on offshoring of value chain activities. Journal of International Management, 19(4), 390–406. https://doi.org/10.1016/j.intman.2013.03.011
- Sena, V., Kanungo, R. P., Ozdemir, S., Yannopoulou, N., & Patel, P. (2022). Are reshoring decisions influenced by external stakeholders and Country-Level environmental regulation? British Journal of Management, 34(3), 1184–1214. https://doi.org/10.1111/1467-8551.12680
- Shih, W. C. (2020). Global supply chains in a post-pandemic world. Harvard Business Review, 98(5), 82-89.
- Sirilertsuwan, P., Ekwall, D., & Hjelmgren, D. (2018). Proximity manufacturing for enhancing clothing supply chain sustainability. The International Journal of Logistics Management, 29(4), 1346–1378. https://doi.org/10.1108/ijlm-09-2017-0233
- Sirilertsuwan, P., Hjelmgren, D., & Ekwall, D. (2019). Exploring current enablers and barriers for sustainable proximity manufacturing. Journal of Fashion Marketing and Management, 23(4), 551–571. https://doi.org/10.1108/jfmm-09-2018-0114
- Srai, J. S., & Ané, C. (2016). Institutional and strategic operations perspectives on manufacturing reshoring. International Journal of Production Research, 54(23), 7193–7211. https://doi.org/10.1080/00207543.2016.1193247
- Stentoft, Jan & Olhager, Jan & Heikkilä, Jussi & Thoms, Lisa. (2016). Manufacturing backshoring: A systematic literature review. Operations Management Research. 10. http://doi.org/10.1007/s12063-016-0111-2
- Stentoft, J., Mikkelsen, O. S., & Jensen, J. K. (2016a). Offshoring and backshoring manufacturing from a supply chain innovation perspective. Supply Chain Forum, 17(4), 190–204. https://doi.org/10.1080/16258312.2016.1239465
- Stentoft, J., Olhager, J., Heikkilä, J., & Thoms, L. (2016b). Manufacturing backshoring: a systematic literature review. Operations Management Research, 9(3–4), 53–61. https://doi.org/10.1007/s12063-016-0111-2

- Stentoft, J., Mikkelsen, O. S., Jensen, J. K., & Rajkumar, C. (2018). Performance outcomes of offshoring, backshoring and staying at home manufacturing. International Journal of Production Economics, 199, 199–208. https://doi.org/10.1016/j.ijpe.2018.03.009
- Strange, R. (2020). The 2020 Covid-19 pandemic and global value chains. ECONOMIA E POLITICA INDUSTRIALE, 47(3), 455–465. https://doi.org/10.1007/s40812-020-00162-x
- Stentoft, J., Adsbøll Wickstrøm, K., Philipsen, K., & Haug, A. (2021). Drivers and barriers for Industry 4.0 readiness and practice: empirical evidence from small and medium-sized manufacturers. Production Planning & Control, 32(10), 811-828. https://doi.org/10.1080/09537287.2020.1768318
- Suyanto, Bloch, H., & Salim, R. A. (2012). Foreign direct investment spillovers and productivity growth in Indonesian garment and electronics manufacturing. The Journal of Development Studies, 48(10), 1397-1411. http://doi.org/10.1080/00220388.2011.646992
- Talamo, G., & Sabatino, M. (2018). Reshoring in Italy: a recent analysis. Contemporary Economics, 12(4), 381-398. https://doi.org/10.5709/ce.1897-9254.284
- Tamayo-Torres, J., Roehrich, J., & Lewis, M. A. (2017). Ambidexterity, performance and environmental dynamism. International Journal of Operations & Production Management, 37(3), 282–299. https://doi.org/10.1108/ijopm-06-2015-0378
- Tao, F., Cheng, Y., Da Xu, L., Zhang, L., & Li, B. H. (2014). CCIOT-CMFG: Cloud Computing and Internet of Things-Based Cloud Manufacturing Service System. IEEE Transactions on Industrial Informatics, 10(2), 1435–1442. https://doi.org/10.1109/tii.2014.2306383
- Tate, W. L. (2014). Offshoring and reshoring: U.S. insights and research challenges. Journal of Purchasing and Supply Management, 20(1), 66–68. https://doi.org/10.1016/j.pursup.2014.01.007
- Tate, W. L., & Bals, L. (2017). Outsourcing/offshoring insights: going beyond reshoring to rightshoring. International Journal of Physical Distribution & Logistics Management, 47(2/3), 106–113. https://doi.org/10.1108/ijpdlm-11-2016-0314
- Tate, W. L., Ellram, L. M., Schoenherr, T., & Petersen, K. J. (2014). Global competitive conditions driving the manufacturing location decision. Business Horizons, 57(3), 381–390. https://doi.org/10.1016/j.bushor.2013.12.010
- The Wall Street Journal (2022) Countries Embrace 'Friend-Shoring' to Secure Supply Chains. In: WSJ Podcast. https://www.wsj.com/podcasts/google-news-update/countries-embrace-friend-shoring-to-secure-supply-chains/3ffe9e3c-9127-4b65-8ef6-498848cb100c. Accessed 17 May 2022
- Theyel, G., & Hofmann, K. H. (2020). Manufacturing location decisions and organizational agility. The Multinational Business Review, 29(2), 166–188. https://doi.org/10.1108/mbr-02-2020-0035
- Theyel, G., Hofmann, K. H., & Gregory, M. (2018). Understanding manufacturing location decision making: rationales for retaining, offshoring, reshoring, and hybrid approaches. Economic Development Quarterly, 32(4), 300–312. https://doi.org/10.1177/0891242418800222

- Uluskan, M., Godfrey, A. B., & Joines, J. A. (2016). Impact of competitive strategy and cost-focus on global supplier switching (reshore and relocation) decisions. Journal of the Textile Institute, 108(8), 1308–1318. https://doi.org/10.1080/00405000.2016.1245596
- Uluskan, M., Joines, J. A., & Godfrey, A. B. (2017). Comprehensive insight into supplier quality and the impact of quality strategies of suppliers on outsourcing decisions. Supply Chain Management, 21(1), 92–102. https://doi.org/10.1108/scm-04-2015-0140
- Unctad. (2021). World investment report 2021: Investing in sustainable recovery. UN.
- Van De Ven, A. H., & Huber, G. P. (1990). Longitudinal field research methods for studying processes of organizational change. Organization Science, 1(3), 213–219. https://doi.org/10.1287/orsc.1.3.213
- Vanchan, V., Mulhall, R., & Bryson, J. R. (2017). 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. https://doi.org/10.1111/grow.12224
- Van Hoek, R. (2020). Research opportunities for a more resilient post-COVID-19 supply chain – closing the gap between research findings and industry practice. International Journal of Operations & Production Management, 40(4), 341–355. https://doi.org/10.1108/ijopm-03-2020-0165
- 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: An International Journal, 26(6), 689-701. https://doi.org/10.1108/SCM-09-2020-0498
- Verbeke, A. (2020). Will the COVID-19 pandemic really change the governance of global value chains? British Journal of Management, 31(3), 444–446. https://doi.org/10.1111/1467-8551.12422
- Voss, C., Tsikriktsis, N., & Frohlich, M. (2002). Case research in operations management. International Journal of Operations & Production Management, 22(2), 195–219. https://doi.org/10.1108/01443570210414329
- Wan, L., Orzes, G., Sartor, M., Di Mauro, C., & Nassimbeni, G. (2019). Entry modes in reshoring strategies: An empirical analysis. Journal of Purchasing and Supply Management, 25(3), 100522. https://doi.org/10.1016/j.pursup.2018.11.002
- Wan, L., Orzes, G., Sartor, M., & Nassimbeni, G. (2019). Reshoring: Does home country matter? Journal of Purchasing and Supply Management, 25(4), 100551. https://doi.org/10.1016/j.pursup.2019.100551
- Watson, W. E., Michaelsen, L. K., & Sharp, W. D. (1991). Member competence, group interaction, and group decision making: A longitudinal study. Journal of Applied Psychology, 76(6), 803–809. https://doi.org/10.1037/0021-9010.76.6.803
- Wiesmann, B., Snoei, J. R., Hilletofth, P., & Eriksson, D. (2017). Drivers and barriers to reshoring: a literature review on offshoring in reverse. European Business Review, 29(1), 15–42. https://doi.org/10.1108/ebr-03-2016-0050

- Wilkinson, S. (2004). Introducing focus groups. Qualitative research: Theory, method and practice, 2nd edn, pp. 177–199.
- Williamson, O. E. (1979). Transaction-Cost Economics: The governance of Contractual relations. The Journal of Law and Economics, 22(2), 233–261. https://doi.org/10.1086/466942
- Wu, X., & Zhang, F. (2014). Home or overseas? An analysis of sourcing Strategies under competition. Management Science, 60(5), 1223–1240. https://doi.org/10.1287/mnsc.2013.1823
- Wulandhari, N. B. I., Budhwar, P., Mishra, N., Akbar, S., Do, Q., & Milligan, G. (2022). Organizational resilience to supply chain risks during the COVID-19 pandemic. British Journal of Management, 34(3), 1282–1315. https://doi.org/10.1111/1467-8551.12648
- Xu, Z., Elomri, A., Kerbache, L., & Omri, A. E. (2020). Impacts of COVID-19 on global supply chains: Facts and perspectives. IEEE Engineering Management Review, 48(3), 153–166. https://doi.org/10.1109/emr.2020.3018420
- Xun, T., Lai, K., Zhu, Q., Zhao, S., Chen, J., & Cheng, T. (2018). Multinational enterprise buyers' choices for extending corporate social responsibility practices to suppliers in emerging countries: A multi-method study. Journal of Operations Management, 63(1), 25–43. https://doi.org/10.1016/j.jom.2018.05.003
- Ysabel, N., Joren, N., & Lucass, P. (2022). The impact of additive manufacturing on production location decisions: a case study in Belgium and the Netherlands. International Journal of Value Chain Management, 13(3), 297-318. https://doi.org/10.1504/IJVCM.2022.125858
- 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, 102500. https://doi.org/10.1016/j.omega.2021.102500
- Yin, S., Ding, S. X., Xie, X., & Luo, H. (2014). A review on basic data-driven approaches for industrial process monitoring. IEEE Transactions on Industrial electronics, 61(11), 6418-6428. http://10.3138/cjpe.30.1.108
- Yu, U., & Kim, J. (2018). Financial productivity issues of offshore and "Made-in-USA" through reshoring. Journal of Fashion Marketing and Management, 22(3), 317–334. https://doi.org/10.1108/jfmm-12-2017-0136
- Zhai, W., Sun, S., & Zhang, G. (2016). Reshoring of American manufacturing companies from China. Operations Management Research, 9(3–4), 62–74. https://doi.org/10.1007/s12063-016-0114-z
- Zhang, L., Lockhart, J., & Macpherson, W. (2023). What happens with the host during reshoring? An exploration of the host company's response in China. Journal of Manufacturing Technology Management. https://doi.org/10.1108/jmtm-12-2022-0428
- Zhang, S. Y. (2021). Using equity market reactions and network analysis to infer global supply chain interdependencies in the context of COVID-19. Journal of Economics and Business, 115, 105974. https://doi.org/10.1016/j.jeconbus.2020.105974

- Zorzini, M., Stevenson, M., & Hendry, L. C. (2014). Coordinating offshored operations in emerging economies: a contingency-based study. International Journal of Production Economics, 153, 323-339. https://doi.org/10.1016/j.ijpe.2014.03.017