

**Manufacturing Relocation ambiguity model: a prerequisite for knowledge management****Abstract**

Knowledge management and manufacturing relocation have been treated as independent spheres. However, for a relocation to be fruitful, knowledge management needs to be incorporated. The purpose of this research is to shed light on the lack of knowledge management in dynamic manufacturing relocation. In particular, the research focuses on the ability to change, adapt, and revert manufacturing relocation decisions, that is, the dynamic nature (or use) of the concept. A Swedish company was used as a case study. Nine in-depth interviews were conducted with key informants at the company's headquarters in Sweden and its factory in China to capture a dyadic perspective. The findings demonstrate that (a) knowledge transfer is crucial to create/sustain competitive advantage in the offshoring and reshoring phase; (2) lack of knowledge transfer results in limited learning outcomes with operational and strategic consequences in the relocation; (3) resistance to knowledge transfer in the offshoring creates a knowledge gap that consequently leads to relocation ambiguity in the reshoring phase; and (d) companies need to develop knowledge management strategies to promote knowledge transfer and learn from their international relocation, to cope with the relocation ambiguity. Our theoretical contribution introduces the knowledge ambiguity framework, which is a result of insufficient knowledge transfer in the dynamic manufacturing relocation. Even if an organization relocates efficiently, it can fail to take advantage of knowledge transfer and development as potential learning for the organization.

**Keywords:** knowledge transfer, de-globalization, reshoring, dynamic, Sweden, China

## Introduction

The field of management, with its related themes, seeks to advance management practices through social impact, where internationalization, global competitiveness, and production are few of the interdisciplinary areas that may take on some of the societal challenges in the world (Thorpe, et al., 2011). The past three decades have witnessed the theory and practice of international business (IB) vigorously developed in the era of globalization dominated by investment across borders (Kobrin, 2017; Meyer 2017). While foreign direct investments are studied in IB, manufacturing relocation and reshoring originally streams from operations management but have more recently also been addressed through the IB lens (McIvor & Bals, 2021; Pegoraro *et al.*, 2021; Srai & Ané, 2016). Manufacturing relocation (i.e., offshoring and reshoring) has been a high priority for decades in industry but has lately attracted an increasing scholarly interest (e.g., Engström et al., 2018a; Karatzas *et al.*, 2022; Pedgoraro *et al.*, 2022; Hilletofth et al., 2021; Boffelli *et al.*, 2021). The manufacturing relocation decision is important not only for organizational performance, profitability, and competitiveness (Johansson & Olhager, 2018; Zhao & Huchzermeier, 2017) but also for economics and national trade. Public institutions, policymakers, and media have also paid attention to this growing field. The underlying assumption behind this paper is that reshoring and offshoring are not one-off one-directional moves but manifestations of the dynamics of the larger offshoring–reshoring and home-host organization duality. We argue that international relocation constitutes novel learning opportunities for the involved organizations and can develop the organizations' supply networks and offshoring/reshoring activities (i.e., Karatzas et al., 2022; Boffelli et al., 2021; Söderlund & Tell, 2009; Midler, 2013; Midler, 2019).

Schniederjans et al., (2020) and Wilson and Doz (2012) have highlighted the need of combining knowledge management with supply chains. Knowledge management is a broad concept with no consensus on its definition (Corrêa et al., 2022) regarding the management and utilization of knowledge within the firm, where knowledge transfer (see Argote and Ingram, 2000) concerns the

*transfer of experience/knowledge/instructions* from one person/unit to another. Thus, to capture the knowledge dimension in offshoring/reshoring discourse we need to understand knowledge transfer as one aspect of knowledge management. Research on knowledge management in reshoring or manufacturing relocation is scarce but of importance for both practitioners and scholars. Del Rosario Pérez-Salazar *et al.* (2017) call for research that helps combine the field of knowledge management with manufacturing relocation. Knowledge is crucial to increase competition (see e.g., Clarke, 2012; Riley & Vance, 2012). Bals *et al.*, (2016) invite future studies to focus on the role of *learning* in reshoring and insourcing. Another challenge linked to this is to restore the loss of offshored competencies and tacit skills (Ashby, 2016; Kinkel, 2014). In offshoring decisions, organizations require information about the foreign destination and systematic location planning (Kinkel & Maloca, 2009), quality assurance (Bailey & De Propis, 2014), and risk avoidance (Nelson, 2013; Zhao & Huchzermeier, 2017). Past experiences with offshoring influence the coming decisions as well as their outcomes (Bals *et al.*, 2016). Previous research has treated offshoring and reshoring as separate research spheres around which detached bodies of literature are being developed. More attention is needed on why offshoring and reshoring take place simultaneously, and how decisions are made (Perez *et al.*, 2022; Gray *et al.*, 2013). Nevertheless, little research has been conducted so far to capture the dynamic *interdependence* between offshoring and reshoring (cf. Joubioux & Vanpoucke, 2016) and to take advantage of the learning opportunities for the firm. If an organization experiences difficulties concerning (any of) these aspects, it could lead to reshoring by bringing the offshored manufacturing back home. “The decision to remain in or to leave is thus a matter of strategic vision of the firm rather than just the concern of cost reduction” (Fjellström *et al.*, 2019, p. 10).

The current global context witnesses a de-globalization trend that can also be an effect of the global Covid-19 pandemic that subsequently influences the designs of value chains and the balance between foreign/domestic operations (Verbeke, 2020). Moradlou *et al.*, (2021) state that geopolitical uncertainty is the main motivation behind manufacturing relocation decisions. Decision-making under

unstable conditions is made under limited time and with limited knowledge. De-globalization with economic decoupling in global value chains, at least in part, is the new reality of international business in the new normal of the geopolitical landscape (Petricevic & Teece, 2019 Witt, 2019a; 2019b, Witt, et al., 2022). De-globalization is referred to as the weakening of global interdependence and a decline in foreign direct investments (FDI) (Li & Sun, 2020; Petricevic & Teece, 2019). The global Covid pandemic seems to have further accelerated de-coupling processes in the world economy (Li & Sun, 2020; Witt, et al., 2022) that impact offshoring and reshoring decision-making. Furthermore, geopolitical uncertainty, global volatility, and risks are forcing organizations to reconsider their foreign operations (Petricevic & Teece, 2019). The Ukraine-Russia war and Brexit are two examples that force multinational organisations to reconsider their foreign operations (e.g. Cumming & Zahra, 2016). This contextual complexity opens up unanswered questions about the new normal, resilience, and ambiguity in particular for dynamic manufacturing relocation. In an emerging market, such as China, the context and local conditions that invigorate reshoring can appear stronger (Zhao & Huchzermeier, 2017).

At the firm-level organisations care about their global footprint and how it influences societies (Meyer, 2017). According to Kobrin (2017), global MNEs face uncertainty because of the need to balance global integration with local adaptation. Offshoring can result in the limited innovative capability of the firm (Mazzola *et al.*, 2019). The decision to offshore should not be made rapidly. Furthermore, this can have consequences for the organization itself as well as for its relationships and partnerships.

The influence (or impact) on how knowledge management, in turn, would influence reshoring remains largely unanswered. In light of the discussions above, the purpose of this research is to shed light on the lack of knowledge management in dynamic manufacturing relocation with the following research questions:

- (1) What is the role of knowledge transfer in dynamic manufacturing relocation?

(2) How can knowledge transfer challenges influence dynamic manufacturing relocation?

(3) How can organisations develop knowledge from dynamic manufacturing relocation?

We examine how an international relocation within a Swedish company took place to understand the role of knowledge transfer. A dyadic angle is applied to capture the interplays between offshoring and reshoring in the organizational context since they are in effect an opposition-in-unity phenomenon (cf. Fang 2012; Li, 2016); they give rise to, exist within, reinforce, and complement each other to shape a holistic, dynamic, and dialectical organizational configuration in response to the overarching movements of globalization vs. de-globalization. We echo the call by Joubioux and Vanpoucke (2016) and Hilletoft *et al.*, (2019b) to go beyond the reshoring versus offshoring divide to study “right-shoring”. We view the seemingly contradictory processes of offshoring and reshoring as inherently interrelated with and interdependent on each other – a manifestation of the dynamic changes of the host organization to the home organization and vice versa in a larger manufacturing configuration.

Knowledge generates a competitive advantage (Grant, 1996) for the firm and creates value in the supply chain (del Rosario Pérez-Salazar *et al.*, 2017). To address this issue, we develop an understanding of the headquarters’ decision to initiate the offshoring to China and later how the knowledge was later acquired from the Chinese factory back to the headquarters. The contribution of this study is twofold. The novelty of this study is the knowledge ambiguity framework, which is the result of insufficient knowledge transfer in the dynamic manufacturing relocation. By combining efficiency- and strategic asset seeking with the knowledge-based view we elaborate on the dynamic nature that we need to understand knowledge in the manufacturing relocation from a dyadic, holistic and dialectical perspective (e.g., Fang, 2012). Furthermore, we extend the perspective of Joubioux and Vanpoucke’s (2016) to focus on the duality of offshoring to reshoring in terms of the knowledge dimension.

The paper is structured as follows: After this introduction, the literature will be discussed in the next section, which is followed by the research method section and the empirical data presentation

section. The empirical data are later analysed, and the study is concluded with a discussion of implications.

## Literature Review

To fulfill the aim of the paper, which is to shed light on the lack of knowledge management in dynamic manufacturing relocation, this paper is positioned at the intersection of operations management and IB literature (McIvor & Bals, 2021; Pegoraro *et al.*, 2021; Srai & Ané, 2016). The theoretical perspective derives from the reasoning behind international localization decisions that can be traced back to Dunning's (1980) eclectic paradigm and the knowledge view of the firm (Kogut & Zander, 1992). The eclectic paradigm about *ownership, location, and internalization*, (OLI) is still considered as relevant for international production (Dunning, 2001; Ellram *et al.*, 2013) in operations management. The paradigm consists of four main reasons for location advantage in production: resource-seeking, market-seeking, efficiency seeking, and strategic asset seeking advantages. While there can be several advantages and reasons for conducting offshoring, the current debates have developed the perspective that organizations must protect their knowledge and extensive offshoring may result in the loss of tacit knowledge. The argument that knowledge increase competitive advantage has prevailed in research for long time, and Lee *et al.*, (2007) further argue that knowledge is more important than access to raw material and low labour costs. According to Kogut and Zander (1992: 384), a firm's competitive advantage lies in its ability "*to create and transfer knowledge efficiently within an organizational context*". They discuss that individual knowledge needs to be transformed into social and organizational knowledge, since knowledge is socially constructed. For organizations that are either offshoring or reshoring, this constitutes opportunities for the firm to learn from individuals and to ensure they develop knowledge capabilities. Furthermore, firms need to balance short-term survival with development of long-term capabilities. In the short-term perspective the focus lies on daily operations, however, to maintain a competitive position, and increase the

knowledge base, an organization need to develop strategies on how to utilise acquired knowledge. An internal decision of home production, or offshoring usually depend on three criteria; current capabilities, learning capabilities, and the potential to use capabilities in new markets. Thus, there is a distinct need for organizations to develop ways to acquire and retain organizational knowledge. The knowledge-based view can be combined with Dunning's OLI framework since both efficiency-, and, strategic asset-seeking are considered to be more dynamic in nature than market-, and, resource-seeking, and consequently have a stronger link to the knowledge dimension since the definition of strategic assets-seeking entails the embedded notion of knowledge acquisition (Eden & Dai, 2010). Knowledge as a commodity can serve several purposes for the firm, it can add value to it by combining it with other perspectives (Dunning, 2010). Even though "Dunning's factors will undoubtedly remain relevant" (Luo, 2021: 3), the knowledge-based view strengthens the assumption that strategic assets are increasable and unpredictable. The OLI framework can benefit from extending its learning perspective (Pitelis, 2007; Dunning, 2010).

Polyani (1966) argued that not everything can (easily) be expressed when he classified human knowledge into tacit and explicit knowledge. Tacit knowledge is something that cannot be codified, formulated or expressed, while explicit knowledge on the other hand can be concrete, clear, recorded, and stored. This distinction has clear implications for the firm. Knowledge ambiguity has been defined as the lack of understanding of "logical linkages between the actions and outcomes, inputs and outputs, and causes and effects that are related to technological or process know-how" (Simonin, 1999, p. 597). Damanpour *et al.*, (2018) identified that knowledge ambiguity influences the knowledge transfer in the context of international strategic alliances in the field of organizational innovations. Process innovations can be associated with reshoring, which is identified with new elements in the production process.

The decision to offshore and/or reshore is strategically important and it influences all parts of the organization: strategic, tactical and operational levels (Presley *et al.* 2016). Fratocchi, *et al.* (2016)

argue that reshoring can be the result of an earlier offshoring mistake because of *insufficient knowledge* and preparations when the offshoring was decided, where Joubioux and Vanpoucke (2016) discuss the need to understand the reshoring decision-making as a reversion of the previous offshoring decision. In other words, there is a need to study the interdependence between offshoring and reshoring. Kinkel (2012) argues that relocation to emerging markets is mainly due to low wages as well as location advantages and the trends to relocate following the global macro-economic waves. In a turbulent business environment, organizations place more emphasis on operations at the parent company rather than in foreign countries (i.e., reshoring). Fang *et al.* (2010) discussed that sourcing is a matter of cost, strategy, and culture. Martinez-Mora and Merino (2014) showed that the return to the home market is a response to both the market changes and the economic climate. From a dynamic perspective (Martinez-Mora & Merino, 2014), the (re)location decisions change with time and context. They also identified that new environmental factors could emerge when the decision to offshore was made. Fjellström *et al.*, (2019) studied reshoring as a competitive tool to respond to external market factors (e.g., closeness to customers). To remain competitive in the era of contextual challenges (e.g., global risk, uncertainty and economic recessions, new consumer preferences, and difference in manufacturing costs between home and manufacturing country), scholars argue that organizations need to be dynamic in their thinking and action in their response (i.e., Kinkel, 2012; Johansson & Olhager, 2018).

### *Knowledge development in international relocation*

Joubioux and Vanpoucke (2016) conducted a multiple case study in the aeronautics industry, known to be knowledge intensive. They reinforced the view that organizations need to consider multiple factors in the decision-making process (i.e., strategy, risk management, flexibility, and chain reliability). Any firm has three options when firm considering reshoring: 1) full reshoring: when a company moves all production to a home country; 2) partial reshoring: when a company moves only



partial production back to home country only and keeps the other operations at the foreign countries; and 3) no reshoring: when a company keeps all operations, especially production in the foreign countries. It is not possible to study offshoring, or reshoring, in isolation along these lines; they must be studied together (see also Kinkel, 2011). Reshoring is not an easy decision that supply chain experts can make in isolation and we cannot operate facilities in isolation. There are several factors that are associated with it and competing priorities can deeply affect this decision. Accordingly, there should be an understanding, evaluation, and consensus regarding the trade-offs among costs, risks, and resilience. Moving an entire manufacturing plant to our home country, for example, will take sufficient time and sizable investments. Joubioux and Vanpoucke (2016) also found that although many organizations still expand internationally, organizations become more aware of the quality aspect of the relocations. Furthermore, there are hidden costs, or unexpected costs that can arise. The risks that they identified with the offshoring were intellectual property rights, lack of flexibility and changes in legislation. Finally, they noted that geographical and cultural distance can have a negative influence on the productions, while customer proximity is argued to increase the competitive advantage. Mandják et al., (2021) studied the knowledge interconnection process and found that it has implications for the network. Knowledge exist on several layers in an organization, it can be at the individual, group, project or firm level Brady & Davies, 2004; DeFillippi & Arthur, 2002. The knowledge structure can be diffusing in a host form of organizational structure (e.g. Brady & Davies, 2004) such as the outsourcing case. For example, there is a need to understand the motivations and implications for reshoring in relocations (Kinkel, 2009).

Lampón and González-Benito (2019) identified that reshoring brings advantages for the firm such as positive atmosphere, increased production, and more advanced technology. Hafeez *et al.*, (2018) studied knowledge transfer in virtual communities, a context parallel to the project. They identified *engagement* as an important factor. Engagement and willingness are important in knowledge transfer.

Knowledge that is utilized correctly can lead to development, whereas mistakes can be repeated if acquired knowledge is not utilized correctly within an organization (Brady & Davies, 2004).

Knowledge transfer is crucial in offshoring (e.g. Søberg & Wæhrens, 2019). García *et al.*, (2021) discuss that offshoring is used for resource seeking arguments which consequently means that firms can gain access to new knowledge. Thus, the underlying argument is that firms can access new knowledge through offshoring which in turn can lead to innovations. To encourage knowledge transfer in international relocation, the roles of the individuals must be defined clear where cultural intelligence is an important factor (Henderson *et al.*, 2018) as well as organizational culture (i.e. Søberg & Wæhrens, 2019). This can be visible in the outcome and the satisfaction (Henderson *et al.*, 2018). Since there are several factors and perspectives to consider, a holistic approach to coordinate knowledge in the organization is necessary (Ul Musawir *et al.*, 2017). The dimension of knowledge, i.e. communication, can also be important from a stakeholder perspective.

### *Manufacturing relocation*

In manufacturing relocation decision-making, it is vital to consider the overall dynamics of the decision and not consider it as a one-directional decision. The drivers and barriers of previous relocation are essential in understanding the current decision, and a decision should not be made that hinder future changes in the manufacturing setup. Manufacturing relocation decisions are complex as the number of relevant criteria to consider may grow quickly and make it challenging to identify an appropriate solution (Gray *et al.*, 2013; Wiesmann *et al.*, 2017). The decision criteria are all those factors that impact the decision-making and may include both drivers and barriers (Engström *et al.*, 2018b). Many factors are presented in the literature and are sometimes grouped. In one framework, the factors are divided according to the goal (cost efficiency or perceived value) and the level of analysis (internal or external) (Fratocchi *et al.*, 2016), while they can also be grouped based on the

targeted competitive advantage (Benstead *et al.*, 2017) divided into global competitive dynamics, host country, home country, supply chain and firm-specific issues (Wiesmann *et al.*, 2017).

It is not only the number of factors to consider that adds to the complexity but also trade-offs between the factors (Tate, 2014). This means that a decision-maker must be aware of a significant number of factors and trade-offs and try to make the best possible decision (Gray *et al.*, 2013). These evaluations are often cost-based, and the goal is to make a decision that creates the lowest landed cost (Gylling *et al.*, 2015). Research argues that this is not enough (Hilletoft *et al.*, 2021; Sequeira *et al.*, 2021; Sequeira *et al.*, 2022). The main reason for many reshoring cases is that the previous offshoring decision was made with a very rudimentary decision-making framework (Stentoft *et al.*, 2015). Hence, there is not enough transparency and knowledge about either the decision-making support tools to ensure resilient decisions (Hilletoft *et al.*, 2019a) and reshoring processes. Along similar veins, opens up for opportunities to study the manufacturing relocation from a knowledge management lens. Table 1 offers a summary of manufacturing relocation studies that examine the role of knowledge transfer or dynamic dimensions.

Table 1. Summary of recent manufacturing relocation studies that examines knowledge or dynamic dimensions

| Academic source                                | Field    | Method     | Knowledge dimension | Dynamic relocation | Highlights   |
|--|----------|------------|---------------------|--------------------|--|
| Bals <i>et al.</i> , 2016                      | OM       | Review     | No                  | Yes                | Investigates how reshoring and insourcing decision-making and call for future studies to investigate the role of learning in reshoring and insourcing.                                   |
| Ciabuschi <i>et al.</i> , 2019                 | IB       | Conceptual | Yes                 | Yes*               | Applies a risk-management perspective to understand manufacturing reshoring  |
| Del Rosario Pérez-Salazar <i>et al.</i> , 2017 | OM<br>KM | Review     | Yes                 | No                 | Examines the state of knowledge management research in supply chain management and call for research that helps combine the field of knowledge management with manufacturing relocation. |
| Fratocchi <i>et al.</i> , 2016                 | OM       | Review     | Yes*                | No                 | Present a framework for the analysis of reshoring. Discuss that reshoring can be the result of an earlier offshoring mistake because of insufficient knowledge.                          |
| Fjellström <i>et al.</i> , 2019                | IB       | Case study | Yes*                | Yes                | Investigates how reshoring can be contextualized through competitiveness, as a dynamic and a strategic tool.   |
| García <i>et al.</i> , 2021                    | IB       | Survey     | Yes                 | No                 | Analysis of technological capabilities and its impact of offshoring on firm innovation   |
| Joubiou & Vanpoucke, 2016                      | OM       | Case study | Yes                 | Yes*               | Dynamic interdependence between offshoring and reshoring, place emphasis on knowledge transfer in relocation.  |
| Kinkel, 2014                                   | OM       | Secondary  | Yes*                | Yes                | Overview of manufacturing back-shoring decisions over the past 15 years. Highlights the dynamic aspect and various motivations for reshoring in project relocations                      |
| Martinez-Mora & Merino, 2014                   | OM       | Case study | Yes*                | Yes                | Examines the determinants and scope of the strategy, the study elaborates on the return to the home market as a response to both the changes in the economic climate and market changes. |
| Mclvor & Bals, 2021                            | IB       | Conceptual | Yes*                | No                 | Develops a framework for understanding location and governance choice in the reshoring decision  |
| Pegoraro <i>et al.</i> , 2021                  | IB       | Case study | Yes                 | No                 | Study of regional interactions (i.e. policy, technological, ecosystem, and supply chain issues when companies decide to reshore manufacturing.   |
| Petricevic & Teece, 2019                       | IB       | Review     | Yes                 | Yes*               | Investigates macro level movements to reshape the structure of the global economic order, requiring new rethinking by MNEs on how to develop.  |
| Schniederjans <i>et al.</i> , 2020             | OM       | Review     | Yes                 | No                 | Knowledge management to enhance the supply chain digitisation research paradigm  |

OM=operations management, IB=international business, KM=knowledge management, \*=briefly/indirectly

With several global disruptions (such as Tech Cold War, the Covid-19 era and Russia-Ukraine war) and environmental, societal, and economic challenges forming the discourse in international business and supply chain management, the phenomena of manufacturing relocation are one characteristic of Foreign Direct Investments with impacts for the single firm, politics, national economy and international investments. This movement require more scholarly attention.

## Research Method

We have adopted a qualitative method to conduct our research (Easterby-Smith *et al.*, 2012; Ghauri *et al.*, 2020). Due to the novel context surrounding the reshoring case, the case design consists of one Swedish company “Eco Global Systems” (EGS, fictive name), with the headquarters as one sub case and the offshored factory as another sub case. The case study design facilitates and encourages a detailed understanding of the company, and in this case from two different countries.

EGS has developed expertise for over 150 years to manufacture high-end taps that are technologically advanced, eco-friendly, and sustainable. Immediately after EGS was reorganized based on the merger of two companies in 2007 it was decided to offshore the production. The company board realized that they lacked internal capabilities and resources to continue production of all the products in one factory. To manage the post-merger integration, they decided to offshore to China to improve the efficiency of the company. The company started the offshoring without a definite plan to make it a permanent relocation, which is the reason for the term dynamic manufacturing relocation. The EGS customer base is mainly in the Nordic business-to-business segment. The company strives for up-to date innovations, leading-edge technology, high quality, attractive design, and eco-friendliness.

To gain the insights, in-depth interviews were used as the method for data collection (Yin, 2003; Eisenhardt, 1989; Stake, 1995). At the headquarters (i.e., the home organization) interviews were conducted over time (in 2014, 2016, 2018, and 2020) with managers and at its offshoring factory (i.e., the host organization) in China in 2016 (Fjellström & Guttormsen, 2016) see Table 2. However the main data collection took place in 2014-2016, after this we followed up with perspectives regarding the reshoring in 2018-2020 with respondents in new positions. In total nine in-depth interviews were conducted with key informants that were involved in the reshoring. From the Chinese perspective, the Quality Control Manager in the Chinese factory located in Zhongshan in the Guangdong Province was interviewed in person. The manager was selected because of his experience working at the host

organization and leading the quality control process, while he was in regular communication with the headquarters, as this can be regarded as one form of triangulation to compare the perspectives. Questions were asked pertaining to reshoring, knowledge transfer from Sweden to China and from China to Sweden through offshoring and reshoring, respectively, development of the reshoring project and the decision, as well as the reshoring itself. All interviews were conducted with two researchers present in person to ensure the quality, validity and for language verification in the transcripts. The interview guide was discussion-based with open ended questions, to allow the respondents to elaborate on their experiences. Interpretative sense making (Stake, 1995; Welch *et al.*, 2011) was used to theorize from the case, based on the empirical insights garnered from the interviews.

*Table 2. Interviews*

| <b>Position</b>         | <b>Date</b>        | <b>Venue</b> | <b>Duration</b>   | <b>Language</b> |
|-------------------------|--------------------|--------------|-------------------|-----------------|
| CEO                     | Dec 7, 2014        | HQ           | 1:10:25           | English/Swedish |
| Controller              | April 20, 2016     | HQ           | 1:31:58           | Swedish         |
| Production Engineer     | April 20, 2016     | HQ           | 0:51:26           | Swedish         |
| Product Technician      | April 20, 2016     | HQ           | 0:52:07           | Swedish         |
| Constructor             | April 21, 2016     | HQ           | 1:06:04           | Swedish         |
| Quality Control Manager | June 30, 2016      | China        | 1:45:12           | English         |
| Sourcing Specialist     | March 12, 2018     | HQ           | 09:36 follow-up   | Swedish         |
| Project leader          | March 12, 2018     | HQ           | 08:56 follow-up   | Swedish         |
| CEO                     | September 21, 2020 | HQ           | Digital follow-up | Swedish         |

The data was analyzed in three steps (Miles & Huberman, 1994), i.e., data reduction, data display, and verification of conclusions. Firstly, the collected data was reduced by selection and exclusion, then the data was organized to compress the information and identify main themes after which an understanding of the data was selected and displayed in the earlier steps. Figure 1 presents the hierarchical structure of the first order concepts, themes and the aggregate dimension. The three steps often overlap and occur simultaneously throughout the study. The data was jointly analysed and checked by the research team.

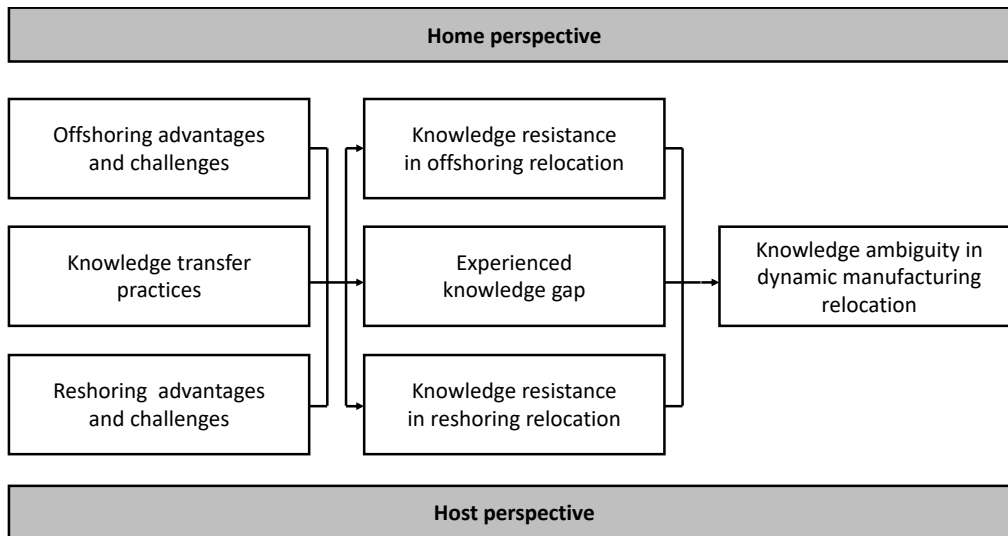


Figure 1. Hierarchical structure of first-order concepts, themes, and the aggregate dimension

## Findings

### *Perspectives of the Organization in Sweden*

The offshoring project was the result of a merger of two companies with their separate factories. The post-merger phase consisted of efficiency and synergy in the (new) parent organization. The board realized that they lacked in-house resources such as physical space to continue production of all the products in one factory, even though they had the machines available and people to use them. To continue production of the products, the decision was made to offshore the production to China on a contract basis. From the headquarters, it was not a planned strategic decision to offshore; instead, the decision-making was fast. The lack of planning consequently resulted in miscommunications and a lack of information about the specifications of the production, assembly, and packaging. According to the CEO, offshoring was deemed essential to maintain the product portfolio. Furthermore, the CEO added, “because this [offshoring manufacturing to China] was a trend and the right decision at the time”.

The offshoring to China initially encountered quality and control issues as well as delays in the delivery. About 60 percent of the production had no issues while 20 percent had to be developed or

refined, and another 20 percent caused problems. Issues arose due to the mistakes and errors made on the EGS side, i.e., the specifications were not sufficiently detailed in the initial stages of sourcing.

A couple of challenges arose in this dynamic manufacturing relocation from the perspective of the home organization (Table 3). The cost of raw materials rose in the spring of 2006, in some cases three times higher than what it was. Parallel to the rising costs at the offshored location, the organization was facing challenges with long lead times. This became the starting point of the reshoring. Some of the components were very demanding in labor. With the delays and longer lead time, the business that was supposed to get the delivery of sourced products in the spring to be able to sell them in the summer started to suffer. The lead time was longer than what the customer could accept. The possible solution was to end the project organization of offshoring and move it back to the home organization.

*Table 3. Challenges and advantages in the dynamic manufacturing relocation*

|                   | <b>Offshoring</b>   | <b>Reshoring</b>  |
|-------------------|---|---|
| <b>Challenges</b> | Lack of knowledge transferred, shortage of staff, geographical distance, delays, increasing cost, forecasting challenges, contextual, cultural, and linguistic barriers, supplier network and relationship challenges | Developing up-to-date knowledge, sourcing potential knowledge from offshored plants, developing manufacturing capabilities and strategic assets |
| <b>Advantages</b> | Potentially an easy solution, cost advantages, efficiency-seeking, resource seeking   | Know-how in-house, machines available, supplier, network, improved logistics, market seeking  |

The reshoring decision meant that the home factory could do the final assembly after customer requirements. Another problem the Chinese factory experienced was the high turnover of human resources. The factories were short of staff and this gave rise to manufacturing problems and uncertainty of delivery. With the long geographical distance between Sweden and China, there could also be logistics delays. Random samples were tested before they were transported from China and the respondents said they did not have more problems from the factory in China. The forecast and



estimations were difficult to make from the headquarters. The view from the headquarters was that they could have better understood the production methods and processes in China.

When they started to evaluate a possible reshoring, a project group was assigned at the headquarters. Reshoring was a project requiring investigations, cost comparisons, and evaluation of skills and competences, and this laid the foundation for the reshoring decision. It started off with a brainstorming meeting with selected participants from the headquarters that possessed skills that could become useful during the reshoring. Regarding the evaluation of the skills in-house one employee explained: “one benefit was that we still had the old machines in the factory and employees who knew how to run them”.

The project leader started to work on the project in 2011 and she started to make a plan, calculating production times and lead times. “Resources, skills, experience and competences – all we had in-house” she said. This made the reshoring decision easier to take. Many employees at the headquarters could not realize that they were taking the production home again, everyone wanted to be involved somehow, “it was great collaboration and a fun experience”. A technician involved said that it went smoothly, and after they made the reshoring, they started to develop the product with modern technique.

The reshoring decision was made in 2010-2011 due to both internal factors such as customer demands, internal reorganizations, and a shorter window to correct mistakes as well as the global economic crisis as an external factor. One employee explained that he/she had not considered various consequences and possible problems when they offshored to China. He/she explained that a factory looked very different in China than it did in Sweden. EGS communication was not clear and transparent regarding the measurements and specifications to the Chinese suppliers they had been working with since 2007. However, even though the reshoring decision was taken, the CEO explained their current strategy at the time of the reshoring “produce where our customers are based”. He further explained that “we have not left China that is for sure. We have been very clear in communication

that I mean this is not a static decision that we now make everything in Sweden”. The CEO confirmed in 2020 that the production reshored from the project organization now became part of the home organization at EGS. A summary of the motivations for offshoring-reshoring are presented in Table 4 with the key activities.

*Table 4. Motivations in the dynamic manufacturing relocation*

| <b>EGS Case</b>  | <b>Offshoring</b>                                | <b>Reshoring</b>   | <b>Summary key activities</b>          |
|------------------|--|--|--|
| Company strategy | Lack of capabilities and resources, cost-cutting | Produce near the customers   | 2007: Decision to offshore             |
| Main objectives  | Cost-cutting, maintain production capabilities   | Cost-cutting, adaptations, flexibility, control, avoid stocks, shorter lead time | 2010-2011: Planning of reshoring at HQ |
| Market entry     | External supplier                                | In-house production  | 2012: Production reshored to Sweden    |

### *Perspectives of the Organization in China*

The Quality Control Manager in China confirmed that the withdrawal (reshoring) was mainly motivated by the company’s need to shorten lead-time and increase flexibility, not by quality issues. One of the reasons for the reshoring, according to him, was increased costs in China, because some of the components were now “absurdly expensive”, as these were sourced from European (Swedish) suppliers due to certification and standards. The withdrawal from China did not entail trust issues with local Chinese suppliers despite all the “bad feelings”, because the Swedish company handled the reshoring in a “transparent way”. The manager thought the beginning of the offshoring was challenging, since headquarters were not clear on the instructions what to manufacture and their specifications. One example provided, was one product with two drawings, the process to unify this took two to three years. Thus, the response from EGS was rather slow. The manager said that the approach to solve this “took long time” and after that came a lot of testing and verifications. The

reshoring resulted in significantly improved logistics, supply chain and sourcing strategies (e.g., lean production and strategic development of suppliers in China).

From the perspectives of the host organization, a couple of challenges arose in this dynamic manufacturing relocation (Table 3). There were challenges regarding the raw materials, as one component was not produced a hundred percent by using Chinese brands or local materials. According to the specifications, some of the components had to be brought from overseas; it could be from Germany or Sweden, because EGS already had the supplier network established in Sweden.

The material brass was that was ordered in containers had a very long lead-time and was challenging to forecast. The suppliers had 45-50 days to produce an item, before which, they had to have the correct and enough raw materials. After production, the delivery by sea to Sweden took an additional six weeks. The manager explained that it was a challenge to have the overall planning and do the forecasting. The challenges with the forecasting increased the costs since they purchased more raw materials to ensure sufficient stock.

The manager further explained that it was hard to motivate local employees. Motivation was important to appreciate the job, but in China the local culture was that it was just “any” job and employees felt that it could easily be replaced. This became a challenge for the EGS.

From the factory perspective, the manager thought that the employees from the headquarters did not understand the context and the suppliers. He said that “China is really not that undeveloped”, like he also thought what the employees at the headquarters thought. The perceptions could create misunderstandings. He emphasized the relationship with other employees “If I knew people, if I talked, some problem could be solved”.

Challenges in the production could result in large stocks, and sometimes goods had to be transported by air instead of sea, which increased costs substantially given the time for transportation from China to Sweden, which caused a two-month hold in the sales. Occasionally, the offshoring often resulted in a gap between the market demand and the supply.

The Chinese supplier noticed that EGS lacked control over forecast as well as internal systems for product specification and drawings. EGS could send several drawings for the same product. In some cases, it could be “two different drawings for the same or almost identical product, and it took 2-3 years to merge these drawings into one system”. The Chinese managers admitted that they did not get the accurate information in time for the production, which we interpret as a lack of knowledge transfer from the headquarters to the factory. Sometimes there could also be misunderstandings because of cultural reasons. The respondent in China argued that trust was a way to develop the relationship and ensure good communication behaviour. He argued that Chinese employees would say “yes” but they mean “no” and from the headquarters they would be confused when the Chinese partners is changing or not delivering. The Chinese manager explained: The Chinese way to communicate is that they are afraid that they could lose the opportunity to have this business. So, they would consider to seize the opportunity first, and then they will negotiate with you.

When the reshoring decision was announced, the quality control manager said it was “very sad for the supplier”. They reduced the number of employees and their turnover. Notwithstanding, they have remained a supplier to EGS, although not supplying the same quantities.

He perceived that EGS wanted to have better control over the production, delivery, and sub-suppliers. During visits to Sweden, he realized that EGS invested in “very complicated machines”.

## **Discussion**

This study advanced three research questions and have developed a process to generate insights for each of them. The three questions pertain to (1) “What is the role of knowledge transfer in dynamic manufacturing relocation?”, (2) “How can knowledge transfer challenges influence dynamic manufacturing relocation?”, and (3) How can organisations develop knowledge from dynamic manufacturing relocation? We discuss the insights developed for each of these three questions next.

### *Knowledge transfer in dynamic manufacturing relocation*

According to EGS, the proximity to customers and control over the process were explicitly the two most crucial reasons for reshoring, besides innovation, costs, and environmental aspects. With a clear focus on sustainability, the company would reconsider offshoring and reshoring, depending on how the markets develop over time. The empirical case demonstrated that apart from improving its competitiveness in the market, retaining a dynamic view of reshoring was important to the company. “Reshoring can be used as a dynamic competitive means in response to the internal and external environment, and in particular to customer needs” (Fjellström *et al.*, 2019, p. 28).

The reshoring was mainly motivated by the company’s need to shorten lead time and increase flexibility, not due to quality nor pricing which was not the issue. Johansson and Olhager (2018) argued that a relocation to Sweden would not be due to cost advantages. However, it became clear that several challenges arose and grew stronger due to the lack of knowledge sharing and transfer in the offshoring phases.

In the offshoring to another location, it requires successful knowledge transfer to the factory and/or suppliers. Here, culture plays a vital role since it is important to understand the culture and communication patterns in the host country. Misunderstandings can occur otherwise. The reshoring requires more and frequent internal knowledge transfer so that it is successful. Since the reshoring can be complex many functions and departments are involved to assure its success.

This study demonstrates a reluctance to share knowledge in the offshoring to the host organizations. At the host organization, it was clear that they lacked the right knowledge and information. From the headquarters, the focal point was merely to move the production back to the home country. However, since the organization still has international suppliers as well as production, they should develop knowledge from this experience (Brady & Davies, 2004).

### *Barriers for knowledge transfer in dynamic manufacturing relocation*

Knowledge was found to be central in both the offshoring and the reshoring. A smooth offshoring requires knowledge transfer between the headquarters and the factory, and vice versa for the reshoring. The knowledge transfer is not only about transfer of instructions or practices, but it is also of importance to ensure that the receiver can develop and apply the knowledge. If knowledge transfer does not exist, it will result in a knowledge gap at the offshoring or reshoring. In the offshoring, the knowledge was scarce and there was resistance to sharing it from the headquarters. The main barrier to knowledge transfer in manufacturing relocation is the resistance from the organisation to share knowledge. It could be intentional or unintentional, that they do not want to share knowledge or do not understand the importance and potential of sharing knowledge. However, the resistance to share knowledge have severe consequences for the organisation. It could also be due to limited cultural and linguistic awareness. It was illustrated that one drawing took years to merge and utilise this would create even more delays in the performance and deliveries from the factories. It became clear in the empirical data that the lack of knowledge and the existence of incorrect knowledge were mostly perceived at the Chinese factory. In other words, they did not receive accurate knowledge from the sender in order to produce or assemble the products. At the headquarters, they realized that there were delays and a lack of control.

Since the decision to offshore was taken quickly the lack of meticulous planning consequently resulted in miscommunications and lack of information about the product specifications. Henderson et al. (2018) placed emphasis on the interplay, roles, and culture in communication in global projects. Our empirical data from both perspectives confirmed that there were mistakes and misunderstandings. Many of these mistakes and misunderstandings became more complicated and more severe due to issues in communication behavior. The information provided was not correct, there were delays in communication and often the communication was digitally transferred. Previous research also argued for participation and cultural awareness, which was limited.

Brady and Davies (2004) explained the importance of learning from projects, as this was not clear from our empirical data, and what knowledge the home organization acquired from the offshoring–reshoring journey. If the organization is not aware of the learning outcome, and if they don't take advantage of it, or use it in the organization, similar mistakes can be repeated. (Brady & Davies, 2004). The host organization was depending on knowledge from the home organization. If this knowledge were explicit and available, many of the perceived problems and knowledge gaps would not occur.

The focal point from the headquarters was merely to take the production back home, and that was the end of the host organization and the offshoring. Whereas, research suggests that there should be an evaluation and learning from the host organization (Brady & Davies, 2004).

### *Insufficient knowledge transfer during dynamic manufacturing relocation*

A reshoring decision is sometimes a correction as of previous managerial mistake but perhaps more commonly it is a strategic decision part of the firm's internationalization strategy (Di Mauro *et al.*, 2018). In both scenarios a comprehensive decision-making framework is needed to ensure that the decision is resilient. This means that there is no need to revise the decisions due to incorrectness in the previous decision. However, the external environment can change and with new market demands, this could require further relocations (e.g., changes in market demand and customer preferences). Consequently, decisions should be made with this in mind.

If a manufacturing relocation (e.g., offshoring) starts with resistance to transfer knowledge it will create a knowledge gap, thus leading to *knowledge ambiguity* at the receiving organization. The relocation requires transparency and willingness to share knowledge from the start to avoid this. Knowledge ambiguity at the host organization will impact the outcome of the offshoring. Knowledge ambiguity created in the first relocation cycle, due to knowledge resistance, will further contribute to knowledge ambiguity in the next cycle of relocation and the situation may even be more problematic if knowledge resistance also is present in this cycle. Lack of consideration of knowledge transfer and

management hence results in manufacturing relocation ambiguity that will affect the overall competitiveness and future decisions regarding relocation (i.e., offshoring-reshoring). Figure 2 illustrates the manufacturing relocation ambiguity model, which builds on the interpretative sensemaking from the case study (Welch *et al.*, 2011) and accounts for “what”, “how”, and “why” (Whetten, 1989) concerning the dynamics of offshoring and reshoring.

EGS CEO argues that the offshoring was a trend at the time. De-globalization influences the decision to offshore-reshore to a certain extent. It could lead to new types of internationalization motives and ‘value chain decoupling’ at the micro-level” (Petricevic & Teece, 2019). For emerging markets, like China, previously been known for manufacturing require new ways to catch up with advanced technology, to resolve critical dependencies on foreign suppliers (Witt, 2019a, 2019b). Thus, both the offshoring-reshoring debate very much depend on the macro level trends of internationalization and de-globalization.

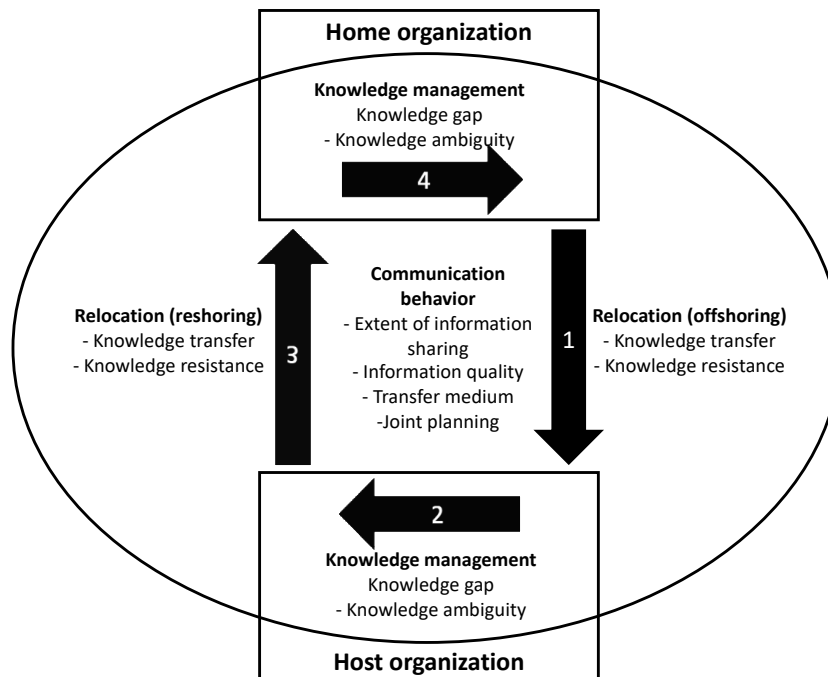


Figure 2. Manufacturing relocation ambiguity



## Conclusion

Knowledge transfer plays a vital role in dynamic manufacturing relocation, which can be crucial for its success or failure. An organization needs to understand the importance and the *potential* role of knowledge transfer in manufacturing relocation, since it has direct effects on all levels (Presley *et al.*, 2016). Knowledge influences current and future decisions on where to locate production. These are important decisions that influence the organization in several ways. There are potential barriers to knowledge transfer in dynamic manufacturing relocation. The barriers include intentional/unintentional resistance to sharing knowledge, limited time after the decision to relocate is made, as well as cultural and linguistic barriers. Thus, the study demonstrates that offshoring and reshoring can be regarded as an opposition-in-unity phenomenon (Fang, 2012; Li, 2016) that is vital for reinforcing knowledge transfer in manufacturing relocations. Many problems may arise due to a lack of knowledge transfer in dynamic manufacturing relocation at both strategic and operational levels. The problems in manufacturing can negatively impact the performance of the firm as well as relationships with customers and stakeholders. Insufficient knowledge transfer creates a knowledge gap that leads to knowledge ambiguity. Hence, it is essential for organizations to avoid knowledge ambiguity.

Our theoretical contribution introduces the knowledge ambiguity framework, which is a result of insufficient knowledge transfer in the dynamic manufacturing relocation. Even if an organization relocates efficiently, it can fail to take advantage of knowledge transfer and development as potential learning for the organization. The contribution is twofold. First, we incorporate both efficiency- and strategic asset-seeking with the knowledge-based view. In doing so, we elaborate on the dynamic nature and respond to the recent call for knowledge management and manufacturing relocation (see del Rosario Pérez-Salazar *et al.*, 2017; Fjellström *et al.*, 2019). We develop and extend the perspective that we need to understand knowledge in the manufacturing relocation from a dyadic, holistic and dialectical perspective (e.g., Fang, 2012). Second, our study echoes Joubioux and Vanpoucke's (2016,

p. 130) assertion that the lack of knowledge during the transition from offshoring to reshoring “are more likely to fail and to reshore their activities in later stages”. It furthermore explains why and how (Whetten, 1989) reshoring depends on the previous decision to offshore (Joubioux & Vanpoucke 2016). The decision to offshore, and reshore, need to be sustainable for the organization.

As managerial implications, organizations can be better positioned through planning and implementing international relocation dynamically, combining host organizations with home organizations in relation to the macro environment and geopolitical challenges. Furthermore, practitioners need awareness and a strategy to employ knowledge transfer in the reshoring, such as the Relocation Ambiguity Model. The model helps managers to understand the *potential* learning outcome from dynamic manufacturing relocation, that is, it is an opportunity to develop new knowledge and embrace this organisational change. Even if the organisation possess knowledge in-house, in most scenarios when the production is relocated it opens for further technological and digital advancements. Also, knowledge needs to be stored and communicated within the organisation. A learning approach needs to be encouraged and spread among the employees, in a learning culture. Knowledge needs to be transferred and managed within the organization.

This study is limited to one case from Sweden that highlights knowledge transfer in dynamic manufacturing relocation and consists of nine interviews. This offers control over extraneous variations arising out of including multiple firms. Moreover, the study is designed to encourage studies that combine the field of knowledge management and reshoring. Further studies are welcome that more specifically investigate the knowledge transfer process during the reshoring and implementation process between one organisation/unit and another. To expand this research area more, studies can focus on either knowledge transfer and management of the decision-making, if applicable an initial assessment of manufacturing relocation, or the phases that follow thereafter. The relocation ambiguity model can be developed and tested further for linkages in the theory.

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