# Do Industry 4.0 Technologies Matter When Companies Backshore Manufacturing Activities? An Explorative Study Comparing Europe and the US

**Luciano Fratocchi and Cristina Di Stefano**

**Abstract** The objective of this chapter is to analyze the impact (if any) of Industry 4.0 enabling technology on firms' decision to relocate to the home country their offshored production activities. In particular, the chapter analyzes whether Industry 4.0 technologies may represent a driver/motivation or an enabling factor for companies which are evaluating such a strategic alternative. In order to reach such an objective, a two-step explorative methodology has been applied. After implementing a structured literature review, empirical evidence of backshoring decisions implemented by both European and US companies has been analyzed. Collected findings show that the majority of sampled articles conceptualize Industry 4.0 technologies as a driver. At the same time, empirical findings show some interesting differences between European and US companies adopting backshoring decisions based on/enabled by Industry 4.0 technologies. Finally, competences (related to both the manufacturing activities as a whole and the Industry 4.0 technologies) emerge as one of the most critical issue for investigated companies.

## 1 Introduction

Companies have been offshoring (and often also outsourcing) their manufacturing activities for a long time. They mostly relocate to low-cost countries (e.g., Eastern Europe and Asia) since their main goal was efficiency seeking. However, the benefits of offshoring have often proven elusive (Manning, 2014); for instance, the relocation of production activities abroad often diminishes firm's competence due to the spatial decoupling of R&D and manufacturing activities (Stentoft, Olhager, Heikkilä, & Thoms, 2016). This risk is even higher when offshoring decisions are coupled with the adoption of outsourcing governance mode. In such a context, employee deskilling and decline of firms' industrial knowledge emerge (Nujen,

L. Fratocchi (✉) · C. Di Stefano
University of L'Aquila, L'Aquila, Italy
e-mail: luciano.fratocchi@univaq.it



M. Bettiol et al. (eds.), *Knowledge Management and Industry 4.0*, Knowledge Management and Organizational Learning 9,
https://doi.org/10.1007/978-3-030-43589-9_3

Halse, Damm, & Gammelsaeter, 2018). This, in turn, may have serious implications also for the entire economic system of the home country level (Pisano & Shih, 2012). Therefore, in the last 20 years an increasing number of companies have been reconsidering their offshoring choice having experienced several offshoring difficulties (Manning, 2014). Consequently, they often adopt a relocation of second-degree strategy (Barbieri, Elia, Fratocchi, & Golini, 2019), also identified by the literature as reshoring (Fratocchi, Di Mauro, Barbieri, Nassimbenid, & Zanoni, 2014). This term includes both the relocation to the home country (RHC or backshoring) and the one to a third country (RTC). The latter is defined alternatively near-shoring—when the company relocates to a host country within the home region—and further offshoring—when the new host country is a faraway one.

In the last 10 years, scholars have mostly focused their attention on RHC operations (Barbieri, Ciabuschi, Fratocchi, & Vignoli, 2018; Stentoft et al., 2016; Wiesmann, Snoei, Hilletofth, & Eriksson, 2017) particularly studying motivations, i.e., drivers of the operations. Among them, increasing attention has been paid to production automation (see, for instance, Ancarani & Di Mauro, 2018; Ancarani, Di Mauro, & Mascali, 2019) and additive manufacturing (Fratocchi, 2018a, 2018b; Moradlou & Tate, 2018). Both of them are technologies based on cyber-physical systems, and are identified with the broad term Industry 4.0 technologies i.e., "smart machines, warehousing systems and production facilities that have been developed digitally and feature end-to-end ICT-based integration, from inbound logistics to production, marketing, outbound logistics and service" (Kagermann, Wahlster, & Helbig, 2013, see p. 14).

Firm's internationalization process can be strongly influenced by information and communications technologies (ICTs); they allow remote coordination and extend the span of control while reducing its cost (Alcácer, Cantwell, & Piscitello, 2016; Chen & Kamal, 2016; Leamer & Storpe, 2001). Thanks to those technologies, companies can redefine their location strategy and "fine slice" the most value adding activities (Buckley, 2011; Buckley & Ghauri, 2004) or reconfigure their production footprint. Moreover, the increase in productivity these technologies allow (Brynjolfsson & McAfee, 2014; Kagermann et al., 2013) may reduce—and even eliminate—location advantages of low-cost countries (Ancarani et al., 2019; Ancarani & Di Mauro, 2018; Dachs, Kinkel, & Jäger, 2019). At the same time, the adoption of Industry 4.0 technologies allows a higher flexibility of the manufacturing process and increases companies' responsiveness to clients' need and their possibility to offer customized products (Ancarani et al., 2019; Ancarani & Di Mauro, 2018; Dachs et al., 2019; Fratocchi, 2018a, b; Moradlou, Backhouse, & Ranganathan, 2017; Moradlou & Tate, 2018). Finally, Lampón and González-Benito (2019) have recently showed that companies which improved their key manufacturing resources (e.g., process optimization, technologies, and facilities) after the offshoring decision are more likely to backshore.

At the same time, the implementation of Industry 4.0 technologies requests companies to develop specific competencies (Nujen, Mwesiumo, Solli-Sæther, & Slyngstad, 2018). In this respect, recent studies pointed out that there is a serious lack of qualified workforce able to implement such technologies, especially in small and medium companies (Stentoft, Jensen, Philipsen, & Haug, 2019; Stentoft & Rajkumar, 2019). Therefore, companies aiming at implementing backshoring strategies need to evaluate their readiness not only in terms of manufacturing competences (Lampón & González-Benito, 2019) but also in terms of Industry 4.0 ones (Nujen, Mwesiumo, et al., 2018).

Considering the above-discussed framework, this chapter mainly addresses two research questions:

(a) In the evaluation of RSD alternatives, do companies consider Industry 4.0 technologies as a driver/motivation (Fratocchi et al., 2016)?
(b) In the evaluation of RSD alternatives, do companies consider Industry 4.0 technologies as an enabling factor (Engström, Hilletofth, Eriksson, & Hilletofth, 2018; Engström, Sollander, Hilletofth, & Eriksson, 2018)?

A two-step explorative approach will be adopted to investigate the two research questions, the first of which is conducted through a structured literature review based on 115 Elsevier Scopus indexed journal articles published until August 2019. The second step of the adopted methodology is based on empirical evidence based on the UnivAQ Manufacturing Reshoring Dataset (UMRD), which has already been adopted in previous backshoring research (Ancarani et al., 2019; Ancarani & Di Mauro, 2018; Ancarani, Di Mauro, Fratocchi, Orzesc, & Sartorc, 2015; Fratocchi, 2018a, b; Fratocchi et al., 2015; Fratocchi et al., 2016; Wan, Orzes, Sartor, & Nassimbeni, 2019; Wan, Orzes, Sartor, Di Mauro, & Nassimbeni 2019) since it is recognized as the most comprehensive at the worldwide level.

The first step of the analysis indicates that interest of scholars in the topic under investigation has been growing over the years. However, among all the Industry 4.0 enabling technologies, the literature has mainly focused on the study of production automation (42 out of 115 sampled Elsevier Scopus indexed journal articles, published from 2014 to 2019) and additive manufacturing (10 documents published only in the last 2 years). Moreover, only four journal articles (of which three have been published in 2019) specifically investigated the causality (if any) of Industry 4.0 technologies on backshoring. However, the research findings emerging from these four articles are quite differentiated and not definitive. Finally, it is worth noting that, while the majority of sampled articles conceptualize Industry 4.0 technologies as a driver (Barbieri et al., 2018), they have also been viewed as enabling factors (Engström, Hilletofth, et al., 2018; Engström, Sollander, et al., 2018). At the same time, empirical findings sorted by the UMRD show some interesting differences between European and US companies adopting backshoring decisions based on/enabled by Industry 4.0 technologies.

To investigate the proposed research questions, the rest of the chapter is as follows: Section 2 describes the methodology adopted. Section 3 presents and discusses findings. The last section concludes and presents the implications and limitations of the analysis.

## 2 Methodology

As previously introduced, the analysis is conducted adopting a two-step explorative methodology. At first, a structured literature review regarding backshoring decision has been conducted following the Seuring and Gold (2012) approach for content analysis. This approach has been already followed for literature reviews focused on RHC (Barbieri et al., 2018; Stentoft et al., 2016). Documents have been extracted from the Elsevier Scopus dataset, which is recognized as one of the most valuable source for publications in the business and management field of study (Greenwood, 2011). Adopted research criteria were the following:

(a) English written journal articles
(b) Published until August 2019
(c) Containing in the title, abstract, and/or keywords one of the following terms : “reshor∗,” “re-shor∗,” “backshore∗,” “back-shor∗,” “back-reshor∗,” and “back-sourc∗”

Authors found a total number of 177 journal articles and carefully read all the text. Some articles were excluded from the analysis on the basis of the following excluding criteria:

- Journal articles focusing on RHC implemented by service companies (e.g., ICT companies)
- Not peer review articles
- Journal articles related to different fields of study (reshoring concept is used with different meanings in the maritime and building engineering research fields)
- Journal articles not focused on manufacturing (e.g., documents referring to functions as human resources and research and development (R&D)).
- Based on these criteria, 62 documents were eliminated; therefore, the total amount of sampled documents was 115 (see Appendix).

The second step of the analysis considers the evidence collected in the UMRD; it contains data of European and American companies that implemented RHM operations. To the best of our knowledge, it is the most comprehensive available dataset on reshoring since it combines evidence from different sources:

(a) European Reshoring Monitor (ERM) dataset: it is a public available dataset that has already been used in previous backshoring studies (Ancarani et al., 2019; Wan, Orzes, Sartor, Di Mauro, et al., 2019; Wan, Orzes, Sartor, & Nassimbeni, 2019). It was financed by the EU foundation Eurofound and “collects information on individual reshoring cases from several sources (media, specialized press, scientific literature, practitioner literature) and it organizes it into a secured access, regularly updated, online database” (https://reshoring.eurofound.europa.eu/).
(b) Uni-CLUB MoRe reshoring (UCMR) dataset: it is a vast dataset containing evidence of companies that implemented manufacturing backshoring operations and has already been considered in several researches on manufacturing

backshoring (see, among others, Ancarani & Di Mauro, 2018; Ancarani et al., 2015, 2019; Fratocchi, 2018a, b; Fratocchi et al., 2015, 2016; Wan, Orzes, Sartor, Di Mauro, et al., 2019; Wan, Orzes, Sartor, & Nassimbeni, 2019).

(c) Reshoring Initiative dataset: it is a large dataset which includes evidence of US companies that implemented various location strategies (e.g., backshoring, kept from offshoring, foreign direct investments) having an impact on employment levels in the USA. It was already used for previous research on the phenomenon in the USA (Abbasi, 2016; Moore, Rothenberg, & Moser, 2018). Given the heterogeneity of the operations it includes, all the evidence has been checked by researchers and only the ones referring to RHC decisions have been incorporated in the UMRD dataset.

Up to the end of December 2018, the UMR dataset contained a total of 1279 instances of evidence regarding backshoring decisions implemented by companies belonging to 24 European countries (814), the USA (428), and other foreign countries (37).

# 3 Findings

## *3.1 Findings from the Extant Literature*

The analysis of the 115 sampled journal articles clearly shows that the relationship (if any) between Industry 4.0 technologies as a whole and backshoring has been specifically addressed by only four journal articles (namely, Ancarani & Di Mauro, 2018; Ancarani et al., 2019; Dachs et al., 2019, Stentoft & Rajkumar, 2018). However, wider attention has been given to two of the most well-known Industry 4.0 technologies, namely automation and three-dimensional (3D) printing/additive manufacturing (Table 1). More specifically, reshoring scholars have been increasingly conceptualizing automation as a backshoring driver and/or an enabling factor since 2014, reaching a total of 42 citations up to August 2019. In contrast, attention to the role of additive manufacturing/3D printing technologies has arisen only in the last 2 years. This finding may be—at least partially—explained by the early stage of the additive manufacturing technologies in large-scale production (Fratocchi, 2018a, b). Finally, only one contribution (Ancarani & Di Mauro, 2018) specifically refers to other two Industry 4.0 technologies, namely sensors and simulation. At the same time, Ancarani et al. (2019) investigated the opportunity for adopting cyber-physical systems to connect production and development and/or buyers and suppliers. Finally, it must be taken into account that the influence (if any) of Industry 4.0 technologies on backshoring decisions has been increasingly proposed as a future research avenue (e.g., Bals, Kirchoff, & Foerstl, 2016; Barbieri et al., 2018; Engström, Hilletofth, et al., 2018; Stentoft et al., 2016). Therefore, this chapter appears to be timely since it allows us to define the state of the art of the academic

**Table 1** Breakdown of sample articles by year and article content

| Year | Published articles | Production automation | 3D printing/additive manufacturing | Sensors | Simulation | Cyber-physical systems connecting production and development and/or buyers and suppliers | I4.0 impact on backshoring |
|---|---|---|---|---|---|---|---|
| 2007 | 1 | | | | | | |
| 2009 | 1 | | | | | | |
| 2011 | 1 | | | | | | |
| 2012 | 1 | | | | | | |
| 2013 | 6 | | | | | | |
| 2014 | 11 | 3 | | | | | |
| 2015 | 8 | 1 | | | | | |
| 2016 | 23 | 12 | | | | | |
| 2017 | 16 | 6 | | | | | |
| 2018 | 24 | 13 | 8 | | | 1 | 1 |
| 2019 | 23 | 7 | 2 | 1 | 1 | | 3 |
| Total | 115 | 42 | 10 | 1 | 1 | 1 | 4 |

debate on Industry 4.0 technologies and second-degree relocations to the home country.

Regarding production automation technology, the first evidence in the sampled journal articles is proposed by Arlbjørn and Mikkelsen (2014) who found that 47.5% of Danish firms which offshored production activities between 2009 and 2014 found the same activities could be backshored as a result of the advances in automation. Similarly, Heikkilä et al. (2018, b) found in a sample of Danish, Finnish, and Swedish companies that access to technology (including production automation) is one of the "significantly more important drivers for back-shoring than for off-shoring ($p \leq 0.001$)" (Heikkilä, Martinsuo, & Nenonen, 2018, p. 228). Moreover, Johansson and Olhager (2018a, b) found, on the basis of a Swedish sample, that companies that have both off- and backshored during the investigated period considered the access to technology at a slightly lower level than companies implementing only backshoring strategies. Finally, in their qualitative study, Engström, Sollander, et al. (2018) found that several companies decided to backshore in Sweden following the benefits offered by production automation. However, the huge contribution of such an enabling technology to the relocation of manufacturing activities in the home Nordic countries seems to be questioned by scholars who investigated other geographic areas. For instance, Ancarani and Di Mauro (2018) point out that only 13.6% of the 840 backshoring decisions belonging to the EU and US companies they analyzed specifically declared at least one of the Industry 4.0 technologies as a relocation driver. At the same time, De Backer, DeStefano, Menon, and Suh (2018) found that robotics have a negative impact on offshoring decisions (at least for companies located in developed countries) but do not yet trigger backshoring decisions.

It has been speculated that production automation reduces the relevance of labor cost as a location criterion since it increases productivity (Abbasi, 2016), making production in high-cost countries more viable (Engström, Hilletofth, et al., 2018). As a consequence, such a production technology has usually been considered as a driver of RHC. It also facilitates the implementation of a flexible production system (Lu, 2017) that allows product customization and firms' responsiveness (Moradlou et al., 2017). Based on this, Ancarani and Di Mauro (2018) state that both "cost-oriented" (i.e., relocation aimed at reducing production and logistics costs) and the "flexibility-oriented" (aimed at improving a firm's responsiveness to customer needs) backshoring strategies are supported by production automation. This evidence is quite relevant since—according to these two authors—the two typologies of reshoring decisions are the most diffused among the 840 backreshoring initiatives' evidence at the worldwide level they analyzed. In contrast, "quality-oriented" backshoring strategies—i.e., when the relocation to the home country is aimed at implementing product upgrade strategies (Bettiol, Burlina, Chiarvesio, & Di Maria, 2018)—are less relevant. This finding is quite at odds with previous evidence collected by Moradlou et al. (2017) and Moradlou and Tate (2018) with respect to the UK backshoring firms. This divergence may, at least partially, be explained from a home country perspective, that is the amount of product and process knowledge located at the home location, either within the backshoring company or within its suppliers' network. In this respect, the relocation within an industrial district at the home country could be not coupled with investments in Industry 4.0 since the backshoring company may implement upgrade strategies leveraging on specific manufacturing competencies (often having craft/manual nature) developed at the cluster level. On the contrary, firms located in countries where manufacturing manual competences are no longer available (given the de-industrialization processes following decades of offshoring strategies) may substitute them with production automation systems (Ancarani & Di Mauro, 2018).

As far as the second research question (Industry 4.0 as a barrier to backshoring strategies) is concerned, Engström, Hilletofth, et al. (2018) are the only authors addressing this issue. More specifically, they point out that Industry 4.0 may represent not only a driver of backshoring decision but also a barrier to its implementation. In this respect, useful insights have been recently offered by Stentoft and Rajkumar (2019). Authors point out that companies characterized by high levels of Industry 4.0 relevance (that is they carefully analyzed drivers and barriers of this phenomenon) are the ones that either backshored or simultaneously off- and backshored in the last 3 years. On the contrary, companies remained at the home country did not develop a specific Industry 4.0 competence. According to the authors, the former companies (the ones backshored or off- and backshored) have been developed or are still involved in learning processes. More specifically, such learning processes might or might not include learning about Industry 4.0 issues. : "*if the level of automation should be seen as a factor acting as a barrier or driver*," i.e., if it either boosts the backshoring decision or its lack hinders the relocation to the home country. In this respect, Nujen, Halse, et al. (2018) point out that the introduction of new technologies requests new competences within the company; therefore, the implementation of Industry 4.0 programs should be carefully evaluated in terms of firm's backshoring readiness (Bals et al., 2016; Nujen, Mwesiumo, et al., 2018). In this respect, employee upskilling programs are of crucial relevance.

As far as the 3D/additive manufacturing technologies are concerned, it is expected they will have a disruptive impact on global value chains (GVC), therefore also supporting backshoring decisions (Brennan, Ferdows, Godsell, & Golini, 2015; Strange & Zucchella, 2018). In this respect is worth noting that Moradlou and Tate (2018) found that 72% of 50 investigated companies adopting additive manufacturing technologies positively evaluate the contribution it makes to backshoring decisions. In this respect, d'Aveni (2015) states that 3D printing technologies will induce firms to locate manufacturing activities closer to customers; hence its adoption would boost reshoring decisions. Ancarani and Di Mauro (2018) adopt a more restrictive position, stating that this technology may support the implementation of only quality-oriented backshoring decisions. This is because additive manufacturing better supports product development processes and integration between R&D, design, production, and marketing functions (Ketokivi, Turkulainen, Seppälä, Rouvinend, & Ali-Yrkköd, 2017). Moreover, additive manufacturing allows firms to reduce prototyping costs and times (Ancarani et al., 2019). Moreover, Moradlou and Tate (2018) state that relocation to the home country is boosted by the following six benefits that additive manufacturing technologies offer in terms of supply chain management: *"shorter lead time, responsiveness to the product and market changes, lower transportation costs, fewer miscommunications with suppliers, more customization options, fewer products stored in inventory"* (see p. 241). At the same time, Fratocchi (2018a, b) presents evidence that 3D printing technology produces technical and economic advantages that adequately respond to the backshoring drivers presented by the literature (Barbieri et al. 2018). Moreover, Fratocchi (2018a, b) showed that additive manufacturing technologies are adopted in the same industries in which the literature identified greater evidence of backshoring decisions. This is in line with Laplume, Petersen, and Pearce (2016) who identified industries more likely to introduce additive manufacturing technologies.

As already noted, the attention paid by scholars to the relationship (if any)—and even the causality—between manufacturing reshoring and the whole set of Industry 4.0 technologies is still in its infancy. Among the few authors who have investigated such a linkage, Ancarani and Di Mauro (2018) point out "robotics is not a necessary ingredient of [back-]reshoring" but "Industry 4.0 supports manufacturing [back-] reshoring when design and product innovation are involved" (2018, see p. 8). At the same time, Ancarani et al. (2019) provide evidence that—at least until now—backshoring decisions have been implemented without investing in new technologies, especially if the relocation was aimed at leveraging on the "made in" effect and/or shortening the lead time and improving firms' responsiveness. However, authors expect Industry 4.0 may play—in the near future—a specific role in supporting manufacturing relocation decisions, especially in the case of skill shortage—due to previous de-industrialization emerging after decades of manufacturing offshoring—and/or when companies aim to improve design and strengthen product-development linkage. Previous findings are also confirmed by Stentoft and Rajkumar (2019) who analyzed a sample of Danish manufacturing companies. They found that the investigated technologies have no impact on the decision to relocate manufacturing activities to the home country. In contrast, Dachs et al. (2019) found a positive and significant association between investments in Industry 4.0 technologies and backshoring decisions. Moreover, their study—which has been focused on manufacturing companies belonging to Germany, Austria, and Switzerland—also shows that there is no causality between the two variables since both of them are driven by the research on higher levels of flexibility. It is worth noting that a previous investigation on a German sample conducted by Müller, Dotzauer, and Voigt (2017) (not included in the sampled literature) found that in only 13 of the 50 sampled backshoring decisions they analyzed, have Industry 4.0 technologies played a supporting role. Moreover, quantitative analysis of the issue did not support the correlation: considering a Likert scale (from 1 to 5), the mean value was 2.3, for companies that implemented backshoring while in-sourcing their production activities, and 2.2 for those which backshored while outsourcing. Findings by Müller et al. (2017) also show that the adoption of investigated technologies is mainly related to companies declaring the following backshoring drivers: innovation, testing of technologies, and time-to-market reduction.

Of specific note is the Dachs et al.'s (2019) study, in which the authors point out that the higher level of responsiveness allowed by Industry 4.0 technologies may be carefully evaluated in terms of geographical distribution of firms' customers. More specifically, if company customers are located in countries/regions other than the home country, the adoption of Industry 4.0 technologies would induce companies to implement RTC strategies, either in the form of near-shoring or of further offshoring.

To sum up, the structured literature review conducted earlier offers a varied set of results which are not conclusive. While several authors recognize that single Industry 4.0 technologies (mainly 3D/additive manufacturing and automation) may have an impact on manufacturing relocation decisions, their impact is highly dependent on the strategic aims pursued by the company. Moreover, analyses have been focused, until now, on a restricted number of countries (mainly in Europe). Further investigations are then requested; in this respect, evidence belonging to the UMRD—which will be discussed in the next section—may contribute to the academic debate.

### *3.2 Empirical Findings*

The literature review did not provide homogeneous results that can be considered conclusive; therefore, to further investigate the topic we now analyze empirical evidence from the UMRD. The latter includes data collected from secondary sources of backshoring decisions performed by European and US companies. Up to the end of December 2018, the UMRD covered a total of 1279 instances of evidence regarding backshoring decisions implemented by companies belonging to 24 European countries (814), the USA (428), and other foreign countries (37). Before analyzing the impact (if any) of Industry 4.0 technologies on the backshoring decisions, it seems useful to point out the main characteristics of the sampled backshoring decisions. In so doing, similarities and differences among the two main subsamples (European vs. US companies) deserve specific attention.

As far as the geographical dimension (home vs. host country/region) is concerned, three out of four US companies backshored from Asia (in particular from China), while European companies implemented backshoring more homogeneously from Asia and Europe (Table 2). Moreover, it is worth noting that the majority of intra-Europe relocations have been implemented among Western countries, i.e., among high-cost nations (when compared with those in Eastern Europe).

The breakdown by firm's size shows a higher homogeneity among the two subsamples, even if large companies are slightly more overrepresented in the European one (52.2% of total ones vs 43.7%).

Focusing the attention on industries, among most representative industries both in Europe and in the USA there is "manufacture of electrical equipment" and "manufacture of machinery and equipment not elsewhere classified n.e.c." (difference up to 1%). Differently, "manufacture of leather and related products" is an industry in which more European companies implemented the relocation, while "manufacture of computer, electronic, and optical products" is more diffused in the USA.

Examining drivers of relocation (Table 3), for both European and US companies three of the four most important drivers are related to the value-based quadrants of the Fratocchi et al.'s (2016) framework, namely: "customer responsiveness

**Table 2** Breakdown of backshoring decisions by home and host region

| Host region/country | Europe (%) | USA (%) | Others (%) | World (%) |
|---|---|---|---|---|
| China | 33.8 | 61.0 | 45.9 | 43.2 |
| Asia (other than China) | 9.2 | 11.0 | 8.1 | 9.8 |
| Asia (not specified) | 2.2 | 4.0 | 5.4 | 2.9 |
| *Asia* | *45.2* | *75.9* | *59.5* | *55.9* |
| Eastern Europe and former USSR | 17.6 | 0.7 | 10.8 | 11.7 |
| Western Europe | 26.0 | 7.7 | 21.6 | 19.8 |
| Europe (not specified) | 0.5 | 0.2 | | 0.4 |
| *Europe and the former USSR* | *44.1* | *8.6* | *32.4* | *31.9* |
| North Africa and the Middle East | 3.7 | 0.9 | | 2.7 |
| South Africa | 0.1 | 0.0 | | 0.1 |
| Africa (not specified) | 0.2 | 0.2 | | 0.2 |
| *Africa* | *4.1* | *1.2* | | *3.0* |
| USA | 0.4 | 0.0 | | 0.2 |
| North America (not USA) | 2.0 | 2.3 | 2.7 | 2.1 |
| Central and South America | 1.5 | 9.8 | 2.7 | 4.3 |
| *Americas* | *3.8* | *12.1* | *5.4* | *6.6* |
| *Oceania* | *0.1* | *0.2* | | *0.2* |
| *Not available* | *2.7* | *1.9* | *2.7* | *2.4* |
| *Total* | *100.0* | *100.0* | *100.0* | *100.0* |

Source: UnivAQ More reshoring dataset

**Table 3** Breakdown of backshoring decisions by declared motivation[a]

| Motivation | Europe (%) | USA (%) | Others (%) | World (%) |
|---|---|---|---|---|
| Customer responsiveness/vicinityHigher service quality | 17.1 | 27.6 | 8.1 | 20.3 |
| Logistics costs (including freight costs) | 16.3 | 28.5 | 8.1 | 20.2 |
| Made in effect (home country) | 19.5 | 22.2 | 5.4 | 20.0 |
| Delivery time (including delays) | 17.3 | 24.5 | 10.8 | 19.5 |
| Offshored poor product quality | 16.1 | 23.1 | 13.5 | 18.4 |
| Firm's organizational restructuring | 17.6 | 8.6 | 16.2 | 14.5 |
| **Adoption of automation and/or other innovative product/process technologies (excluding 3D printing/ additive manufacturing)** | **13.1** | **11.7** | **13.5** | **12.7** |
| Increasing labor cost in the host country (including higher productivity in the home country) | 7.6 | 19.4 | 18.9 | 11.9 |
| Total cost of ownership | 11.8 | 11.4 | 16.2 | 11.8 |

Source: UnivAQ More reshoring dataset
[a]Motivations declared by at least 10% of companies at the worldwide level. Motivation belonging to Industry 4.0 in bold

**Table 4** Backshoring motivations cited jointly with the production automation[a]

| Motivations | Europe (%) | USA (%) | Others (%) | World (%) |
|---|---|---|---|---|
| Customer responsiveness/vicinity<br>Higher service quality | 12.9 | 13.6 | 66.7 | 13.8 |
| Logistic costs (including freight costs) | 8.3 | 8.2 | 33.3 | 8.5 |
| Made in effect (home country) | 18.9 | 10.5 | | 15.6 |
| Delivery time (including delays) | 18.4 | 8.6 | 50.0 | 14.8 |
| Offshored poor product quality | 13.7 | 10.1 | 40.0 | 12.8 |
| Cost and difficulties in controlling the host country activities | 21.8 | 19.4 | 50.0 | 21.4 |
| Vicinity of engineering and production + Firm's strategies focused on product and process innovations | 17.2 | 12.7 | | 15.0 |

Source: UnivAQ More reshoring dataset
[a]Only motivations cited by at least 10% of companies at the worldwide level

improvement" (20.3%), "made in effect" (20% of total sample), and "delivery time" (19.5%) while "logistics costs" (20.2%) belongs to the cost quadrants. Even if these drivers are relevant for both the subsamples, they were slightly more cited by US companies.

When considering Industry 4.0 technologies, findings by Ancarani et al. (2019) are confirmed since companies only cited production automation and additive manufacturing as drivers for relocation to the home country. However, while automation has been declared a backshoring driver in 12.7% of the sampled decisions (with a slight over-citation by European companies: 13.1% vs. 11.7%), the adoption of additive manufacturing technologies has been considered as a reshoring motivation in only 1.3% of the sampled relocation decisions. Moreover, such a technology has been implemented almost exclusively by US companies (0.5% vs. 2.8%). Finally, only five (four US and one European) out of the 16 firms adopting 3D/additive manufacturing technologies also cited product automation as a driver for the backshoring decision. This finding confirms—at least partially—the Ancarani and Di Mauro (2018) and Ancarani et al.'s (2019) evidence that the two investigated technologies are likely to support different typologies of reshoring decisions. More specifically, both articles suggest that production automation is more consistent with "cost-oriented" and "flexibility-oriented" backshoring decisions while "quality-oriented" ones are better supported by additive manufacturing technologies. However, our data unexpectedly show that—considering only the 10 most cited motivations—production automation has been jointly cited with the following three motivations (all referring to quality-oriented relocation decisions): "cost and difficulties in controlling the host country activities" (21.4% of total companies cite this motivation), "made in effect" (15.6%), and "vicinity of engineering and production" (15%). In contrast, issues regarding production costs (e.g. "total cost of ownership" and "labor costs/productivity") are jointly cited by less than 10% of the sampled companies adopting production automation (Table 4).

**Table 5** Backshoring evidence citing production automation: breakdown by firm's size

| Firm's size | % of total European companies | % of total US companies | % of total other countries' companies | % of worldwide companies |
|---|---|---|---|---|
| Large | 11.5 | 9.6 | 10.3 | 10.9 |
| Medium | 18.2 | 12.6 | | 16.2 |
| Small and micro | 12.2 | 13.3 | 25.0 | 12.8 |
| n.a. | | 33.3 | 100.0 | 16.7 |
| Total | 13.1 | 11.7 | 13.5 | 12.7 |

Source: UnivAQ More reshoring dataset

**Table 6** Backshoring evidence citing production automation: breakdown by host region

| Host region | % of European companies | % of US companies | % of other countries' companies | % of worldwide companies |
|---|---|---|---|---|
| Asia | 13.6 | 12.3 | 13.6 | 13.0 |
| Europe and the former USSR | 12.8 | 13.5 | | 12.5 |
| Africa | 21.2 | | | 18.4 |
| Americas | 3.2 | 9.6 | | 7.1 |
| Oceania | | | | |
| Not available | 13.6 | | 100.0 | 12.9 |
| Total | 13.1 | 11.7 | 13.5 | 12.7 |

Source: UnivAQ More reshoring dataset

Though 3D/additive manufacturing technologies have been cited as a backreshoring driver by very few companies (16 out of 1,269), it is worth noting that companies citing such a technology mainly stated their backshoring decisions were based on "cost and difficulties in controlling the host country activities" (5.8% of total companies cited this motivation) and "vicinity of engineering and production" (4%). This finding is consistent with the expectations of Ancarani and Di Mauro, Fratocchi, Orzes, and Sartor (2018), and Ancarani et al. (2019).

Given the little evidence of backshoring decisions implementing 3D/additive manufacturing technologies, further insights may emerge when considering the breakdown of backshoring decisions citing product automation as a driver by size, geography, and industry. As far as size is concerned (Table 5), quite unexpectedly data show this technology—which generally requires high levels of investment—to be mainly adopted by medium-sized companies (16.2% of total firms in the range vs. 10% for the large ones and 12.8% for small and micro ones), especially among European companies.

When considering the geographic issues (Table 6), data clearly show that the adoption of automated production technologies is not influenced by the host region where companies have earlier offshored production activities. Also, this finding is partially unexpected, since one would have expected that backshoring decisions regarding production activities located in low-cost countries (e.g., Asia) would be

**Table 7** Backshoring evidence citing production automation: breakdown by firm's industry[a]

| NACE Code | Description | Number of companies at the worldwide level | % of total European companies | % of total US companies | % of total other countries' companies | % |
|---|---|---|---|---|---|---|
| 26 | Manufacture of computer, electronic, and optical products | 153 | 15.9 | 7.8 | 14.3 | 12.4 |
| 28 | Manufacture of machinery and equipment n.e.c. | 130 | 11.6 | 9.8 | | 10.8 |
| 27 | Manufacture of electrical equipment | 128 | 6.4 | 17.8 | | 10.2 |
| 14 | Manufacture of apparel | 108 | 16.3 | 14.8 | | 15.7 |
| 25 | Manufacture of fabricated metal products, except machinery and equipment | 85 | 26.2 | 17.1 | | 21.2 |
| 22 | Manufacture of rubber and plastic products | 73 | 13.5 | 12.1 | 100.0 | 16.4 |
| 10 | Manufacture of food products | 58 | 22.4 | | | 19.0 |
| 31 | Manufacture of furniture | 52 | 22.2 | 4.0 | | 13.5 |
| 24 | Manufacture of basic metals | 21 | 31.3 | | | 23.8 |

Source: UnivAQ More reshoring dataset
[a]Only industries with no less than 20 companies at the worldwide level

largely supported by automation when compared with medium- and high-cost countries (e.g., Europe). Moreover, it is in contrast with previous findings of Dachs et al. (2019) in terms of higher "Industry 4.0 readiness" of large companies with respect to small and medium ones. A possible explanation for this unexpected result may be represented by latter-day implementation of automated production systems by the medium companies.

Finally, when considering the firms' industry (Table 7) dissimilarities among European and US backshoring decisions clearly emerge. For instance while only 7% of European leather manufacturers declared to have invested in production automation when backshoring, the corresponding value for US companies is 28.6%. In contrast, European companies have highly automated furniture production (22.2%) compared with US ones (4%). This finding seems to confirm that the home country—at least partially—matters when investigating the backshoring decisions (Wan, Orzes, Sartor, & Nassimbeni, 2019).

## 4 Concluding Remarks

The chapter aimed to investigate the relationship (if any) between Industry 4.0 technologies and decisions to relocate earlier offshored manufacturing activities to the home country. To shed new light on this research question, an exploratory approach has been implemented adopting a two-step methodology. First of all a structured literature review has been conducted on a sample of 115 Scopus indexed journal articles published between 2007 and August 2019. This research clearly shows the topic is attracting growing interest among scholars (at least from 2014). However, they mainly focus on specific technologies, namely production automation and 3D printing/additive manufacturing. In any case, findings are not sufficient to be conclusive and seem to be influenced by geographic issues, since automation is not equally implemented in the different Western countries, also because of their different industry structure (i.e., the type of sectors in which local companies operate). Only four journal articles specifically address the relationship between Industry 4.0 technologies and backshoring decisions; moreover, their findings are somewhat contrasting. For instance, Dachs et al. (2019) found a significant and positive relationship (but not also the causality) between the two issues while Ancarani et al. (2019) and Stentoft and Rajkumar (2019) did not discover any connection. This finding might induce the speculation that country-specific issues may influence the obtained results, since Dachs et al. (2019) focus on German, Austrian, and Swiss companies, while Stentoft and Rajkumar (2019) on Danish ones. As clearly showed by analyzing data from the UMRD, the European and US companies that backshored their production based on Industry 4.0 technologies are characterized by some dissimilarities, especially in terms of industry and adopted technology (production automation vs. additive manufacturing). Finally, the geographic dimension deserves a specific note since investments in Industry 4.0 technologies may be influenced by financial aids provided by national and/or local government bodies. In this respect, Ancarani et al. (2019) suggest policymakers should not only offer companies the possibility to reduce the fixed cost belonging to the adoption of Industry 4.0 technologies but also to develop "the necessary digital competencies for the successful exploitation of these technologies" (2018, p. 10). This is consistent with Nujen, Halse, et al. (2018) who state Industry 4.0 investments "have little value unless complemented with employee upskilling programs" (2018, see p. 690). Moreover, authors point out that the use of advanced technologies, as the ones belonging to Industry 4.0, needs to be complemented with other manufacturing competences. In this respect, Lampón and González-Benito (2019) state that backshoring strategies are more likely implemented by companies which improved their key manufacturing resources (e.g., process optimization, technologies, and facilities). Moreover, in the case of backshoring decisions coupled with re-insourcing ones, these competences may be already available within the firm or, more often, have to be redeveloped activating adequate learning process. To sum up, the effective implementation of both Industry 4.0 technologies and backshoring strategies requests companies to carefully evaluate their readiness and activate proper learning processes.

Another issue emerging as relevant is the one concerning the size. While it is generally expected Industry 4.0 technologies are more easily adopted by large companies, analysis of UMRD data provides evidence that—at least production automation—is mainly implemented by European medium-sized companies and US small and micro ones. Future research should further address this aspect, given the implications in terms of availability of skilled employees (Stentoft & Rajkumar, 2019).

A third question is still open as regards the relationships (if any) between the adoption of a specific Industry 4.0 technology and the strategic aims pursued by the backshoring decision. While Ancarani et al. (2019) and Ancarani and Di Mauro (2018) suggest that production automation is more consistent with "cost-oriented" and "flexibility-oriented" backshoring decisions; data from the UMRD provide evidence that companies adopting this technology were driven by motivations belonging to the "quality-oriented" backshoring decisions.

The previous discussion induces us to conclude that further studies are requested to further investigate the proposed research question. Our study has an explorative aim and is mainly based on secondary data; therefore, our conclusions are not generalizable. However, it may represent a useful state of the art of the academic debate and of backshoring evidence available up to now. In this respect, we suggest future research should couple a longitudinal case study approach with quantitative surveys.

## Appendix

| Publication year | Authors | Journal | Automated production system | Additive manufacturing | I4.0 and Back-shoring |
|---|---|---|---|---|---|
| 2007 | Kinkel, S., Lay, G., Maloca, S. | International Journal of Entre-preneurship and Small business | | | |
| 2009 | Kinkel, S., Maloca, S. | Journal of Pur-chasing and Sup-ply Management | | | |
| 2011 | Hogg, D. | Manufacturing Engineering | | | |
| 2012 | Kinkel, S. | International Journal of Opera-tions and Produc-tion Management | | | |

(continued)

| | | | | | |
|---|---|---|---|---|---|
| 2013 | Baldwin, R., Venables, A.J. | Journal of International Economics | | | |
| 2013 | Canham, S., Hamilton, R.T. | Strategic Outsourcing | | | |
| 2013 | Denning, S. | Strategy and Leadership | | | |
| 2013 | Ellram, L.M. | Journal of Supply Chain Management | | | |
| 2013 | Ellram, L.M., Tate, W.L., Petersen, K. J. | Journal of Supply Chain Management | | | |
| 2013 | Gray, J.V., Skowronski, K., Esenduran, G., Rungtusanatham, M. | Journal of Supply Chain Management | | | |
| 2014 | Arlbjørn, J.S., Mikkelsen, O.S. | Journal of Purchasing and Supply Management | X | | |
| 2014a | Bailey, D., De Propris, L. | Cambridge Journal of Regions, Economy and Society | X | | |
| 2014b | Bailey, D., De Propris, L. | Revue d'Economie Industrielle | | | |
| 2014 | Fratocchi, L., Di Mauro, C., Barbieri, P., Nassimbeni, G., Zanoni, A. | Journal of Purchasing and Supply Management | | | |
| 2014 | Kinkel, S. | Journal of Purchasing and Supply Management | | | |
| 2014 | Martínez-Mora, C., Merino, F | Journal of Purchasing and Supply Management | | | |
| 2014 | Mugurusi, G., de Boer, L. | Strategic Outsourcing | | | |
| 2014 | Tate, W.L. | Journal of Purchasing and Supply Management | X | | |
| 2014 | Tate, W.L., Ellram, L.M., Schoenherr, T., Petersen, K.J. | Business Horizons | X | | |

(continued)

| | | | | | |
|---|---|---|---|---|---|
| 2014 | Wu, X., Zhang, F. | Management Science | | | |
| 2014 | Zhai, W. | Economic Modelling | | | |
| 2015 | Ancarani, A., Di Mauro, C., Fratocchi, L., Orzes, G., Sartor, M. | International Journal of Production Economics | X | | |
| 2015 | Belussi, F. | Investigaciones Regionales | | | |
| 2015 | Fox, S. | Technology on Society | | | |
| 2015 | Grandinetti, R., Tabacco, R. | International Journal of Globalisation and Small Business | | | |
| 2015 | Grappi, S., Romani, S., Bagozzi, R.P. | Journal of the Academy of Marketing Science | | | |
| 2015 | Gylling, M., Heikkilä, J., Jussilä, K., Saarinen, M. | International Journal of Production Economics | | | |
| 2015 | Razvadovskaja, YV., Shevcenko, I. K. | Asian Social Science | | | |
| 2015 | Sardar, S., Lee, Y. H. | Mathematical Problems in Engineering | | | |
| 2016 | Abbasi, H. | Journal of Textile and Apparel Technology and Management | X | | |
| 2016 | Ashby, A. | Operations Management Research | | | |
| 2016 | Bals, L., Kirchoff, J.F., Foerstk, K. | Operations Management Research | X | | |
| 2016 | Barbieri, P., Stentoft, J. | Operations Management Research | X | | |
| 2016 | Foerstl, K., Kirchoff, Bals, L. | International Journal of Physical Distribution and Logistics Management | X | | |

(continued)

| | | | | | |
|---|---|---|---|---|---|
| 2016 | Foster, K. | Journal of Textile and Apparel Technology and Management | X | | |
| 2016 | Fratocchi, L., Ancarani, A., Barbieri, P., Di Mauro, C., Nassimbeni, G., Sartor, M., Vignoli, M., Zanoni, A. | International Journal of Physical Distribution and Logistics Management | X | | |
| 2016 | Huq, F., Pawar, K. S., Rogers, H. | Production Planning and Control | | | |
| 2016 | Joubioux, C., Vanpoucke, E. | Operations Management Research | | | |
| 2016 | Lavissière, A., Mandjá, K., Fedi, L. | Supply Chain Forum | | | |
| 2016 | Młody, M. | Entrepreneurial Business and Economics Review | | | |
| 2016 | Moradlou, H., Backhouse, C.J. | Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture | | | |
| 2016 | Presley, A., Meade, L., Sarkis, J. | Supply Chain Forum | | | |
| 2016 | Robinson, P.K., Hsieh, L. | Operations Management Research | | | |
| 2016 | Saki, Z. | Journal of Textile and Apparel Technology and Management | X | | |
| 2016 | Sardar, S., Lee, Y. H., Memon, M.S. | Sustainability | | | |
| 2016 | Srai, J.S., Ané, C. | International Journal of Production Research | X | | |
| 2016a | Stentoft, J., Mikkelsen, O.S., Jensen, J.K. | Operations Management Research | X | | |

(continued)

| | | | | | |
|---|---|---|---|---|---|
| 2016b | Stentoft, J., Mikkelsen, O.S., Jensen, J.K. | Supply Chain Forum | X | | |
| 2016a | Stentoft, J., Ohlager, J., Heikkilä, J., Thoms, L. | Operations Management Research | X | | |
| 2016 | Sutherland et al. | CIRP Annals - Manufacturing Technologies | | | |
| 2016 | Uluskan, M., Joines, J.A., Godfrey, A.B. | Supply Chain Management | | | |
| 2016 | Zhai, W., Sun., S, Zhang, G. | Operations Management Research | X | | |
| 2017 | Benstead, A. V., Stevenson, M., Hendry, L.C. | Operations Management Research | X | | |
| 2017 | Bettiol, M., Burlina, C., Chiarvesio, M., Di Maria, E. | Investigaciones Regionales | | | |
| 2017 | Brandon-Jones, E., Dutordoir, M., Frota Neto, J.Q., Squire, B. | Journal of Operations Management | | | |
| 2017 | Bye, E., Erickson, K. | Research Journal of Textile and Apparel | | | |
| 2017 | Chen, L., Hu, B. | Manufacturing and Service Operations Management | | | |
| 2017 | Delis, A., Driffield, N., Temouri, Y. | Journal of Business Research | | | |
| 2017 | Fel, F., Griette, E. | Strategic Direction | | | |
| 2017 | Gray, J.V., Skowronski, K., Esenduran, G., Rungtusanatham, M. et al. | Journal of Operations Management | | | |
| 2017 | Hartman, P.L., Ogden, J.A., Withlin, J.R., Hazen, B.T. | Business Horizons | | | |
| 2017 | Moradlou, H., Backhouse, C. J., Ranganathan, R. | International Journal of Physical Distribution and Logistics Management | X | | |

(continued)

| | | | | | |
|---|---|---|---|---|---|
| 2017 | Schmidt, A.S.T., Touray, E., Hansen, Z. N. L. | Production Engineering | | | |
| 2017 | Tate, W.L., Bals, L. | International Journal of Physical Distribution and Logistics Management | X | | |
| 2017 | Uluskan, M., Godfrey, A. B., & Joines, J. A. | Journal of the Textile Institute | X | | |
| 2017 | Wiesmann, B., Snoei, J.R., Hilletofth, P., Eriksson, D. | European Business Review | X | | |
| 2017 | Yegul et al. | Computers and industrial engineering | | | |
| 2017 | Zhao, L., Huchzermeier, A. | European Journal of Operational Research | X | | |
| 2018 | Ancarani, A., Di Mauro, C. | IEEE Engineering Management Review | X | X | X |
| 2018 | Bailey, D., Corradini, C., De Propris, L. | Cambridge Journal of Economics | | | |
| 2018 | Baraldi, E., Ciabuschi, F., Lindahl, O., Fratocchi, L. | Industrial Marketing Management | | | |
| 2018 | Barbieri, P., Ciabuschi, F., Fratocchi, L., Vignoli, M. | Journal of Global Operations and Strategic Sourcing | X | X | |
| 2018 | Boffelli, A., Golini, R., Orzes, G., Dotti, S. | IEEE Engineering Management Review | | | |
| 2018 | Di Mauro, C., Fratocchi, L., Orzes, G., Sartor, M. | Journal of Purchasing and Supply Management | X | | |
| 2018 | Engström, G., Hilletofth, P., Eriksson, D., Sollander, K. | World Review of Intermodal transportation research | X | | |
| 2018 | Engström, G., Sollander, K., Hilletofth, P., Eriksson, D. | Journal of Global Operations and Strategic Sourcing | X | | |

(continued)

| | | | | | |
|---|---|---|---|---|---|
| 2018a | Fratocchi, L. | World Review of Intermodal Transportation Research | | X | |
| 2018 | Grappi, S., Romani, S., Bagozzi, R.P. | Journal of World Business | | | |
| 2018 | Hasan, R. | Journal of Textile and Apparel Technology and Management | X | X | |
| 2018 | Heikkilä, J., Nenonen, S., Olhager, J., Stentoft, J | World Review of Intermodal Transportation Research | X | | |
| 2018 | Heikkilä, J., Martinsuo, M., Nenonen, S. | Journal of Manufacturing Technology Management | X | | |
| 2018a | Johansson, M., Olhager, J. | International Journal of Production Economics | | | |
| 2018b | Johansson, M., Olhager, J. | Journal of Manufacturing Technology Management | | | |
| 2018 | Moore, M.E., Rothenberg, L., Moser, H. | Journal of Manufacturing Technology Management | X | X | |
| 2018 | Moradlou, H., Tate, W. | World Review of Intermodal Transportation Research | | X | |
| 2018 | Nujen, B.B., Halse, L.L., Damm, R., Gammelsæter, H. | Journal of Manufacturing Technology Management | X | X | |
| 2018 | Pal, Harper, Vellesalu | The International Journal of Logistic Management | X | | |
| 2018 | Sirilertsuwan, P., Ekwall, D., Hjelmgren, D. | International Journal of Logistics Management | | | |
| 2018 | Stentoft, J., Mikkelsen, O. S., Jensen, J. K., Rajkumar, C. | International Journal of Production Economics | X | | |

(continued)

| | | | | | |
|---|---|---|---|---|---|
| 2018 | Theyel, G., Hofman, K., Gregory, M. | Economic Development Quarterly | | | |
| 2018 | Vanchan, V., Mulhall, R., Bryson, J. | Growth and Change | X | X | |
| 2018 | Yu, U.-J., Kim, J.-H. | Journal of Fashion Marketing and Management | | | |
| 2018 | Nujen, B.B., Mwesiumo, D.E., Solli-Sæther, H., Slyngstad, A.B., Halse, L.L. | Journal of Global Operations and Strategic Sourcing | X | X | |
| 2019 | Ancarani, A., Di Mauro, C., Mascali, F. | Journal of World Business | X | X | X |
| 2019 | Barbieri, P., Elia, S., Fratocchi, L., Golini, R. | Journal of Purchasing and Supply Management | X | | |
| 2019 | Ciabuschi, F., Lindahl, O., Barbieri, P., Fratocchi, L. | European Business Review | | | |
| 2019 | Dachs, B., Kinkel, S., Jäger, A., Palčič, I. | Journal of Purchasing and Supply Management | | | |
| 2019 | Fjellstrom, D., Fang, T., Chimenson, D. | Journal of Asia Business Studies | X | | |
| 2019 | Gadde, L.E., Jonsson, P. | Journal of Purchasing and Supply Management | | | |
| 2019 | Hilletofth, P, Eriksson, D., Tate, W., Kinkel, S. | Journal of Purchasing and Supply Management | | | |
| 2019 | Hilletofth, P., Sequeira, M., Adlemo, A. | Expert Systems with Applications | | | |
| 2019 | Oshri, I., Sidhu, J. S., Kotlarsky, J. | Journal of Business Research | | | |
| 2019 | Johansson, M., Olhager, J., Heikkilä, J., Stentoft, J. | Journal of Purchasing and Supply Management | | | |
| 2019 | Luthra, S., Mangla, S.K., Yadav, G. | Journal of Cleaner Production | | | |

(continued)

| | | | | | |
|---|---|---|---|---|---|
| 2019 | Perrone, G., Bruccoleri, M., Mazzola, E. | International Journal of Production Economics | | | |
| 2019 | Mohiuddin, M., Rashid, M.D.M., Al Azad, M.D.S., Su, Z. | International Journal of Logistics Research and Applications | | | |
| 2019 | Orzes, G., & Sarkis, J. | Resources, Conservation & Recycling | | | |
| 2019 | Piatanesi, B., Arauzo-Carod, J. M. | Growth and Change | | | |
| 2019 | Sayem, A., Feldman, A., Ortega-Mier, M. | BRQ Business Research Quarterly | X | | |
| 2018 | Talamo, G., Sabatino, M. | Contemporary Economics | | | |
| 2019 | Thakur-Werns, P. | Journal of Global Operations and Strategic Sourcing | | | |
| 2019 | Wan, L. Orzes, G., Sartor, M., Di Mauro, C., Nassimbeni, G. | Journal of Purchasing and Supply Management | | | |
| 2019 | Wan, L. Orzes, G., Sartor, M., Nassimbeni, G. | Journal of Purchasing and Supply Management | | | |
| 2019 | Dachs, B., Kinkel, S., Jäger, A. | Journal of World Business | X | | X |
| 2019 | Stentoft, J., Rajkumar, C. | International Journal of Production Research | X | | X |
| Total | | | 42 | 10 | 4 |

## 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), 1–6.

Alcácer, J., Cantwell, J., & Piscitello, L. (2016). Internationalization in the information age: A new era for places, firms, and international business networks? *Journal of International Business Studies, 47*, 499–512.

Ancarani, A., & Di Mauro, C. (2018). Reshoring and Industry 4.0: How often do they go together? *IEEE Engineering Management Review, 46*(2), 87–96.

Ancarani, A., Di Mauro, C., Fratocchi, L., Orzesc, G., & Sartorc, M. (2015). Prior to reshoring: A duration analysis of foreign manufacturing ventures. *International Journal of Production Economics, 169*, 141–155.

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.

Arlbjørn, J. S., & Mikkelsen, O. S. (2014). Backshoring manufacturing: Notes on an important but under-researched theme. *Journal of Purchasing & Supply Management, 20*(1), 60–62.

Ashby, A. (2016). From global to local: Reshoring for sustainability. *Operations Management Research, 9*(3-4), 1–14.

Bailey, D., Corradini, C., & De Propris, L. (2018). Home-sourcing and closer value chains in mature economies: The case of Spanish manufacturing. *Cambridge Journal of Economics, 42* (6), 1567–1584.

Bailey, D., & De Propris, L. (2014a). Manufacturing reshoring and its limits: The UK automotive case. *Cambridge Journal of Regions, Economy and Society, 20*(1), 66–68.

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, 1*(145), 45–61.

Baldwin, R., & Venables, A. J. (2013). Spiders and snakes: Offshoring and agglomeration in the global economy. *Journal of International Economics, 90*(2), 245–254.

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), 1–15.

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.

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.

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.* https://doi.org/10.1016/j.pursup.2018.12.003

Barbieri, P., & Stentoft, J. (2016). Reshoring: A supply chain innovation perspective. *Operations Management Research, 9*(3-4), 49–144.

Belussi, F. (2015). The international resilience of Italian industrial districts/clusters (ID/C) between knowledge re-shoring and manufacturing off (near)-shoring. *Investigaciones Regionales – Journal of Regional Research, 32*, 89–113.

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.

Bettiol, M., Burlina, C., Chiarvesio, M., & Di Maria, E. (2017). From delocalisation to backshoring? Evidence from Italian industrial districts. *Investigaciones Regionales, 39*, 137–154.

Bettiol, M., Burlina, C., Chiarvesio, M., & Di Maria, E. (2018). Manufacturing, where art thou? Value chain organization and cluster-firm strategies between local and global. In V. De Marchi, E. De Maria, & G. Gereffi (Eds.), *Local clusters in global value chains* (pp. 155–174). London: Routledge.

Boffelli, A., Golini, R., Orzes, G., & Dotti, S. (2018). "How to reshore": Some evidence from the apparel industry. *IEEE Engineering Management Review, 46*, 4. 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*, 31–36.

Brennan, L., Ferdows, K., Godsell, J., & Golini, R. (2015). Manufacturing in the world: Where next? *International Journal of Operations & Production Management, 35*(9), 1253–1274.

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York: Norton.

Buckley, P. J. (2011). International integration and coordination in the global factory. *Management International Review, 51*, 269–283.

Buckley, P. J., & Ghauri, P. N. (2004). Globalisation, economic geography and the strategy of multinational enterprises. *Journal of International Business Studies, 35*(2), 81–98.

Bye, E., & Erickson, K. (2017). Opportunities and challenges for Minnesota sewn product manufacturers. *Research Journal of Textile and Apparel, 21*(1), 72–83.

Canham, S., & Hamilton, R. T. (2013). SME internationalisation: offshoring, 'backshoring', or staying at home in New Zealand. *Strategic Outsourcing: An International Journal, 6*(3), 277–291.

Chen, L., & Hu, B. (2017). Is reshoring better than offshoring? The effect of offshore supply dependence. *Manufacturing & Service Operations Management, 19*(2), 166–184.

Chen, W., & Kamal, F. (2016). The impact of information and communication technology adoption on multinational firm boundary decisions. *Journal of International Business Studies, 47*(5), 563–576.

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.

d'Aveni, R. (2015). The 3-D printing revolution. *Harvard Business Review, 93*(5), 40–48.

Dachs, B., Kinkel, S., & Jäger, A. (2019). Bringing it all back home? Backshoring of manufacturing activities and the adoption of Industry 4.0 technologies. *Journal of World Business, 54*(6), 101017.

De Backer, K., DeStefano, T., & Menon, C., J.R Suh (2018). *Industrial robotics and the global organisation of production* (Working Papers 2018/03). Paris: OECD Science, Technology and Industry.

Delis, A., Driffield, N., & Temouri, Y. (2017). The global recession and the shift to re-shoring: Myth or reality? *Journal of Business Research, 103*, 632–643.

Denning, S. (2013). Boeing's offshoring woes: Seven lessons every CEO must learn. *Strategy & Leadership, 41*(3), 29–35.

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.

Ellram, L. M. (2013). Offshoring, reshoring and the manufacturing location decision. *Journal of Supply Chain Management, 49*(2), 3–6.

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.

Engström, G., Hilletofth, P., Eriksson, D., & Hilletofth, P. (2018). Drivers and barriers of reshoring in the Swedish manufacturing industry. *World Review of Intermodal Transportation Research, 7*(3), 195–220.

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.

Fel, F., & Griette, E. (2017). Near-reshoring your supplies from China: A good deal for financial motives too. *Strategic Direction, 33*(2), 24–26.

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.

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.

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), 1–10.

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.

Fratocchi, L. (2018a). Additive manufacturing technologies as a reshoring enabler: A why, where and how approach. *World Review of Intermodal Transportation Research, 7*(3), 264–293.

Fratocchi, L. (2018b). *Additive manufacturing as a reshoring enabler considerations on the why issue*. In Paper presented at workshop on metrology for Industry 4.0 and IoT, MetroInd 4.0 and IoT 2018 – Proceedings 6 August 2018, Article number 8428316.

Fratocchi, L., Ancarani, A., Barbieri, P., Di Mauro, C., Nassimbeni, G., Sartor, M., et al. (2015). Manufacturing back-reshoring as a nonlinear internationalization process. In R. Van Tulder, A. Verbeke, & R. Drogendijk (Eds.), *The future of global organizing, Progress in international business research (PIBR)* (pp. 367–405). Bingley: Emerald.

Fratocchi, L., Ancarani, A., Barbieri, P., Di Mauro, C., Nassimbeni, G., Sartor, M., et al. (2016). Motivations of manufacturing back-reshoring: An interpretative framework. *International Journal of Physical Distribution & Logistics Management, 46*(2), 98–127.

Fratocchi, L., Di Mauro, C., Barbieri, P., Nassimbenid, G., & Zanoni, A. (2014). When manufacturing moves back: Concepts and questions. *Journal of Purchasing and Supply Management, 20* (1), 54–59.

Gadde, L. E., & Jonsson, P. (2019). Future changes in sourcing patterns: 2025 Outlook for the Swedish textile industry. *Journal of Purchasing and Supply Management, 25*(3), 100526.

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), 139–161.

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.

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.

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*, 37–51.

Gray, J. V., Skowronski, K., Esenduran, G., & Skowronski, K. (2013). The reshoring phenomenon: What supply chain academics ought to know and should do. *Journal of Supply Chain Management, 49*(2), 27–33.

Greenwood, M. (2011). *Which business and management journal database is best?* Accessed December 22, 2018, from https://bizlib247.wordpress.com/2011/06/19/which-business-and-management-journal-database-is-best/

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.

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.

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), 1–6.

Heikkilä, J., Martinsuo, M., & Nenonen, S. (2018). Backshoring of production in the context of a small and open Nordic economy. *Journal of Manufacturing Technology Management, 29*(4), 658–675.

Heikkilä, J., Nenonen, S., Olhager, J., & Nenonen, S. (2018). Manufacturing relocation abroad and back: Empirical evidence from the Nordic countries. *World Review of Intermodal Transportation Research, 7*(3). 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., & Adlemo, A. (2019). Three novel fuzzy logic concepts applied to reshoring decision-making. *Expert Systems with Applications, 126*, 133–143.

Hogg, D. (2011). Lean in a changed world. *Manufacturing Engineering, 147*(3), 102–113.

Huq, F., Pawar, K. S., & Rogers, H. (2016). Supply chain configuration conundrum: How does the pharmaceutical industry mitigate disturbance factors? *Production Planning & Control, 27*(14), 1206–1220.

Johanson, M., & Olhager, J. (2018a). 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.

Johanson, M., & Olhager, J. (2018b). Manufacturing relocation through offshoring and backshoring: The case of Sweden. *Journal of Manufacturing Technology Management, 29*(4), 637–657.

Johansson, M., Olhager, J., Heikkilä, J., & Stentoft, J. (2019). Offshoring versus backshoring: Empirically derived bundles of relocation drivers, and their relationship with benefits. *Journal of Purchasing and Supply Management, 25*(3), 100509.

Joubioux, C., & Vanpoucke, E. (2016). Towards right-shoring: A framework for off- and re-shoring decision making. *Operations Management Research, 9*(3-4), 1–16.

Kagermann, H., Wahlster, W., & Helbig, J. (2013). *Recommendations for implementing the strategic initiative INDUSTRIE 4.0: Securing the future of German manufacturing industry.*. Final report of the Industrie 4.0 Working Group. Berlin: Acatech – Deutsche Akademie der Technikwissenschaften e.V.

Ketokivi, M., Turkulainen, V., Seppälä, T., Rouvinend, P., & Ali-Yrkköd, J. (2017). Why locate manufacturing in a high-cost country? A case study of 35 production location decisions. *Journal of Operations Management, 49*, 20–30.

Kinkel, S. (2012). Trends in production relocation and backshoring activities: Changing patterns in the course of the global economic crisis. *International Journal of Operations & Production Management, 32*(6), 696–720.

Kinkel, S. (2014). Future and impact of backshoring – some conclusions from 15 years of research on German practices. *Journal of Purchasing and Supply Management, 20*(1), 63–65.

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), 256–276.

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.

Lampón, J. F., & González-Benito, J. (2019). Backshoring and improved manufacturing resources in firms' home location. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2019.1676479

Laplume, A. O., Petersen, B., & Pearce, J. M. (2016). Global value chains from a 3D printing perspective. *Journal of International Business Studies, 47*, 595–609.

Lavissière, A., Mandják, T., & Fedi, L. (2016). The key role of infrastructure in backshoring operations: The case of free zones. *Supply Chain Forum: An International Journal, 17*(3), 143–155.

Leamer, E. E., & Storpe, M. (2001). The economic geography of the Internet age. *Journal of International Business Studies, 32*(4), 641–665.

Lu, Y. (2017). Industry 4.0: "A survey on technologies, applications and open research issues". *Journal of Industrial Information Integration, 6*, 1–10.

Luthra, S., Mangla, S. K., & Yadav, G. (2019). An analysis of causal relationships among challenges impeding redistributed manufacturing in emerging economies. *Journal of Cleaner Production, 225*, 949–962.

Manning, S. (2014). Mitigate, tolerate or relocate? Offshoring challenges, strategic imperatives and resource constraints. *Journal of World Business, 49*(4), 522–535.

Martínez-Mora, C., & Merino, F. (2014). Offshoring in the Spanish footwear industry: A return journey? *Journal of Purchasing and Supply Management, 20*(4), 225–237.

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.

Mohiuddin, M., Rashid, M. M., Al-Azad, S. M., & Su, Z. (2019). Back-shoring or re-shoring: Determinants of manufacturing offshoring from emerging to least developing countries (LDCs). *International Journal of Logistics Research and Applications, 22*(1), 78–97.

Moore, M. E., Rothenberg, L., & Moser, H. (2018). Reshoring manufacturing in the textile and apparel industry. *Journal of Manufacturing Technology Management, 29*(6), 1025–1041.

Moradlou, H., & Backhouse, C. J. (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.

Moradlou, H., Backhouse, C. J., & 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., & Tate, W. (2018). Reshoring and additive manufacturing. *World Review of Intermodal Transportation Research, 7*(3), 241–263.

Mugurusi, G., & De Boer, L. (2014). Conceptualising the production offshoring organisation using the viable systems model (VSM). *Strategic Outsourcing: An International Journal, 7*(3), 275–298.

Müller, J., Dotzauer, V., Voigt, K. I. (2017). Industry 4.0 and its impact on reshoring decisions of German manufacturing enterprises. In Bode C, Bogaschewsky R, Eßig, M R Lasch, W Stolzle (Eds.) *Supply chain research*. Heidelberg: Springer.

Nujen, B. B., Halse, L. L., Damm, R., & Gammelsaeter, H. (2018). Managing reversed (global) outsourcing – the role of knowledge, technology and time. *Journal of Manufacturing Technology Management, 29*(4), 676–698.

Nujen, B. B., Mwesiumo, D. E., Solli-Sæther, H., & Slyngstad, A. B. (2018). Backshoring readiness. *Journal of Global Operations and Strategic Sourcing, 12*(1), 172–195.

Orzes, G., & Sarkis, J. (2019). Reshoring and environmental sustainability: An unexplored relationship? *Resources, Conservation and Recycling, 141*, 481–482.

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.

Pal, R., Harper, S., & Vellesalu, A. (2018). Competitive manufacturing for reshoring textile and clothing supply chains to high-cost environment: A Delphy study. *The International Journal of Logistics Management, 11*(1), 79–122.

Perrone, G., Bruccoleri, M., & Mazzola, E. (2019). The curvilinear effect of manufacturing outsourcing and captive-offshoring on firms' innovation: The role of temporal endurance. *International Journal of Production Economics, 211*, 197–210.

Piatanesi, B., & Arauzo-Carod, J. M. (2019). Backshoring and nearshoring: An overview. *Growth and Change, 50*, 806–823.

Pisano, G. P., & Shih, W. C. (2012). *Producing prosperity: Why America needs a manufacturing renaissance*. Boston: Harvard Business Press.

Presley, A., Meade, L., & Sarkis, J. (2016). A strategic sourcing evaluation methodology for reshoring decisions. *Supply Chain Forum: An International Journal, 17*(3), 156–169.

Razvadovskaja, Y. V., & Shevcenko, I. K. (2015). Dynamics of metallurgic production in emerging countries. *Asian Social Science, 11*(19), 178–184.

Robinson, P. K., & Hsieh, L. (2016). Reshoring: A strategic renewal of luxury clothing supply chains. *Operations Management Research, 9*(3-5), 1–13.

Saki, Z. (2016). Disruptive innovations in manufacturing–an alternative for re-shoring strategy. *Journal of Textile and Apparel, Technology and Management, 10*(2), 1–7.

Sardar, S., & Lee, Y. H. (2015). Analysis of product complexity considering disruption cost in fast fashion supply chain. *Mathematical Problems in Engineering, 2015*, 670831.

Sardar, S., Lee, Y., & Memon, M. (2016). A sustainable outsourcing strategy regarding cost, capacity flexibility, and risk in a textile supply chain. *Sustainability, 8*(3), 234.

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.

Schmidt, A. S. T., Touray, E., & Hansen, Z. N. L. (2017). A framework for international location decisions for manufacturing firms. *Production Engineering, 11*(6), 703–713.

Seuring, S., & Gold, S. (2012). Conducting content-analysis based literature reviews in supply chain management. *Supply Chain Management: An International Journal, 17*(5), 544–555.

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.

Srai, J. S., & Ané, C. (2016). Institutional and strategic operations perspectives on manufacturing reshoring. *International Journal of Production Research, 54*(23), 1–19.

Stentoft, J., Jensen, K. W., Philipsen, K., & Haug. A. (2019). Drivers and barriers for Industry 4.0 readiness and practice: A SME perspective with empirical evidence. In: *Proceedings of the 52nd Hawaii International Conference on system Sciences*, Hawaii (pp. 5155–5164).

Stentoft, J., Mikkelsen, O. S., & Jensen, J. K. (2016a). Flexicurity and relocation of manufacturing. *Operations Management Research, 9*(3/4), 1–12.

Stentoft, J., Mikkelsen, O. S., & Jensen, J. K. (2016b). Offshoring and backshoring manufacturing from a supply chain innovation perspective. *Supply Chain Forum: An International Journal, 17* (4), 190–204.

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.

Stentoft, J., Olhager, J., Heikkilä, J., & Thoms, L. (2016). Manufacturing backshoring: A systematic literature review. *Operations Management Research, 9*(3-4), 53–61.

Stentoft, J., & Rajkumar, C. (2018). Balancing theoretical and practical relevance in supply chain management research. *International Journal of Physical Distribution & Logistics Management, 48*(5), 504–523.

Stentoft, J., & Rajkumar, C., (2019). The relevance of Industry 4.0 and its relationship with moving manufacturing out, back and staying at home. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2019.1660823

Strange, R., & Zucchella, A. (2018). Industry 4.0, global value chains and international business. *Multinational Business Review, 25*(3), 174–184.

Sutherland, J. W., Richter, J. S., Hutchins, M. J., Dornfeld, D., Dzombak, R., Mangold, J., et al. (2016). The role of manufacturing in affecting the social dimension of sustainability. *CIRP Annals, 65*(2), 689–712.

Talamo, G., & Sabatino, M. (2018). Reshoring in Italy: A recent analysis. *Contemporary Economics, 12*(4), 381–398.

Tate, W. L. (2014). Offshoring and reshoring: US insights and research challenges. *Journal of Purchasing and Supply Management*, *20* (1), 66–68.

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.

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.

Thakur-Wernz, P. (2019). A typology of backsourcing: Short-run total costs and internal capabilities for re-internalization. *Journal of Global Operations and Strategic Sourcing, 12*(1), 42–61.

Theyel, G., Hofmann, K., & Gregory, M. (2018). Understanding manufacturing location decision making: Rationales for retaining, offshoring, reshoring and hybrid approaches. *Economic Development Quarterly, 32*(4), 300–312.

Uluskan, M., Godfrey, A. B., & Joines, J. A. (2017). Impact of competitive strategy and cost-focus on global supplier switching (reshore and relocation) decisions. *Journal of the Textile Institute, 108*(8), 1308–1318.

Uluskan, M., Joines, J. A., & Godfrey, A. B. (2016). Comprehensive insight into supplier quality and the impact of quality strategies of suppliers on outsourcing decisions. *Supply Chain Management: An International Journal, 21*(1), 92–102.

Vanchan, V., Mulhall, R., & Bryson, J. (2018). Repatriation or reshoring of manufacturing to the US and UK: Dynamics and global production networks or from here to there and back again. *Growth and Change, 49*(1), 97–121.

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.

Wan, L., Orzes, G., Sartor, M., & Nassimbeni, G. (2019). Reshoring: Does home country matter? *Journal of Purchasing and Supply Management, 25*(4), 100551.

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.

Wu, X., & Zhang, F. (2014). Home or overseas? An analysis of sourcing strategies under competition. *Management Science, 60*(5), 1223–1240.

Yegul, M. F., Erenay, F. S., Striepe, S., & Yavuz, M. (2017). Improving configuration of complex production lines via simulation-based optimization. *Computers & Industrial Engineering, 109*, 295–312.

Yu, U. J., & Kim, J. H. (2018). Financial productivity issues of offshore and “Made-in-USA” through reshoring. *Journal of Fashion Marketing and Management, 22*(3), 317–334.

Zhai, W. (2014). Competing back for foreign direct investment. *Economic Modelling, 39*, 146–150.

Zhai, W., Sun, S., & Zhang, G. (2016). Reshoring of American manufacturing companies from China. *Operations Management Research, 9*(3–4), 1–13.

Zhao, L., & Huchzermeier, A. (2017). Integrated operational and financial hedging with capacity reshoring. *European Journal of Operational Research, 260*(2), 557–570.