TAMPERE UNIVERSITY OF TECHNOLOGY

What brings production back? The case of Finland

Citation
Heikkilä, J., Martinsuo, M., & Nenonen, S. (2016). *What brings production back? The case of Finland*. Paper presented at International Annual European Operations Management Association Conference, .

Year
2016

Version
Peer reviewed version (post-print)

Link to publication
TUTCRIS Portal (http://www.tut.fi/tutcris)

Take down policy
If you believe that this document breaches copyright, please contact cris.tau@tuni.fi, and we will remove access to the work immediately and investigate your claim.

Download date:19.11.2019

This research was presented in the European Operations Management Association's Annual Conference in Trondheim, Norway on 20-22 June, 2016.

What brings production back? The case of Finland

Jussi Heikkilä (jussi.heikkila@tut.fi)
Tampere University of Technology, Industrial Engineering and Management

Miia Martinsuo
Tampere University of Technology, Industrial Engineering and Management

Sanna Nenonen
Tampere University of Technology, Industrial Engineering and Management

Abstract

This study investigates the drivers and mechanisms of reshoring in the manufacturing industry of Finland. The survey with 229 firms reveals the background, drivers and patterns of offshoring and reshoring. The results indicate that over one-third (37%) of the manufacturing companies in Finland have been active in transferring production across the national borders, both offshore and back to Finland. More production has been moving away from Finland than coming back. The drivers and benefits of offshoring and reshoring are quite different, which suggests that companies must prepare their manufacturing location strategies in line with their benefit expectations.

Keywords: Production, Offshoring, Reshoring

Introduction

Manufacturing industries have a central role in economic growth through production and its interplay with broader business ecosystems. Therefore, it is necessary to understand the mechanisms through which manufacturing companies make their production location decisions. This research paper highlights the case of Finnish manufacturing industry and the extent to which Finnish-based manufacturing companies move production outside of Finland (*offshoring*) and return production back (*reshoring*). The goal is increased knowledge on the drivers and mechanisms of reshoring, and its role in the manufacturing strategies of different firms. The focus is on two main research questions: 1) Why do Finnish manufacturing firms offshore and reshore their production? and 2) How do the reshoring companies differ from other companies? The research was carried out as part of a three-country survey, i.e. Denmark, Finland and Sweden, of the trends and drivers of offshoring and reshoring of manufacturing. The particular focus in this paper is on the companies that have brought production back to Finland during the last five years.

Changes in manufacturing industries

The share of manufacturing sector in the Nordic countries' gross national product (GNP) has declined in recent decades, following the same trend as in the other developed economies. In Finland, for example, the highest manufacturing share in the GNP was reached in 1974 when it accounted for 32 percent of the GNP. In early 2000s

the share fluctuated between 25 and 28 percent, but collapsed to 20 percent in 2009, as a result of the 2008 crisis. The share has remained the same since then, and the other sectors have not been able to compensate for the loss of this GNP contribution. (FMEE, 2014).

The employment in manufacturing industries has also been in decline in the three Nordic countries. Sweden has lost around 400,000 manufacturing jobs since 1980 and Finland around 240,000 jobs. Denmark has presently about 344,000 manufacturing jobs, Finland about 366,000 jobs, and Sweden's industrial workforce is about 634,000. Over the long-term, however, Nordic manufacturing output has continued to grow, primarily because of investments in automation and the shift towards more technology- and knowledge-intensive sectors.

Offshoring and job losses have affected most the labor-intensive industries, such as furniture, textiles, and electrical components. Much of production in these industries has moved to lower cost countries and emerging markets. For example, Swedish computing and electrical component manufacturers employed virtually all of their workers domestically in 2000. A decade later, 22 percent of their employees were in low-cost countries. In addition, a large number of workers were employed offshore by contract manufacturers. Among textile and apparel industries, the share of employment in low-cost countries rose from 8 percent to 42 percent. The labor force of Swedish machinery and equipment companies in low-cost countries rose from 15 percent in 1998-2000 to 34 percent in 2008-2010 (BCG, 2013).

In the changing global business environment, the Nordic manufacturing companies are increasingly shifting the focus of their investments outside their home base. From 2000 to 2006, 81 percent of capital expenditure by Finnish manufacturing companies was invested within the Nordic region. From 2007 to 2011 that dropped to 67 percent. The Finnish capital investments were moving to the rest of Western Europe and developing economies, including Russia, Eastern Europe, and South America. Furthermore, the Nordic manufacturing sectors are suffering from poor financial performance. In Finland, from 2005 through 2010, return on capital employed (ROCE) averaged 2 percent for paper manufacturers and 8 percent for wood product manufacturers. The cost of capital for these two sectors during the same period was 8 percent and 11 percent, respectively. (FMEE, 2014)

The decreased industrial value-added is the most significant challenge that the manufacturing sector in Finland is presently facing. The Finnish electronics industry has lost about 9 billion EUR of its value-added during 2009-2015. In the wood and paper industry the loss has been about 1.5 billion EUR and also the metal processing industry has been severely affected. The causes are slightly different across the three industries. In the electronics industry the loss of value-added can be explained by the collapse and eventual divestment of Nokia's mobile terminals business for Microsoft. The loss in paper industry is caused by the global decrease in the demand for printed media, with the resulting overcapacity and the need to close factories in the Nordic countries. In the metal processing there is a combination of factors behind the loss of industrial value-added: lower demand for investment goods, increased competition from the emerging markets, lowered prices for metal products, and loss of competitiveness because of increasing cost levels. (FMEE, 2014)

Offshoring and reshoring of manufacturing

An increasing amount of research has been published about the reallocation of manufacturing through offshoring and outsourcing. Companies choose these actions for several reasons, for example, to obtain cost advantages and proximity to customers

(Kakabadse and Kakabadse 2002; Kinkel and Maloca 2009). More recently, research has focused on the reverse movement, that is, moving manufacturing back to its original location, referred to as backshoring (Kinkel 2014), reshoring (Gray *et al.* 2013; Ellram *et al.* 2013; Tate 2014), and re-insourcing (Drauz 2014).

Stentoft et al. (2015b) made a content-based literature review to analyze the current research on the backshoring, reshoring, and insourcing of manufacturing. The specific issues for moving manufacturing back to manufacturing companies' home countries can be related to six distinct aspects: (i) cost, (ii) quality, (iii) time and flexibility, (iv) access to skills and knowledge, (v) risks, and (vi) other factors (such as incentives, core focus, shrinking market, and correction of a misjudged decision).

The most common factor for moving manufacturing back according to the reviewed research literature is the changing costs of operations. Particular issues mentioned include increasing labor costs, increasing logistics costs, eroding cost advantage, higher-than-expected coordination efforts and transaction costs, miscalculation of actual cost, energy costs, productivity differences between locations, economies of scale and scope, and capacity utilization. Thus, cost is a major driver for moving manufacturing, not only for offshoring, but also for reshoring. In addition, quality, time, and flexibility aspects, as well as access to skills and knowledge, were frequently discussed in the literature as major drivers for moving manufacturing back to its origin. Specific issues mentioned in terms of access to skills and knowledge were proximity to R&D resources, availability of skilled labor, and utilization of new technologies and automation. Other specific drivers for reshoring include the risk of losing know-how or intellectual property, supply chain risks, volatility in currency exchange rates, and government incentives favouring a certain location. (Stentoft et al., 2015b)

There are no earlier systematic comparative studies available of the extent and drivers of offshoring and reshoring trends in the Nordic countries. The trends in manufacturing employment and investments have rather been observed through macroeconomic level numbers. The perspective of manufacturing firms' strategies and decision making has been missing so far. This study seeks to fill this gap in research.

Research design and approach

This paper is based on survey research that was carried out in the autumn of 2015, investigating the extent and drivers of manufacturing companies' production offshoring and reshoring in Denmark, Finland and Sweden. The survey design is based on previous research on reshoring in Germany, US, Spain and Denmark; cf. Kinkel (2014), Tate (2014), Martínez-Mora and Merino (2014), and Stentoft et al. (2015a). The questionnaire was jointly developed, its early version was tested with selected test respondents, and some items were modified based on the testing.

The targeted companies consist of all the manufacturing companies with a minimum of 50 employees in all the manufacturing industry categories (ISIC codes 10-33). In Finland, 949 companies belong to the target group. All the companies in the target group were contacted by telephone to identify the person responsible for production and operations. The companies' manufacturing contact persons were contacted to ask for their willingness to participate in the survey. 434 of the 949 companies were willing to receive the survey, after which an electronic link was sent to the questionnaire. Three reminders were e-mailed to the contact persons, to increase the response rate. The number of manufacturing companies submitting the survey was 242 out of which 13 did not fulfill the criteria of having over 50 employees. Therefore, the final number of acceptable survey responses was 229, corresponding to a 24% response rate.

The respondent sample is compared to the total population of manufacturing companies in Tables 1-3 in terms of company size, industry and ownership. The respondent sample is somewhat biased towards large companies (over 500 employees) and there is also one clearly over-represented industry, i.e. machinery industry and equipment (ISIC code 28).

Table 1 - Comparison of the respondent sample to the total industry population of Finnish manufacturing firms in terms of company size (numer of employees).

Distribution across company size	Total population	Respondents
51-100 employees	49.0 %	31.7 %
101-250 employees	31.4 %	31.7 %
251-500 employees	11.1 %	11.9 %
Over 500 employees	8.5 %	24.7 %
Total	100.0 %	100.0 %

Table 2 - Comparison of the respondent sample to the total industry population of Finnish manufacturing firms in terms of industry.

Distribution across industry	Total population	Respondents
Food industry (10)	8.3 %	6.1 %
Beverage industry (11)	1.0 %	0.4 %
Textile and clothing industry (13, 14)	1.6 %	1.3 %
Timber industry (16)	6.4 %	5.7 %
Paper industry (17)	4.3 %	2.6 %
Graphical industry (18)	3.4 %	2.6 %
Petroleum industry (19)	0.3 %	0.4 %
Chemical industry (20)	5.1 %	7.0 %
Pharmaceuticals industry (21)	0.8 %	1.3 %
Rubber and plastics industry (22)	6.3 %	5.7 %
Other non-metallic mineral products industry (23)	5.0 %	4.8 %
Basic metals industry (24)	2.8 %	1.7 %
Fabricated metal products, except machinery and equipment (25)	14.0 %	14.8 %
Computer, electronic and optical products (26)	4.8 %	6.1 %
Electrical equipment (27)	5.5 %	6.6 %
Machinery industry and equipment (28)	17.0 %	22.7 %
Motor vehicle, trailer and semi-trailer industry (29)	2.6 %	2.2 %
Transport equipment industry (30)	2.3 %	1.7 %
Furniture industry (31)	2.5 %	2.2 %
Other manufacturing (32)	1.9 %	1.3 %
Repair and installation of machinery and equipment (33)	4.1 %	2.6 %
Total	100.0 %	100.0 %

Table 3 - Comparison of the respondent sample to the total industry population of Finnish manufacturing firms in terms of ownership.

Ownership	Total population	Respondents
Finnish privately owned	75.3 %	75.1 %
Foreign owned	23.5 %	24.9 %
Finnish state owned	1.2 %	0.0 %
Total	100.0 %	100.0 %

The survey covered three levels of manufacturing related issues: the company, the recent offshoring and/or reshoring decisions, and the focal plant. The company means

either the entire company or a business area in a multi-business corporation. The focal plant means the company's major domestic plant selected by the survey respondent. Offshoring and reshoring refer to transferring production permanently from one geographic location to another location, either from Finland to another country (*offshoring*) or bringing it to Finland (*reshoring*). In both offshoring and reshoring, the ownership of the transferred production may or may not change.

The questions on the background of the companies were category variables inquiring the industry, number of manufacturing plants, location of plants, number of employees in the company and the plant, and aspects of the company strategy. Also, the respondent's job position and experience were inquired. The intent and history of offshoring and reshoring, number of offshoring and reshoring cases, impact on jobs and turnover, target of offshoring, source of reshoring, and the firm's cost structure were inquired with nominal or category variables. Likert type scales of 1 through 5 (with a no response option) were used to inquire the importance of various drivers of offshoring and reshoring and characteristics of offshored/reshored production (very low…very high), strategic role of production location choices (strongly disagree…strongly agree), and pursuit of manufacturing technology innovations (not at all..very large extent). In this paper, we inspect the item-level results.

84 percent of the survey respondents were production managers, plant directors or managers, global operations directors or managers and supply chain directors or managers. Other responsibilities of the respondents included, e.g., Chief executive officers, Chief financial officers, Chief procurement officer, Quality and development manager, and Chief technology officer. The average work experience of the respondents in production and operations management tasks was 15.5 years and in their current job position 6.5 years.

The companies that responded having brought production back to Finland were analyzed to compare them with the group of non-reshoring companies. The objective was to understand if these companies together form a group with some unique characteristics. The results are presented in terms of category frequencies (N or %) or scale averages. The reshoring and non-reshoring groups were compared by cross tabulations and Fisher's exact tests in the case of categorical variables and by Mann-Whitney U-test in the case of continuous variables to find out possible statistically significant differences. Fisher's exact test was chosen instead of χ^2-tests due to the small number of reshoring companies, and nonparametric Mann-Whitney U-tests were used as the assumptions of the parametric t-test were not met.

Results

We first examined the extent of offshoring and reshoring, to understand the status of location movements among the respondents. The survey results tell that a considerable amount of production is transferred across the national borders to both directions. However, more production is moving away from Finland than coming back. Thirty percent of the respondent companies (68 out of the total 229 companies) reported that they have permanently moved production to other countries during the last five years (2010-2015) and 13 percent of companies (30 companies) reported that they have moved production to Finland.

The 68 companies that reported having offshored production during the last five years reported that they had carried out a total of 202 cases of permanent offshoring. The 30 companies that had done reshoring reported that they had done 62 permanent cases of reshoring.

Production was offshored mainly to the companies' own plants; 118 out of the 202 reported production offshoring cases were made to own plants, whereas 84 offshoring cases were made to an external supplier's plant. Reshoring to Finland was mainly done from external suppliers' plants; 38 out of 62 reported production reshoring cases were made from external plants and 24 reshoring cases were made from the company's own foreign plant.

13 companies (6%) of the survey respondents in Finland reported having done both offshoring and reshoring during the last five years. 144 companies (63%) reported that they have neither offshored nor reshored production during the last five years.

Strategies and drivers for offshoring and reshoring

To understand why companies offshore and reshore their production, we analyzed the responses concerning strategies and drivers for location movements. 96 companies (42%) of all the 229 companies that participated in the survey reported that they have a corporate-wide strategy for guiding offshoring and reshoring decisions. 185 of the respondents informed that their focal plant has an explicit plant-specific manufacturing strategy and 181 respondents informed that their company has an explicit corporate-wide manufacturing strategy.

Figure 1 shows the reported importance of factors for making the offshoring and reshoring decisions. According to the survey responses, the most important reasons for offshoring from Finland are labor and other (not labor and logistics) costs. On the other hand, flexibility, quality, lead time and logistics cost are the most important factors when bringing production to Finland.

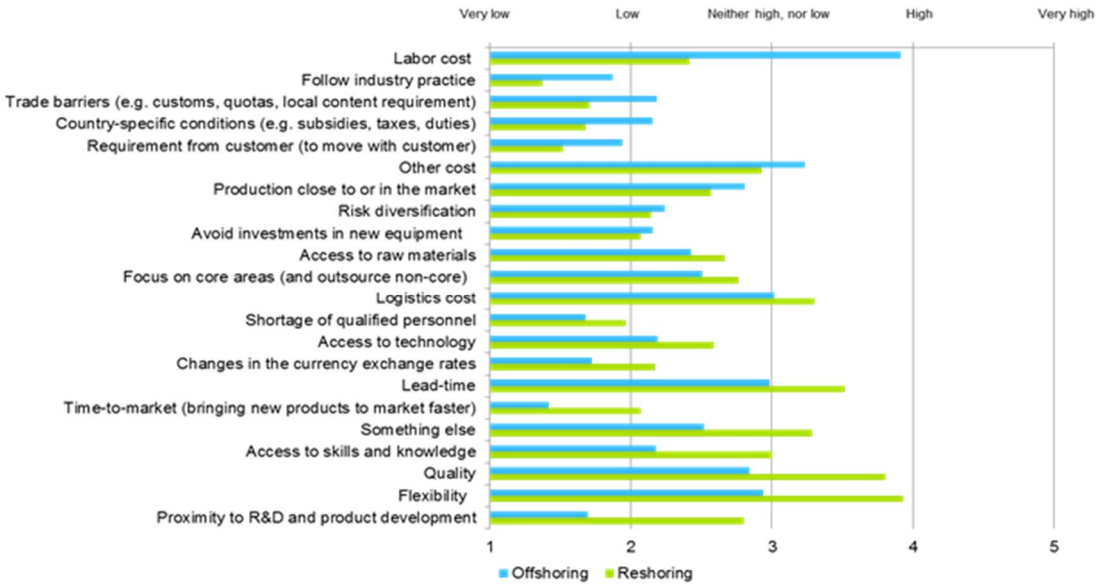

Figure 1 - The importance of factors in offshoring and reshoring decisions. (Averages of all responses, N = 68 offshoring / 30 reshoring)

The 68 offshoring and 30 reshoring companies were asked to select the most recent significant movement of production (offshoring and/or reshoring) as the target of more detailed questions concerning the movement. Only movements that were done 2010 or later were accepted for the further data analysis. This narrowed down the number of offshoring cases to 59, whereas the number of reshoring cases remained the same (30).

The main markets for both the offshored and reshored production were in Europe. Most of the selected 59 significant offshoring cases were made to Eastern Europe (49%)

or Western Europe (25%, incl. Nordic countries). 14% of offshoring cases were made to China and 7% to Asia (excl. China). Reshoring cases of moving production to Finland originated mostly from Western Europe or another Nordic country (33%), Eastern Europe (27%) or China (23%).

It seems that the amount of production movements will further increase in the future. 85 respondents (37% of the 229 companies) expected that their company would offshore production during the next two years to a small or moderate extent. 15 respondents (7%) expected that their company would offshore production to a large or very large extent. The respondents' expectations concerning reshoring of production during the next two years were as follows: 53 respondents (23%) expected reshoring to Finland, 13 respondents (6%) expected reshoring to another Nordic country, and 28 respondents (12%) expected reshoring to another European country.

Companies bringing production back to Finland

The group of 30 companies that responded having brought production back to Finland was analyzed to compare them with the group of non-reshoring companies. Companies that have done reshoring can be found in all company sizes. They were found in 11 out of the 20 ISIC manufacturing industry categories. The highest number of reshoring companies was in the machinery industry and equipment (10 companies, ISIC code 28), fabricated metal products (4 companies, code 25), electrical equipment (3, 27), computer, electronic and optical products (3, 26), chemical industry (3, 20) and basic metals industry (2, 24).

Companies that had done reshoring to Finland have a higher number of production plants than the non-reshoring companies ($p=0.009$). One third (10) of the reshoring companies have over 10 production plants, compared to less than 10 percent of the non-reshoring companies.

Reshoring companies also have their production plants in a higher number of locations than the non-reshoring companies ($p=0.004$); the average number of production locations for the reshoring companies is 2.6 and for the non-reshoring companies 1,8. All of the reshoring companies naturally have at least one plant in the Nordic countries and the most common other locations are Western Europe (37% of the reshoring companies), Eastern Europe (27%), China (27%) and North America (20%). The reshoring companies have more plants in Western Europe ($p=0,025$) and in China (0.040) than the non-reshoring companies. Having production plants in several locations suggests that reshoring companies do not necessarily transfer production to close the plant in the location where production is moved from. Instead, this observation suggests that companies that are active in transferring production develop specific roles for their plants and allocate production to the plants according to these roles.

Reshoring companies have more commonly a higher number of employees (40% have more than 500 employees) than the non-reshoring companies (22% have more than 500 employees, however, the result is statistically not significant). The reshoring companies' focal plants in Finland are bigger in size in terms of the number of employees when compared with those of the non-reshoring companies ($p=0.013$). 21 percent of the reshoring companies have over 500 employees in their focal plant in Finland, compared to 6 percent of the companies in the comparison group.

A higher share of both the reshoring (77%) and offshoring companies (68%) report to have a corporate-wide strategy for guiding offshoring and reshoring decisions, compared to non-offshoring and non-reshoring companies (40%). Reshoring companies believe their companies to continue reshoring to Finland more than companies that have not done reshoring during the last five years ($p<0.001$). Reshoring companies seem to

be rather similar to the other companies in terms of their primary competitive strategy being strongly based on differentiation from competitors.

Reshoring companies use more external resources (buying more direct materials and services; mean 61% (reshoring companies) versus 53% (non-reshoring companies) of the total cost structure (p=0.009) and, respectively, their direct labor costs are lower; mean 20% (reshoring companies) versus 27% (non-reshoring companies) of the total cost structure (p=0.004). In the overheads, there is no significant difference between the reshoring and non-reshoring companies; 19% (reshoring companies) versus 20% (non-reshoring companies) of the total cost structure.

In terms of manufacturing innovations, the respondent companies were asked to consider what kinds of manufacturing innovations does their company and the focal plant pursue and what changes have taken place in manufacturing. Five options were given in the survey for the respondents to consider: digitalization, new high-tech materials, new process technologies, automatization and robotization, and other innovation specified by the respondent. The reshoring companies have pursued new high-tech materials and new process technologies to a larger extent than the non-reshoring companies (p=0.007 and p=0.034, respectively), which suggests that technological innovation is a factor attracting manufacturing companies to reshore production.

Discussion

The results indicate that over one-third (37%) of the manufacturing companies in Finland have been active in transferring production across the national borders, both offshore and back to Finland. More production has been moving away from Finland than coming back; for every one company having reshored production there have been 2.3 companies offshoring production, and for every case of reshoring reported by these companies there have been 3.3 cases of offshoring. This means that reshoring accounts for 30-45% of offshoring. This ratio between reshoring and offshoring is somewhat higher compared to earlier studies in other countries. For example, research done in Germany indicates that the amount of production reshoring to Germany during 2006-2012 was 10-35% of the offshoring activities (Kinkel 2014). However, the data for Sweden in this survey indicate that reshoring accounts even higher, for 60-75% of simultaneous offshoring done by Swedish manufacturing companies, considerably more than studies carried out in other countries have shown.

Access to skills and knowledge, access to technology, and proximity to R&D and product development are factors that scored higher in importance for reshoring versus offshoring. Reshoring activity to Finland appears to be linked with companies to pursue new material and process innovations. This attracts some production to return but its importance in larger scale still requires to be studied in more detail. Further analysis is needed to understand these factors in specific industry and company contexts.

Conclusions

The findings suggest that moving production across national borders is one option in the growth strategies of firms and a way to stay internationally competitive. It does not necessarily reduce the importance of production for companies in the Nordic home countries. The drivers and benefits of offshoring and reshoring are quite different, which suggests that companies must prepare their manufacturing location strategies in line with the benefit expectations. Companies must carefully weigh the relevance of cost, quality, flexibility, speed and reliability, when defining location-specific plant roles in their production networks.

This survey study has limitations that need to be considered to assess the validity of the results. The questionnaire design was carefully considered in an international team and earlier literature was used, and well-established measures and scales were used, to enable comparability with other offshoring and reshoring studies. However, the low number of offshoring and reshoring experiences among the respondents hinder the use of advanced statistical techniques within the single-country sample. Combining the datasets of the three Nordic countries will provide an opportunity for further studies at a larger scale. The sample of 229 manufacturing companies offers a limited view of the entire manufacturing industry in Finland. Significant effort was made to reach the high response rate and to clean up the data and, thereby, improve the validity. The data is biased toward larger firms (compared to the population), which limits the generalizability of the findings.

Besides the international studies to test the antecedents and consequences of offshoring and reshoring decisions, this study has pointed out the important role of manufacturing strategies and innovations, in connection with location movements. Further research is needed in these domains, to explain the background of potential successes and failures in the location choices.

Acknowledgements

This research is conducted in the Reshoring of Manufacturing (ROaMING) research project in collaboration with Lund University in Sweden and University of Southern Denmark in Denmark. The questionnaire was developed jointly with professors Jan Olhager and Jan Stentoft. The project is part of the Innovation research program "Renewal of Manufacturing" jointly financed by Tekes - the Finnish Funding Agendy for Innovation and the Swedish innovation agency VINNOVA. We acknowledge the financial support for this research, and the Nordic research partners for the fruitful cooperation.

References

Boston Consulting Group (BCG) (2013). Revitalizing Nordic manufacturing, Boston Consulting Group, August, 32 pp.

Drauz R (2014). "Re-insourcing as a manufacturing-strategic option during a crisis – cases from the automobile industry." *Journal of Business Research* 67 (3): 346-353.

Ellram LM, Tate WL, Petersen KJ (2013). "Offshoring and reshoring: an update on the manufacturing location decision." *Journal of Supply Chain Management* 49 (2): 14-22.

Finland's Ministry of Employment and the Economy (FMEE) (2014). Teollisuus osana elinvoimaista elinkeinorakennetta – Teollisuuden globaalit trendit, Suomen teollisuuden tilanne ja uudistuvan suomalaisen teollisuuden askelmerkit (Manufacturing industry as part of a vital economic structure - Global trends in manufacturing, Finnish industrial situation and the step marks for renewable Finnish manufacturing), FMEE Publications Innovation 20/2014, Enterprise and Innovation Department, 96 pages.

Gray JV, Skowronsky K, Esenduran G, Rungtusanatham JM (2013). "Reshoring phenomenon: what supply chain academics ought to know and should do." *Journal of Supply Chain Management* 49 (2): 27-33.

Kakabadse A, Kakabadse N (2002). "Trends in outsourcing." *European Management Journal* 20 (2): 189-198.

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, Maloca S (2009). "Drivers and antecedents of manufacturing offshoring and backshoring: a German perspective." *Journal of Purchasing and Supply Management* 15 (3): 154-165.

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

Stentoft J, Mikkelsen OS, Johnsen T (2015a) "Going local: a trend towards insourcing of production?" *Supply Chain Forum* 16 (1): 2-13.

Stentoft J, Olhager J, Heikkilä J, Thoms L (2015b). "Moving manufacturing back: a content-based literature review." EurOMA Annual Conference, Neuchatel, Switzerland, 28-30 June.

Tate WL (2014). "Offshoring and reshoring: US insights and research challenges." *Journal of Purchasing and Supply Management* 20 (1): 66-68.