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Manufacturing relocation abroad and back: empirical evidence from the Nordic countries

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Abstract: Businesses have increasingly engaged in various forms of cross-border transfers of activities. Much production, knowledge and work has been moved offshore from developed economies to achieve better competitiveness. However, recent research has begun to report about an opposite movement, i.e., backshoring of business activities. This research paper reports empirical survey results, exploring and explaining manufacturing relocation from and to three Nordic countries. The purpose was to investigate manufacturing firms' practices of pursuing different manufacturing globalisation strategies in terms of *why*, *what types of companies*, and *where* questions, and in the context of manufacturing relocation activities originating from Denmark, Finland, and Sweden. Both offshoring and backshoring of manufacturing are also analysed from the perspective of changes in ownership, i.e., the extent to which outsourcing or insourcing are related to manufacturing relocation.

Keywords: manufacturing; offshoring; outsourcing; backshoring; insourcing; reshoring; relocation; rightshoring; survey; Nordic countries; production.

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1 Introduction

Many companies from the developed countries have moved their production abroad, the high cost level at home being among the primary reasons for these decisions. Backshoring of previously offshored manufacturing is a relatively new but potentially increasing trend (Fratocchi et al., 2016; Kinkel, 2014; Stentoft et al., 2016b; Tate, 2014; Wiesmann et al., 2017). Backshored operations are assumed to differ from what is being offshored. Changes take place in the configuration of the activity and the related processes, the relationships with the other functions of the firm, and the broader global business network. This paper is concerned with manufacturing firms from three Nordic countries, namely Denmark, Finland, and Sweden, moving manufacturing abroad (offshoring) and back to the companies' home locations (backshoring) and with the implications of this for the development of the global business networks of the manufacturing firms. Nordic countries are characterised by relatively small home markets and the traditionally important role of manufacturing exports for the respective national economies. This makes them different in terms of manufacturing relocation from larger countries such as the USA, Germany, Spain and Italy (cf., Ellram et al., 2013; Fratocchi et al., 2016; Gray et al., 2011; Kinkel, 2014; Martínez-Mora and Merino, 2014).

Fratocchi et al. (2014) propose new items for the future research agenda on manufacturing relocation. First, research is called for to explore the motivation for backshoring. Second, research on understanding the advantages and disadvantages of home and foreign locations is needed. Further, Arlbjørn and Mikkelsen (2014) and Barbieri and Stentoft (2016) propose investigating the dynamics of manufacturing relocation along with the contingencies of firm size and industry. In addition, Stentoft

et al. (2016a) advocate more research on the manufacturing companies' global manufacturing footprints and country-specific factors.

In light of these challenges, the purpose of this paper is to advance the understanding of manufacturing relocations based on the type of relocation activity. The context of the study is the manufacturing industry originating in the three Nordic countries. In addition to the analysis across the types of relocation activity, comparisons are made across the groups of companies that have relocated their production within their own manufacturing network, i.e., internal offshoring and backshoring, or externally, i.e., offshore outsourcing and backshore insourcing.

The objective of this paper is to answer the following three research questions concerning the relocation of manufacturing firms' production operations:

- RQ1 Why do firms offshore/outsourcing and backshore/insourcing their production?
- RQ2 What types of companies offshore and backshore their production?
- RQ3 Where do manufacturing companies offshore/outsourcing to and backshore/insourcing from?

In order to achieve these objectives, the paper is further organised into five sections. The next section presents a review of the relevant research literature. Then we describe the research methods and means of collecting data. The main section of the paper is concerned with the research findings, namely what types of Nordic manufacturing companies engage in offshoring/outsourcing and backshoring/insourcing, why and where. We conclude by presenting some implications for research and practice and discuss limitations and suggestions for further research.

2 Literature review

Globalisation of production and supply chains has taken place with increased intensity in recent decades. Production location decisions are a dynamic phenomenon. The terms used to describe moving manufacturing abroad are outsourcing and offshoring (Arlbjørn and Mikkelsen, 2014; Manning et al., 2015). Outsourcing means that ownership and control are handed over to another party, whereas internal offshoring means that ownership and control are retained but the location is moved cross-border (Hätönen and Eriksson, 2009; Mudambi and Venzin, 2010). Internal offshoring is also termed 'captive offshoring' and external outsourcing 'offshore outsourcing' by some authors (Mudambi and Venzin, 2010). Outsourcing fundamentally does not require a certain geographical location. In the context of the present paper, cross-border outsourcing is the object of study. The opposite terms insourcing and backshoring refer to the opposite movement of manufacturing back to a company's ownership, and to the home location (Arlbjørn and Mikkelsen, 2014; Foerstl et al., 2016). The term reshoring has also recently been used. This term refers to the geographical movement of an activity, but not necessarily to a home location. Overall, these different movements of manufacturing have been termed globalisation strategies of manufacturing (Arlbjørn and Lüthje, 2012). Finally, the term right-shoring has been proposed suggesting the right balance of moving manufacturing out and back (Joubioux and Vanpoucke, 2016; Tate, 2014) and thus refers to the dynamic nature of the phenomenon (Arlbjørn and Mikkelsen, 2014; Foerstl et al., 2016).

In the following three subsections we first provide a brief overview of the drivers for pursuing various globalisation strategies, followed by two sections focusing on the characteristics of the globalisation strategies pursued and locations for the relocations of manufacturing.

2.1 Drivers for pursuing different globalisation strategies of manufacturing

The literature analysing the motives for moving manufacturing abroad, whether through outsourcing or through offshoring, is rich (see, e.g., Stentoft et al., 2015). Drivers for outsourcing have been identified as obtaining cost advantages through lower wages (Barthélemy and Geyer, 2001; Drauz, 2014; Roza et al., 2011; Schmeisser, 2013), a focus on core competences (Kakabadse and Kakabadse, 2002; Quinn and Hilmer, 1994), access to external competences and quality (Drauz, 2014; Kakabadse and Kakabadse, 2002), proximity to customers and markets (Roza et al., 2011; Stentoft et al., 2015), and transforming fixed costs into variable costs (Alexander and Young, 1996; Lonsdale and Cox, 2000). Several reviews of the backshoring literature have recently been published (see, e.g., Foerstl et al., 2016; Fratocchi et al., 2016; Stentoft et al., 2016a; Wiesmann et al., 2017). Some of the main drivers for backshoring manufacturing are reported to be eroding cost advantages (e.g., labour and logistics costs) (Ancarani et al., 2015; Fratocchi et al., 2016; Kinkel, 2014; Leibl et al., 2011; Pearce, 2014; Tate et al., 2014); currency exchange rate fluctuations (Ellram et al., 2013; Gylling et al., 2015; Stentoft et al., 2016a; Tate et al., 2014); quality problems (Foerstl et al., 2016; Kinkel, 2014; Kinkel and Maloca, 2009; Tate, 2014); automation of manufacturing processes (Arlbjørn and Mikkelsen, 2014; Foerstl et al., 2016; Stentoft et al., 2016b; Tate et al., 2014), and labour market structure and flexibility (Kinkel and Maloca, 2009; Tate et al., 2014; Stentoft et al., 2016c).

2.2 Globalisation strategies and demographic characteristics of companies making manufacturing relocations

The literature so far on different globalisation strategies has addressed different practices across industries. In general, the conceptually grounded literature on globalisation strategies seems not to deal with such demographic issues, as does the empirically grounded literature (Stentoft et al., 2016a). Furthermore, empirical studies also either compare the globalisation strategies applied across industries or apply a specific industrial focus (e.g., Ancarani et al., 2015; Caputo and Palumbo, 2005; Gylling et al., 2015; Kinkel and Maloca, 2009; Jabbour, 2010).

Contingency factors related to manufacturing relocation decisions have been identified in several studies. Based on their systematic literature review, Stentoft et al. (2016a) suggest that industry-specific contingencies exist concerning the decision to move manufacturing back, referring to studies by Bailey and De Propriis (2014), Gylling et al. (2015), and Martínez-Mora and Merino (2014). They found that SMEs also move manufacturing offshore and back (Canham and Hamilton, 2013; Kinkel, 2012; Kinkel and Maloca, 2009; Stentoft et al., 2015). The decision-making factors, however, may be different for different sized firms.

2.3 Relocation destinations for manufacturing

In general the vast majority of empirically grounded research on globalisation strategies is focused on movements to and from low-cost areas such as Asia, Eastern Europe and Central America (e.g., Arlbjørn and Lüthje, 2012; Ellram et al., 2013; Gray et al., 2011; Gylling et al., 2015; Jabbour, 2010; Zhai et al., 2016).

Studies on the offshoring and backshoring of manufacturing have been carried out in several national contexts; Denmark, Germany, New Zealand, Spain and the USA. Stentoft et al. (2015) used a large-scale survey in Denmark to study the extent of and reasons for outsourcing and insourcing from and to Denmark. Kinkel (2012) surveyed German manufacturing companies and found that export-intensive companies tended to re-concentrate their production capacities to improve capacity utilisation. Canham and Hamilton (2013) studied manufacturers in New Zealand, comparing offshoring, backshoring and staying at home. They found that backshoring and staying at home were similar in terms of drivers. Martínez-Mora and Merino (2014) studied the Spanish footwear industry, observing that although firms offshored part or all of their production, they also increased production in Spain in the long-term. Ellram et al. (2013) used survey responses to elucidate the manufacturing location problem and potential advantages of nearshoring or backshoring from the US perspective. They found that organisations are beginning to look at their manufacturing location decisions through a broader lens, giving more weight to supply chain issues as well as strategic factors.

3 Research methodology and data

This study is based on an explanatory survey, designed and processed in accordance with guidelines and recommendations given, e.g., in Dillman (2000) and Forza (2002). The survey was designed by researchers from Denmark, Finland and Sweden. The survey questionnaire consists of five sections focusing on

- 1 a company's manufacturing network characteristics
- 2 the extent and perceived drivers, benefits and performance of recent significant offshoring decisions
- 3 the same for backshoring decisions
- 4 decision-making and performance related to manufacturing relocations
- 5 the company and respondent background.

A master version of the survey was developed in English and translations were made for each of the respective local languages in order to give respondents the choice of responding in English or in their native language. The translated survey versions were pretested by practitioners and researchers in each country.

The targeted companies consist of all the manufacturing companies in Denmark, Finland, and Sweden with a minimum of 50 employees in all the manufacturing industry categories (SI code 10–33). In total, the target group includes 4,590 companies and 847 responses were received distributed as follows: Denmark 245, Finland 229, and Sweden 373. This results in an overall response rate of 18.5%.

Data were collected during September and October 2015. The respondents were all upper or middle-level managers involved in production and are thus assumed to be knowledgeable about the survey questions. The average respondent had 15.8 years of experience in production and operations management, and 6.2 years in his/her position at the time of the survey. There was a wide range of respondents in terms of firm size and industries across the three countries, representing all firm sizes and manufacturing industries; see Table 1. The highest number in each row is presented in bold face and the lowest number in italics.

Table 1 Respondent characteristics (percentages within the sample)

<i>Characteristic</i>	<i>Denmark</i>	<i>Finland</i>	<i>Sweden</i>	<i>All countries</i>
Number of employees within firm				
Less than 100	24.6	31.7	<i>15.5</i>	22.5
101–250	27.5	31.7	28.8	29.2
251–500	14.3	11.9	<i>9.8</i>	11.7
More than 500	33.6	<i>24.7</i>	45.9	36.6
Industry (SI code)				
Machinery industry and equipment (28)	<i>17.1</i>	22.7	17.4	18.8
Fabricated metal products, except machines (25)	<i>8.6</i>	14.8	10.7	11.2
Food industry (10)	19.2	<i>6.1</i>	7.5	10.5
Electrical equipment (27)	<i>5.3</i>	6.6	7.0	6.4
Other non-metallic mineral products industry (23)	9.4	4.8	<i>4.6</i>	6.0
Rubber and plastics industry (22)	5.7	5.7	<i>5.6</i>	5.7
Chemical industry (20)	<i>3.3</i>	7.0	5.9	5.4
Computer, electronic and optical products (26)	5.3	6.1	<i>5.1</i>	5.4
Timber industry (16)	5.3	5.7	<i>5.1</i>	5.3
Paper industry (17)	<i>2.4</i>	2.6	6.2	4.1
Motor vehicle, trailer and semi-trailer industry (29)	<i>2.0</i>	2.2	5.4	3.5
Basic metals industry (24)	<i>1.2</i>	1.7	4.8	3.0
Furniture industry (31)	4.1	2.2	2.7	3.0
Other industries	11.0	11.8	12.1	11.7

Manufacturing firms in the Nordic countries are quite active when it comes to manufacturing relocations. Out of the 847 companies, 78 (9.2%) had both offshored and backshored production during the last five years, while 197 firms (23.3%) had only offshored and 82 (9.7%) only backshored. Thus a total of 275 firms had experiences of offshoring and 160 of backshoring. On the other hand, 490 firms (57.9%) had not moved any production in this period. Table 2 presents the total number of relocations by these groups as well as the distribution by country.

Table 2 Distribution across manufacturing relocation types and countries (number of respondents/percentages)

	<i>Only offshoring</i>	<i>Both off- and backshoring</i>	<i>Only backshoring</i>	<i>No movement</i>	<i>Total</i>
No. of all respondents	197	78	82	490	847
Denmark	27.3%	6.5%	6.1%	60.0%	245
Finland	21.0%	4.8%	8.3%	65.9%	229
Sweden	22.0%	13.7%	12.9%	51.5%	373
All three countries	23.3%	9.2%	9.7%	57.9%	100%

The respondents were asked detailed questions anchored in the earlier research literature concerning the most recent (2010–2015) significant movement of production, both offshore and backshore. Respondents reported whether the movement was done internally (internal offshoring and internal backshoring) or externally in the production network (offshore outsourcing and backshore insourcing), the target or source region of the movement and the perceived drivers of production movements and benefits achieved through the decision to relocate manufacturing. The survey items and scales used are presented in Table 3. The industry of each respondent company was ascertained from official company data in each country.

Table 3 Survey items and scales used in the research

<i>Survey items</i>	<i>Scales</i>	<i>Remarks</i>
Has your company permanently moved production abroad <i>from/back*</i> to Den/Fin/Swe** during the last five years either <i>to/from</i> another plant of your own company, or <i>to/from</i> an external supplier or contract manufacturer?	Yes/no	
Did production in this movement <i>come from/move out to</i> ...		
...an external contract manufacturer or supplier?	Yes/No	
...another plant abroad that belongs to your company?	Yes/No	
Please indicate the importance of the following factors in their recent relocation decision to move production <i>abroad/back</i> (please choose all the alternatives that apply and give them a rating).	Very low (1) Low (2) Neither high, nor low (3) High (4)	See Table 4 for factors assessed
Please consider if your company benefitted in the following areas from moving production <i>abroad/back</i> (please choose all the alternatives that apply and give them a rating).	Very high (5) N/A	See Table 6 for areas assessed
<i>To/from</i> which geographical area was the production moved (mark only one option)?	Yes	
How many manufacturing plants are there in your company?	1; 2; 3–5; 6–10, over 10	
What is the total number of employees in your company?	51–100; 101–250; 251–500; over 500	

Notes: *The first five questions were presented separately for offshoring and backshoring cases; alternative wordings are marked in italics. **Depending on the nationality of the respondent company.

Some responses reported that the movement was done both internally and externally. After removing these responses, 171 internal offshoring cases, 85 offshore outsourcing cases, 75 internal backshoring cases and 78 backshore insourcing cases were used in the data analysis. In moving production within the internal and external production network, it was more typical to offshore production internally (67% of all recent significant offshoring cases) than to outsource production to an external partner (33%). The distribution between internal and external movements was more balanced in backshoring; 49% of backshoring cases were internal and 51% were external movements.

4 Results and discussion

This section presents the findings of the questionnaire survey. The section is organised into three subsections. The first of these presents the results concerning the drivers for pursuing and perceived benefits gained by a specific globalisation strategy. The next subsection describes data on the basis of which companies pursue the various globalisation strategies. The final section presents data related to geographical destinations for the movements of manufacturing.

4.1 Drivers of offshoring and backshoring of manufacturing

This section seeks to explain why firms offshore and outsource or conversely backshore and insource their production. Drivers for decision-making on offshoring versus backshoring were found to be essentially different. The respondents were given 21 drivers of manufacturing relocation to consider (see Table 4) based on the existing research literature. They were asked to estimate the importance of each factor in their recent relocation decisions. The same set of drivers was given for both offshoring and backshoring decisions. Table 4 shows the results of a two-tailed t-test for equality of means. The drivers are organised in Table 4 according to the difference in their importance for offshoring versus backshoring. The greatest difference favouring offshoring is for labour costs (3.93 – 2.43), and the greatest difference favouring backshoring is proximity to R&D and product development (1.98 – 3.10). The highest number in each column is presented in bold face and the lowest number in italics.

Several drivers for offshoring versus backshoring are significantly statistically different. Labour costs dominate for offshoring decisions ($p \leq 0.001$). Country-specific conditions and trade barriers are also more important for offshoring than for backshoring, but on a lower significance level ($p \leq 0.050$). Backshoring decisions are based on a broader set of drivers. Quality, flexibility, lead-time, access to skills and knowledge, access to technology, proximity to R&D and time-to-market are all significantly more important drivers for backshoring than for offshoring ($p \leq 0.001$). Thus, labour cost is dominant for offshoring decisions, while a wide range of factors are taken into account to a significantly greater extent for backshoring decisions. This confirms similar findings in the existing literature (see, e.g., Fratocchi et al., 2016; Roza et al., 2011; Schmeisser, 2013; Stentoft et al., 2015, 2016a).

Table 4 Drivers of off- and backshoring (averages of the responses) ranked according to offshoring minus backshoring score

<i>Drivers of off- and backshoring</i>	<i>Offshoring (N = 275)</i>	<i>Backshoring (N = 160)</i>
Labour cost ^a	3.93	2.43
Trade barriers (e.g., customs, quotas, local content requirement) ^c	2.30	2.00
Country-specific conditions (e.g., subsidies, taxes, duties) ^c	2.37	2.08
Avoid investments in new equipment	2.67	2.50
Follow industry practice	2.09	1.95
Requirement from customer (to move with customer)	2.09	2.04
Other cost	3.23	3.21
Production close to or in the market	2.88	2.90
Risk diversification	2.50	2.59
Focus on core areas (and outsource non-core)	2.90	2.99
Logistics cost	3.01	3.12
Changes in the currency exchange rates	2.27	2.39
Access to raw materials	2.45	2.64
Shortage of qualified personnel	1.97	2.19
Time-to-market (bringing new products to market faster) ^a	2.02	2.58
Lead-time ^a	2.95	3.56
Flexibility ^a	2.95	3.73
Access to technology ^a	2.43	3.24
Quality ^a	2.94	3.82
Access to skills and knowledge ^a	2.50	3.48
Proximity to R&D and product development ^a	1.98	3.10

Note: Statistical significances: ^a $p \leq 0.001$; ^b $p \leq 0.010$; ^c $p \leq 0.050$.

Table 5 shows the results of a two-tailed t-test for equality of means for pairwise comparisons of internal offshoring (retaining ownership) versus offshore outsourcing (transferring ownership) and internal backshoring versus backshore insourcing. Only the drivers in which the differences were found to be statistically significant are included in Table 5. The higher number in each pairwise comparison is presented in bold face.

Table 5 suggests that the driver 'production close to or in the market' is more influential for internal offshoring than for offshore outsourcing. This is in line with the findings of Stentoft et al. (2015), which also distinguish between these two different globalisation strategies for moving production abroad. Offshore outsourcing is more driven by a focus on core areas and to a lesser degree by proximity to customers and/or markets (i.e., drivers 'production close to or in the market', 'country-specific conditions', 'requirement from customer'). The driver 'other costs' obtains a higher mean value for internal backshoring than for backshore insourcing. 'Other costs' covers costs of administration and facilities that are higher when ownership is retained. Table 5 also

reveals significant mean variances in ‘flexibility’, ‘lead-time’, and ‘risk diversification’ drivers for backshore insourcing, indicating unsatisfactory performance outcomes of offshore outsourced production, leading to backshore insourcing.

Table 5 Drivers for offshoring/outsourcing and backshoring/insourcing (averages of the responses)

<i>Drivers of off- and backshoring</i>	<i>Offshoring</i>		<i>Backshoring</i>	
	<i>Internal offshoring (N = 171)</i>	<i>Offshore outsourcing (N = 85)</i>	<i>Internal backshoring (N = 75)</i>	<i>Backshore insourcing (N = 78)</i>
Logistics costs ^c	3.12	2.75	-	-
Other costs ^c	-	-	3.45	3.06
Production close to or in the market ^a	3.15	2.39	-	-
Flexibility ^c	-	-	3.50	3.93
Lead-time ^c	-	-	3.28	3.78
Risk diversification ^c	-	-	2.39	2.79
Country-specific conditions ^c	2.50	2.12	-	-
Focus on core areas (and outsource non-core) ^b	2.72	3.23	-	-
Avoid investments in new equipment ^a	-	-	2.85	2.15
Requirement from customer ^c	2.20	1.79	-	-

Note: Statistical significances: ^a $p \leq 0.001$; ^b $p \leq 0.010$; ^c $p \leq 0.050$.

As for the drivers, the respondents were given ten benefits of offshoring and backshoring to consider derived from the existing research literature (see Table 6). They were asked to assess the importance of each benefit in their recent decision to offshore or backshore. Table 6 shows the results of a two-tailed t-test for equality of means. The highest number in each column is given in bold face and the lowest number in italics.

Table 6 Perceived benefits of off- and backshoring (averages of the responses) ranked according to offshoring minus backshoring score

<i>Benefits of off- and backshoring</i>	<i>Offshoring (N = 275)</i>	<i>Backshoring (N = 160)</i>
Labour costs ^a	4.09	2.87
Profitability	3.75	3.74
Other costs	3.44	3.57
Logistics costs ^a	3.07	3.56
Volume flexibility ^a	3.25	3.79
Product mix flexibility ^a	2.96	3.69
Delivery reliability ^a	2.90	3.85
Delivery speed ^a	2.90	3.87
Process quality ^a	2.73	3.83
Product quality ^a	2.79	3.94

Note: Statistical significances: ^a $p \leq 0.001$; ^b $p \leq 0.010$; ^c $p \leq 0.050$.

'Labour costs' was the only statistically significantly different perceived benefit for offshoring ($p < 0.010$), whereas there was a wider set of benefits for backshoring (all $p < 0.010$): 'logistics costs', 'volume flexibility', 'product mix flexibility', 'delivery reliability', 'delivery speed', 'process quality', and 'product quality' were all perceived as benefits of backshoring.

The perceived benefits of production relocations were also analysed making pairwise comparison of internal offshoring versus offshore outsourcing and internal backshoring versus backshore insourcing. Table 7 shows the results of a two-tailed t-test for equality of means. Only the benefits in which statistically significant differences were found are included in Table 7. The higher number in each pairwise comparison is given in bold face.

Table 7 Perceived benefits of offshoring/outsourcing and backshoring/insourcing (averages of the responses)

<i>Benefits of off- and backshoring</i>	<i>Offshoring</i>		<i>Backshoring</i>	
	<i>Internal offshoring</i> (<i>N</i> = 171)	<i>Offshore outsourcing</i> (<i>N</i> = 85)	<i>Internal backshoring</i> (<i>N</i> = 75)	<i>Backshore insourcing</i> (<i>N</i> = 78)
Logistics costs	3.20^b	2.73 ^b	-	-
Delivery speed	3.02^c	2.68 ^c	3.59 ^a	4.11^a
Delivery reliability	3.00^c	2.70 ^c	3.55 ^a	4.14^a

Note: Statistical significances: ^a $p \leq 0.001$; ^b $p \leq 0.010$; ^c $p \leq 0.050$.

Table 7 shows interesting results for the scores of the perceived benefits 'logistics costs', 'delivery speed' and 'delivery reliability' being higher for internal offshoring than for offshore outsourcing. A possible explanation is that internal offshoring beyond the cost driver is driven by relocating production closer to the customers and markets, and the scores of the perceived benefits indicating that these benefits have been achieved in comparison to offshore outsourcing. By contrast, the scores for delivery speed and delivery reliability are higher for backshore insourcing than for internal backshoring. This suggests a need to improve delivery performance by controlling production through ownership.

4.2 Differences between firms with respect to manufacturing relocation activity

This subsection is concerned with answers to the question 'what type of companies offshore and backshore their production?' In other words, do industry, company size or the characteristics of the manufacturing network influence the relocation activities of manufacturing firms?

Companies of all sizes have relocated production, but large companies were more active than others. This concurs with the findings of Roza et al. (2011) and Stentoft et al. (2015), both of whom conclude that relocation of manufacturing is an issue for all types of firms whatever their sizes. The differences between the four manufacturing relocation activity types (globalisation strategies) were tested in terms of the number of employees and the number of manufacturing plants (Table 8), geographic presence (Table 9) and industries (Table 10). Fisher's exact test was used to detect statistically significant

differences across the groups. The highest number in each column in Table 8 is given in bold face and the lowest number in italics.

Table 8 Differences across manufacturing relocation activity types in terms of company size and number of plants (percentage)

	<i>Only offshoring</i> (<i>N</i> = 197)	<i>Both off- and backshoring</i> (<i>N</i> = 78)	<i>Only backshoring</i> (<i>N</i> = 82)	<i>No movement</i> (<i>N</i> = 490)
Number of employees in the company (% within the group) ^a				
51–100	<i>11.1</i>	<i>4.2</i>	<i>6.9</i>	77.8
101–250	19.2	6.5	9.8	64.5
251–500	19.4	11.2	8.2	61.2
Over 500	34.5	14.0	11.7	39.7
Number of manufacturing plants (% within the group) ^a				
1	<i>20.5</i>	<i>8.2</i>	<i>5.5</i>	65.8
2	30.8	8.6	11.9	48.6
3–5	31.4	17.4	9.3	<i>41.9</i>
6–10	28.8	15.0	14.4	<i>41.9</i>
Over 10	23.1	9.3	9.8	57.8

Note: Statistical significances: ^a $p \leq 0.001$.

Among the smallest companies (51–100 employees), the majority (77.8%) has not moved production but in this group, too, production transfers occur in both directions. The largest companies with over 500 employees are the most active in production relocations; 60.3% of companies in this size group have moved production either offshore, back home or in both directions. The same phenomenon is apparent in terms of the number of manufacturing plants. Companies with a higher number of production plants are typically more active in moving production than are those with only one or a few production plants. There is a gradual increase in movement activity when company size grows in terms of number of plants. Interestingly, however, the movement activity decreases when the number of plants exceeds ten. This would suggest that companies with a large number of plants in several locations are in a more stable situation regarding their need to move production within their geographically distributed network.

Table 9 shows the locations of the respondent companies' production plants globally in regions. It is natural that almost all the companies (96.1%) have a plant in the Nordic countries. The group of bi-directional movers has the highest shares of plants in almost all other regions; over half of the companies in this group have a plant in Western Europe (52.6%) and close to 40% of them also have plants in Eastern Europe (39.7%) and China (38.5%). Companies that have moved their production also have multiple plant locations more often than do the non-movers; non-movers have plant locations on average in 1.76 regions, offshorers in 3.04 regions, backshorers in 2.67 regions, and bi-directional movers in 3.33 regions. This insight can be regarded as novel since the literature does not so far seem to have analysed such figures.

Table 9 Differences across manufacturing relocation activity types in terms of geographic presence (percentages)

	<i>Only offshoring (N = 197)</i>	<i>Both off- and backshoring (N = 78)</i>	<i>Only backshoring (N = 82)</i>	<i>No movement (N = 490)</i>	<i>All groups (N = 847)</i>
Location of the plants in regions, percentage share of the total in the group					
Nordic ^a	93.9	94.9	98.8	96.7	96.1
Western Europe ^a	41.1	52.6	42.7	18.6	29.3
Eastern Europe ^a	37.6	39.7	14.6	14.1	22.0
North America ^a	29.9	33.3	32.9	11.2	19.7
Latin America ^a	16.8	24.4	13.4	6.3	11.1
China ^a	36.5	38.5	26.8	11.7	21.4
India ^a	18.3	21.8	12.2	5.1	10.4
Rest of Asia ^a	19.8	17.9	14.6	6.7	11.6
Rest of World ^c	10.2	10.3	11.0	5.3	7.4

Note: Statistical significances: ^ap ≤ 0.001; ^bp ≤ 0.01; ^cp ≤ 0.050.

The overall conclusion is that firm and size of manufacturing network seem to correspond to the number of options available for distributing production. Small firms and single-plant companies seem to be restricted in moving production – this may be due to a reluctance to move production, but it may also be that the options for distributing manufacturing are very limited. On the other hand, larger companies with many plants in their manufacturing network have many options to relocate manufacturing – to and from other parties or within their own manufacturing network. They do indeed seem to be very active in moving production. However, it should be noted that there are also quite a few large companies and/or large manufacturing networks that have not moved production at all during the period studied.

Table 10 shows the analysis results for comparing the differences between the four manufacturing relocation activity types in terms of industries. The industries of the responding companies were classified according to the Eurostat (2016) codes into four categories according to their technological intensity (high technology, medium-high technology, medium-low technology and low technology).

There are significant differences in the tendencies of companies in different industries to relocate production. Of the responding companies, 86.7% in the timber industry have not undertaken any production location movements. Some other industries in which the movement activity is low are pharmaceuticals (75.0% of the companies are non-movers), the graphics industry (75.0%) and other non-metallic mineral products industry (74.5%). The other extremes are transport equipment, in which 83.3% of the companies have offshored and/or backshored their production and the electrical equipment industry, in which 61.1% of the companies have moved their production. The rate of backshoring is relatively high in industries such as transport equipment (20.5%), electrical equipment (20.4%), the basic metals industry (16.0%), the furniture industry (16.0%) and the chemicals industry (15.2%). The highest share of offshorers is in other manufacturing (44.4%), the transport equipment industry (41.7%), and the computer, electronic and optical products industries (37%).

Table 10 Differences across manufacturing relocation types in terms of industries (percentages, only industries with ten or more respondents included)

Industry (SI code) ^a	<i>Only offshoring</i>	<i>Both off- and backshoring</i>	<i>Only backshoring</i>	<i>No movement</i>
<i>High technology intensity industries</i>				
Pharmaceuticals industry (21)	12.5	6.3	6.3	75.0
Computer, electronic and optical products (26)	37.0	6.5	8.7	47.8
<i>Medium-high technology intensity industries</i>				
Chemicals industry (20)	15.2	15.2	15.2	54.3
Electrical equipment (27)	27.8	13.0	20.4	38.9
Machinery industry and equipment (28)	28.9	13.2	10.1	47.8
Motor vehicle, trailer and semi-trailer (29)	30.0	16.7	0.0	53.3
Transport equipment (30)	41.7	16.7	25.0	16.7
<i>Medium-low technology intensity industries</i>				
Rubber and plastics industry (22)	27.1	6.3	8.3	58.3
Other non-metallic mineral products (23)	9.8	5.9	9.8	74.5
Basic metals industry (24)	8.0	20.0	16.0	56.0
Fabricated metal products (25)	24.2	9.5	8.4	57.9
<i>Low technology intensity industries</i>				
Food industry (10)	21.3	4.5	6.7	67.4
Textile and clothing industry (13, 14)	10.0	20.0	10.0	60.0
Timber industry (16)	4.4	2.2	6.7	86.7
Paper industry (17)	22.9	8.6	5.7	62.9
Graphics industry (18)	18.8	6.3	0.0	75.0
Furniture industry (31)	20.0	0.0	16.0	64.0
Other manufacturing (32)	44.4	5.6	5.6	44.4

Note: Statistical significances: ^a $p \leq 0.001$; ^b $p \leq 0.010$; ^c $p \leq 0.050$.

When looking at the movement activity in relation to the technology intensity categorisation we get a somewhat confusing picture. In the high-technology group, the pharmaceuticals industry seems to be relatively stable in their production movements, whereas companies in the computer, electrical and optical products industries are very active in moving manufacturing, mostly offshore. The highest overall manufacturing relocation activity can be seen in the medium-high technology category, in which all five industries are active in production movements, most of them in both directions. There are also exceptions. For example, respondents in the motor vehicles, trailer and semi-trailer industry report no backshoring. On the other hand, there are industries reporting relatively high movement activity in both medium-low technology intensity industries

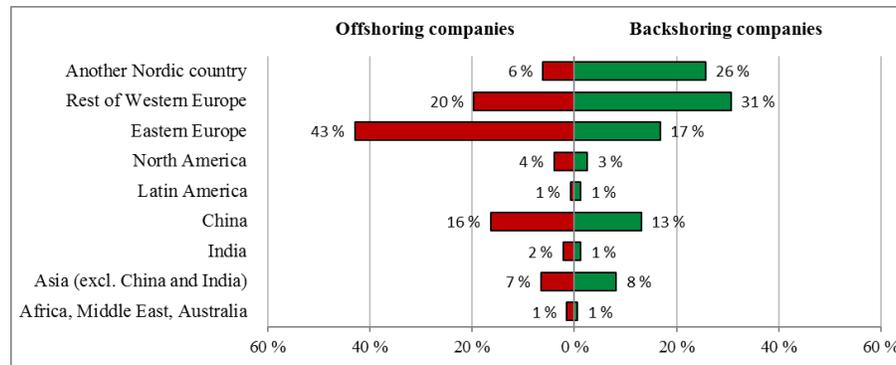
(basic metals) and in the low technology intensity industries (textiles and clothing, furniture).

It seems that two types of industries have a stable manufacturing footprint; they do not engage much in moving their production. These are the process industries (timber, paper and minerals) and industries that mostly serve local markets (e.g., food industry). On the other hand, industries that experience intense global competition, such as those producing computers, electronics and motor vehicles, seem to be moving their production to a much larger extent, and with more offshoring than backshoring.

4.3 Regional perspectives on relocations and markets

This section answers the questions about the target and source regions of manufacturing relocations and investigates if there are differences between movements internally and externally in the manufacturing networks. The manufacturing relocations made by Nordic firms are global. The regions for offshoring and backshoring, as well as the markets served by this production, include all regions of the world, see Figure 1. The major regions for offshoring from the three Nordic countries were Eastern Europe, China and Western Europe, together accounting for 79% of all the recent significant offshoring cases of the respondent firms. The major regions of origin for backshoring to the Nordic countries are Western Europe, the Nordic countries, Eastern Europe and China, together accounting for 87% of recent significant backshoring cases.

Figure 1 Geographical areas from which or to which production was moved (see online version for colours)



Comparison of production movements within internal and external networks across the different regions revealed several differences between external and internal movements. Using Fisher's exact test, statistically significant differences were found when the backshoring origins of internal and external movements ($p < 0.001$) were compared. In backshoring production back to the Nordic home country, 44% of those that had made the move from one of their own plants made the move from Western Europe, compared to 19% of those that had made the move from an external party. By contrast, in the movements from an external party, Eastern Europe (22% from an external plant versus 13% from own plant), China (17% from an external plant versus 11% from own plant),

and the rest of Asia (13% from external plant versus none from an own plant) were found to be more common points of departure for moving back to the Nordic countries.

This means that backshoring movements from Western European countries are significantly more common within a company's own plant network but backshoring movements from Eastern European and Asian countries are more common from external suppliers or contract manufacturers. Such findings have not previously been reported in the literature. They suggest regional production location strategies within companies' own production networks in Western Europe, and potentially disappointing experiences of working with external suppliers in more remote locations. No similar statistically significant differences were found for offshoring cases.

5 Conclusions

This paper set out to investigate why manufacturing firms from relatively small and open national economies, such as the Nordic countries, relocate their manufacturing, what type of companies do it, and to and from which geographical locations these movements take place. The main findings are summarised in Table 11 and discussed in more detail in the text after the table.

Table 11 Summary of the main findings

<i>Research questions</i>	<i>Main findings</i>
RQ1 <i>Why</i> do firms offshore/outsource and backshore/insource their production	<ul style="list-style-type: none"> • Drivers of offshoring decisions differ from those of backshoring. • Drivers and perceived benefits differ between internal and external production movements.
RQ2 <i>What</i> types of companies offshore and backshore their production?	<ul style="list-style-type: none"> • Companies of all sizes relocate production but large companies are more active in relocating production. • The relocation activity differs regarding company's industry and the industry's technology intensity.
RQ3 <i>Where</i> do manufacturing companies offshore/outsource to and backshore/insource from?	<ul style="list-style-type: none"> • Production relocations of Nordic firms are global. • Eastern Europe is the most common target area for Nordic firms' offshoring, whereas Western Europe (including other Nordic countries) is from where most of the backshored production comes from. • Regions of internal and external production relocations are divergent.

Manufacturing firms in the Nordic countries are active in production relocations. Over 40% of the manufacturing firms in the survey had either offshored or backshored production during the last five years, or done both. The manufacturing relocations made by Nordic firms have a geographically broad scope; the major regions for offshoring and backshoring being Eastern and Western Europe, the Nordic countries and China. Offshoring is more common than backshoring, which concurs with another of the few

studies to have simultaneously investigated movements of production out and back in the same survey-setup (Stentoft et al., 2015).

The drivers of relocation decisions are clearly different for offshoring compared to backshoring. Labour costs are a dominant driver for offshoring decisions, whereas backshoring decisions are based on a wider set of drivers. These findings confirm earlier findings (e.g., those of Drauz, 2014; Ellram et al., 2013; Kinkel and Maloca, 2009; Stentoft et al., 2015). Quality, flexibility, lead-time, access to skills and knowledge, access to technology, proximity to R&D and time-to-market are all significantly more important drivers of backshoring than of offshoring. Offshore outsourcing is generally driven more by cost reduction issues and a focus on core areas, whereas internal offshoring is more due to seeking proximity to customers and/or markets. Drivers of backshore insourcing that potentially indicate unsatisfactory performance of offshore outsourced production are flexibility, lead-times and risk diversification, resulting in backshore insourcing to the Nordic countries, particularly from remote locations.

Companies with 2–10 plants at multiple locations are more active than others in relocating production. The large firms with over ten plants are less active. This signals a more stable situation with less need for relocation activity. This result concurs with the findings of Stentoft et al. (2015) but provides a different perspective on firm size in pursuing different globalisation strategies than that discussed by Roza et al. (2011). The firm size perspective seems in general to be under-researched and potentially changing due to SMEs becoming increasingly active in international production relocations (Bailey and De Propriis, 2014; Gylling et al., 2015; Kinkel and Maloca, 2009; Stentoft et al., 2015).

Companies in different industries differ in their tendencies to relocate manufacturing. The highest overall manufacturing relocation activity can be seen in the medium-high technology category, in which all five industries – the chemicals industry, electrical equipment, the machinery industry, motor vehicles and transport equipment – are active in production movements.

Backshoring movements from Western European countries are more common within a company's own plant network but backshoring movements from Eastern European and Asian countries are more common from external suppliers or contract manufacturers. These findings indicate regional production location strategies within companies' own manufacturing networks in Western Europe, and possible experiences of suboptimal performance in working with external suppliers in more remote locations.

5.1 Implications for practice and research

This research provides a view of what is currently going on in the Nordic countries in terms of manufacturing relocations. The Nordic countries have experienced both extensive offshoring and backshoring. Therefore it is a suitable region to analyse the relative magnitude, rationale, and perspectives on offshoring versus backshoring. It is a 'high-cost' region and the results are important for policy-makers in such regions.

The structure of this research contains an interesting aspect for researchers in that we used the same set of questions to elicit data on both offshoring and backshoring. In so doing, we can clearly identify differences as well as similarities in how companies approach these two different directions of manufacturing movements. This particular feature of our research was rewarding, and we advocate the use of this approach in

further research on offshoring and backshoring. In addition, by using data from particular offshoring and backshoring cases (instead of using the company as the unit of analysis) we add detail to the research on the phenomenon of manufacturing relocation and movements within external and internal production networks.

5.2 *Limitations and further research*

This research is limited to the Nordic countries. Consequently, it would be important to conduct similar studies on offshoring versus backshoring in other parts of the world. Longitudinal studies that can capture the evolution in firms engaging in offshoring and backshoring would likewise be welcome. In the course of this research, we identified a couple of issues that deserve further research. How does ownership affect attitudes towards relocating production between countries or continents – are foreign owners more prone to move than are domestic owners? How do manufacturing improvement initiatives such as lean production affect the practices of offshoring and backshoring? How do product and process innovations relate to manufacturing relocation?

Another future research area related to manufacturing relocation would be the increasing influence of patriotism in many areas of the world, e.g., what will be the influence of the actions of the 45th president of the USA or Brexit in the UK on the movements of production in a global perspective? Not only will it be interesting to see how the new policies influence the development of the US and UK manufacturing domestically and abroad, but also how and to what extent this affects decisions in other regions of the world. Thus many interesting avenues for future research are open.

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