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Global Manufacturing Firm Investments - an Explorative Study in the Nordic Context

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Abstract

A strong research trend has recently focused on movements of manufacturing across regional boundaries. However, this research perspective depicts only a partial picture of global manufacturing strategies. More recently, revival of manufacturing in the high cost countries is related to collaboration in broader industrial ecosystems, particularly in the context of technology innovation. The purpose of this paper is to analyse and compare the various types of capital investments of large Nordic manufacturing firms in various parts of the world to build a global presence, i.e. direct capital expenditures, R&D expenditures and acquisitions and divestments. The aim is at understanding the various forms of building the global manufacturing firm footprints in different manufacturing industries under different contingencies, with a special focus on the role of technology in the major investment decisions of Nordic manufacturing firms. A novel approach and new avenues is searched to the recent research on global manufacturing movements.

Keywords: globalization, manufacturing, strategy, technology, networks, explorative research

1. Introduction

A strong and growing research trend has focused on movements of manufacturing across regional boundaries through various "shoring" activities, e.g. offshoring, backshoring, reshoring, nearshoring and rightshoring. In our literature search for articles with some word ending in "shoring" in the title of the article, we identified over 80 academic articles published in peer reviewed journals during the last 13 years, i.e. 2006-2018 (e.g. Jahns et al 2006; Kinkel and Maloca 2009; Gray et al 2011; Canham and Hamilton 2013; Ellram et al 2013; Martinez-Mora and Merino 2014; Linares-Navarro et al 2014; Ancarani et al 2015; Gylling et al 2015; Mykhaylenko et al 2015; Zhai et al 2016; Stentoft et al 2016; Fratocchi et al 2016; Gray et al 2017; Tate and Bals 2017; Wiesmann et al 2017; Baraldi et al 2018; Barbieri et al 2018; Di Mauro et al 2018; Heikkilä et al 2018; Johansson and Olhager 2018; Johansson et al 2018; Kaivo-oja et al 2018; Stentoft et al 2018). The number of articles to the "shoring" phenomenon seems to be growing. This strong focus on movement of manufacturing activities gives a narrow understanding for the choice of international locations for manufacturing related activities. Most recently, several authors have raised the issue of collaborative relationships in industrial ecosystems (e.g. Bailey et al 2018; Ketokivi et al 2017), and the role of technology in their development (Heikkilä et al 2018; Livesey 2017). Attention is required to understand the

various forms of building the global manufacturing footprints of firms in different industries under different contingencies.

The strategies for building global footprints of the Nordic large manufacturing companies were analyzed in this work-in-progress research project. The research results indicate considerable differences in the way manufacturing firms develop their global footprints, in terms of geographic presence, the forms of investments used to build the footprint, the role of technology in the investment decisions, and consequent network arrangements. Comparisons were made to highlight differences across industries and companies. Illustrative examples are provided and future research proposals suggested to enrich existing research on globalization of manufacturing.

2. Methodology

The research strategy in this study was archival research. The archival research strategy is applied in order to achieve the longitudinal perspective of twelve years, i.e. 2005-2017. The data used is documentary secondary data. Comparable analyses related to manufacturing relocation and utilizing news archive databases have been made, e.g., by Ancarani et al. (2015), Fratocchi et al. (2013) and Zhai et al. (2016). Ten largest manufacturing firms were included from each of the four Nordic countries, i.e. Denmark, Finland, Norway and Sweden, see Table 1. The sources of data included LexisNexis news database, company financials and EU R&D scoreboard. For each of the 40 manufacturing firms included in the study, over the analysis period, data was collected to compare the direct capital expenditure, R&D expenditure, and acquisitions and divestments.

Table 1 The manufacturing firms included in the study.

Norway	**Sweden**	**Finland**	**Denmark**
Statoil	Volvo	Nokia	Novo Nordisk
Yara International	Ericsson	Neste	Arla Foods
Norsk Hydro	Volvo Car Group	UPM-Kymmene	Carlsberg
Aker	Electrolux	Stora Enso	Vestas Wind Systems
Sapa	SCA	Kone	Danish Crown
Hydro Aluminium	Atlas Copco	Outokumpu	Danfoss
Orkla	Scania	Wärtsilä	Lego Group
Kongsberg Gruppen	Sandvik	Metsä Group	Siemens Wind Power
Jotun	SKF	Cargotec	FL Smidth
Tine	Assa Abloy	Valmet	NKT Holding

As seen in Table 1, the focus was on major Nordic manufacturing firms whose major business decisions were expected to be made in Norway, Sweden, Finland or Denmark. The primary choice criteria was sales turnover in 2016. However, with that criteria also Total E&P Norge, Norge Esso and Norske Shell would have been included in the study. But because they are

subsidiaries of global industry giants Total, Exxon and Shell in the oil and gas industry, their business decisions were expected to be made outside of the Nordic countries. Among the firms included in the study also Scania (Volkswagen Group), Siemens Wind Power (Siemens) and Volvo Cars Group (Geely Group) belong to international business groups with the ownership being outside of the Nordic countries. However, we considered these firms to have sufficiently independent Nordic business in order for the major decisions taken in the Nordic countries.

In total, we estimate that the identified capex investments, acquisitions and divestments represent approximately 60-80% of the real investments of the selected companies over the analysis period and the R&D investments approximately 30-40% of the real investments. The firm-specific volume of investments can be higher or lower than these estimated ranges.

3. Findings

In total, 590 major capital expenditure investments were found for the selected 40 large Nordic manufacturing companies for the analysis period 1/2015 – 6/2017. The combined monetary value was 108.2 billion Euros for those identified investments for which the value was available (543 capital expenditure investments with the monetary value available / 590 capex investments in total; 92%). As for the R&D investments, 170 individual investments were found. The total value was 11.1 billion Euros for those R&D investments with monetary value available (89 R&D investments with the monetary value available / 170 R&D investments in total; 52%). For acquisitions, 502 acquisition investments were identified. The total sum was 102.6 billion Euros for those acquisitions with the investment sum disclosed or that could be approximated (411 acquisitions with the monetary value published or approximated / 502 acquisitions in total; 82%). Finally, 194 divestments were found in total. The total value of divestments was 53.8 billion Euros for those divestments in which the contract sum was published or it was approximated (150 divestments with the monetary value available or approximated / 194 divestments identified in total; 77%).

3.1.One firm over others

One company was found to dominate the investment values both in capital expenditure and acquisitions. The Norwegian Statoil in the oil and gas industry had a total of 56.8 billion Euros worth of capex investments over the analysis period, which counted for 52% of all the identified capex investments with monetary value available. Correspondingly, the value of Statoil's acquisition investments was 28.4 billion Euros for those acquisitions in which the value was disclosed or could be approximated. This value counted for 28% of the total acquisition value identified for all the companies included in the study.

In terms of comparison, the Finnish firm Neste works in the same industry as Statoil. Among the firms in the study, Neste was one of the largest in terms of the capex investments. The over three billion Euro capex investments of Neste were still only a small fraction of Statoil's capex investments. The majority of Statoil's capex investments and acquisitions were made at home in Norway but they made also important investments in South and North America, Africa and

Middle East. Neste made over half of their investments in Finland. However, Neste's international growth strategy is based on successful entry into the renewable biodiesel industry. Therefore, the most important international investments were made in the renewable biodiesel refineries in Singapore and Rotterdam in the Netherlands.

3.2.Four distinct groups in terms of investment patterns

Four distinct groups were identified in terms of their investment patterns. The first group consisted of companies in the high-technology industries, e.g. Novo Nordisk in the pharmaceuticals and biotechnology and Ericsson in telecommunications and hardware. For these companies, R&D investments were manifold compared to their capital expenditure and net acquisition investments. The second group comprised companies with a balance between R&D and capital expenditure investments. Typical examples of this group are companies in the industrial engineering industry, such as Atlas Copco, Cargotec, Kone, Valmet and AB Volvo. In the third group, capital expenditure investments were the primary way of global growth, being dominant over the R&D investments and acquisitions. Such companies can be found in food and beverages, e.g. Carlsberg and Arla Foods, and companies making products based on direct raw materials, e.g. Stora Enso and UPM Kymmene in forestry and paper and Outokumpu in industrial metals. The fourth group consists of companies using net acquisitions as their global growth strategy, over the alternative strategies of capital expenditure or R&D investments. Such companies can be found in several industries, examples being Yara International in chemicals, Assa Abloy in construction and materials, SCA in forestry, pulp and paper, and Wärtsilä in industrial engineering.

3.3.Different growth strategies in the same industry

Even in the same industry, firms can have different growth strategies that are directing their investments decisions. There were four firms in the study from the forestry, pulp and paper industry, i.e. the Finnish Metsä Group and UPM Kymmene, the Finnish-Swedish owned Stora Enso and the Swedish SCA. Like in the oil and gas industry, the capex investments generally dominate investments in the forestry, pulp and paper industry, compared to the much smaller relative share of the R&D investments. Particularly for the three Finnish owned firms the capex investments were dominant, compared with the investment portfolio of SCA in which acquisitions exceeded the capex investments.

Geographically the investments were directed differently in this group of four firms. Almost all of the investments of Metsä Group were focused on one single investments, i.e. the large new bio production plant in Äänekoski in central Finland. As a comparison, Stora Enso's production investments were made broadly around the globe, the most important target countries being Uruguay, China and Finland. UPM Kymmene made their largest production investments in Russia, Uruguay and Finland. SCA's acquisition volume was about twice as high as their capex investments. They made about half of their production investments in Sweden, and large acquisitions in Germany, China and North America.

3.4.High technology firms searching for growth through R&D

The firms located early in the value chain, i.e. those processing raw materials, e.g., in the oil and gas and forestry, pulp and paper industries, search growth primarily through capex investments in production or acquisitions and their R&D investments are very low compared to capex and/or acquisitions. The relationship between different investments is the opposite in the high technology industries. Of the analyzed 40 firms, three companies work in the high technology industries, i.e. the Danish Novo Nordisk in the pharmaceuticals and biotechnology, and the Swedish Ericsson and Finnish Nokia in telecommunications. When Statoil alone counted for over half of the capex investments in this study, these three firms were responsible for over third of the R&D investments identified in the study. In addition, Volvo Car Group made large R&D investments and above average R&D investments were also made by SKF and Norsk Hydro. Most of the R&D investments of these companies were made in their home countries; Novo Nordisk focused their R&D investments mostly in Denmark, Volvo Car Group in Sweden and Norsk Hydro in Norway. The noteworthy exception of this pattern was Ericsson with their highest R&D investments going to South Korea and Canada.

3.5.Acquisitions as the growth form in several industries

Some firms are searching for growth primarily through acquisitions, the volume of which exceed their capex and R&D investments. Such firms in our sample were, e.g., Yara International in the chemical industry, Assa Abloy in building materials, Wärtsilä and Atlas Copco in industrial engineering, and the earlier mentioned SCA in the forestry, pulp and paper industry. In terms of the number of acquisitions, the most active firm was Assa Abloy that made 92 acquisitions in 29 different countries all over the world during the analysis period. Typically, companies active in acquisitions were found in relatively mature industries, e.g., in the building materials and industrial engineering. In these types of industries, acquisitions are often directed to buying access to markets or technologies through acquisition of local firms.

3.6.Observations about the role of technology in the growth strategies

For the 1456 individual instances of capital expenditure, R&D, acquisitions and divestments, we explored how the term technology was used when the firms explained their motivations for their decisions in press releases and media. We examined all the collected media clips from the LexisNexis news database using the search term “techn*”. The role of technology was analyzed in the explanations given for the decisions made. Illustrative examples of the role of technology in the investment decisions of individual companies are given next, with some elaboration of general conclusions.

Capital expenditure – Technology was not much used as an explanation for capital expenditure investments, particularly for those companies with the highest volumes of capex investments. The more technology-oriented companies often raised issues in which improvements in the product or production technologies were mentioned, as well as the operations capability issues.

28.6.2005. Norway's Hydro Aluminium is planning to build a EUR 50m car parts factory in Gyor (NW Hungary), to be completed by 2008, Hydro Aluminium CFO Gabor Mersich announced on Tuesday. The factory will produce aluminium piston heads and engine blocks using technology Hydro has developed itself. The parts are more expensive, but better for the environment, Mr Mersich said.

26.5.2009. Neste Oil today laid the foundation stone for its renewable diesel plant in the Port of Rotterdam. Upon completion, the plant will be the largest renewable diesel plant in Europe with an annual production capacity of 800,000 metric tonnes. The investment cost of the plant is estimated to be EUR 670 million, and it will create over 100 jobs. "With this plant in the Netherlands, Neste Oil will become the leading renewable diesel producer supplying Europe from the Netherlands. Our investment also signals Neste Oil's commitment to driving forward latest innovation with our NExBTL technology in Europe", said Matti Lievonen, President and CEO of Neste Oil.

23.5.2014. Swedish machinery group Atlas Copco AB will invest EUR 15 million (USD 20.4m) in its facility for compressed air technology in Wilrijk, northern Belgium, CEO Ronnie Leten was cited as saying in Brussels by local media on Thursday. According to daily De Tijd, Atlas Copco's unit in Wuxi in the Chinese Jiangsu province was also in the race for the investment, but an internal assessment found that Wilrijk was more competitive than Wuxi. Furthermore, the parent company considers it strategically important to develop new competences at its core facility for compressor technology.

9.1.2015. Novo Nordisk is investing DKK2.1bn (USD303.5mn) in a new 10,300 sq m facility in Hillerod, Denmark. The facility will produce medicines for the treatment of diabetes and obesity. The facility is expected to be operational in 2019 and will create 450 new production and engineering jobs in Hillerod, where Novo Nordisk already employs 1,900 people. Incorporating the latest state-of-the-art insulin production technology, the new insulin filling facility will ensure production capacity for existing and future products within diabetes.

R&D – Large investments were made in technology centres with strategic locations by many companies. The companies in the high technology industries, i.e. Ericsson, Nokia and Novo Nordisk were very active but several other companies were also building technology centres in various industries. An interesting area for further analysis would be the relationship between these technology centers and manufacturing networks.

13.7.2009. Ericsson on Sunday offered to invest an estimated $1.5 billion in telecom and green technologies in Korea for the next five years, Cheong Wa Dae said.

25.9.2012. Global healthcare company Novo Nordisk is investing $100m to expand its research operations in China. A new R&D center, spread over 12,000m2 area, is being established in Beijing to ensure focus on protein technology, biology and pharmacology research activities.

20.1.2014. As part of the commitment to further increase its investment in Research and Development, SKF has announced plans to build two new Global Technical Centres - one in Gothenburg, Sweden and one in Nieuwegein, The Netherlands. Together these will form a Global Technical Centre Europe (GTCE) structure and will enable SKF to utilise fully its global footprint and resources to develop innovations across its five technology platforms - bearings, seals, mechatronics, lubrication systems and services. SKF already has a Global Technical Centre India (GTCI) in Bengaluru and is expanding its Global Technical Centre China (GTCC) and moving it to the new campus at Jiading, Shanghai.

20.2.2017. In 2016, the Czech Republic became the fourth country in the world besides Italy, Russia and the US, in which the Swedish white goods manufacturer Electrolux established a Global Technological Centre. The centre was placed in Prague with the initial employment of ten people, which should increase by a further ten in 2017 and up to 30 in the future. The R&D global centre focuses on cyber security by testing software and data transfer safety for IoT, closely collaborating with the Czech Technical Research Institute (CVUT).

29.3.2017. KONE, one of the global leaders in the elevator and escalator industry, today celebrates the opening of one of the world's tallest elevator test towers. The new 36-floor tower is centrally located at the KONE Park manufacturing site, engineering facility and research and development (R&D) center in the Kunshan New and Hi-tech Industrial Development Zone in Eastern China. Reaching a height of 235.6 meters, the tower contains 12 shafts that can be reconfigured for testing new high-rise solutions and components. This is the world's first double-decker elevator to feature KONE UltraRope(TM) super-light rope technology.

Acquisitions and divestments – There were a few companies clearly focusing on acquisition of companies with advanced technologies to complement the acquiring companies technology portfolio. Assa Abloy is a good example of such company but also companies like Atlas Copco, Cargotec, Danfoss, Sandvik, Norsk Hydro, Ericsson, Nokia and FLSmidt explained their acquisitions by access to technologies.

31.1.2008. ASSA ABLOY has signed an agreement to acquire SimonsVoss Technologies AG - a leading company in the rapidly growing market for wireless digital locking and access control systems. The market for digital locking and access control systems is growing rapidly and SimonsVoss is one of the leading companies within this segment. SimonsVoss exhibits a strong performance in relevant system technologies due to its advanced technology and broad system platform. The company employs a staff of 225 people and has its headquarters close to Munich in Germany.

10.2.2014. Lumidigm is an important technological addition to the ASSA ABLOY Group. The Company complements our current offering within the rapidly growing biometric segment. The acquisition of Lumidigm considerably enhances the Group's

position within biometrics and will provide complementary growth opportunities," says Johan Molin, President and CEO of ASSA ABLOY. Lumidigm was founded in 2001 and has 33 employees. The head office is located in Albuquerque, New Mexico.

21.12.2015. ASSA ABLOY has signed an agreement to acquire the Swiss company CEDES, a leading company in sensor technology to the door and elevator industry. CEDES was established in 1986 and has some 340 employees. The company is headquartered in Landquart, Switzerland. CEDES's sales for 2016 are expected to reach CHF 60 million (approx. SEK 510 million) with a good EBIT margin. The acquisition will be accretive to EPS from start.

4. Implications for research and practice

Globalization of operations has been an important option in the strategies of manufacturing firms to build their competitiveness. Companies must carefully consider various forms of developing their operations footprint when determining strategies for their global networks.

New theoretical explanations are still needed to elaborate the sources of competitive advantages for Nordic manufacturing firms in the global business environments. Explanations need to be searched in the future research from the perspectives of multinational organizations (Dunning 1980 and 2003; Gulati et al. 2000; Vereecke et al. 2006), industrial networks (Håkansson 1990; Johansson and Vahlne 2009; Karlsson 2003; Vahlne and Johansson 2013), and intra-firm production networks (Colotla et al. 2003; Ferdows 1989, 1997 and 2006; Hayes and Schmenner 1978; Ferdows et al. 2016; Shi and Gregory 1998; Vereecke et al. 2006). Various theoretical explanations will be searched in our research project and the prevailing research stream of manufacturing relocation enriched with empirical evidence.

The role of manufacturing industries in the economies and employment of the developed countries has been changing along the globalization of industries. Policymakers in several countries have increasingly challenged this development. From the social perspective, it is important to understand the ongoing transformation and its implications.

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