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Abstract

The central research question of the Made in Europe thesis is: *which location factors need to be considered by Europe's manufacturing industry to survive the 21st century?*

A literature review provided the theoretical background, covering the following research areas: international business, economic geography, manufacturing strategy, government industrial policy and decision-making theory.

The research applied a pragmatic mixed methods approach. Primary research was a Delphi study using an expert panel of industrial elites from the manufacturing sectors Automotive, Chemical, High Tech and Metals / Machinery. These sectors were selected based on statistical data research that looked at what 'the European Manufacturing industry' stands for in terms of employment and economic importance in the European Union. As supportive research, the industrial intervention policies of the European Commission plus three individual member states (Germany, the UK and the Netherlands) were analyzed.

For Europe's manufacturing industry to remain competitive in the 21st century, the key findings of the research are:

1. **Manufacturing location factors**: in the coming decade, the critical location factors for manufacturing industries are (1) a stable, tax friendly and favorable governmental ecosystem, (2) the access to end markets combined with (3) the availability of high skilled labor
2. **Manufacturing strategy**: is no longer based on a focus on 'cost minimization' (transport, labor, raw materials) but on 'value creation' (access to an integrated supply chain, skilled labor and new markets)
3. **Manufacturing location decisions**: have in the past often failed as a result of insufficient preparation, cultural insensitivity and a short-term focus. The research suggests that applying experience and intuition from a diverse stakeholder group combined with objective evaluation criteria and keeping a long-term business perspective with a high degree of flexibility, is expected to deliver the best results
4. **Government industrial policy**: although 'government' is not a critical driver of the strategy-making process in manufacturing industries, government industrial policy can play a decisive role in manufacturing location decisions and development of industrial agglomerations

Based on the research findings, a new decision framework is presented, ***the Made in Europe manufacturing location decision circle***, as a synthesis of the main findings, translated into a model for both academic purposes and practical business application, highlighting the importance of geo-political factors in international location decisions.

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Prologue

In 1781 the Scot, James Watt, patented the first steam engine. With his 10hp engine, different manufacturing machinery could now be powered, regardless of physical location and application. Before James' engine, any industrial activity required a location with direct access to water. Because of this innovative steam engine, companies for the first time could decide to locate their manufacturing operation anywhere they preferred. Watt's invention took place in a time, which was later referred to as the 1st Industrial Revolution (1760-1840). Economic historians regard this era as one of the most important in the history of the human race. The population in Europe rapidly expanded resulting improved healthcare and living conditions. A 2nd Industrial Revolution (1850-1910) followed and gave us the combustion engine, electricity and many new materials and chemicals. A variety of new and innovative products were discovered and most of them are still applied in products used every day. At the end of the 20th century, a new technological revolution emerged: computer technology and the internet. Jeremy Rifkin, a US economic and social theorist, described this as the 3rd Industrial Revolution. The birth of the Internet and the use of renewable energies are the main triggers for revolutionizing the industrial sector. Jobs in many industries evaporated and in 1995, Rifkin predicted in his book 'The End of Work' (Rifkin, 1995) that mass employment in the production of goods and services will be phasing out. Today, de-industrialization is an on-going process in the mature economies (Doyle, 2002). During the previous decades, major shifts took place in the employment numbers per economic sector: Agriculture, Industry and Services. Job growth across the European Union in the last 25 years took place mainly in the services sector, not the manufacturing sector. In the first decade of the 21st century, over 2 million jobs in the Manufacturing sector were lost in the European Union countries (EU-15) (Oxfordresearch.eu, 2016). Job losses in the Manufacturing Industry have been and still are significant and that trend does not seem to stop. The currently ongoing 4th Industrial revolution is increasingly replacing human labor by robotics and other digital manufacturing solutions.

In the mid 80's of the previous century, I finished my studies and got my first job. The company I started working for was a well-known player in the global manufacturing industry in those days, making diesel engines for large ships and electricity power stations used across the world. The majority of my work in the subsequent 30 years has been the restructuring of the operations of a variety of manufacturing industries I worked for. In order to survive and remain competitive in the global marketplace, every industry I worked for had no choice but to keep improving their organization. Make them better, cheaper and faster. My personal experience with how companies are taking location decisions, is best described with a quote from Dina Gerdeman: 'Many companies think of geographic strategy as a short-term checkers-match rather than as a long-term chess game'. (HBS Working Knowledge, 2012). Looking back, all of the companies I helped restructuring, have been moving their operating facilities around the world: from Western Europe to Eastern Europe, from Europe to Asia. All are still active in some form or shape, but employment in the Netherlands and Europe has either disappeared or been decimated. The on-going process of de-industrialization has been close to my professional life since over 30 years. I expect the research to help me improve and further expand my current Supply Chain Strategy practice, helping companies make decisions to stay competitive in the fast pace global environment.

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CHAPTER 1

INTRODUCTION

1 INTRODUCTION

1.1 Problem statement

The manufacturing industry is considered to be the backbone of the economy. 'No growth and jobs without Industry' is the motto of the European government (European Commission, 2013). In Europe, about 100 million people work in the manufacturing and related sectors (Westkämper, 2014). However, employment is the manufacturing industry is decreasing rapidly. 'Who moved my job?'[1] is a question asked by people who lost their manufacturing job. De-industrialization caused millions of job losses in the manufacturing sector in the well-developed economies in Europe and the US. The share of manufacturing in today's economy in Europe and other well-developed economies has declined drastically and the share of services has grown substantially (Johnston, 2009; Van Winden et al., 2011). Manufacturing is not disappearing, but it is taking new forms and shapes in our digitized economies (Ketokivi et al., 2017). Multinational corporations (MNC's) play an important role in the new, global economy by orchestrating their global supply chains and moving their products and services around the world of constantly changing markets (Spence, 2011).

If a manufacturing facility is closing, the decision to do so usually is the outcome of an intensive decision process, that took place in the company's corporate headquarters. Senior management of the manufacturing plant thought long and hard on the following question: *'What is the best location for our factory if we want to survive in our business?'* The question itself is fairly straightforward. But all the factors that come into play for taking this decision are complex. Nobody can predict the future. Nobody knows with certainty how global markets will develop. The business decision on a new manufacturing location is based on assumptions, predictions and estimates.

Location decisions always have been a strategic issue for MNC's in the manufacturing industry. The importance of a firm's location is increasing since the manufacturing marketplace has become more and more global (Gilani and Razeghi, 2010). The majority of manufacturing firms compete in the global marketplace with their products and services. Geography is expected to play an increasingly important role in international business. Every investment decision made by MNC's involves a location decision as well (Iammarino and McCann, 2013). The ability to adapt manufacturing capability to the everchanging requirements of clients is a critical factor for survival. Research showed that the implementation of a manufacturing strategy can lead to superior operational performance (Thun, 2008). Academic research on international location factors and the geography of MNC's in relation to a firm's structure and strategy is under researched (MacCarthy and Atthirawong, 2003; Iammarino and McCann, 2013). More recently, research on the topic of location strategy has intensified (Bals et al., 2016; Ketokivi et al., 2017), but most of this research had a limited geographical scope and a limited research focus area. To date, there do not appear to be studies on manufacturing strategies, international location factors and the decision-making process using the Delphi method with an expert panel of senior business leaders with hands-on experience in the actual European manufacturing industry itself. The 'Made in Europe' research will be taking exactly this perspective. Involving the industrial elite to contribute to an academic research, involving business sensitive information like manufacturing location decisions, has been a true 'dance of seduction' (Aguiar and Schneider, 2016). The Delphi output from an 'International Business' perspective, is expected to be a strong contribution to the academic and theoretical discussions on the economically and geographically relevant subject of manufacturing location decisions.

[1] Kobayashi-Hillary, 2010

The **problem statement** of the thesis is formulated as a question: ***what are the critical location factors for the Manufacturing Industry, which will help them decide on where their operations needs to be located in order to remain competitive and survive the 21st century?***

The central research question of this thesis therefore is: which location factors need to be considered by Europe's Manufacturing Industries to survive the 21st century? The 'Made in Europe' research objective is to ***'develop a framework to support location decisions for Europe's Manufacturing Industry sectors in the 21st century'***.

Besides the central research questions and in order to achieve the objective, the following subsequent research questions will be dealt with:

1. What manufacturing strategies drive location decisions in multinational corporations (MNC's)?
2. What are current location factors that drive decisions on location of operations? What examples are available in recent decades in the European Industry?
3. What decision models are available for answering complex questions and (how) are they applied in an actual business setting?

In order to appropriately frame the research questions, this thesis will look into the relevant theories on international business, location factors theories, economic geography, government intervention policy and decision-making theories. The following sections will give an overview of the research approach and discuss its relevance and contributions. An initial definition of terms will clarify the terminology used in this thesis. Finally, the geographical context which has been chosen is explained to 'set the scene' for the remainder of this research.

1.2 Research methodology overview

To achieve the formulated research objective, the following research methodology was chosen and is visualized in Figure 1. First, a literature review will discuss all relevant aspects of the problem statement and research objective and will give the proper theoretical background. As primary research a Delphi study will be conducted, using an expert panel of industrialists. As secondary (supportive) research, a Data research on the European manufacturing industry will be conducted with the objective to clarify what exactly is meant with 'the manufacturing industry' and understand its place in the economy in Europe. As additional supportive research, some of the current European industrial policies will be documented and reviewed.

A literature review providing theoretical background and a data research providing statistical and data background is not sufficient for developing a 'location decision framework for Europe's manufacturing industry'. As will be explained in more detail in Chapter 3 Methodology, the main research method is applied using experts from the European manufacturing industry. A Delphi research with senior executives from selected industries is conducted, with a specific focus on manufacturing sectors that have been impacted the most by the ongoing process of de-industrialization. The experiences that a group of seasoned business professionals have on past location strategies and decisions will be the basis for interacting with this group about what they see as the future location factors for their industries. Their collective knowledge and hands-on experience combined with the theoretical framework provided in the literature review, will deliver the location decision framework as described as the ultimate research objective. The characteristics of the Delphi method are essential for obtaining valid results: anonymity of the participants

safeguard that no sensitive business information is shared among peers of even potential competitors. A structured and centrally organized information flow, avoiding face to face communication, will secure a time-efficient research process. Finally, the regular feedback loop with different interview rounds from the Delphi method, ensures that participants can learn from each other without the potentially negative effects of influencing each other, which can be the case in group meetings or interview sessions. Based on these considerations, the application of the Delphi method for especially a group of industrial elites is preferred to give this research the 'behind the scenes' insights in the strategy making process leading to location decisions.

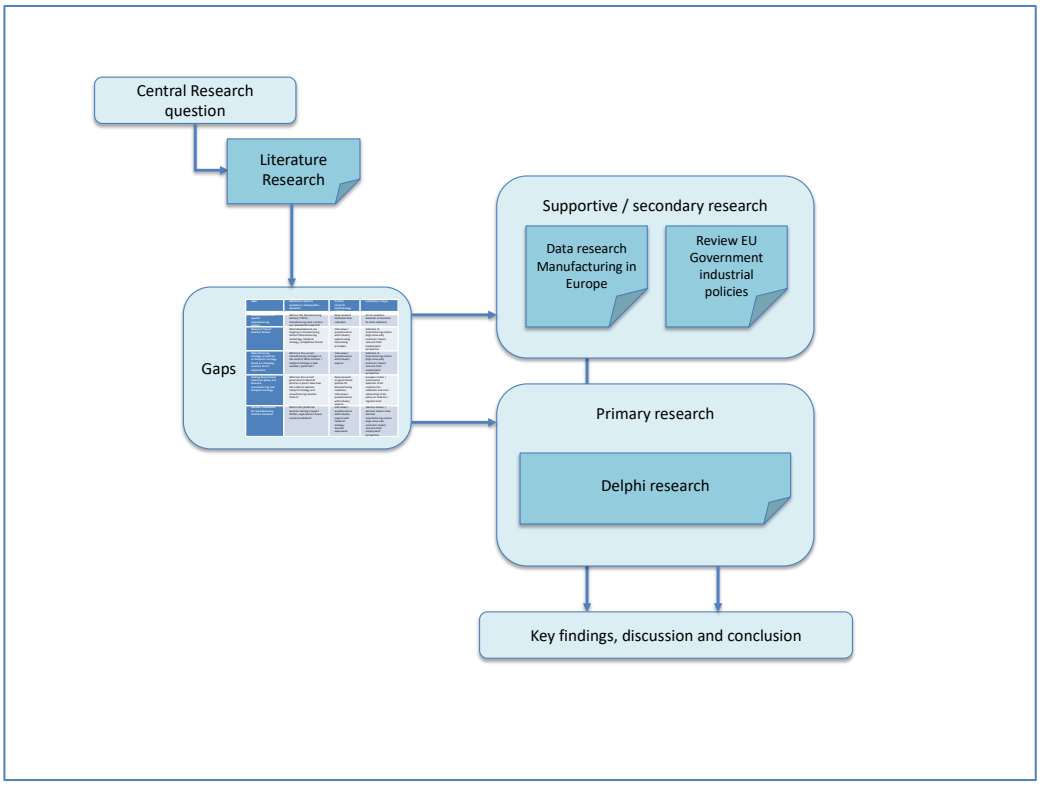

Figure 1 Made in Europe research approach

1.3 Relevance and contributions

Global industries face fierce competition in today's dynamic, digital world. Manufacturing companies are struggling to find ways to stay innovative and make products, which add value in the eyes of the customer. Besides sales, marketing and innovation strategies, there is also the manufacturing or operations strategy. What products will be manufactured in house? Which manufacturing technologies will be used? What will suppliers produce and deliver? But there is another strategic question related to a firm's manufacturing strategy: what is the best manufacturing location for the company? The thesis 'Made in Europe' will research this problem, faced by every industry. On the topic of industrial location for global companies, available research is scarce. '*Only a limited amount of research has been reported on factors influencing international location decisions for (…) manufacturing operations.'* (MacCarthy and Atthirawong, 2003). More recent research on industrial location decisions (Bals et al., 2016; Ketokivi et al., 2017) had a limited geographical scope and also a limited research focus area.

Manufacturing companies operating on a global level are forced to continuously rethink their operations and distribution strategies (Meijboom and Voordijk, 2003), caused by the globalization of economies and businesses. New technologies like 3D printing are impacting the current manufacturing processes and are disrupting the traditional ways of working (Petrick and Simpson, 2013). Freshly designed supply chains, using resources and materials from all over the globe are changing with the same speed as they are built. The topic of 'Industrial location' is becoming increasingly important caused by the new advanced manufacturing technologies, wiping away traditional industrial solutions and companies. The thesis 'Made in Europe' will contribute to current knowledge of what are important future manufacturing location factors. Increased understanding of all the dynamics around the problem will help to come up with practical solution directions, applicable in today's academic and business environment.

1.3.1 Business

Adding value and trying to maximize business profits are important drivers for commercial enterprises. The pressure to lower operating cost is always there. The 'Cost of Goods' element in the Profit & Loss statement of any manufacturing industry is often the largest cost element. Substantially improving profitability therefore automatically results in a clear focus on the cost of production. Entire industry sectors like Consumer Electronics, Telecom / Mobile equipment, Clothing and Shoe apparel and several other products have moved to 'low cost countries' in other parts of the world. Finding the lowest cost levels for manufacturing products have long been an important strategic driver to remain competitive in the market. But how sustainable is a manufacturing strategy based on just 'low cost labor'?

Linking overall company strategy to Operations in order to achieve competitive advantage is crucial for all globally operating businesses (Kaplan and Norton, 2008). On the board agenda of every CEO in any Industry, you will find the dilemma of lowering total cost while remaining flexible and customer centric. To choose the 'right' location for your operations is therefore critical for improving the competitiveness and resilience of any manufacturing industry.

1.3.2 Government

The European Union currently is spending billions of Euros of taxpayer's money on a program called 'Horizon 2020'[2]. A critical element in this program is the effort to stop the process of de-industrialization in Europe, with the objective to improve employment opportunities. National governments also have various Industry policies, trying to keep local industries where they are (import tariffs, taxation measures, aid programs etc.). Understanding the process of how the local and global manufacturing industry is making decisions on the location of their operations is important for government policy makers. Insight into this process can help government bodies with allocating funds to stimulate industries to take decisions supporting long-term competitiveness and employability instead of subsidizing short-term employment.

'*There is therefore a compelling need to reconsider the rules of the game constraining the exercise of industrial policy (…)'* (United Nations (Lall), 2004). Nahtigal continues to state that in the European Union countries should adopt '*more innovative industrial policies'* (Nahtigal, 2014). Research on what are the expected relevant future location factors for what is considered the backbone of the economy, can help governments make the right choices on the topic of Industrial policy. Can

[2] https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020

governments make an impact on the competitiveness of industrial companies? And if so, what tools should be used to be as effective as possible and also: what tools should be avoided?

This research aims to bring the topic of Industrial location closer to current government policy on both national and international level. Government policy can only influence business policy to a certain extent. Understanding the dynamics of global business challenges is critical for supporting companies to stay competitive with qualified people working in this economic sector.

1.3.3 Theories of Industrial location

The social science community in the fields of Economy, Geography and combinations of them (Economic Geography, Spatial Economy, Regional Economy) has historically been focused in trying to understand and model why people and business are where they are, and what factors influence their decision to (re-) locate. A variety of 'location theories' have been developed during the previous two centuries to help us understand what has been happening.

James Watt's steam engine caused a revolution in the manufacturing industry as location of industrial operations became much more flexible. The location theory models developed by the economic science community have evolved over time. Understanding the 'future location factors' to be considered by the Manufacturing Industry will contribute to adjusting current theories or even developing new location theories. The acquired knowledge from business leaders in the Manufacturing sector can shed a new light on industrial location models developed by economic geographers.

In the Literature review besides Economic Geography, four other research fields will be discussed: International Business, Strategic Management, Government policy and Decision Making. So far, these elements have not been described in academic research in the context of the issue of Industrial location in Europe. Delphi research has never been applied to these combined elements or has been restricted to the one topic of 'Industrial location factors'. Furthermore, forming an expert panel coming from the Industry itself has never been attempted in relation to the research topic. In similar research the Delphi expert panels consisted of business consultants, economists and politicians.

1.4 Definition of Terms

This research will refer to the terms 'Industry', 'Manufacturing' and 'Manufacturing Industry' as defined and categorized by Eurostat, the statistical office of the European Union. Eurostat recognized the following economic sectors: Agriculture, Commercial Services, Public Services, Educations / Health and Industry (2015 version of NACE coding[3], see also Appendix 2). The Industry sector is split up in the following subsectors: Mining, Manufacturing, Utilities and Construction. This thesis will use the terms manufacturing industry or manufacturing companies according to the above Eurostat categorization: Manufacturing as subsector of the sector Industry. The Manufacturing sector can furthermore be split up in another set of subsectors like Chemicals, Automotive, Food, High Tech, Textiles etc. In Chapter 3 Methodology and 4 Data Research on the European Industry, more details will be provided on Eurostat and the NACE coding.

[3] NACE stands for Nomenclature of Economic Activities and is the classification system used by the EUROSTAT for economic activities.

The majority of companies in the manufacturing industry have become global companies with global supply chains (Gilani and Razeghi, 2010). This research will use the terms 'manufacturing companies' and 'multinational companies' (MNC's) when referring to manufacturing companies having global supply chains and an international customer base. When the term MNC is used in this thesis, it refers to a globally operating manufacturing firm. In the following Chapter Literature review, the term MNC will be further defined and reviewed (section 2.2 International and 2.5 Manufacturing Strategy).

An extensive Definition of Terms can be found in Appendix 0.

1.5 Geographical context

The geographical context for this research is Europe, as the home of the 1st and 2nd Industrial Revolution. Globally operating manufacturing companies, located in Europe that survived the on-going de-industrialization proved their manufacturing strategy has paid off, at least for now. Charles Darwin, who lived during the 1st Industrial Revolution, developed the evolution theory which is also applicable to the manufacturing industry: 'it is not the strongest of the species that survives, nor the most intelligent, but the ones most responsive to change'.

The supportive research of 'Made in Europe' will look into the relevant European Manufacturing industry data (employment development) and government industrial policies. The manufacturing industry data will look at the EU-15[4] countries, as they are historically consistent from statistical perspective. For the European industrial government policy, the research will look at the recent publications of the European Commission. Employment data analysis and government policy review on a pan-European level however is very 'high level'. For reasons of cross reference and data validation, the supportive research will look into the manufacturing industry data and government industrial policies of three additional individual member states: Germany, the United Kingdom and the Netherlands. Jointly, these three EU-15 member states represent almost half of the total EU-15 economy size (see Figure 2: bubble represents GDP size), sufficient for data validation purposes.

Besides the basic EU-15 data, these three individual countries were selected based on their unique economic characteristics: Germany is the largest economy in Europe combined with the highest manufacturing employment rate; the United Kingdom, as 3rd largest economy in Europe, 3rd highest income per capita has the lowest manufacturing employment rate; finally the Netherlands has the highest income per capita and the 2nd lowest Industrial employment rate.

1.6 Research overview

Following Chapter 1 Introduction, a Literature review is conducted (Chapter 2) to explore the different angles of the research topic from an academic perspective. Chapter 3 presents and explains the research Methodology, expected to find answers on the central research question and fill some of the gaps found in the Literature study.

[4] the EU 15 was the number of countries which were members of the European Union prior to the accession of 10 candidate countries in May 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom

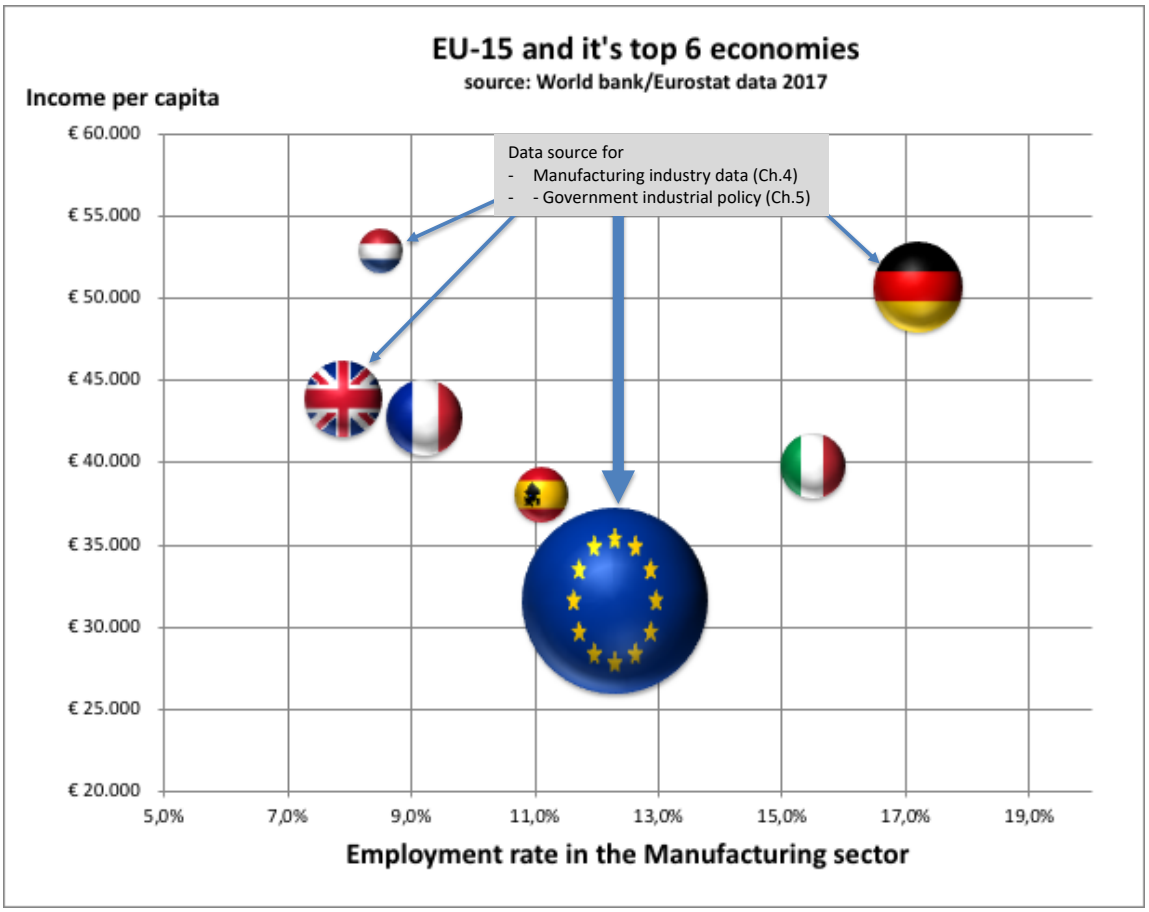

Figure 2 GDP total, GDP per capita and Manufacturing Employment rate of EU-15 and its top 6 economies (source: World bank and Eurostat data 2017)

In Chapter 4 and 5, the secondary supportive research will be presented: the employment development of all the relevant sectors in the 'the European Manufacturing Industry' (Chapter 4) and the Government Industrial policies of the European Commission, Germany, the UK and the Netherlands (Chapter 5). In Chapter 6 the primary research is documented: a Delphi study with an expert panel from the organizational elite: top industrialists from various European based manufacturing sectors. In Chapter 7 Discussion, the findings from the secondary and primary researches are discussed in relation to the academic literature findings. Chapter 8 concludes the research, presenting a new decision framework for academic purposes and practical business application.

CHAPTER 2

LITERATURE REVIEW

2 Literature Review

2.1 Introduction

In this chapter, the literature relevant to the research topic will be reviewed. The research topic touches a variety of academic research areas, as visualized in Figure 3. First of all, the field of Industrial Business covers the world that MNC's as global operating industries are dealing with. Literature on 'location factors' can be found in the field of Economic Geography in general and Industrial Location more specifically. Manufacturing Industry is one of the Industries covered in literature on Industrial policy from (inter/intra-) national government bodies. The decision-making aspect of the research problem is covered in the game theory and organization theory fields, specifically the Decision-Making theory. Finally, academic literature on Strategic Management and Competitive Operations will be discussed in relation the research topic.

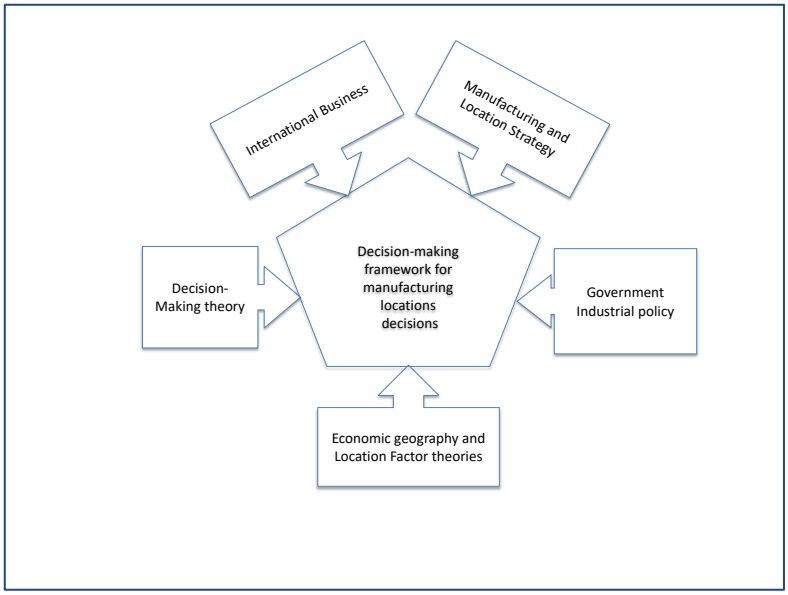

Figure 3 Literature review approach for the Made in Europe thesis

The main purpose of the literature review is to gain knowledge and understanding on all the key angles of the research topic. What has been published that can help along the research journey? What are the views of different authors on the subject and how do they compare? Are there any gaps in the research and how does the research project Made in Europe compare to the various publications on the subject? The Literature review will help us limit the problem statement and place the study in historical perspective. The gaps found in the literature review in relation to the research question will form the basis for selecting the appropriate research methods to be used further in the research. Publications on the abovementioned five elements for the research have both an academic and business orientation. The 'academic' focus will form the theoretical foundation necessary for the remainder of the research. The 'business' focus will help to secure practical application in today's globalized enterprises. Besides these focus areas, literature review on location decisions needs to contain both a wide as well as a narrow angle; in other words, a macro as well as a micro perspective.

Looking at business location decisions from a narrow, micro level is required and relevant to understand the dynamics in which companies are operating in certain countries, dealing with local laws and government regulations. However, most of the manufacturing companies nowadays operate at a global level, dealing with global competition. This requires therefore also a wide, macro perspective on the topic in order to put any local (narrow) issue from the manufacturing industry into a global (wide) perspective. Only then the problem is approached from all angles and the research gains the required understanding of the problem.

As shown in Figure 4, the proposed Literature review areas cover the relevant areas from both broad and narrow perspective. Also, both Business as well as Academic literature is covered in the different elements of the Literature review. The objective of the research is *to develop a framework to support location decisions for the manufacturing industry* in the years ahead. This justifies a limitation in the selection of publications from a historic perspective. The literature review section on 'Economic Geography' will use a more historic perspective of the various publications. This approach is required in order to fully understand the developments taken place in the area of social sciences until today. The four other sections (International Business, Strategic Management – Competitive Operations, Industrial Policy, Decision making theory) will not require this historic perspective in the light of the Research objective. Publications to be used will be mainly from the 21st century to secure focus on the latest insights and developments.

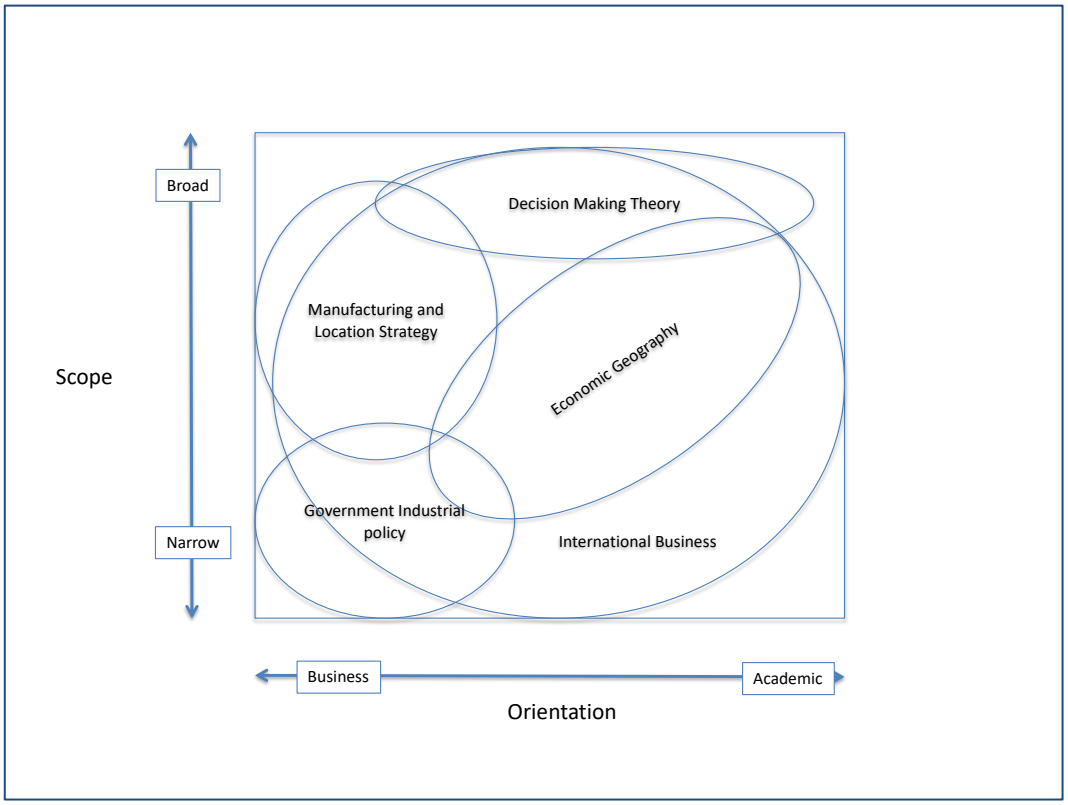

Figure 4 Literature review – Scope and Orientation

The Literature review will start with the field of 'International Business', followed by 'Economic geography and Industrial location' and 'Government Industrial policy'. The remaining sections cover 'Manufacturing and Location Strategy' and 'Decision Making theory'.

2.2 International Business

In this section, the concept of the 'Multinational Enterprise or Corporation' (MNE or MNC) will be defined and framed in relation to the research topic. Subsequently, the MNC in relation to 'location decisions' and 'government institutions' will be reviewed. This research will be using the term MNC when referring to globally operating manufacturing companies.

An MNC, on which concept there is in fact no dominant academic theory, can be defined as '*a multi-plant, multi-activity firm that engages in the foreign production of goods as service*' (Iammarino and McCann, 2013; p13). Why does a firms decide to become an MNC? John Dunning's foundational work published in the '70s of the previous century, delivered the concept of the 'eclectic or OLI framework' (Mudambi, 2001; Dunning and Lundan, 2008). OLI stands for Ownership, Location and Internalization as being the three core sources of advantage based on which firms engage in Foreign Direct Investment or FDI. The Ownership advantage deals with issues around 'why' a company decides to go international; the Internalization advantage deals with 'how' this is organized in the most efficient way. Finally, the Location advantage refers to the decision 'where' to locate the MNC's operations. the decision to invest in foreign countries by locating an MNC's operation is usually based on the following reasons: cost reasons (vertical FDI) and/or reasons for market access (horizontal FDI) (Neary, 2009).

Although the MNC is attributed to play a crucial part in the global restructuring of economic geography (McCann, 2008), there is just a limited amount of academic literature of the MNC's strategy in relation to place and space, making the geography of the MNC an under researched academic topic (Cantwell, 2009; Iammarino and McCann, 2013). The knowledge on the relation between MNC's and a specific country, region or city is scarce (McCann and Acs, 2011). Any investment decision made by the senior management of MNC's involves location decisions and can be regarded as very complex. The Location element from Dunning's OLI framework is regarded to be its Achilles heel. The increasing importance of location and geography for MNC's could explain the recently intensified research on the relation between MNC and its location decision drivers (Iammarino and McCann, 2013).

Besides vertical and/or horizontal FDI motives, Cantwell (2009) point out the MNC's quest for finding new or complementary innovation sources. Pure vertical FDI (cost motives) is argued to have lost significance, favoring increased agglomeration, clustering and learning effects (Dunning, 2009; Beugelsdijk, McCann and Mudambi, 2010). Agglomeration, clustering and co-location can generate benefits in the area of logistics, shared resources (materials but also human resources) as well as face to face contact (Arita and McCann, 2000).

What role do government institutions play in relation to MNC's and their FDI location decisions? The interaction between MNC and local government is best characterized as a 'strategic game' (Mudambi, 2001), resulting in the attraction of FDI by MNC's if governments play this game well. Institutional infrastructure that has a clear focus on space and place is an important influencing factor for MNC's decision making (Dunning and Lundan, 2008). The positive agglomeration effects through the geographical concentration of industries is welcomed by MNC's as this helps securing the necessary local (human) resources and (innovation) capabilities.

What does the research field on International Business believe the future holds for MNC's, the location factor and government infrastructure is heading? The increased globalization effects are a direct result of MNC's location decisions, triggered by a variety of strategic motives (cost, market access, innovation potential) (McCann, 2008). Dunning's OLI framework is argued to be inappropriate for explaining the spatial behavior of MNC's, simply because in the previous decades both MNC's as

well as governments have fundamentally changed (McCann and Mudambi, 2004). One example is that for many global operating companies, its global headquarters is frequently geographically fully disconnected from the location of its business units and operating companies. Each function, whether it is Research & Development, Manufacturing or Corporate Finance have different spatial characteristics resulting in a physically disconnected enterprise (Iammarino and McCann, 2013). Availability as well as access to 'knowledge' is becoming increasingly important as competitive advantage for MNC's. If governments succeed in facilitating the MNC needs related to specialized local pools of skilled labor and other knowledge sources, they are expected to influence MNC's FDI decisions. Chapter 2.4 Government industrial policy will take a closer look this issue. With their subsequent location decisions, MNC's '*shape economic geography, both local and global*' (Iammarino and McCann, 2013).

2.3 Economic geography and Location factor theory

As referred to in the previous section, the topic of Economic Geography will now be reviewed: what is Economic Geography and what are the principles and core assumptions underlying this academic field? And more specifically, what are the current Location factors and Location conditions for Industries to be found in academic Literature? This section ends with a summary on the recent developments and expected future developments regarding Industrial location conditions.

The discipline of Economic Geography deals with the question where economic activity takes place and why? (Fujita, Krugman and Venables, 1999). More recently Roger Hayter and Jerry Patchell described their work on Economic Geography as dealing with 'the variations in location and spatial distribution of economic activities' (Hayter and Patchell, 2011). The main objective of Economic Geography is to help both business and governments take decisions on the best way to organize various activities across space. Historically and during the various Industrial Revolutions, economists developed models to help businesses and governments to make policies focused on creating increased economic growth. Academic location theories can be divided in three areas (van Dijk, 2009):

- The classical location theories: Johann Heinrich von Thuenen (1826), Alfred Weber (1909)
- The neo-classical location theories: Michael Porter (1990)
- The modern location theories: Paul Krugman (Nobel Prize winner Economics, 2008)

Each area will be described shortly. The work of Alfred Weber, a German economist and sociologist, is considered to be foundational for most modern location theories (Weber and Friedrich, 1929). Weber's core assumption was that a firm chooses a location with the objective to minimize their cost. In order to reach minimal cost, Weber analyzed three elements: the material index, labor and the agglomeration economics. Weber's developed the Location Triangle, which was used to explain the location of especially heavy industries during the 2nd Industrial Revolution.

In line with Weber, the work of Roger Hayter et al. (Hayter, 1997; Hayter and Patchell, 2011) repeat that the objective of any firm is to minimize cost, emphasizing this is particularly the case for companies operating in the manufacturing Industry. The assumption is based on the concept of 'homo economicus' where any decision is made rationally based on pure economic considerations and similar quantitative factors. The pure 'homo economicus' line of thinking is critiqued by scientists from the 'behavioral location theory', claiming it is impossible to have all required information available for these decisions resulting in imperfect and even irrational decisions. Cees-Jan Pen (Pen, 1999) and others criticize these views because firms are regarded as a 'black box'. There is limited understanding in how firms take (rational) decisions. Pen suggests opening this so-called black box by looking closely how the actual process of strategic decision making within a firm takes place.

Schumpeter called this process of continuously re-inventing the firm's economic structure including its location 'Creative Destruction' (Schumpeter, 1943). He stated that this process of continuous destruction and rebuilding is the core driver of modern capitalism and therefor part of how the economy works as a whole.

Michael Porter neo-classical location theory is based on the 'diamond model' (see also Figure 5). Porter's model suggests that there are specific reasons why industries in specific countries are more competitive on a global scale than similar industries in other countries. Porter assumption is that the national home base of organizations can create a global competitive advantage (Porter, 1990). Porter analyzed successful 'clusters' of smaller industries within a specific region or country in order to understand their how they have been able to create what he calls 'global competitive advantage'.

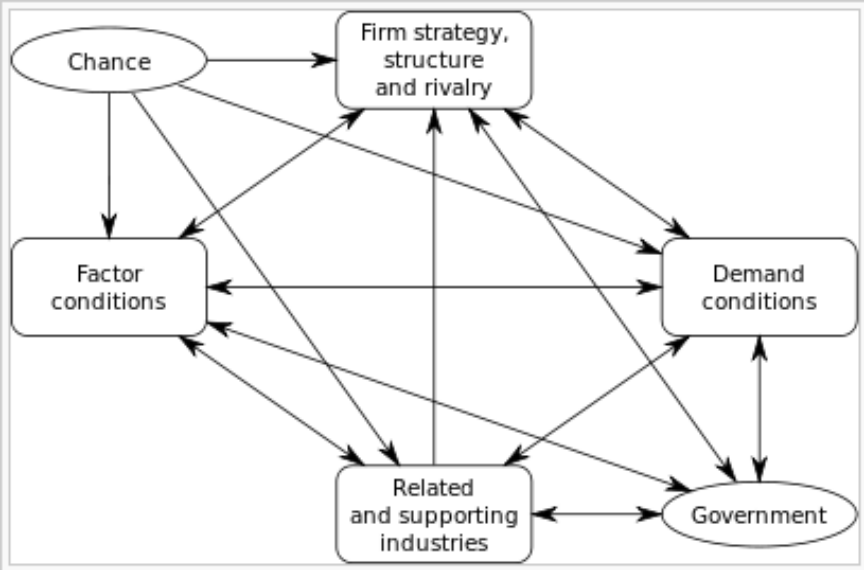

Figure 5 The diamond model (Michael Porter, 1990)

In Porter's diamond model, all factors interact with each other creating increased competitiveness and a more innovative environment for companies. The 'Factor conditions' refer to all the different types of resources required for being a competitive firm: human, physical, capital resources and infrastructure. 'Demand conditions' refer to the home markets putting pressure on companies to innovate. 'Firm strategy, structure and rivalry' refers to the importance of a successful corporate strategy, preferably in an environment where rivalry is pushing company's management to keep innovating. Pressure to innovate and renew ways of working also come from 'related and supporting industries'. On top of these tangible attributes within a company, Porter describes two other factors influencing a company's competitive advantage: the government and 'chance'. The government can influence all critical factors described and need to be considered as part of a firm's strategy. 'Chance' merely refers to things happening beyond the control of the company, like new emerging technologies, markets etc. This factor may not be 'manageable' but it is certainly something to consider frequently in a firm's strategy evaluation processes.

2.3.1 New Economic Geography and Agglomerations

One of the 'modern location theorists' is Paul Krugman. In the 21st century, Paul Krugman is regarded as one of the world's most influential economists, receiving the Nobel Prize on Economics for his work on 'Economic Geography' in 2008. The first slide of his Award presentation reads: "*new trade", "new geography", and the troubles of manufacturing* (Krugman, 2008), specifically referring to the industrial location challenges in todays globalized world. Krugman's introduced the concept of the 'new trade theory' in the field of Economic Geography as an alternative to Ricardo's framework of 'comparative advantage', which was how many theorists thought about international trade prior to the 1980's. What is 'new' about Krugman's self-proclaimed 'new economic geography' (Hassink and Gong, 2016)? In the mainstream field of economics, the elements space, place and geography had for a long time been mainly disregarded. Krugman integrated the existing economic trade theories into the location theories in regional economics. Krugman recognized two forces affecting the geographical concentration of economic activities: centripetal and centrifugal forces (Krugman, 1998). Centripetal forces tend to promote geographical concentration whereas centrifugal forces tend to oppose these forces. Economic areas with good access to large markets attracts both local downstream producers as well as labor with specialized skills as it is easier to find jobs for both employer as well as employee. These two are examples of centripetal forces of economic concentration of activities or agglomeration. Examples of centrifugal forces are e.g. the cost of land. Concentration of activities may drive up the cost for leasing or buying land which can become a disincentive for concentration. Centrifugal forces can also come from the supply and demand side of an industry: production of natural resources will go to where these resources and required labor are available and assembly of final product may be more beneficial to be done close to the end consumer. In Krugman's location theory of production, the development of economic spatial structure is formed by the balance or equilibrium of the centripetal and centrifugal forces (Krugman, 2010). Krugman helped to put space and geography back on the agenda of economic researchers.

Where originally an industry geographically starts its business is highly dependent on chance and events that happened in the past (Hassink and Gong, 2016). As a result of this, economic development in a specific region is regarded as a path dependent process. Certain historical events in the history of a region frequently have led to the establishment of an industry specialized in a certain manufacturing sector. In Europe, Asia and the US there are several examples of these manufacturing industry clusters in the Automotive (Detroit, US), Chemical (Ruhr area, Germany) and High Tech (Shenzhen, China) sector. Their initial success resulted in a true spin-off of a variety of related industries and the subsequent agglomeration processes in these regions.

Krugman's new economic geography based on various mathematical models also received criticism from other economic geography scientists. Krugman's deductive models would neglect cultural, social and political realities in his models (Hassink and Gong, 2016). The policy implications derived from Krugman's new economic geography models is sometimes regarded as too much a 'one size fits all' approach for regional policy makers and other governmental institutions. The debate on this topic is referred to as the 'place based vs. place neutral approach' and will be discussed later in the Literature section on Government Industrial policy.

Another debate that is relevant in relation to agglomeration is the 'Marshall versus Jacobs' controversy. The phenomenon of industrial clustering or agglomeration and particularly what causes this, has been a research topic of interest for a variety of economists and economic geographers in the last two decades. Researchers noted that innovative activities in mature industrial economies are very strong geographically clustered (Beaudry and Schiffauerova, 2008). As described in the previous section on International Business, specifically for MNC's the availability of knowledge leading to innovation is crucial for remaining competitive in the global market. How to stimulate further regional innovativeness, is a topic of strong debate (van der Panne and van Beers, 2006).

There are two lines of thought in academic literature: the Marshall-Arrow-Romer (MAR) model versus the Jacobs theory. The MAR model is based on the ideas and publications of Marshall (1890), Arrow (1962) and Romer (1986) and '*claims that the concentration of an industry in a region promotes knowledge spillovers between firms and facilitates innovation in that particular industry within that region*' (Beaudry and Schiffauerova, 2008). Jacobs (1969) on the other hands claims that knowledge spillovers do not originate from inside these regions but come from other and different industries and originate mainly in urban areas and cities. The diversity of 43knowledge coming from different industries is what she believes is the driving force behind innovation in geographically clustered industries. Several publications (Greunz, 2004; Beaudry and Schiffauerova, 2008) on 'who is right?' in this debate come to a similar conclusion: it depends. Depending on region, on maturity of the industry, on how innovativeness is measured, either the MAR of Jacobs model is applicable. Greunz (2004) e.g. did extensive research across 153 European regions and 16 different manufacturing sectors and concluded that in high density regions in combination with high tech industries the Jacobs theory could be applied, relevant for the respective MNC's.

2.3.2 Location factors

Albert Weber developed the 'Location Triangle' as a mathematical model to explain the process of Industrial Location selection. Weber identified three main factors that influenced industrial location in the early years of the 20th century: transport costs, labor costs and agglomeration economies (Weber and Friedrich, 1929). Weber's model explained why industries with a high level of raw material usage are located close to supply sources. His ideas remained valid for the location of heavy industries from the early days of the 1st Industrial Revolution until the mid 20th century. Hayter and Patchell state that the importance of location conditions is thoroughly changing over time. Transportation cost has become a much less relevant and significant cost element in the second half of the 20th century (Hayter and Patchell, 2011; Kasper, 2002). New transportation methods combined with advanced communication technology changed the way the manufacturing industry operated around the globe. New transportation networks laid down a new foundation for extensive globalization of many industries. Transporting textile products from Asia is still in many cases more cost efficient than production within the national borders of the advanced high labor cost economies in the West.

With transport cost becoming less important, the land and labor cost component climbed the ladder of most influential location factors (Kasper, 2002). Fujita and Thisse (2013) called this phenomenon the 'death of distance', referring to lower transport costs combined with the disappearance of communication cost resulting in a possible decline of protectionism (Fujita et al., 2013). However, the authors showed that 'distance' for sure is not dead and that economic growth is still geographically unequal and local. Fujita and Thisse show that agglomerations 'rely on the trade-off between various forms of increasing returns and the different types of mobility costs'. In 2008 for instance, 99.8% of all PC's came from East Asia as an example of what is called an economic agglomeration. All in all, the authors conclude that transport cost still matters.

MacCarthy and Atthirawong have published their extensive research on international location factors for global industries in a variety of papers (MacCarthy and Atthirawong, 2001, MacCarthy and Atthirawong, 2003). Hayter and other economic geographers identified similar location factors, described in similar wordings and definitions (Hayter, 1997). Abele et al.'s (2008) publication on new production facilities location factors was based on a survey in only a limited number of manufacturing sectors: automotive, machine tool manufacturing and electronics. A list of 13 location factors were described that could to be considered in a facility location decision, which the authors proposed could possibly also be used beyond these sectors.

More recent research on location criteria in the manufacturing area is limited to a narrow geographical area. Spallanzani et al. (2016) for instance, conducted a survey among >100 manufacturing companies in France (Paris region). The study found that the key influencing location decisions for manufacturing operations were: workforce availability and territorial dynamism or agglomeration. Badri (2007) conducted maybe the most extensive research on industrial location factors, using literature and data research from academics as well as practitioners. Table 1 shows fourteen location factors identified by Badri in his 2007 research.

CRITICAL FACTORS	EXPLANATION OF CRITICAL FACTOR
TRANSPORTATION	Infrastructural facilities. Shipping cost of raw materials. Cost of finished goods transportation. Warehousing & storage facilities. Availability of postal outlets
LABOR	Low cost labor. Attitude of workers. Managerial labor. Skilled labor. Wage rates. Unskilled labor. Unions. Educational level of labor. Cost of living.
RAW MATERIALS	Proximity to suppliers. Availability of raw materials. Nearness to component parts. Location of suppliers. Availability of storage facilities of raw materials
MARKETS	Existing consumer market. Existing producer market. Potential consumer market. Anticipation of growth of markets. Favourable competitive position. Income & population trends. Consumer characteristics. Location of competitors. Future expansion opportunities. Size of markets. Nearness to related industries.
INDUSTRIAL SITE	Accessibility of land. Cost of industrial land. Developed industrial park. Space for future expansion. Availability of lending institutions. Closeness to other industries.
UTILITIES	Water supply, cost and quality. Disposable facilities of industrial waste. Availability and cost of fuels, electric power, gas, sewage facilities, coal and nuclear facilities.
GOVERNMENT ATTITUDE	Building ordinances. Compensation laws. Insurance laws and safety inspections.
TAKS STRUCTURE	Tax assessment basis. Industrial property tax rates. State corporate tax structure. Tax free operations. State sales taks.
CLIMATE	Living conditions. Air pollution.
COMMUNITY	Schools and research institutions. Quality of schools. Bank and credit institutions.
INTERNATIONAL LOCATION FACTORS	
POLITICAL SITUATION OF FOREIGN COUNTRY	Relations with the west. History of country. Stability of regime. Protection against expropriation. Treaties and pacts. Attitude in the UN. Type of military alliances. Attitude towards foreign capital.
GLOBAL COMPETITION AND SURVIVAL	Material and Labour. Market opportunities. Availability of capital. Proximity to international markets.
GOVERNMENT REGULATION	Clarity of corporate investment laws. Regulations concerning JV's and mergers. Regulations on transfer of earnings out of country. Taxation of foreign owned companies. Foreign ownership laws. (…)
ECONOMIC FACTORS	Standard of living. Per capita income. Strength of currency. Balance of payment status. Government aids.

Table 1 Critical factors of industrial location (Masood A. Badri, 2007)

2.3.3 The development of Industrial Location theory

In the mid 1700's, the location of manufacturing activities was closely related to the distribution of the population. China and India were the largest manufacturers in the world in those days. With the start of the 1st Industrial Revolution in Europe, manufacturing exploded in the Western world. In 1880, the UK was responsible for 23% of global production. By 1900, the US and Europe combined

had a share of 92% of global manufacturing (Hayter, Patchell, 2011). The Ford manufacturing system (mass production using e.g. assembly lines), also called Fordism, was the standard from the early 20th century up to the '70s. By that time the Japanese model of flexible specialization took over the mass production manufacturing model. Manufacturing companies in North America as well as in Europe started to move a significant amount of their industrial operations to lower cost regions in Asia and Mexico in order to keep up with the new global competitive environment of the manufacturing industry.

The shifts in transportation costs and new information technology have had significant impact on location decisions of manufacturing companies. From 1973 onward, the percentage of people working in Western Manufacturing Industries have dropped (Hayter, 1997). As an example, the UK lost half of the jobs in industry in the period from 1966 up to 1994. Kasper even goes as far as claiming that low transport rates and even lower cost of communication 'have thrown many firms and their workers into global competition' (Kasper, 2002). This process of de-industrialization does not imply that economies are in a recession but is an indication that western economies are going through a structural change where manufacturing will be losing more and more of its significance in terms of direct employment. Singh puts the process of de-industrialization in historic perspective, comparing the decline in manufacturing in the 2nd half of the 20th century with the decline in the agricultural sector that took place two centuries earlier (Singh, 1977). By now the declining employment in agriculture is understood and accepted, so why worry so much over the current process of de-industrialization in the economies, Singh asks rhetorically.

Steven Brakman analyzed the de-industrialization process a step further, claiming that the process of outsourcing parts of a production process increases a county's welfare (Brakman, 2004). Brakman argues that trying to keep jobs that cannot compete on a global basis is lowering a nation's competitive position. Adopting and promoting new (manufacturing) technologies into an economy is expected to boost competitiveness resulting in job creation even more than promoting trade.

Since Albert Weber, the concept of industrial agglomeration is widely accepted among the classical, neo-classical as well as the modern economic geographers. Agglomeration can be defined as the geographic concentration of industries. Hayter calls this 'clustering and congregation' claiming it supports innovation, cooperation and information sharing (Hayter, 1997). Porter continues along this path claiming the agglomeration process can be planned by industries with the help of government policy, resulting in increased global competitiveness (Porter, 1995). Krugman acknowledges localization, calling it 'the home market effect' as part of his New Trade Theory (Krugman, 1991, 2008). The home market effect indicates the concentration of industries in large (national) markets. Contradictory to maybe other location theorists, Krugman argues that transportation cost does play a role in location decisions, supporting the idea that 'distance is not dead' (Fujita and Thisse, 2013).

How important is the existence of a strong manufacturing sector in an economy or country? Opinions from economic geographers and location theorist are not fully in synch on this. Where Singh (Singh, 1977) sees the decline of the manufacturing industry similar to the decline in the agricultural sector, Fingleton for instance claims (Fingleton, 2000) that having a strong manufacturing sector is critical to the future of any country. Also, Hayter claims the manufacturing sector is vital to secure required increases in productivity. Increased productivity comes from developing and applying advanced technologies that have generated new employment in the same manufacturing sector. An almost self-cleansing process of decline and uprising, as described by Schumpeter as 'Creative Destruction' (Schumpeter, 1943). Britton and Gilmour claim that even in today's economies the Manufacturing sector is still responsible directly and indirectly for more than 50% of total employment (Hayter, Britton and Gilmour, 1980).

Clearly the complexities of the seemingly simple laws of economic geography (companies look for minimizing cost) are overwhelming and require careful study and analysis before these laws are applied in the real world of business. Concluding statement for this section of the literature review comes from Roger Hayter: 'the advantages of relocation are inevitably complicated by the advantages of staying put' (Hayter, 1997).

Summarizing the literature available on Economic Geography and Location factor theory, there is broad consensus on why location is important for the manufacturing industry: to minimize cost. Furthermore, there seems to be agreement on one of the location factors: agglomeration, i.e. the geographic concentration of industries. From the late 19th century (Von Thuenen, Weber and Friedrich) up to the early 21st century (Krugman) the concept of a geographical cluster of industries is a recognized critical location factor. The availability of 'knowledge' in agglomerations is critical for MNC's in order to feed innovativeness leading to increased competitive advantage. Both the MAR model and the Jacobs theory recognize this, although they differ in their view on how to increase regional innovation activities.

Looking at the perceived importance of the manufacturing industry for a country's economy, the views are contradicting. Some claim that having a strong manufacturing industry is critical for a country's economic future (Hayter, 1997; Britton and Gilmour, 1980; Fingleton, 2000). Others point out the direct opposite. Brakman (2004) for instance is the most outspoken, claiming that moving manufacturing activities to low cost countries is actually increasing a country's welfare: non-value adding activities are exported leaving room for adopting new technologies and innovation that add real value for both the company and its host country.

Also there is disagreement on the importance of several industrial location factors. First one is 'transportation', which by some researchers is said to lose its importance as a result of the decline of transport cost in the last decades: the death of distance. A second location factor which importance is disputed is 'labor cost', because the impact of this in the overall cost of a product is decreasing as a result of increased technology and therefore is losing importance. A third location factor where researcher's opinions are not in synch is 'government'. Can a government indeed have an important impact on location decisions? Earlier research does mention 'government' as a factor, but more contemporary research shows increased importance of this location factor.

Although location theory is directly linked to the (Manufacturing) Industry of an economy, there is hardly any literature available for specific manufacturing sectors or even subsectors. Available research is either generic for all industrial sectors globally or sometimes nationally, but never sector specific within the overall Industry. Another undiscovered area is that all research on Location theory seems to focus on looking at the past trying to understand the actual status quo. Research on future developments for the Manufacturing Industry in relation to location theory seems to be non-existent.

2.4 Government Industrial policy

As described in the previous sections on International Business and Economic Geography, the role of the 'Government' is mentioned frequently in relation to the research topic. Government institutions have been frequently referred to as playing an important role in MNC's location decisions. In the following section of the Literature review, a closer look will be taken on the role of government and its development intervention policies. The following questions will be reviewed: what does Industrial policy mean, why is it important and what is its purpose? Can Industrial policy help manufacturing

Industries with global competitiveness? What are the key elements of successful Industrial policy? Finally, this section will discuss what are the two leading development intervention strategies (place based versus space neutral) and how they differ in approach and implementation.

2.4.1 Industrial policy: definition and purpose

What does 'Industrial policy' mean? A recent study, published by the OECD (Warwick, 2013) defines as follows: *"Industrial Policy is any type of intervention or government policy that attempts to improve the business environment or to alter the structure of economic activity toward sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare than would occur in the absence of such intervention."*

Intervention is the key word is this definition. In the first half of the 20th century, also called the Great Depression, John Maynard Keynes, British economist wrote 'The General Theory of Employment, Interest and Money' (Keynes, 1936). Keynes' ideas and thoughts are based primarily on the 'intervention' concept (O'Sullivan and Sheffrin, 2003): '*Decisions made in the private or business sector can lead to inefficient macroeconomic results. The public sector needs to respond to this by implementing monetary and fiscal policies to stabilize the national economy, measured in Gross Domestic Product (GDP)*'. Keynes' line of thinking is recognized in the way various governments reacted after the economic crisis of 2008 (PBS News Hour, 2009). The basic line of thought is: macroeconomic inefficiencies created by the private sectors (businesses) require and justify government intervention. What this intervention looks like can be very different depending on what type of government is in place. The two extreme opposites are the 'Neoliberal' versus the 'Structuralist' approach (Lall, 2004). The Neoliberal perspective advocates that countries should liberalize by maximum integration into the global economy. Neoliberals criticize government intervention as this will only lead to welfare reduction. The Structuralist perspective is the opposite and sees the government as an effective intervening institute, which is required because free markets are not capable of achieving national welfare objectives. The more an economy is dependent of free markets, the more governments should intervene, according to the Structuralism's line of thinking.

The call for governments to intervene is heard louder in times of economic downturn: Keynes wrote his views after the Great Depression in the 1st half of the 20th century. Similar, the global economic crisis of 2008 resulted in many governments adopting new industrial policies (Ambroziak, 2014). If a country's standard of living is at stake, even in one of the most liberal economies, the United States of America, the lack of government support is described as one of the reasons for economic crisis (Tiemstra, 1994).

Keynes basic idea was to influence supply and demand of a country's economy, resulting in a more stabilized growth of GDP, which in turn should result in steady welfare increase. Today, this approach is seen as old fashioned and not effective in the current global marketplace (Bailey, Cowling and Tomlinson, 2015). How successful governments are in increasing industrial competitiveness varies greatly from country to country (Lall, 2004). Research on this showed that governments that increased state aid to the manufacturing industry had the opposite effect: the share of manufacturing in the Economic Value Add declined versus governments who did not increase state aid (Ambroziak, 2014). Also, Porter confirms the limited role governments can play in this respect (Porter, 1990): *Governments do not control national competitive advantage; they can only influence it'.*

Government policy should not merely be focused on increasing employment in the Industrial sector, the Brueghel Institute argues (Veugelers, 2013). By doing so, it can undermine the trend of productivity increases which is critical to industrial competitiveness. A decline in employment in the industrial sector as a result of productivity increase is therefore not a bad thing, but a clear sign of the sector's strength. Effective government policy is a complicated issue. A certain level of government support or intervention is generally regarded as a potential supporting element for increasing industrial competitiveness. Various ideas and insights of what exactly is required for an effective government policy will be described in the next section.

Why is Industrial policy seen as important? Governments are chosen in most democracies in order to stimulate economic growth, leading to employment opportunities for citizens. High employment rates are generally seen as an important basis for societal welfare. Government institutions are regarded to play an important role increasing the economic prosperity in a country or region (Rodrik et al., 2002). The manufacturing sector in today's economy has the highest multiplication effect of all other sectors in today's economy. Friedli et al. (2014) show that $1 more output in manufacturing can generate $1.40 more output in other economic sectors. Aligning the interests of the public sector (employment) and the private sector (profit) is a true balancing act (Spence, 2011) but if implemented successfully, creates a winning combination.

For the manufacturing sector to grow in output, a well-balanced industrial policy is an important ingredient for success. Trying to find the right mix of public intervention and focus on the manufacturing market is a balancing act for the Ministries of Economic Affairs in many countries (Mosconi, 2015). To be successful on a European level, Mosconi (2015) advocates building a '*truly supranational research and innovation (R&I) policy'*, seeing this as the key success factor for a possible Manufacturing Renaissance.

2.4.2 Intervention strategy – business perspective

Can Industrial policy from a government be effective? Can government policy help manufacturing companies to become more competitive in the global marketplace? Answers from economists, scientists, economic geographers and industry experts vary widely. Mainly because there is no scientific proof these two topics are related: Government policy and Industry competitiveness. How can one objectively measure this relation?

Industrial policy is controversial in the application of the means to implement successfully as described earlier. But having a policy in place is still regarded as important for the manufacturing sector (Weiss & Tribe, 2016). The link between industrialization and economic development is strong, even after many manufacturing jobs in the old industrial centers of Europe, the US and Japan relocated to lower cost regions. The combination of the reduction of trade barriers and the technological change in transportation and communications facilitated this globalization movement. The economic potential of these new global value chains is seized by both individual companies as well as individual governments.

The economic value add of any individual global company can be measured by looking at several economic indicators, like share values, cashflow, profitability or market capitalization. An effort to measure the effectiveness of a government or nation is more difficult.

Ranking	Economy
1	Switzerland
2	Singapore
3	United States
4	Germany
5	Netherlands
6	Japan
7	Hong Kong SAR
8	Finland
9	Sweden
10	United Kingdom

Figure 6 The Global Competitiveness Index 2015-2016 Rankings (World Economic Forum, www.weforum.org)

One of these efforts is the Global Competitiveness Report, annually published by the World Economic Forum (WEF). This not-for-profit independent foundation, headquartered in Switzerland, is an international organization for Public-Private Cooperation and is bringing business leaders and governments together in an annual conference. In the Global Competitiveness Report all participating national countries are ranked in the Global Competitiveness Index (see example in Figure 5). The complete Global Competitiveness Index 2015-2016 Rankings can be found in Appendix 1. Competitiveness is defined by the WEF as the 'set of institutions, policies and factors that determine the level of productivity of an economy'. The limitation of the Index is that the competitiveness of the national economy is measured and not the competitiveness of the Industry. Main reason for this is that a national economy has national borders. A globally operating Industry on the contrary, does not have these borders, which makes any mathematical or academic relation impossible. This means the *qualitative* argumentation from publicists on the effectiveness of Industrial government policy needs to be reviewed carefully, taking these limitations into account.

As indicated earlier, several experts question the potential effectiveness of the government to create increased competitiveness for globally operating companies. If a country has economic challenges, Ambroziak doubts if any industrial policy could be the solution (Ambroziak, 2014). Martens and Vendenbempt come to a similar conclusion, calling the dexterity of any government to increase a firm's competitiveness questionable (Martens and Vandenbempt, 1995). They argue that sometimes governments give specific companies or business sector 'shelter' for a period of time, but that can only help temporarily. It will not help building a stronger company. Going a step further Tiemstra claims that in fact the government's focus on short-term support to businesses in trouble, enhances the long-term competitiveness problem of that company or sector. In many cases, Tiemstra argues, government subsidies end up at companies of the past instead of at companies of the future (Tiemstra, 1994). The global market forces are stronger than any attempt of governments to intervene; trade barriers keep obsolete industries alive and increase the competitiveness problem for the company or sector.

If subsidizing companies with government money is to be avoided as an Industrial policy instrument, what other instruments can be used by government? Experts come up with a variety of solution directions. Ambroziak points out that industrial policy should be tailored towards specific business sectors and regions within a country (Ambroziak, 2014). Tiemstra supports this idea with the proposal to install and promote enterprise zones in specific regions, where idle resources can be incentivized (Tiemstra, 1994). Tiemstra has a clear US focus, but in the UK, there are similar insights. Bailey et al. suggest tailoring government policies to local levels in order to exploit what they call 'cluster and interfirm dynamics'. Government in this respect should support a closer link between universities and research institutes. Small and medium sized companies in local communities should

be stimulated to work in independent networks. Government aid to multinational corporations should be restricted to avoid 'the abuse of corporate power' (Bailey, Cowling and Tomlinson, 2015). It is argued that in this case the UK government has no tools to bring about a transformation in the performance of companies working in the manufacturing industry. A more effective policy would be to focus on what is called the 'foundational economy in a regional setting', referring to the production of everyday goods and services like education, health, transport. Besides the promotion of a more regional, local approach, some more general tools are described for effective government policies. Hart (Hart, 2001) claims that industrial policy can be effective if the government limits itself to: antitrust policies, IP (intellectual property) protection and encouragement of startups.

Tiemstra (1994) strongly objects to governments intervening directly with businesses or sectors. He proposes that the government should focus on the removal of roadblocks that obstruct industrial change and prevent the industry to accelerate their capabilities on the global market (Tiemstra, 1994). In similar words, Martens and Vandenbempt stated that 'the most effective road is to develop a favorable economic context and infrastructure in which domestic and foreign companies can build strong positions' (Martens and Vandenbempt, 1995). Veugeler (Veugeler, 2013) makes this general approach more specific, pointing out four specific areas for government to look at: Energy (important for specifically the manufacturing industry), the capital markets for SME (small and medium enterprises), the education system (central importance for any modern economy) and finally trade barrier reduction. Veugeler continues to highlight a crucial flaw in today's government aid programs: the focus on individual economic sectors like Industry, Services, and ICT etc. Nowadays, global and local markets are highly integrated and the division between these economic sectors in the marketplace is disappearing. The promotion of individual sectors in the economy will potentially only increase inefficiencies, resulting in weaker economic growth. Christos Pitelis (co-author of the 'New perspectives on industrial policy, edited by Bailey, Cowling and Tomlinson, 2015) recognizes similar developments, renaming the economic sector of Services and Manufacturing Industry into 'Manuservices' (Bailey, Cowling and Tomlinson, 2015). Pitelis argues that in fact the majority of the income generated by manufacturing companies comes from not physical products but from services. An example: an internationally operating manufacturing company (e.g. an aircraft engine manufacturer) offers a wide variety of services besides its physical products. In the statistics this company is seen as a 'manufacturing company' and not a 'services company' even if the majority of revenue could in fact be coming from 'services'. The dividing lines between traditional economic sectors seem to disappear and government should adapt their policies accordingly instead of sticking to ancient economic typologies.

Tiemstra highlights what he sees as one of the core problems of the economy (in this case the US): the loss of worldwide market share in key manufacturing industries. He is quite outspoken in his views, concluding: 'it is not government policy but business policy that will solve the (US) competitiveness problem' (Tiemstra, 1994). In this respect, Swann (2018) contradicts Tiemstra's views stating that one of the success stories of the unified European Economic Community is the fact that the fundament of the European Industrial policy is in fact the 'competition policy'. Swann argues that a government policy should be aimed at supporting manufacturing industries to be able to compete on a global level.

2.4.3 Intervention strategy – government perspective

Notwithstanding the outspoken views of a variety of academic economists on the level of government intervention required for increasing a nation's economic prosperity, this section will review the different intervention strategies government institutions can choose. As referred to earlier in this chapter, the global economic crisis was also a wake-up call for many government institutes. What is the most effective intervention strategy for boosting economic prosperity?

In the years prior to the 2008 global economic crisis, the thinking on economic geography as well as economics has changed considerably. In the previous section the 'new economic geography' concept of Krugman and Fujita is just one example. Besides academic theory development, the world has undergone a tremendous globalization, where MNC's have reshaped the economic geography of places. On the one hand, the world saw capital, goods, people (and their knowledge) travel easy across the continents. On the other hand, a majority of these industries were concentrated in large regional agglomerations. The concept of space has become both 'slippery' (economic inputs travel easy) as well as 'sticky' (stuck in local industrial clusters). Following the 2008 crisis, governments reviewed their state aid programs as their industrial intervention programs frequently turned into 'strategies of waste': valuable resources and state aid funds went to the 'wrong' industries (Barca, McCann and Rodriguez, 2012).

Governments can choose between two intervention strategies in relation to the regional development of current (or new) industrial agglomerations: a 'place-based' or a 'place-neutral' approach (Barca et al., 2012). Until the early years of the 21st century, state aid was mainly focused at infrastructure (roads, ports, railway etc.) and subsidizing specific industries of even companies. The new industrial clusters, populated by global MNC's and their suppliers, needed a new approach from government perspective. The 'place-neutral' or spatially blind approach puts the government intervention focus on people and their knowledge, mobility and productivity. The 'place-based' approach focuses on places and their related aspects like infrastructure, schooling and regional assets. The two different approaches were developed and published in the year following the 2008 crisis. The World Bank (2009) follows the spatially blind approach, claiming that 'cities' deliver the most dominant contribution to economic prosperity. The OECD (2009) and the European Union favor the 'place-based' intervention strategy, promoting and funding innovation, infrastructural provisions and schooling in a specific regional environment. This regional policy is also referred to as the 'cohesion policy', documented by Barca (2009). Barca argues that particularly for the EU with its open labor markets, a place-based strategy is the best way to utilize available regional potential resources through a regional or cohesion policy (Barca, 2009). Academic publications show the same diversity as when one reads the economic manifestos of different political parties in a country. There seems to be agreement on only two basic principles in this respect. The first one is that there is no scientific or statistical proof of the actual effectiveness of government industrial policy (e.g. Ambroziak, 2014). The second is that indeed the government can influence individual businesses or sectors with their policies (e.g. Lall, 2004; Barca, 2009). One can argue that these two principles in itself are contradicting. We cannot measure the effectiveness of government policy, but we agree on the fact that the government can influence businesses with their policies.

Summarizing the literature on government industrial policy, there are several areas of disagreement. One is the discussion which has been going on ever since the days after the Great Depression in the early decades of the 20th century: is there a need for government intervention with regard to the industrial sector in a country, region or union of different nations? Hart (2001), Lall (2004) and Barca (2009) seem to follow the principles of the Keynes (1936) philosophy: government needs to intervene to protect the interests of the local economy because industries primarily take decisions that protect the interest of its shareholders. Other views from Tiemstra (1994), Veugeler (2013) and Bailey et al. (2015) argue that governments should be very careful in considering intervening in business decisions. If government subsidizes business sectors or companies who are not competitive on a global basis, it could even be counterproductive: the symptoms of the 'disease' are treated temporarily, but the root cause of the problem is not solved. On top of that, government tends to focus their aid on specific manufacturing sectors like ICT, the Chemical industry etc. (Veugeler, 2013). But global companies do not operate this way (manufacturing products and services are fully integrated in today's markets) and Ministries of Economic Affairs need to refocus their views, based on what is happening in today's global marketplace (Bailey et al., 2015).

Another area of disagreement is around how governments with an industrial policy should approach the market: on the one side there is the sectorial / regional approach (Ambroziak, 2014, Tiemstra, 1997, Bailey et al. 2015), on the other side is the national / integrated market approach (Martens et al., 1995, Hart, 2001). Examples of a regional approach are the development of economic free zones in certain countries, mostly for specific industries. National laws for protection of Intellectual Property (IP) and antitrust policies are examples of government policy based on a more nationwide approach. A third area of disagreement is the place-based versus the place-neutral debate, also known as the MAR vs Jacobs model. Should development intervention focus on people or on places?

Looking at available literature on government policy in relation to location strategies of manufacturing companies, there seems to be a gap in quantitative research conducted on this topic. No substantial research has been found on linking government policy to location theory and business strategy. Although there is consensus that the two elements are related, specific research on the matter could not been found. Although the immediate interests of the private sector (profit) and the public sector (employment) do not seem to be aligned, there is a common agenda which is related to skilled labor available in the right region: the right professional for the right job. This is where business and government objectives meet

2.5 Manufacturing strategy

How can a manufacturing company survive in the global, transparent, virtual world? What strategy must be chosen which will bring the company the financial benefits required to secure business continuity? And more specifically towards this Research, what manufacturing and location strategy will be successful in today's dynamic business environment? The amount of publications on Strategy and Strategic Management is enormous. Limitations are required to keep proper focus on the Research topic. First limitation is selecting publications strongly related to the global Industry and Manufacturing sector. Literature related to the commercial Services sector and also Agriculture is excluded. Second limitation is that only contemporary publications on the topic will be reviewed. Publications on Strategic Management from the times there was no access to the Internet and manufacturing was less global, will be disregarded. Only publications on Strategic Management from roughly 1990 onwards will be included.

This section of the Literature review will answer the following questions: what is strategic management for global manufacturing organizations and how does strategic management relate to Operations Management in general and location decisions more specifically? The sections end with an overview of the latest developments in strategic management and criteria for future success in global manufacturing?

2.5.1 Strategic Management: how to build a competitive global manufacturing operation

Strategy comes from the ancient Greek work 'strategia' (στρατεγια), which can be roughly translated as (military) campaign. Following this basic line of thought, strategy is the combined activities in order to reach a desired overall objective. Putting it in a business perspective, David Teece defined Strategic Management as taking important decisions on investments that are required to achieve a company's objective: grab business opportunities in constantly changing circumstances (Teece, 2009). The ancient Greek military campaigns and contemporary global business strategies show a remarkable amount of similarities.

The Manufacturing world is becoming more and more global (Gilani and Razeghi, 2010). *Manufacturing companies are either mindlessly global or hopelessly local* was a statement often made about Manufacturing companies in the previous century. In the 21st century, that is hardly true anymore. Gilani and Razeghi argue that the majority of companies in the manufacturing industry developed global supply chains in order to benefit from cost advantages, access new markets using new technologies as well as save transport cost. Internationalization of operations is required for survival and the choice of where to locate your operation can be decisive for a company's success (Porter, 1986). Both Marketing and Manufacturing strategies need to be aligned to grab the advantages, resulting in discussions within most Industries on *the location* of both Manufacturing and Distribution Centers (Meijboom and Voordijk, 2003). Barnes (2002) sums up the main drivers for international location decisions: access to new markets and access to resources, e.g. raw materials, low cost and higher skilled labor including researchers.

Besides 'where' to manufacture another important question to be answered has been 'what' the company manufactures. New manufacturing strategies emerged based on what is called 'the core competence' of the organization (Prahalad and Hamel, 2003). The basic idea of the 'core competence' thinking is that companies should focus on those (manufacturing) activities within the organization where the available in-house competence exceeds the competitors' competences. These unique competences are expected to create the true value in the eyes of the customer leading to a profitable sales proposition, according to Hamel and Prahalad. Many manufacturing companies embraced the core competence strategy, leading to a tidal wave of outsourcing and off-shoring manufacturing activities. This resulted in extended and globalized supply chains for the majority of manufacturing companies where parts of the old manufacturing process are outsourced to external suppliers from all over the world (Ellram, Tate and Petersen, 2013). Local manufacturing shops became MNC's, multinational companies. Cost minimization has for long been and still is the location strategy for most manufacturing firms (Meijboom and Voordijk, 2003). The internationalization of manufacturing activities was a must for many companies (Porter, 1986) and international production has given these firms strategic advantages over their rivals (Meijboom and Voordijk, 2003).

A comprehensive overview of what the main drivers for companies to relocate and manufacture across national borders comes from MacCarthy and Atthirawong:

- Access to low labor cost and labor skills
- Access to markets
- Tax incentives from host governments
- Access to raw materials and technology
- Counterattack against competitors

(MacCarthy and Atthirawong, 2003)

But how sustainable is an outsourcing strategy, leading to relocation of manufacturing processes to low cost countries? Will the cost advantages last and continue to give competitive advantage? After two decades of internationalization, the tide seems to be changing. Industry experts have started talking about next-shoring (George, Ramaswamy and Rassey, 2014), which means operations and location strategies should have a stronger emphasis on 'proximity to demand' and also to innovation. Ellram et al. point out that for many US based manufacturing firms the focus on *low cost labor* is shifting towards *value creation* (Ellram, Tate and Petersen, 2013). And in Europe, outsourcing strategies focusing on short-term profits are criticized for destroying part of the economic base, claiming at least 10 million jobs were lost in Europe because of this. In order to secure business continuity, also in Europe the strategy of manufacturing firms is changing from 'cost and short profits' towards 'competition and sustainability' (Westkämper, 2014). Location decisions are considered from a broader perspective than just cost; other strategic factors including supply chain challenges are becoming increasingly important (Ellram, 2013).

Bals et al. (2016) studied several examples of companies in the US and Germany who started to re-shore and/or insource their previously outsourced manufacturing activities. Indeed, several supply chain challenges as mentioned by Ellram (2013) were found as being the drivers behind re-shoring: long supply lead times, high capital lock up, geographical distance. Other drivers for a reshoring and insourcing strategy that Bals et al. (2016) found were: cultural problems, Intellectual Property issues, government incentives and availability of less labor intensive, new production techniques like robotics. Ketokivi et al. (2017) conducted a case study survey among 35 production location decisions in Finland which showed that indeed manufacturing is not disappearing but is seeking new forms, as also described by Ellram (2013) and Bals et al. (2016).

2.5.2 Fundamentals for a sustainable Manufacturing location strategy

What will the future of manufacturing look like? Industry experts, scientists and other thought leaders share with us a wide variety of what they claim to be the critical elements for future success in relation to the company's (manufacturing location) strategy. Choosing the right location for a company's global manufacturing operations is regarded as critical for sustainable business success (Pongpanich, 2000). Before focusing on Operations and Manufacturing, first the broader elements of Strategic Management need to be looked at. Michael Porter's Five Forces Framework (Porter, 1980) has long dominated the view on Strategic Management. But his approach and concept are nowadays regarded as too static, making it unsuitable in the current dynamic and global environment organizations are now part of (Teece, 2009). Teece introduced the concept of 'dynamic capabilities', defining this as 'the capacity to sense and shape opportunities and threats, seize opportunities and maintain competitive by enhancing the company's assets'. Operational excellence and what Teece calls 'technical fitness' is no longer sufficient for future business success. 'Entrepreneurial fitness' is in Teece's view the key to future success. Building this capability into the global Management Teams of MNC's is the foundation for long-term superior performance according to Teece.
Another threat to traditional manufacturing strategies comes from new technologies that are disrupting and destroying complete global markets (Christensen, 1997). Manufacturing companies need to innovate in order to remain competitive on a global scale, but this creates what Christensen calls 'the Innovators dilemma: doing the right thing is the wrong thing'. An example illustrates best what is meant here: imagine a global company successful in manufacturing disk drives for PC's. Becoming the best disk drive company in the world can never lead to business continuity because this once large market has now almost vanished as a result of new, improved technologies for the storage of digital information. Christensen in fact draws lots of parallels with Schumpeter's law of Creative Destruction (Schumpeter, 1943), as described in the previous section of the Literature review.

A fundamental condition for taking manufacturing location decisions is taking a longer-term perspective (Tate et al., 2014). Considering not only initial cost and investment but looking at total lifecycle cost as well as considering potential risk issues are important. But even taking a longer-term perspective must be done under the consideration that an amount of flexibility is required to adapt this decision in case future scenarios become reality. In order to keep synchronizing a firm's manufacturing and location strategy, Errasti et al. (2017) suggest the concept of 'enterprise adaptation', defining this as the '*process of systematically designing & redesigning the enterprise to cope with increasing levels of change, uncertainty and unpredictability'.* If this process is properly embedded in a firm's regular business planning cycle, it is called 'footprint strategy' (Christodoulou et al., 2007).

Looking at what is happening within the Manufacturing sector, not only market for end products are disappearing, also manufacturing technologies are rapidly changing. Advanced robotics and 3D printing technology significantly change manufacturing cost (Petrick and Simpson, 2013). This digitization of operations is impacting the firm's location strategy as the traditional labor component is becoming less and less important as a cost driver of the manufacturing firm (George, Ramaswany and Rassey, 2014; Westkämper, 2014), supporting the idea of near-shoring (relocating manufacturing facilities close to 'home'). A manufacturing location close to an innovative supply base as well as close to demand is seen as the way forward (Petrick and Simpson, 2013). Economies of scale in manufacturing from low cost regions will be replaced by economies of one, is Petrick and Simpson's projection. Manufacturing is expected to be more and more local in a setting where supplier, manufacturer and customer interact closely across the entire supply chain. With supplier selection becoming more important in highly scattered manufacturing chains, the firms with the most intelligent sourcing teams will survive, says Ellram (Ellram, 2013). This 'Intelli-sourcing' balances the firm's economics, replacing the traditional off-shoring strategy. Where the customer interface is less relevant (commodity markets) and the differences in quality and manufacturing technologies are negligible, it may become irrelevant where factories are located according to Westkämper (Westkämper, 2014).

A summary of the key aspects of a sustainable manufacturing strategy comes from Kuivanen. The operations model that is expected to survive has both capability in technology, resulting in innovative products where labor cost is minimal as well as the proper government support (Kuivanen, 2008). Kuivanen and also Britton (Britton, 2000) introduce a new element into the equation: the role of the government. The next section of the Literature review will take a closer look at this aspect.

In contemporary academic publications on competitive operations in relation to location strategies, there is a relative consensus that nowadays MNC's have an increased focus on value creation versus the more traditional approach of focus on mere cost reduction. With widespread outsourced supply chains, most manufacturing companies have in fact stripped their profit and loss account of a major internal product cost component: labor (George, Ramaswany and Rassey, 2014). This has been replaced by external supply spend (Ellram, 2013). Westkämper (2014) describes this process as the shift from a shorter to a more long-term focus within MNC's. Building on this insight, Teece (2009) and Christensen (1997) both state that entrepreneurial fitness and the capability to innovate within the rapidly changing manufacturing environment is critical for survival in the global marketplace.

On the question of where the manufacturing companies should locate, the views among publicists differ. Kuivanen (2008) and Westkämper (2014) both favor manufacturing facilities to be close to local available technologies in (their own) Western European nations, claiming this to be essential for a company's future competitiveness. Others (Petrick and Simpson, 2013; George, Ramaswany and Rassey, 2014 etc.) state that in fact being close to end markets with flexible, local supply chains is more important than keeping manufacturing operations within a current (national) environment.

A next area of disagreement among researchers is the view on the importance of government in relation to manufacturing location decisions. Also here the views of Kuivanen (2008) and Westkämper (2014) differ from views from other European and American publicists. The two publicists claim that government support is critical in keeping manufacturing industries within their current national boundaries. Other academic publications do not mention this topic as being relevant for manufacturing companies to remain competitive.

A third topic for discussion among scientists is the actual Manufacturing or Operations strategy itself. Whereas Teece (2009) and Christensen (1997) advocate the importance of dynamic capabilities and

innovation as Operations strategy, Ellram (2014) and George et al. (2014) argue that 'intelli-sourcing' and near shoring should be on the strategy agenda of MNC's.

Reviewing the literature on Competitive operations and location strategies, some gaps can be seen. For instance, the transformational aspects that are required for an MNC to change its focus from 'cost' to 'value' are left open for individual interpretation and implementation. Christensen's innovators dilemma (1997) comes close to defining this actual gap: focusing on doing *things right* (outsourcing, re-shoring, Intelli-sourcing) moves a company's leadership away from doing the *right things*. 'Things' like innovating entire production capabilities, closing down non-competitive operations, divesting traditional manufacturing options and move to entirely digitized operations. For MNC's to remain competitive this transformation capability may prove to be the instrumental survival kit. How to implement this enterprise adaptation (Errasti et al., 2017) in a sustainable footprint strategy (Christodoulou et al., 2007) is an area for further research.

2.6 Decision making theory

In this section of the Research, the final literature review element important for the Research topic will be discussed: decision-making. Studies of strategic decision-making are one of the central elements in Organization theory (Nutt and Wilson, 2010). Decisions to be taken by the management of autonomous organizations acting in their global market place. Two questions will be presented and discussed in this section: what are the prevailing decision-making theories and what decision-making tools are available for decisions on complex issues like manufacturing location?

Long-term success of any business depends on making the right decisions. Research on decision making however showed that decisions frequently fail. Grünig and Kuhn claim about one out of four business decisions lead to financial problems (Grünig and Kühn, 2013). Paul Nutt did over 20 years of research on decision-making and goes even a step further: decisions fail half of the time (Nutt, 2002). Research on decision making and decision support tools is extensive. For the purpose of the research, the literature review will be limited to publications dealing with decision making on *complex and strategic* issues.

Grünig and Kühn (2013) help in determining when a decision is considered *complex* in case several goals are pursued by the actor at the same time and when there are many variables to consider when going from the current to the target situation. Also when there is uncertainty about the future development of the environment, the decision is considered *complex*. Companies have financial goals, performance goals, environmental and even social goals. The variables to be considering when location decisions are to be taken are numerous. The previous section on Economic Geography – Industrial Locations, showed us a wide variety of locations factors and conditions to be considered (see also Table 1). Furthermore, in today's dynamic economic environment with rapidly upcoming new manufacturing technologies, future developments are extremely uncertain. Above considerations justify identifying 'location decisions' as *complex*.

Are location decisions strategic? Nutt and Wilson (2010) describe *strategic* decisions having the following five characteristics: (1) precise definition is difficult, (2) one needs to understand the problem, (3) there are several solutions available, (4) there is a high level of uncertainty and ambiguity and (5) political pressure is used by the important stakeholders because there are conflicting interests. From this perspective, location decisions can also be called *strategic*. All the mentioned characteristics come into play when a company has to decide about the location of their manufacturing facility. One can imagine that looking at all these influencing elements, the

management of companies needs to operate carefully. Hayter noted already: 'the advantages of relocation are inevitably complicated by the advantages of staying put' (Hayter, 1997). Having to make decisions in very complex environments can indeed lead to 'staying put' as a 'wait and see' strategy. But in many cases, businesses do not have the option to do nothing. If market circumstances dictate looking at new customers in new regions, management needs to act in order to stay ahead or keep up with the competition. If the cost levels of manufacturing products are too high in order to remain profitable, new ways of manufacturing at better-cost need to be pursued and decisions need to be taken to secure business continuity. In the area of decision-making theory, the ultimate goal of research in decision-making is to help companies find ways that lead to their goals (Kugler, 2008).

Another reason to be cautious with decision making on complex issues in a business environment is that people in general and management of business in particular tend to be overconfident (Russo and Schoemaker, 2002). People rely on luck, common sense and intuition, thereby overestimating their specific knowledge on the subject. Without collecting the required factual data, people define the problem in such a way that one overlooks the best options available. People therefore create their own trap, leading to Nutt's claim of 50% decision rate failure.

More recent research describes a different perspective. 'Good' decisions are not equal to 'good' outcomes, Puranam and Vanneste (2016) argue. Decisions are made based on the amount of information available at that moment. Even if more and better information comes along, strategic decisions with high impact are difficult to reverse. Specifically, if initial investments are made and relevant stakeholders are informed. Puranam defines 'good' decisions as ones that can be explained and defended to others and are based on the best information available at the time the decision was taken. Further support for Puranam's views comes from a survey study conducted in Sweden by Olhager and Feldmann (2017). Over 100 manufacturing plants were researched on the question: how does decision making patterns relate to operational performance? The survey showed that no evidence could be found the decision-making structure of the researched Swedish manufacturing plants has had an impact on operational performance.

In the previous century, many academic decision-making models have been studied and presented. Turpin and Marais (2004) give an overview of several decision-making models from the late 1950s to the early 1990s. In the next section of this part of the Literature review, these models will be reviewed. But the abundance of all these rational tools did not lead to a substantial improvement in making winning decisions. In the 21st century, the research on decision-making moved more towards 'behavior decisions research': how do real people make real decisions? Paul Nutt made substantial contributions to the research field of decision-making theory and describes three reasons for 'blunders' (Nutt, 2002). First, there is focus on solving the problem instead of looking at the decision-making process itself. Second, there is tendency to jump at the first great idea and stick to that and finally, once a decision is made and the initial investment is done, all consecutive decisions taken after this are justified although it might be better to reverse the decision-making process.

Turpin and Marais conducted research among several prominent decision makers on their decision-making styles including the use of decision support tools (Turpin and Marais, 2004). The outcome showed a wide variety in decision making styles, but several central themes came out of the research: the use of intuition, attention to the presentation of the information and the importance of sensitivity. These elements are strongly related to 'soft factors' in the decision-making process rather than related to rational elements. Also, in the use of tools among the decision makers Turpin and Marais showed that 'self-help tools' like ordinary office software, was very much favored above complex decision support models. This furthermore emphasizes the individual and personal approach that is favored by decision makers. Their overall conclusion in this research showed that seasoned decision makers having a highly analytical background, do not rely on formal decision

support tools. Gut feel and sensitivity to the political context of the situation were often more important than the rational aspects of the decision-making. Gladwell (2005) refers to this gut feel as 'the adaptive unconscious'. Her extensive research showed that decisions make quickly can be as good as decisions made very carefully.

Following the behavior decisions research in the early years of the 21st century, the study of how psychology affects economic decision making was the basis of a new academic research area: behavioral economics. Daniel Kahneman (Nobel prize winner Economic sciences in 2002) together with Amos Tversky are regarded as the founding fathers of this area research. In essence, behavioral economists challenge the idea that people make decisions logically (Kahneman, 2011). In his bestseller Thinking, Fast and Slow, Kahneman explains his dual processing theory. People make decisions using either what Kahneman calls 'System 1', the intuitive system or by using System 2, the deliberate system. The intuitive, fast system is based on our experiences and makes judgements without having the need for any additional information. The deliberate system is much slower and needs what Kahneman calls 'deliberate activation' (Allan, 2017).

2.6.1 Decision making tools and processes

What decision-making models are available for the complex strategic problem of choosing the preferred industrial location for a manufacturing company? As said earlier, Turpin and Marais (2004) described a variety of decision-making models. Summarizing the models relevant for this research topic, three alternative models can be applied:

1. The rational model (related to the model of bounded rationality)
2. Naturalistic decision making
3. Multiple perspectives approach

The rational model (Simon, 1977) describes a logical step-by-step approach, whereby in the Choice phase the options are valued numerically, resulting in a preferred option based on pre-arranged weighing of the scoring elements. This model assumes that everybody participating in the process has the same knowledge of the alternatives and all have a clear understanding of the consequences of each alternative.

The naturalistic decision model is a contribution of Klein (Klein, 1999). Klein analyzed hundreds of decisions made by people in a life and death situation (firemen, nurses etc.). Based on this, he presents his Recognition-Primed Decision (RPD) model. The RPD model is based on the ability of the decision maker to recognize a situation or problem as being similar to that of a previous experience. Based on this experience they recognize what needs to be done next in order to achieve the required results. Key in this model is 'experience', being a critical factor in making good decisions.

The 3rd model is the Multiple perspectives approach (Mitroff and Linstone, 1993), based on the idea of unbounded systems thinking, assuming any problem is part of any other problem. This decision model approach looks at three different perspectives: technical, organizational or individual. In the technical perspective, analytical tools can be applied to collect data in order to get a clear understanding of the problem. For the organizational and individual perspective, all possible stakeholders should be investigated in order to gain maximum input from a variety of sources.

Besides applying a decision tool best fitted for the decision-making process that needs to be conducted, research has helped with recognizing appropriate steps in the decision-making process. Schoemaker and Russo (2001) describe a four-stage process helpful for 'winning decisions': (1) frame the decision, (2) gather the appropriate information and data, (3) come to a conclusion and finally (4) learn from previous experience.

Nutt (2002) support a clear step by step approach describing the proposed process steps as follows: (1) understand claims, (2) set the proper direction, (3) uncover and evaluate ideas and finally (4) implement the preferred option. Nutt et al. continue with pointing out that a key principle for successful decision-making is to stay what he calls 'issue centered', based on the concept that a decision by itself does not pose a problem to be solved but should be looked at as 'a mystery to be embraced' (Nutt and Wilson, 2010).

A relevant research for the Made in Europe research question looked at how companies take strategic outsourcing decisions (Ordoobadi, 2005). Based on this research, a decision model was developed with three different phases. In the first phase a 'strategic evaluation' takes place, followed by an 'economic evaluation' in the subsequent phase. Based on careful analysis taking place following these two phases, in the third phase a decision analysis is done leading to the required outcome: a final decision on the strategic outsourcing topic at hand. Kahneman (2011) suggests comparable decision stages naming the following four: (1) framing of the problem followed by (2) the collection of relevant information that will lead to (3) a decision that needs to be finally (4) reflected and reviewed (Kahneman, 2011).

Besides conceptual tools and appropriate process steps to be taking when trying to make 'winning decisions', Nutt et al. add another element into the equation: who to involve in the decision-making process? Nutt et al. stress the importance of involving people with very different roles in the process: a person with a genuine cynical approach, a person who can form opinions, a person generating different ideas, a person willing to sabotage the process, a person with a 'just wait and see' attitude and if the decision allows this the expected 'winner and loser' of the decision-making process (Nutt and Wilson, 2010). The argumentation for this approach is that introducing as many angles to the issue to be decided upon, is important for the success of the outcome of the decision-making process. One specific comment from Nutt is directly related to the problem statement of this 'Made in Europe' research: 'decisions involving (…) locating operations fail at least half of the time' (Nutt, 2002).

More recent research (Lerner et al., 2015) highlights another aspect that is regarded crucial in the decision-making process: emotions. Human emotions highly influence personal judgement and the making of choices. The 'emotion imbued choice model' shows similarities with the Multiple perspectives approach (Mitroff and Linstone, 1993): combining inputs from traditional rational decision models with insights from emotion research. Both approaches stress the importance of using more than one perspective in taking strategic decisions.

Summarizing this section on Decision Making theory, contemporary academic publications on decision making agree on several principles applicable for complex and strategic decision-making processes: the purely rational, analytical and technical approach, which were dominant in the 70's and 80's of the previous century (Simon, 1977) is less suitable for circumstances which are considered extremely complex. Furthermore, there is widespread agreement that for complex decisions a variety of different stakeholders need to be involved in order to secure that all angles of the problem have been looked at. Decision making theorists agree on the principle that the time and money spent on involving, discussing and aligning different stakeholders with different personalities is well invested.

If the pure rational and technical decision model approach is not regarded the right tool for complex decision making, this leaves the decision makers with roughly two options (Turpin and Marais, 2004): The Recognition-Primed Decision (RPD) model (Klein, 1999) and the Multiple perspectives approach (Mitroff and Linstone, 1993). Views on which model can be best applied for which situation vary widely. Which is quite understandable from the point of view that any complex and strategic

(location) is unique. No standard checklist is available for decision makers dealing with multiple stakeholders, objectives as well as constantly changing global and political circumstances. Where one theorist emphasizes the importance of experience (Klein, 1999) or even intuition (Gladwell, 2005), other favor the model of multiple stakeholder involvement (Mitroff and Linstone, 1993). Looking at Paul Nutt's (2002) claim that half of all location decisions fail, the question arises how much effort one must put into the selection of the 'right' decision model, as this will probably not change the average failure rate in Nutt's view.

Decision-making theorists for a long time and extensively researched and documented various decision-making models in relation to the different complexity levels of various problems. But which decision model is best suitable or preferred for which type of strategic and complex problem is an area to be further investigated? Turpin and Marais (2004) documented that decision makers with a highly analytical background, trained on using rational decision models, preferred in fact 'gut feel and intuitivism' when making complex decisions. This example can be regarded as the ultimate proof that applying decision models for complex and strategic decision-making is in itself…strategic and complex.

If location decisions fail half of the time as is being claimed (Nutt, 2002), would the elimination of the intuitivism element in fact increase the success rate of these decisions? But this approach may be too simplistic based on the argument that 'good decisions' cannot be linked to 'good outcomes' (Puranam et al., 2016). Decision making theory helps in understanding the complexity of the decision process but leaves important gaps in helping decision makers choose the appropriate model for their strategic decision process.

2.7 Literature Review: observations and gaps

The Literature review in this Chapter looked at the Made in Europe problem statement from five different academic discipline angles: International Business, Economic Geography, Government intervention policy, Manufacturing strategy and Decision making. As visualized in Figure 7, none of the areas covered cover all relevant aspects of the central research questions.

The disciplines International Business as well as Strategy for manufacturing both focus strongly on 'why' of Dunning's OLI framework (Dunning and Lundan, 2008). For successfully managing an MNC with its global supply chain, new strategic factors come into play in the 21st century. To manage these difficulties, not only excellent operations, but 'dynamic capabilities' (Teece, 2009) are required. Entrepreneurial fitness is becoming more important than just operational excellence, being the traditional key strategy for the majority of global manufacturing companies. Traditional strategies can suddenly turn into business continuity threats., A well-designed, cost effective global supply chain can quickly become a cost burden as a result of disruptive technological developments. Success in manufacturing seems to last only as long as the product life cycle. And that cycle is shortening every day based on technology advancements. Survival in the global manufacturing arena therefore is more and more based on the idea of 'value creation' rather than the old school idea of 'cost minimization'.

The Economic Geography discipline still recognizes the importance of the three historical location factors labor, transport and agglomeration, whereas contemporary research notes that their relative importance has changed drastically over time. The constant lowering of transport and communication cost have partly resulted in 'the death of distance' although this need not be

exaggerated, with thought leaders as Krugman (2008) still referring to this as important for agglomeration effects.

Economic geographers (Hayter, 1997; Krugman, 2008; Beaudry and Schiffauerova, 2008) as well as International Business academics (Porter, 1990; McCann and Mudambi, 2004; Dunning and Lundan, 2008) recognize the relevance of government institutions and institutional infrastructure for MNC's decision making on manufacturing location. Academic research on the effectiveness of government intervention policies however is far from conclusive. Two examples of strong academic debates are the 'Neoliberal versus Structuralist' approach (Lall, 2004) and the 'place-neutral versus place-based approach' (Barca et al., 2012).

Literature review areas Core research questions	International Business	Economic Geography	Government industrial policy	Manufacturing strategy	Decision Making
What are the current manufacturing location factors?	X	XX	XX	X	-
What manufacturing strategies drive location decisions?	XX	X	-	XX	-
What decision making models apply for location decision making?	-	-	X	-	XX

XX Primary focus
X Secondary focus
- No focus

Figure 7 Academic literature disciplines versus Made in Europe research questions

Research on Decision making showed that strategic, complex decision making (like location decisions) within an MNC is perhaps a much less a rational, analytical process than one might think. Gut feel, and intuition seem to play an important role in business decisions, as in everyday life decisions (Turpin and Marais, 2004; Gladwell, 2005; Kahneman, 2011). The failure rate of location decisions is considered to be high: up to 50% (Nutt, 2002).

What gaps has this Literature review chapter identified in relation to the research questions? As argued earlier in this section, none of the five academic literature areas covers the entire research topic of Made in Europe, which is a gap in itself. What the relevant manufacturing location factors in the current era of the 4th Industrial revolution are, remains unclear and under researched. The limited available research on location factors either takes a narrow geographical perspective (one county or one sector) or uses academic or political sources for their research.

An MNC, business or practitioner's perspective seem to be lacking in relevant academic research. For the survival of MNC's, renewed (manufacturing) strategies are developed leading to investment and subsequent location decisions. Which strategy on manufacturing drives which location decision also remains an under researched problem (Maccarthy and Atthirawong, 2003; Cantwell, 2009; Iammarino and McCann, 2013).

Governments create an institutional infrastructure that is relevant for MNC's and meant to influence the location decision process. How effective these intervention policies are remains unclear and a topic of strong debate among both academics and business practitioners. Which bring the discussion on anther gap in the researched literature: which decision model or decision framework is most suitable for making manufacturing location decisions within MNC's? Research is limited to strategic and complex decisions in general or specific manufacturing strategy trends like 'out-/insourcing', 'off-/reshoring'. No integrated research covering decision making related to strategic and complex manufacturing location decisions seem to be available.

In the next Chapter, a research methodology will be presented with the objective to fill some of the described gaps and to help build a decision framework for sustainable manufacturing location decisions.

CHAPTER 3

METHODOLOGY

3 Methodology

3.1 Introduction

Research on what the critical location factors are for manufacturing companies, considering the dynamics of rapidly changing global economic environment, is rare. In chapter 2.7, several gaps were identified in the relevant academic literature on the research topic. The goal of the Made in Europe research is to fill some of these gaps and build a decision framework for critical location factors based on a dynamic manufacturing location strategy. The objective of this chapter is to define a research methodology that is best suitable for achieving the research objective.

For collecting all relevant data for the Made in Europe research, a combination of research (mix methods) will be applied. Table 2 gives an overview of the main gaps described in the previous chapter including several research method options. For obtaining the required data for the Made on Europe research, two types of information or data can be identified. First and related to manufacturing industry data and current government policies, a static data analysis is required from statistical agents and publicly available government policy documents. Data and desk research will be done to cover this area. Secondly, a qualitative forecast or prediction is required to uncover what are the likely location factors that are critical for the manufacturing industry in the future,. A Delphi research using a group of expert participants selected from the relevant manufacturing industries is the preferred and selected research method for this. Obtaining predictive opinions on a complex international business issue preferably is obtained from a group of professional experts: business practitioners that have experience in the area of manufacturing strategies and location decisions for global supply chains in the relevant manufacturing sectors.

The next section will further explain and describe the different research methods, selected for the Made in Europe research and also relate these to the philosophical stance of the researcher himself.

Gaps	Additional research questions / missing data elements / gaps	Further research methodology options	Limitation / scope
Location factors for the manufacturing sector	What is 'the Manufacturing Industry'? What manufacturing (sub-) sectors are relevant for research?	Desk research Statistical data collection	EU-15 countries Selection of individual countries for data validation
Relevant 'future' location factors	What developments are ongoing in manufacturing sectors? Manufacturing technology, footprint strategy, competitive forces?	Interviews / questionnaires with industry experts using forecasting principles	Selection of manufacturing sectors (high value adds, economic impact, relevant from employment perspective
Manufacturing strategy vs location strategy based on changing location factor importance	What are the current manufacturing strategies in the sectors? What location / footprint strategy is best suitable / preferred?	Interviews / questionnaires with industry experts	Selection of manufacturing sectors (high value adds, economic impact, relevant from

			employment perspective
Linking Government industrial policy and business manufacturing and location strategy	What are the current government industrial policies in place? How does this relate to business footprint strategy and manufacturing location factors?	Desk research on government policies for Manufacturing industries Interviews / questionnaires with industry experts	European Union / Commission Selection of EU countries for validation and cross referencing of EU policy on national / regional level
Decision framework for manufacturing location decisions	What is the preferred decision-making process? Pitfalls, experiences? Future recommendations?	Interviews / questionnaires with industry experts with footprint strategy decision experience	Industry leaders / decision makers from selected manufacturing sectors (high value add, economic impact, relevant from employment perspective

Table 2 Overview research gaps and research methodology options and scoping

3.2 Primary research - a Delphi study

Manufacturing location decisions are taken by the senior management of MNC's. Involving top industrialists in academic research is a challenging exercise (Drew, 2014). The organizational elites or individuals who have a position of power within an organization are not easy to access (Kezar, 2003). Research using organizational elites to uncover critical (future) location factors for the manufacturing sector, does not seem to exist. One of the reasons could be that the industrial elite can be reluctant to discuss strategic issues openly (Drew, 2014). Decision makers in the manufacturing industry translate and implement manufacturing strategy into a location decision. If this research however is able to mobilize the industrial elite in sharing their views on the research topic, their contribution will provide unique insights in the business drivers for manufacturing industries to consider cross border manufacturing.

Involving organizational elites from the European manufacturing industry is expected to give answers on the three core research questions. First is identifying the past and present drivers for FDI (Foreign Direct Investment) and the resulting cross border manufacturing strategies. Secondly is understanding what location factors they consider to be critical for a successful manufacturing and location strategy for the coming decade? Thirdly, the Delphi participants are asked to share their views on what decision-making process is expected to deliver a successful MNC location decision implementation.

3.2.1 What is the Delphi method?

In the 1950's in the US, the RAND Corporation, an originally US based Research institute, developed the Delphi method to forecast the impact of technology on warfare (Helmer-Hirschberg, 1967): "A description of the Delphi Technique which attempts to make effective use of informed intuitive judgment in long-range forecasting. The Delphi method in its simplest form solicits the opinions of

experts through a series of carefully designed questionnaires interspersed with information and opinion feedback."

Linstone and Turoff (1975) describe the research method as an appropriate technique in case "the problem does not lend itself to precise analytical techniques but cart benefit from subjective judgments on a collective basis". The Delphi technique is different from other research methods because of the three main characteristics. First, during the entire process all participants remain anonymous. Nobody is able to influence other participants as a result of their authority and personality. Experts can form their opinion freely and come back on their previous opinions based on critical feedback from other experts. Second is the structured information flow: all communication is organized centrally, where irrelevant information is deleted. There are no negative effects of 'face to face' discussions and any problems occurring during group discussions are avoided. The third characteristic is the regular feedback loop: all participants comment on their own predictions as well as the answers from other experts. Where in 'normal' group meetings, people may be inclined to stick to their original opinion, the individual can now 'safely' change his original opinion and contribute positively to the overall end result.

The Delphi Method is a tool which is especially well-suited for International Business research (Nielsen, Thangadurai, 2007). In the expanding world of global business activity, applying the Delphi research method (designed for forecasting the future) is considered to be an appropriate research tool, meeting the requirements of international business research like the Made in Europe research. The original Delphi method is designed for supporting 'forecasting' purposes and can therefore be considered as suitable for the research objective. One of the justifications of using the Delphi method is described in Nielsen and Thangadurai (2007) research. In an international research setting, the Delphi method is about (…) *engaging stakeholders with diverse and diverging perspectives*, *exploring complex interrelationships and interdependencies within the global system and forecasting the future 'Big Questions' for global business activity* (Nielsen, Thangadurai, 2007; p151). The central Research question of 'Made in Europe' deals with determining which location factors for Europe's Manufacturing Industry will be important in order to remain competitive throughout the 21st century. To uncover what these factors will be, not only past and current considerations need to be looked at, but specifically future developments expected to impact location decisions. The challenge of 'looking into the future' is an important consideration why the application of the Delphi technique is expected to help with this research, in line with Helmer-Hirschberg (1967) assumptions.

The Delphi technique, however does have various weaknesses. Most of these weaknesses refer to the actual process of the Delphi study (Gordon, 2009): it is difficult to perform well, because of the amount of time needed to come up with the right participants. Also, the preparation of a high quality questionnaire which does not give room for misinterpretation is a time-consuming effort. As the Delphi technique is based on reaching consensus among a group of experts, any 'extreme' opinion might get neglected, however useful it could have been. On the other side, the Delphi technique offers a lot of advantages: reaching expert consensus is considered to be far more accurate than individual forecasts (Ludwig, 1997; Gordon, 2009). The objective exploration of a strategic issue makes the Delphi technique a '*flexible and adaptable tool to gather and analyze the needed data*' (Hsu and Sandford, 2007). Because there are hardly time and place constraints, the panel members can interact with the group (feedback) at their convenience. For the researcher, a Delphi study gives ample possibilities to structure the communication efficiently and in such a way that also larger groups can be handled quite easy compared to individual face to face interviews or joint group meetings. Using the internet as communication medium for a Delphi study is considered a strong method and tackles some of the identified weaknesses. The research method nowadays is therefore frequently referred to as the e-Delphi technique (Donohoe, 2012).

The Made in Europe research is not the first attempt to find answers to research questions on location decisions and their related global manufacturing strategies. What other relevant research is available on the research topic of the Made in Europe research and which research method has been applied? Table 3 gives a comprehensive and chronological list of academic research published in the 21st century.

Title, author(s), year	Research method	Geographical scope	Research focus area
Manufacturing location decision: choosing the right location for international manufacturing facilities, Pongpanich (2000)	Desk / literature research	Not applicable	Manufacturing and Footprint strategy
Factors affecting location decisions in international operations – a Delphi study, MacCarthy and Atthirawong (2003)	Delphi research	Global	Manufacturing and Footprint strategy / Manufacturing Location factors / Decision making
Dimensions of industrial location factors: review and exploration, Badri (2007)	Desk / Literature research	Not applicable	Manufacturing Location factors
Development of a Decision Model for Strategic Outsourcing, Ordoobadi (2005)	Desk / Literature research	Not applicable	Footprint strategy, Decision making
Global production: A Handbook for Strategy and Implementation, Abele (2008)	Questionnaires / interviews	Global	Manufacturing and Footprint strategy
Manufacturing operations location decision: what are the main criteria? Spalanzani, Ageron and Zouaghi (2016)	Questionnaires / interviews	France	Manufacturing Location factors / Decision making
Exploring the reshoring and insourcing decision-making process: toward an agenda for future research, Bals, Kirchoff and Foerstl (2016)	Desk research press publications	Germany, United States	Manufacturing and Footprint strategy, decision making
Distribution of manufacturing strategy decision-making in multi-plant networks, Olhager and Feldmann (2017)	Questionnaires / interviews	Sweden	Decision making
Why locate manufacturing in a high-cost country? A case study of 35 production location decisions, Ketokivi, et al. (2017)	Questionnaires / interviews	Finland	Manufacturing location factors

Table 3 Overview relevant research publications since 2000

Table 3 shows a variety of research that has been conducted related to the Made in Europe research topic: interviews, desk research, literature research as well as a Delphi study. Reviewing research method, focus area and geographical scope, MacCarthy and Atthirawong's Delphi study comes closest to the research objective of this research. MacCarthy and Atthirawong published a variety of papers on location decisions. One of their papers is 'Factors affecting location decisions in international operations – a Delphi study' (MacCarthy and Atthirawong, 2003). In earlier publications by the same researchers (2000 and 2001), a set of 13 major location factors has been compiled. Based on these factors plus additional sub-factors, MacCarthy and Atthirawong used the Delphi technique for their 2003 paper; the panel consisted of representatives from academia, government and consultancies around the world. After several rounds of questionnaires, the factors were ranked, based on the frequency of the responses per factor by each individual panelist. The preselected location factors were ranked by importance from different perspectives. The basis for MacCarthy and Atthirawong's (2003) expert panel selection was: academics, politicians and consultants.

The Made in Europe research has a different geographical scope (Europe) and a different group of participants than MacCarthy and Atthirawong's Delphi. In order to understand truly how and why strategic decisions are made, accessing the industrial elites is a clear requirement (Aguiar and Schneider, 2016). How the research approached the challenge of engaging this elite group, will be further explained in Chapter 6, Delphi Research.

The location factors from the most recent academic findings on this topic (Badri, 2007) will be used for the Delphi study. A complete overview of Badri's location factors is described and explained in the Literature review, Table 1 (chapter 2.3). The Delphi questionnaires of this research will combine open as well as closed questions. For analyzing the open questions, the descriptive analytics method will be applied (Evans and Lindner, 2012) at the tool to summarize qualitative data into meaningful, visual output like charts.

3.3 Supportive research - Europe's Manufacturing industry and Government industrial policy

Discussing and researching manufacturing strategy and location factors require relevant context, as was highlighted in the gap analysis in the introduction of this chapter. The objective of the data research on the European Manufacturing Industry is to gain deep understanding of the Manufacturing Industry in Europe: what are the different subsectors that jointly form what is called the 'manufacturing industry'; what is its contribution to the overall economy what has been the actual employment development been and the relation to other sectors in the economy. Relevant statistical economic data will be compiled from European and other relevant International statistics databases (Eurostat, IMF, World bank etc.). For the definition of which business activities encompass what is called 'manufacturing', the NACE[5] coding applied by Eurostat (the European Union's statistical office) will be applied. Further details on the process of data collection will be presented in the Data Research Chapter 4.

[5] NACE stands for Nomenclature des Activités Économiques dans la Communauté Européenne or Nomenclature of Economic Activities. Statistics produced on the basis of NACE are comparable at European level and are in line with the UN's ISIC (International Standard Industrial Classification). For this research, section C from the NACE coding rev. 2 (2008) will be applied for the economic activities grouped under 'Manufacturing'. A detailed overview of all economic activites reffered to in section C can be found in Appendix 2

The data research outcome will also form the basis for selecting the Delphi expert panel. The intended participants will be chosen from manufacturing sectors that have significant relevance from employment and economic value add perspective.

Government intervention strategies are aimed at influencing MNC decisions on location (Mudambi, 2001; Dunning and Lunda, 2008). One of the gaps found in chapter 2 was the relation between government industrial policy and manufacturing and locations strategy within MNC's. Looking at what actual government policies are in place in Europe provides necessary context for the Delphi expert panel and will try to fill some of the gaps found in relation to the Made in Europe research questions.

3.4 Researchers philosophical stance – Pragmatism

The central research question of this thesis deals with a practical business problem: what is the best location for a company's manufacturing facility? Finding a practical solution for this straightforward question however, requires that the problem needs to be looked at from various angles, as can be concluded based on gaps found in the initial literature review. Choosing one research philosophy is therefore unrealistic in the eyes of the Researcher. Practical considerations influenced the adoption of the research philosophy for the Made in Europe thesis. The researcher has chosen 'pragmatism' as research philosophy, in line with Saunders et al. (2009). This resulted in applying a mixed method approach, combining both quantitative and qualitative research as visualized in Figure 8.

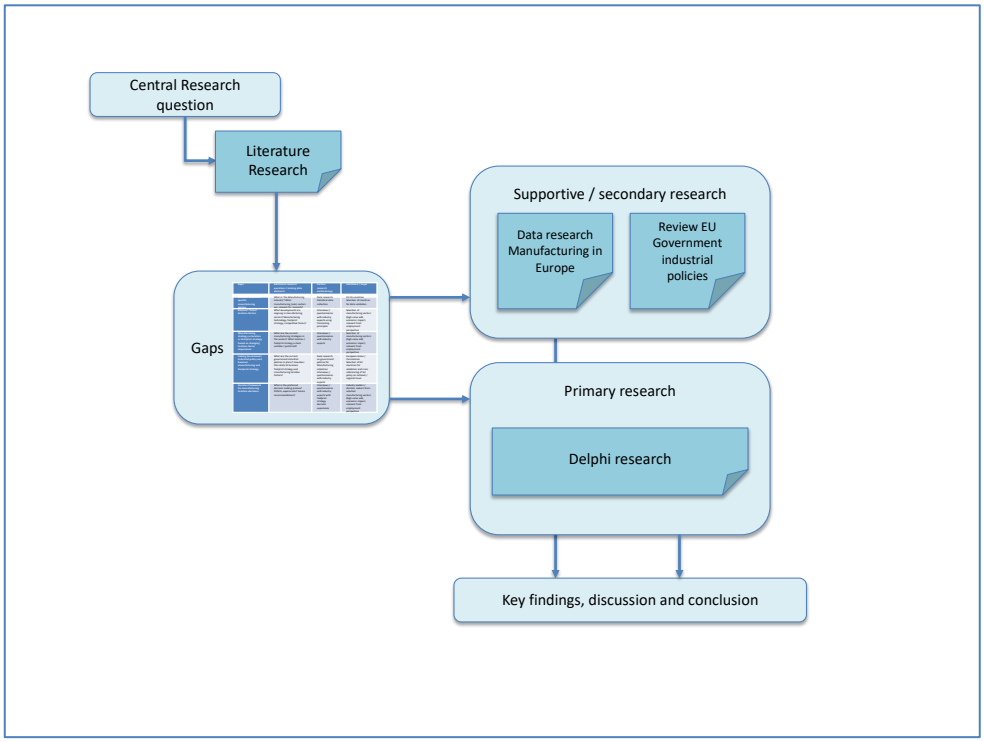

Figure 8 Design of the Research Made in Europe

Tashakkori and Teddlie (1998:30) describe how the researcher views this pragmatism philosophy: '*study what interests you and is of value to you, study in the different ways in which you deem appropriate and use the results in ways that bring about positive consequences within your value system'*.

This combining of theoretical and empirical elements is the foundation of the proposed Research methodology described earlier in this Chapter as well as the personal philosophical stance of the Researcher. A literature review to explore all angles on the Research question, with the purpose to get thorough understanding of the Research problem with qualitative data, observations and findings. Secondly, an objective and clean statistical data research as initial reference point, with the objective to show reality in a reflective way applying quantitative data. Finally, a Delphi research to get insights from other practical business angles with the objective to maximize the use of different perspectives in order to fill in the knowledge gaps using direct sources from experienced business elites.

How is the Delphi method specifically related to the Researcher's philosophical stance? Linestone and Turoff (1975), describe the distinctive approach of five different philosophers towards problem resolution (Leibniz, Locke, Kant, Hegel and Singer). The one that is closest the both the Researcher as well as the chosen Research Methodology is the Kantian approach. Kant's philosophy is based on the belief that 'truth is synthetic; i.e. the truth content of a system is not located in either its theoretical or its empirical components, but in both'. Johnson and Duberley (2000) confirm Kant's position linking his philosophy to applying 'pragmatism' in research methodology.

Combining quantitative data (mainly from the secondary, supportive research) with the Delphi study results (primary research) is how the Researcher plans to gain the insights needed to find practical solutions for the research problem. *Pragmatism* is adopted as the research philosophy for delivering a decision framework for location decisions. The Delphi research itself was constructed using these principles: data will be presented to create basic understanding of 'the facts' and invites insights from the participants. The nature of these participants is that they will welcome some relevant information as pre-read and will then present their own view, as experienced leaders and critical thinkers.

In the following Chapter, a statistical data research will be conducted in order to get a full understanding of what constitutes 'the European manufacturing industry'.

CHAPTER 4

DATA RESEARCH

4 Data Research on the European Manufacturing Industry

4.1 Introduction

Our Research question is centered on 'location factors important for European Manufacturing industries'. In this chapter, factual statistical data on the European Manufacturing Industry will be presented. Before looking into what drives companies in their manufacturing (location) strategies or investigate what different location theories are out there, understanding the basic facts around what is called 'the European Manufacturing Industry' is necessary. For the subsequent Delphi research, a panel of business leaders will be formed with experience and track records in the chosen Manufacturing sectors; this industrial elite will be selected from the specific manufacturing sectors that this data research will show to be most relevant.

This chapter is divided in two sections. The first section will explain what actual data will be collected and presented. In the second section 'Data on Europe's Manufacturing Industry', a variety of economic statistical facts and indicators will be presented to gain detailed understanding of what the Manufacturing Industry in Europe actually reflects. How many people are employed in which specific Manufacturing sectors?

The following data on 'the European Manufacturing Industry' will be collected:

- What actually is 'the European Manufacturing Industry'?
- How many people work is this sector?
- What is the difference between the 'Industry sector' and what is called the 'Manufacturing sector'?
- How does this sector relate to other sectors in the EU economy like Agriculture, Services and the Public sector?
- How important is this sector in the overall European economy?
- How has the actual employment in the Manufacturing sector developed over the years?
- Which sectors within Manufacturing have been impacted the most and which not?
- Has the change in employment in the sector also impacted the economic output of the economy? In other words: have changes in employment in the sector impacted the 'Economic Value Added' as percentage of the Gross National Product of the EU?

By answering this first set of questions, the position of the Manufacturing sector in Europe's economy will be clear from data perspective. E.g. which European manufacturing subsectors have in fact suffered the most from the process of de-industrialization. Two prerequisites are defined for the actual data gathering process: (1) Consistency and (2) Comparability. Consistency is required so when the data is analyzed over a period of time, no wrong conclusions can be drawn for any specific industrial sector in any specified country. Comparability is required to add up any data from any country to be able to put in even broader perspective. Comparability is also required to relate the data to other economic, demographical or social indicators on either a European or even global level. For the compilation of employment data per sector, the NACE coding will be used. NACE stands for Nomenclature of Economic Activities[6] and is the classification system used in Europe for economic activities. All statistics using this coding are comparable on a European and even global level.

[6] More information on NACE coding can be found on http://siccode.com/en/pages/what-is-a-nace-code

The following data set is required for a good understanding of the 'European Manufacturing' as well as the actual process of de-industrialization:

- Development of the *total number of people employed*
- Development of the *number of people employed in the main economic sectors*
    - Agriculture
    - Industry
    - Services (commercial)
    - Public Services
    - Education, Health
    - Other

These data will provide the information on the actual process of de-industrialization, measured in number of people employed in various sectors of the economy. Data will be collected from the total of EU-15 countries as well as the individual countries selected (Germany, UK, the Netherlands). Having the actual number of people employed in the sector 'Industry', the developments within the different sub-sectors of this main sector will be looked into. The following data on sub-sectors of 'Industry' will be collected, as explained in the following section 'Sources':

- Development of the *number of people employed in the sub-sectors of the main sector 'Industry'*
    - Mining
    - Manufacturing
    - Utilities
    - Construction

The number of people employed in the subsector 'Manufacturing' however is not detailed enough for the purpose of the Research questions and objective. Which specific type of businesses within the Manufacturing sector have been impacted the most by the process of de-industrialization, measured in number of people employed in this specific group of businesses?

Although NACE uses a total of 27 subsectors within Manufacturing, for the Research purposes the following eight Manufacturing sectors will be looked at[7]:

1. Food: Food products, beverages, tobacco
2. Textile: Textiles, wearing apparel, leather
3. Wood/paper: Wood and paper products
4. Chemicals: Petroleum, chemical, rubber, plastic and other mineral products
5. Metals and Machinery: Basic and fabricated metal and machinery
6. High Tech: Electrical, computer, electronic and optical products
7. Automotive: Motor vehicles and other transport equipment
8. Other

The level of detail required for the Research objective is now reached. However, before starting to actually compile these data, the following question needs to be answered: is compiling employment data sufficient to understand the dynamics of the process of de-industrialization in the selected countries? The mere number 'people employed' in any specific sector in any country should be put into perspective, before drawing conclusions. For putting the important data set of 'people employed' into the required perspective the following data or indicators will be helpful:

- People employed in the Manufacturing sector as percentage of the total of people employed in the respective country (in other words: what was the change of employment in the Manufacturing sector in relation to the total number of people employed?)

[7] See Appendix 2 for more details on the consolidation of NACE sector coding

- Gross Domestic Product (GDP) per capita in the specific country (in other words: how did the income per capita develop in the specific country versus the development of employment in the Manufacturing Industry?)
- Value added percentage of the GDP of the sector 'Industry' and the subsector 'Manufacturing' in the specific country (in other words: what was the contribution (EVA: economic value added) of the sector 'Industry' and more specific 'Manufacturing' to the total GDP of the specific country?)
- Unemployment data (total, per education sector – primary, secondary, tertiary) (in other words: how do changes in the country's unemployment statistics relate to the development of employment in the Manufacturing sector?)

4.2 Timeframe and sources

For the purposes of the Research objective, recent data is required. This means the latest available statistical data from the selected countries needs to be collected in order to justify any conclusions in this respect. To get a thorough understanding of the data, the timeline needs to be long enough to be able to show significant developments and secure fair representation of the actual trends. The data have been compiled on a year-by-year basis and will give a consistent picture of the development of the process of de-industrialization in a specific country[8]. Looking at the selected countries, Germany, the UK and the Netherlands the following timeframe is selected: **1995 up to 2013.** The year 1995 is the first year that consistent statistical data is available for Germany after the re-union of West and East Germany. 2013 is the last year with consistent yearly statistical data available at the time the data research was conducted.

What sources support the requirements of consistency and comparability? National statistical agencies are expected to generate the relevant data in a consistent way but will not support the 'comparability' requirement. What is defined as 'Industry' or even 'Manufacturing' can vary from country to country and can make comparability useless. This means statistical sources, which supersede national boundaries and meet the requirements, need to be selected. The following three data sources have been reviewed and are selected for the Research, securing both the 'consistency' and comparability' prerequisite:

- Eurostat
- World Bank
- International Monetary Fund (IMF)

All three sources offer free web-based databases with a wide variety of selection criteria, more than sufficient for the purpose of the research.

4.2.1 Eurostat, Wold Bank and IMF statistics

The selected three countries for the Research are all members of the current European Union which secures the availability of statistical data. One of the Directorates – General of the European Commission is EUROSTAT, located in Luxembourg. On Eurostat's website[9], they present themselves as follows:

[8] For the purpose of readability of the data only the years 1995 and 2013 will be shown
[9] http://ec.europa.eu/eurostat/

“Eurostat's mission: to be the leading provider of high quality statistics on Europe. Eurostat is the statistical office of the European Union situated in Luxembourg. Its task is to provide the European Union with statistics at European level that enable comparisons between countries and regions “. Eurostat offers an online free database with a wide variety of statistical data. Consistent data on manufacturing sectors for the selected countries is available from 1995, especially since then the reunion of West and East Germany was completed from economic statistical data perspective. The Eurostat data will be used for all the employment data elements required for this part of the research.

For the GDP data as well as the EVA data and the unemployment data, the World Bank database and IMF database will be used. Main reason for this is that these databases offer the specific data elements required on EVA (Economic Value Added) per sector as well as GDP data in various currency option, which support the comparability and consistency requirement of the Research.

4.3 Presentation of findings - Manufacturing Industry data

In the second section of this data research Chapter, the statistical economic data on the global and European Manufacturing Industry will be presented. The results of the data research will be presented in the following order:

- Global perspective (for comparison purposes)
- EU-15 perspective
- Country perspective (for cross reference and validation data consistency)
    - Germany, the UK, the Netherlands and its consolidated data

4.3.1 Global perspective

Before focusing on Europe, putting the employment data in a global perspective will help in understanding the process of (de-) industrialization on a macroeconomic level. The database of the World Bank offers us a snapshot of the development of the employment per sector in the main economic regions of the world. The snapshot will only look at the main sectors: Industry, Agriculture and Services (private and public).

Figure 8 shows that in the economic regions in the United States, the European Union as well as Japan, the percentage of employment in the sector Industry (as part of the total employment) has been decreasing continuously since 1995. China is clearly developing itself from a country focused on mainly Agriculture towards an increased focus on both Industry and Services. Measured in % of employment, the United States is clearly the most ‘de-industrialized’ from these four economic regions with a mere 17% of employment in the Industrial sector. The European Union as well as Japan follow with 25% employment in the Industrial sector. Taking a closer look at the European Union, it shows 1 out of 4 people (25%) holds a job in the Industrial sector; 1 out of 20 (5%) in Agriculture and more than 2 out of 3 (70%) is employed in the Services sector (private and public).

Country Name	Sector	1995	2000	2005	2010	Most Recent Value
United States	Industry	24	23	21	17	17
	Agriculture	3	3	2	2	2
	Services (private & public)	73	74	78	81	81
European Union	Industry	31	29	28	25	25
	Agriculture	9	8	6	5	5
	Services (private & public)	60	63	66	69	70
China	Industry	23	23	24	29	30
	Agriculture	52	50	45	37	35
	Services (private & public)	25	28	31	35	36
Japan	Industry	34	31	28	25	25
	Agriculture	6	5	4	4	4
	Services (private & public)	60	63	66	70	70

Figure 9 – Employment (as percentage of total) per sector per economic region (World bank database July 2015)

As indicated earlier, just looking at employment in a certain sector is not sufficient to draw conclusions on the overall economic impact of the sector. Annually, the European Union publishes what is called "the European Competitiveness Report'. As the title already indicates, the report annually reviews and compares the industrial policies of the EU as a whole as well as of the individual member states. In the edition of 2014, the graph in figure 9 shows the relative share of manufacturing output of the three regions EU, China and the US. The trend shows a similar picture: the share of manufacturing output of the EU and the US is decreasing versus a clear increase coming from the Chinese economy.

Based on the global snapshot with respect to the development of employment in the |industrial sector, the following observations can be made:

- The United States is the most 'de-industrialized' economic region on a global level with only 17% employment in the sector Industry
- Three economic regions (the US, the EU as well as Japan) show a continuous decline in employment in the industrial (as well as the Agricultural) sector since 1995
- In the US, the EU as well as Japan, the largest sector from employment perspective is the Services sector: the EU and Japan with 70% employment and the US even 81%
- The economy of China is rapidly transforming from an Agricultural focus (from 52% in 1995 to 35% in 2011) to increased employment in the Industrial (from 23% to 30%) and Services sector (from 25% to 36%!); note: employment in the Services sector is growing more rapidly than the Industrial sector

Looking at the data in figure 8 and 9, several patterns can be identified. Employment in the more mature or developed economies in the US, Japan and the EU is decreasing in the sectors Agriculture and Industry in favor of the Services sector. In China, the Agricultural sector is rapidly changing looking at the employment percentages (52% in 1995 down to 35% as most recent value). Employment in the Industrial sector in China is increasing (from 23% in 1995 up to 30% as most recent value), but not as rapidly as employment in the Services sector (from 25% in 1995 up to 36% as most recent value). For China to develop into an economy with the division of employment similar to the developed regions (minimal employment in Agriculture, limited employment in the Industrial sector and a majority of employment in the Services sector), would for sure take several decades.

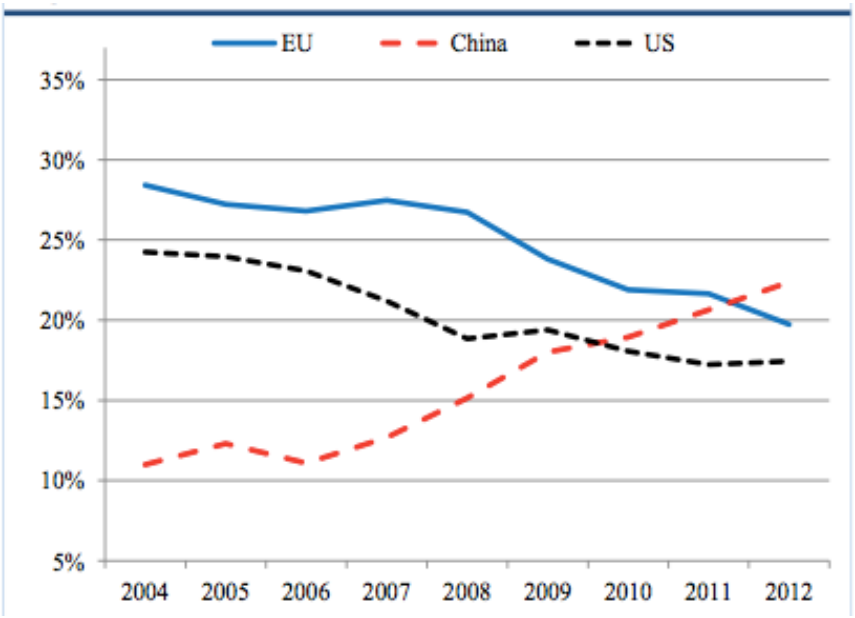

Figure 10 – EU, Chinese and US shares of world manufacturing output (source: European Competitiveness Report 2014, European Union)

Another pattern that emerges in the presented data is the division of employment in the most developed regions: the most recently measured employment percentages of both Japan and the EU show: Agriculture ±5%, Industry 25% and Services 70%. The same data for the US show: Agriculture 2%, Industry 17% and Services 81%.

For the total EU-15 countries as well as the three preselected European countries, the accumulated data per country will be presented in a similar way. The data are split into three sections: first section shows the actual employment data (in thousands) per indicated sector. The sector Industry is furthermore split up in the subsectors:

- Mining
- Manufacturing
- Utilities
- Construction

The actual employment data will be shown from 1995 up to 2013. The second section shows the 8 sub-sectors within the Manufacturing sector. These 8 subsectors are a consolidation of the 27 subsectors defined by NACE[10]. For the purposes of the Research, the 27 subsectors have been compressed to 8 sub-sectors in order to increase comparability of data between the selected countries. Details of the consolidation of the original 27 NACE manufacturing sectors to the defined 8 sectors can be found in Appendix 1, as also explained in the previous Chapter.

The last two columns of the numerical presentation are:

- Change in employment from 1995 up to 2013 indicated as a percentage
- Change in employment from 1995 up to 2013 in actual numbers of people

[10] see Appendix 1 for further explanation and details

The last row of the data shows the percentage of people employed in the Manufacturing sector of the total people employed in the specific region / country. This percentage can be used as an indicator for the process of de-industrialization and is therefore relevant for the research. In the 3rd section, a set of 4 economic indicators is presented as explained in the previous Chapter.

4.3.2 EU-15

The EU-15 (see Figure 11) is formed by the countries that were members of the European Union prior to the accession of ten new member states in May 2004. With this selection, the element of data comparability is secured as the research preselected the timeframe 1995 up to 2013.

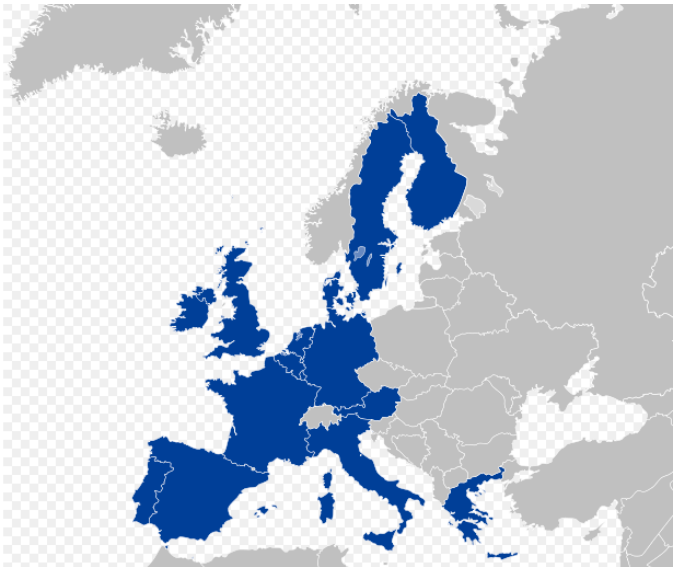

Figure 11 – Overview of the countries representing the 'EU-15'

In the following sections, the development of employment of the EU-15 countries (4.3.2) will be presented as well as the individual member states Germany (4.3.3), the UK (4.3.4) and the Netherlands (4.3.5). Finally the combined data from Germany, the UK and the Netherlands will be shown in 4.3.6 as additional cross-reference of the EU-15 and individual country data.

EU-15

Number of people employed per sector ('000)	1995	2013	1995 <> 2013 <>%	1995 <> 2013 <>#
Agriculture	7.112	4.448	-37%	2.664-
Industry - Mining	638	377	-41%	261-
Industry - Manufacturing	31.293	25.031	-20%	6.262-
Industry - Utilities	1.356	1.398	3%	42
Industry - Construction	11.571	11.330	-2%	241-
subtotal Industry	44.858	38.136	-15%	6.722-
Services - Commercial	51.787	69.224	34%	17.437
Public Services	11.559	11.922	3%	363
Eduction, Health	31.137	42.861	38%	11.725
Other	348	1.195	243%	847
total employed	146.800	167.785	14%	20.985
Number of people employed in Manufacturing ('000)				
Food products, beverages, tobacco	3.561	3.503	-2%	-58
Textiles, wearing apparel, leather etc	3.353	1.289	-62%	-2063
Wood, paper products	1.837	1.063	-42%	-774
Petroleum, chemical, rubber, plastic and other mineral products	4.674	3.858	-17%	-816
Basic/fabricated metals and machinery	7.928	6.135	-23%	-1793
Electrical, computer, electronic and optical products / equipment	3.468	2.122	-39%	-1346
Motor vehicles and other transport equipment	2.744	2.923	7%	179
Other	3.729	4.137	11%	408
total employed Manufacturing sector	31.293	25.031	-20%	-6262
% of total employed	21%	15%		

Figure 12 – EU-15: employment data and economic indicators 1995 – 2013

The following observations can be made:

- In 2013, 15% of the people employed in the EU-15 countries worked in the Manufacturing sector versus 21% in 1995
- In total about 6.3 million jobs (20%) were lost in the Manufacturing sector in the period 1995-2013
- Within the Manufacturing sector the top sectors on number of job losses and largest number of employed people are:
    - Textiles (-2,063,000 jobs)
    - Basic/fabricated metals and machinery (-1,793,000 jobs)
    - Electrical products (-1,346,000 jobs)
    - Chemical products (-816,000 jobs)
- Within the Manufacturing sector only the Automotive sector showed an increase in jobs (+197,000 jobs)

4.3.3 Germany

Germany				
			1995 <> 2013	
Number of people employed per sector ('000)	1995	2013	<>%	<>#
Agriculture	1.071	518	-52%	-554
Industry - Mining	251	76	-70%	-175
Industry - Manufacturing	8.880	7.738	-13%	-1142
Industry - Utilities	356	370	4%	14
Industry - Construction	3.327	2.631	-21%	-696
	12.814	10.815	-16%	-2000
Services - Commercial	11.693	15.381	32%	3688
Public Services	3.138	2.772	-12%	-366
Eduction, Health	6.745	9.149	36%	2404
Other	0	0	0%	0
total employed	35.461	38.633	9%	3172
Number of people employed in Manufacturing ('000)				
Food products, beverages, tobacco	835	899	8%	64
Textiles, wearing apparel, leather etc	468	177	-62%	-291
Wood, paper products	554	220	-60%	-334
Petroleum, chemical, rubber, plastic and other mineral products	1.284	1.063	-17%	-222
Basic/fabricated metals and machinery	2.777	2.319	-16%	-458
Electrical, computer, electronic and optical products / equipment	1.148	828	-28%	-320
Motor vehicles and other transport equipment	911	1.265	39%	354
Other	902	967	7%	65
total employed Manufacturing sector	8.880	7.738	-13%	-1142
% of total employed	25%	20%		
Economic Indicators				
Industry, value added (% of GDP)	33	31	-6%	
Manufacturing, value added (% of GDP)	23	22	-4%	
GDP per capita, PPP (current international $)	$23.111	$43.884	190%	
Unemployment, total (% of total labor force)	8	5		

Figure 13 – Germany: employment data and economic indicators 1995 – 2013

Looking at the data from Germany (1995-2013), the following observations can be made (see Figure 12):

- In 2013, 20% of the people employed in Germany worked in the Manufacturing sector versus 25% in 1995
- In total about 1.1 million jobs (13%) were lost in the Manufacturing sector during this period
- Within the Manufacturing sector the top 3 sectors in number of job losses are:
    - Basic/fabricated metals and machinery (-458,000 jobs)
    - Wood, paper products (-334,000 jobs)
    - Electrical products (-320,000 jobs)
- Within the Manufacturing sector, one sector showed a substantial increase in the number of jobs:
    - Motor vehicles (+354,000 jobs)
- The economic Value added of the Manufacturing sector decreased with 4% versus an employment decrease of 13%
- The GDP (or income) per capita in Germany grew with 190% during this period
- Unemployment decreased from 8 to 5%

4.3.4 United Kingdom

UK			1995 <> 2013	
			<>%	<>#
Number of people employed per sector ('000)	1995	2013	<>	<>
Agriculture	490	266	-46%	-224
Industry - Mining	110	123	12%	13
Industry - Manufacturing	4.847	2.993	-38%	-1853
Industry - Utilities	223	233	4%	10
Industry - Construction	1.819	2.085	15%	267
	6.998	5.434	-22%	-1564
Services - Commercial	10.280	12.699	24%	2418
Public Services	1.535	1.807	18%	272
Eduction, Health	6.102	8.434	38%	2333
Other	121	275	127%	154
total employed	25.526	28.915	13%	3388
Number of people employed in Manufacturing ('000)				
Food products, beverages, tobacco	528	387	-27%	-140
Textiles, wearing apparel, leather etc	435	117	-73%	-318
Wood, paper products	212	132	-38%	-81
Petroleum, chemical, rubber, plastic and other mineral products	805	482	-40%	-323
Basic/fabricated metals and machinery	1.060	575	-46%	-485
Electrical, computer, electronic and optical products / equipment	675	262	-61%	-413
Motor vehicles and other transport equipment	505	378	-25%	-126
Other	628	660	5%	32
total employed Manufacturing sector	4.847	2.993	-38%	-1853
% of total employed	19%	10%		
Economic Indicators				
Industry, value added (% of GDP)	30	20	-33%	
Manufacturing, value added (% of GDP)	19	10	-47%	
GDP per capita, PPP (current international $)	$21.073	$38.259	182%	
Unemployment, total (% of total labor force)	9	8		

Figure 14 – UK: employment data and economic indicators 1995 – 2013

Observations of the UK data (see Figure 13):

- In 2013, 10% of the people employed in the UK worked in the Manufacturing sector versus 19% in 1995
- In total about 1.9 million (38%) jobs were lost in the Manufacturing sector
- Within the Manufacturing sector the top 3 sectors on number of job losses are:
    - Basic/fabricated metals and machinery (-485,000 jobs)
    - Electrical products (-413,000 jobs)
    - Chemical products (-323,000 jobs)
- Within the Manufacturing sector no sector showed any increase in jobs
- The economic Value added of the Manufacturing sector decreased with 47% versus an employment decrease of 38%
- The GDP (or income) per capita in the UK for all sectors grew with 182%
- National unemployment decreased from 9 to 8%

4.3.5 The Netherlands

NL				
			1995 <> 2013	
Number of people employed per sector ('000)	1995	2013	<>%	<>#
Agriculture	244	153	-37%	-91
Industry - Mining	11	10	-3%	0
Industry - Manufacturing	1.074	790	-26%	-284
Industry - Utilities	49	36	-25%	-12
Industry - Construction	394	408	3%	14
	1.527	1.244	-19%	-283
Services - Commercial	2.595	3.400	31%	805
Public Services	541	501	-7%	-40
Eduction, Health	1.614	2.215	37%	601
Other	204	670	229%	466
total employed	6.725	8.183	22%	1458
Number of people employed in Manufacturing ('000)				
Food products, beverages, tobacco	180	133	-26%	-47
Textiles, wearing apparel, leather etc	38	19	-50%	-19
Wood, paper products	47	30	-37%	-18
Petroleum, chemical, rubber, plastic and other mineral products	174	121	-30%	-53
Basic/fabricated metals and machinery	209	174	-17%	-35
Electrical, computer, electronic and optical products / equipment	108	45	-58%	-63
Motor vehicles and other transport equipment	53	42	-21%	-11
Other	264	226	-15%	-39
total employed Manufacturing sector	1.074	790	-26%	-284
% of total employed	16%	10%		
Economic Indicators				
Industry, value added (% of GDP)	27	22	-19%	
Manufacturing, value added (% of GDP)	17	12	-29%	
GDP per capita, PPP (current international $)	$22.901	$46.162	202%	
Unemployment, total (% of total labor force)	7	7		

Figure 15 – Netherlands: employment data and economic indicators 1995 – 2013

These are the observations for the Dutch data (see Figure 14):

- In 2013, 10% of the people employed in the Netherlands worked in the Manufacturing sector versus 16% in 1995
- In total about 0.3 million jobs (26%) were lost in the Manufacturing sector
- Within the Manufacturing sector the top 3 sectors in number of job losses are:
    - Electrical products (-63,000 jobs)
    - Chemical products (-53,000 jobs)
    - Food products (-47,000 jobs)
- Within the Manufacturing sector no sector showed any increase in jobs
- The economic Value added of the Manufacturing sector decreased with 29% versus an employment decrease of 26%
- The GDP (or income) per capita in the Netherlands grew with 202%
- Unemployment remained stable at 7%

4.3.6 Germany + the UK + the Netherlands combined

D + UK + NL				
			1995 <> 2013	
Number of people employed per sector ('000)	1995	2013	<>%	<>#
Agriculture	1.806	936	-48%	869-
Industry - Mining	371	209	-44%	162-
Industry - Manufacturing	14.800	11.521	-22%	3.279-
Industry - Utilities	628	639	2%	11
Industry - Construction	5.540	5.124	-8%	416-
	21.339	17.493	-18%	3.847-
Services - Commercial	24.569	31.480	28%	6.911
Public Services	5.214	5.080	-3%	134-
Eduction, Health	14.461	19.798	37%	5.337
Other	325	944	191%	620
total employed	67.713	75.731	12%	8.018
Number of people employed in Manufacturing ('000)				
Food products, beverages, tobacco	1.542	1.418	-8%	124-
Textiles, wearing apparel, leather etc	941	313	-67%	628-
Wood, paper products	814	381	-53%	433-
Petroleum, chemical, rubber, plastic and other mineral products	2.263	1.666	-26%	597-
Basic/fabricated metals and machinery	4.046	3.069	-24%	977-
Electrical, computer, electronic and optical products / equipment	1.931	1.136	-41%	796-
Motor vehicles and other transport equipment	1.469	1.686	15%	217
Other	1.794	1.853	3%	59
total employed Manufacturing sector	14.800	11.521	-22%	3.279-
% of total employed	22%	15%		

Figure 16 – Germany /UK / Netherlands: employment data and economic indicators 1995 – 2013

The sum of the data of the three selected EU countries (Germany, the UK, the Netherlands, see Figure 15) shows the following:

- In 2013, 15% of the people employed in 3 selected countries worked in the Manufacturing sector versus 22% in 1995
- In total about 3.3 million jobs (22%) were lost in the Manufacturing sector
- Within the Manufacturing sector the top 4 sectors in number of job losses are:
    - Basic/fabricated metals and machinery (-977,000 jobs)
    - Electrical products (-796,000 jobs)
    - Textiles (-628,000 jobs)
    - Chemical products (-597,000 jobs)
- Within the Manufacturing sector 1 sector showed increase in jobs:
    - Motor vehicles (+217,000 jobs)

The consolidated data of Germany, the UK and the Netherlands give a similar indication of overall de-industrialization process in the EU-15. The selected sub-sectors within the Manufacturing area show a significant overlap. The data from both an EU-15 perspective as well as the selected national economies are consistent from employment development perspective.

4.3.7 Summary of findings European Manufacturing Industry

The Data research Chapter had two main objectives: (1) to understand the role of the Manufacturing sector in the European economy (EU-15), (2) to support the selection of the Delphi expert panel. What is called 'the European Manufacturing Industry' is now clear from a statistical and economical perspective. It is understood now what sectors are recognized in 'the Industry' and what subsectors are recognized in what is called 'the Manufacturing sector'. To validate the findings of the total EU-15 data, three countries have been used as cross-reference as well. From 1995 until 2013, total employment in the EU-15 grew with 14% (+21 million jobs). In the sector Industry 6.7 million jobs were lost. The Manufacturing sector lost most jobs: 6.3 million. The data for the combined three selected countries correlates with the total EU-15 data on employment development.

Figure 17 visualizes the development of employment in the overall EU-15 manufacturing subsectors. Experts for the selection of the Delphi panel will be selected from the following four Manufacturing sectors:

1. **Base metals / Machinery**(Basic and fabricated metals and machinery)
2. **High Tech Electronics** (Electr(on)ical products and equipment)
3. **Chemicals** (Chemical and mineral products)
4. **Automotive** (Motor vehicles and other transport equipment)

These four Manufacturing sectors represent 60% of Europe's manufacturing industry from employment perspective. In line with Weiss and Tribe's (2016) definition, these sectors represent the capital intensive and complex technology part of the manufacturing industry. Food, textile, wood/paper are regarded as low technology and labor intensive. For future manufacturing location selection purposes these sectors are less relevant for the Made in Europe research objective.

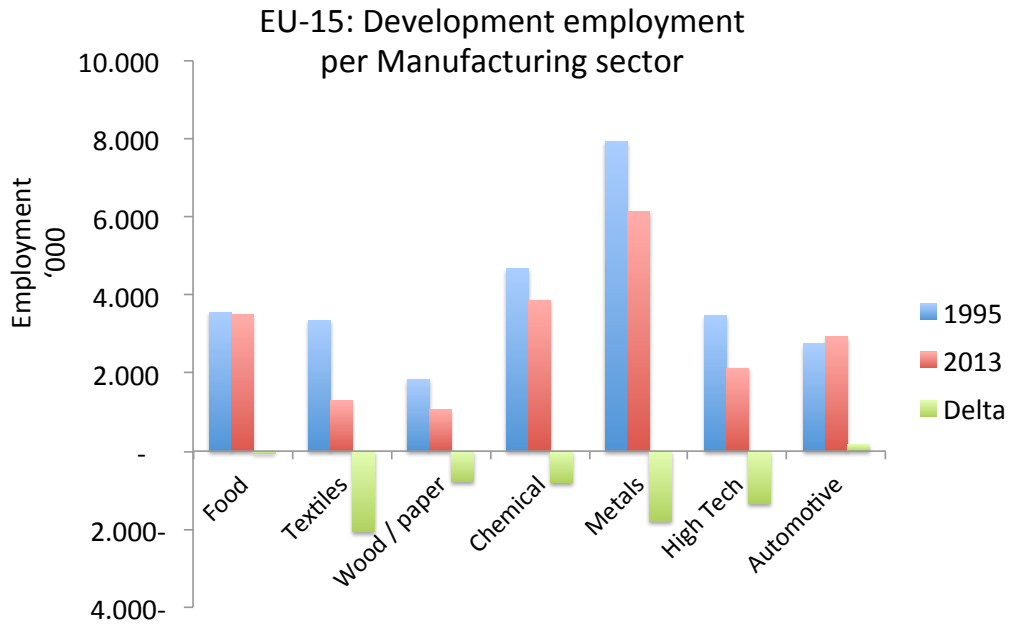

Figure 17 – Development of employment in the EU-15 manufacturing sub-sectors (Eurostat database, July 2015, NACE coding)

In the combined EU-15 countries, the amount of jobs in the Manufacturing sector dropped from around 31 million to 25 million from 1995 up to 2013, a loss of over 6 million jobs in less than 20 years. During the same period, the employment in all the other sectors combined, increased with almost 28 million jobs. In relative numbers: employment in Manufacturing dropped from 21% to 15% (-6%). In the Commercial Services sector, employment grew from 35% to 41% (+6%). The economy in Europe has shown a shift from industrial manufacturing jobs to employment in the Services sector, which is in line with the developments of other highly developed economic regions like Japan and the US.

The next Chapter will document how governments in Europe react to the effects of de-industrialization in their countries and regions.

CHAPTER 5

GOVERNMENT INDUSTRIAL POLICY REVIEW

5 Review of European Government Industrial policies

5.1 Introduction

The previous Chapter showed how employment in the various Industry sectors of Europe's economy has undergone massive changes in the years 1995 until 2013. This chapter will look at what European governments are actually doing in respect to Industrial policy. What are the exact policies in place and in what way are they influencing businesses strategies and therefore employment? In essence, the purpose of government and the purpose of an MNC is different. Both drive their own agenda from the perspective of what they want to achieve. The primary goal of any commercial business is to add value. For a business in the private sector adding value involves generating a profit, required to secure business continuity and growth. Governments have a more diverse agenda for their citizens involving employment potential, healthcare, a safe living environment and a fair distribution of income.

Based on the previously selected geographical scope (see Chapter 1.5), the Industrial policies published by the following government bodies will be reviewed:

- The European Union: Directorate-General for Enterprise and Industry
- Germany: Federal Ministry for Economic Affairs and Energy
- The United Kingdom: Department for Business, Innovation and Skills
- The Netherlands: Ministry of Economic Affairs, Agriculture and Innovation

From a government perspective, more than one ministry will impact the Industrial sector. Think for instance about the Ministry of Finance for corporate taxes. For this research, only the abovementioned bodies will be reviewed, assuming they represent the voice of the government towards the Manufacturing Industry. In this part of the research the following questions will be dealt with:

a. What is the documented objective of the different Ministries regarding Industrial policy? What are the characteristics of this government Industrial policy?
b. What approach has the respective government chosen to implement this policy in their respective country?
c. What sectors (if any) are chosen for specific economic support from the government?

5.2 Timeframe Government policy review

The previous part of the Data Research looked at a specific timeframe: 1995 up to 2013. In this Chapter dealing with governmental policies, the documented economic policy in the period 2014-2017 will be reviewed. Politicians and ministers in charge of the previously mentioned Ministries or DG come and go. As an example, in the Netherlands (not really known for dramatic changes in economic policy or unstable governments) there have been 10 different Ministers for the Department of Economic Affairs in the period 1995 up to 2013. Regular elections that are part of the democratic process will for sure influence the way how policies, including the Industrial policy, are both documented and implemented, as also described in Chapter 2: Literature review – Government Policy. The overall responsible Minister is regularly substituted following democratic elections, same as a CEO within a corporate business environment.

In the Government policy review, documented policies in the years 2014 up to 2017 are reviewed to get a proper understanding of the industrial policies in place in Europe. In the following sections, the Industrial policies of four governments will be reviewed: The European Commission, Germany, the UK and the Netherlands (see also Chapter 1.5 Geographical context).

5.3 The EU (European Commission)

In 2008, the global economy has been severely impacted by an economic and financial crisis. Around the world, banking institutions needed to be saved by governments with taxpayer's money. Housing markets were impacted severely, and a period of economic downturn followed in the majority of the developed economies (see Figure 18).

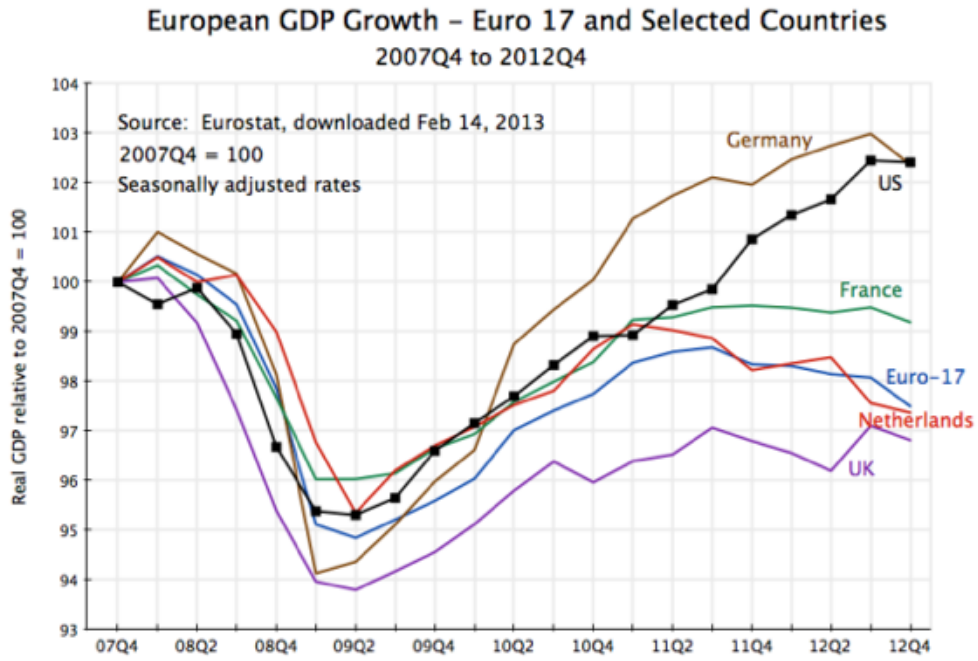

Figure 18 European GDP growth (source: Eurostat)

The European Commission launched a large-scale initiative, with the objective to beat the years of recession and come out of the economic misery as a stronger union. The transformation program was named *Europe 2020*. In 2010, the chairman of the European Commission at that time, Jose Manuel Barroso summed up what he saw as the objective of the Europe 2020: 'more jobs and better lives' (European Commission, 2010). The Commission launched 7 'flagship initiatives' with the objective to reach a variety of targets, which were considered to be critical for the re-birth of the European economy. An overview of both targets and flagship initiatives are presented in Figure 19.

ANNEX 1 - EUROPE 2020: AN OVERVIEW

HEADLINE TARGETS		
– Raise the employment rate of the population aged 20-64 from the current 69% to at least 75%. – Achieve the target of investing 3% of GDP in R&D in particular by improving the conditions for R&D investment by the private sector, and develop a new indicator to track innovation. – Reduce greenhouse gas emissions by at least 20% compared to 1990 levels or by 30% if the conditions are right, increase the share of renewable energy in our final energy consumption to 20%, and achieve a 20% increase in energy efficiency. – Reduce the share of early school leavers to 10% from the current 15% and increase the share of the population aged 30-34 having completed tertiary education from 31% to at least 40%. – Reduce the number of Europeans living below national poverty lines by 25%, lifting 20 million people out of poverty.		
SMART GROWTH	**SUSTAINABLE GROWTH**	**INCLUSIVE GROWTH**
INNOVATION EU flagship initiative "**Innovation Union**" to improve framework conditions and access to finance for research and innovation so as to strengthen the innovation chain and boost levels of investment throughout the Union.	***CLIMATE, ENERGY AND MOBILITY*** EU flagship initiative "**Resource efficient Europe**" to help decouple economic growth from the use of resources, by decarbonising our economy, increasing the use of renewable sources, modernising our transport sector and promoting energy efficiency.	***EMPLOYMENT AND SKILLS*** EU flagship initiative "**An agenda for new skills and jobs**" to modernise labour markets by facilitating labour mobility and the development of skills throughout the lifecycle with a view to increase labour participation and better match labour supply and demand.
EDUCATION EU flagship initiative "**Youth on the move**" to enhance the performance of education systems and to reinforce the international attractiveness of Europe's higher education.	***COMPETITIVENESS*** EU flagship initiative "**An industrial policy for the globalisation era**" to improve the business environment, especially for SMEs, and to support the development of a strong and sustainable industrial base able to compete globally.	***FIGHTING POVERTY*** EU flagship initiative "**European platform against poverty**" to ensure social and territorial cohesion such that the benefits of growth and jobs are widely shared and people experiencing poverty and social exclusion are enabled to live in dignity and take an active part in society.
DIGITAL SOCIETY EU flagship initiative "**A digital agenda for Europe**" to speed up the roll-out of high-speed internet and reap the benefits of a digital single market for households and firms.		

Figure 19 Europe 2020 (European commission, 2010)

5.3.1 Industrial policy Europe 2020

One of the flagship initiatives from the Europe 2020 program is called 'an industrial policy for the globalization era'. The prime objective is to 'improve business environment (…) and to support the development of a strong and sustainable industrial base to compete globally'. Responsible for the implementation of this initiative in 2010 was Antonio Tajani, Vice President of the European Commission for Industry. Tajani used the following slogan: 'Europe needs Industry and Industry needs Europe' (European Commission, DG Enterprise and Industry, 2010). One of Tajani's strategic goals is to bring up the value of the Manufacturing part of the Industrial sector to 20% of total GDP by 2020. Tajani's approach was to implement this new Industrial policy along several dimensions (European Commission, DG Enterprise and Industry, 2010):

1. Improving Framework conditions for Industry through smart regulation
2. Strengthening the Single Market through increased harmonization
3. A new Industrial Innovation policy through innovation and skills enhancement
4. Capitalizing on Globalization through international Trade regulations
5. Promoting Industrial Modernization through Energy resource efficiency
6. Sector specific targeted approach
    - Space
    - Sustainable mobility
    - Climate change, healthcare and security
    - Sectors with highly competitive value chains (Chemicals, Engineering, Automotive, Agro-food, Business Services)
    - Energy intensive sectors

It was furthermore agreed that the program would be monitored closely using the following success indicators:

- International competitiveness
- Number of jobs created in industry
- Rate of manufacturing output increase
- Share of medium/high technology sectors in total manufacturing value-added and employment

Annually the performance of the different initiatives within the EU member states are measured and reported in the member states Competitiveness Report. The 2014 report on the subject of Industrial Innovation had the subtitle: Helping Firms Grow (DG for Enterprise and Industry, EC, 2014). Figure 20 shows an example of two leading indicators related to this part of the flagship initiative from the Europe 2020 program.

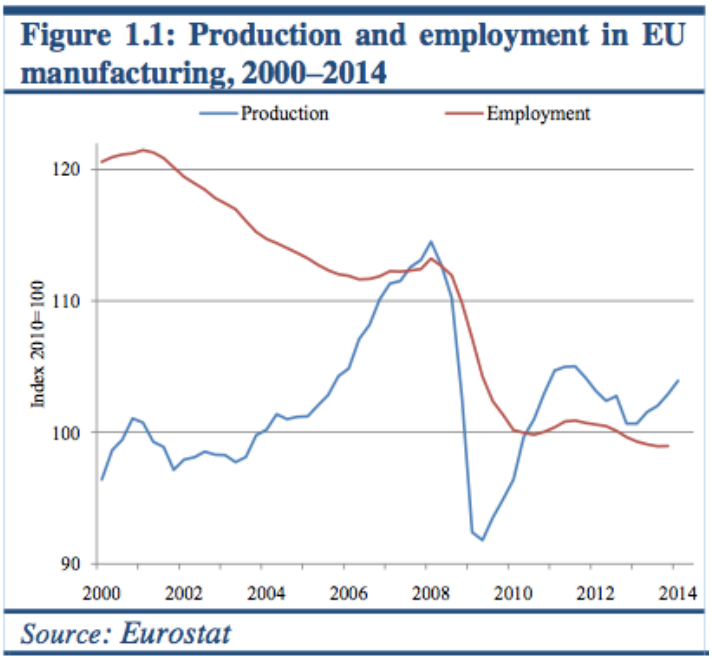

Figure 20 Performance indicators from the EU Competitiveness Report 2014

In 2016, the European Commission (EC) started to prepare an update of the Horizon 2020 program with 'a renewed EU Industrial Policy Strategy'. The document was published in September 2017 under the title 'Investing in a smart, innovative and sustainable Industry'[11]. The main driver for this update was rapidly changing technological development and increasing sustainability challenges in todays globalized economy. For Europe to remain competitive and reinforce Europe's Industrial leadership in this new industrial age, additional effort and intervention was required according to the European Commission. New information technologies and automation is changing the traditional manufacturing world and way of working. The EC recognizes the distinction between manufacturing and services is changing as a result of the digitization of manufacturing processes.

[11] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:479:FIN

Figure 21 visualizes the cornerstones of the updated EC's industrial policy from September 2017. Digitization of the industry, development of people skills in a circular and low carbon economy are examples of how the EC is looking at reinforcing Europe's industrial competitive advantage in the global market.

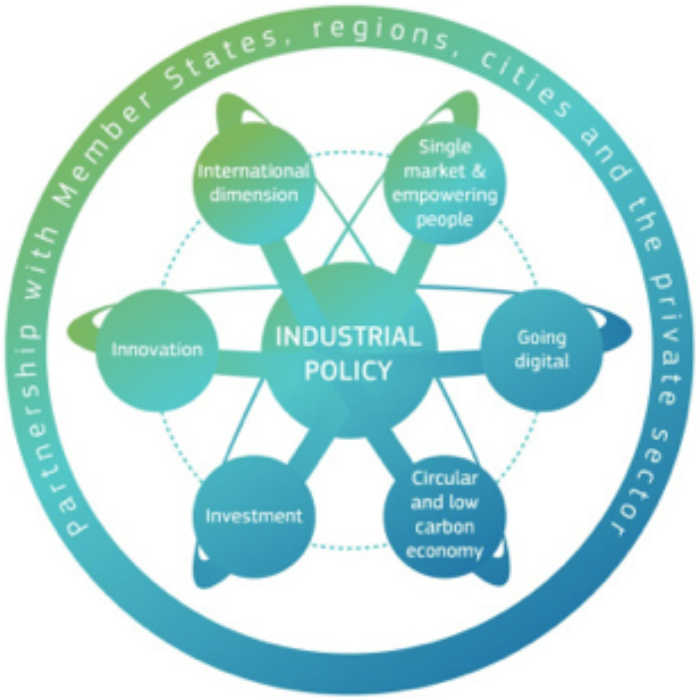

Figure 21 Renewed EU Industrial policy strategy (September 2017)

Increased investment in innovations combined the further removal of trade barriers in the international markets is seen as the enabler for increased economic activity of Europe' industry. In the following sections, the Industrial policies of three EU-15 countries will be described to see how governments have translated the EU Industrial policy principles on a national level.

5.4 Germany

5.4.1 Objective

In Germany's governmental structure, the Federal Ministry for Economic Affairs and Energy is responsible for the nation's Industrial policy.

'The central task of the Ministry for Economic Affairs and Energy is to reinvigorate the social market economy, stay innovative in the long term and strengthen the social fabric in Germany'[12].

[12] see for more information http://www.bmwi.de/

The general task is followed by these more concrete objectives:

- *Investment: We are fostering public and private sector investment. Our goal is to reach an investment rate that is above the OECD average.*
- *Innovation: We are deploying an active industrial policy. Our approach is to focus on the lead markets and lead technologies of the 21st century, to provide the scientific infrastructure needed to support these, and to improve the way in which innovation is brought to market.*
- *Infrastructure: We want to make sure that Germany is fit for the future, which is why we are actively promoting the key areas of digital infrastructure and transport infrastructure. We will be investing more in our transport infrastructure and actively continuing our broadband expansion scheme.*
- *Internationalization: We want to support German companies - particularly SMEs - as they do business with international growth markets. Furthermore, Germany has to become more attractive for foreign investment.*
- *Integration of labor and tapping all the skills reserves: The skilled labor available in our country will be a key factor for investment in Germany. We therefore have to tap our domestic skills reserves: This includes reducing the number of school dropouts and apprentices that do not finish their training. It also means giving people under 35 who have no vocational qualifications a second chance. In addition to this, immigration is and will remain vital for Germany to be able to meet its demand for skilled labor.*
- *Energy reforms: We will continue to promote our energy reforms, focusing in equal measure on climate and environmental sustainability, security of supply and affordability. Electricity costs are to remain affordable for commercial, industrial and private consumers. We will focus more on cost effectiveness and economic efficiency. Energy efficiency is a core part of our energy reforms and must gain even more importance.*

The policy of the Federal Ministry is summarized with the following clear statement: 'The Federal Ministry for Economic Affairs and Energy therefore needs to constantly guarantee competitiveness and a high level of employment'.

5.4.2 Approach and implementation

The organization and structure of the Ministry consists of 10 separate Directorate-Generals (DG's). One of these DG's is called: Industrial Policy. For the implementation of policy, strategy and objectives, Germany turns to annual political action plans. For 2015 e.g., this was called the 'National Reform Programme 2015[13]' in which all different objectives are put into macro-economic context and the most important policy areas for 2015 are highlighted. Being the largest economy in the European Union, Germany is aware of its impact on the overall EU economy. As will be described later in this section (as part of the European Commission's DG for Enterprise and Industry), Germany's Industrial policy is closely linked to the Europe 2020 strategy. Specific targets and actions from Europe's 2020 strategy are linked in detail with actions implemented by the German Ministry. Germany's Industrial policy is described as follows: 'the industrial sector in Germany is a bedrock of prosperity and employment - even more so than in many other industrialized countries. A sustainable industrial policy must seek to ensure that the German industrial sector can maintain and further improve its competitive edge'.

[13] more details on the German Industrial policy can be found on www.bmwi.de

Specifically, on location decisions for Industrial businesses, the German government has started using the slogan: 'Standort Deutschland' in the previous decade. In different publications on the attractiveness of a European country for business to locate themselves, Germany is regarded as one of the leading countries for a variety of reasons: highly skilled labor, excellent infrastructure and so on. One example of such a publication is the annual Global Manufacturing Competitiveness Index from the Accountancy and Consulting firm Deloitte (Deloitte United States, 2014). Besides this political slogan, the German government is actively promoting what is called 'Industry 4.0', referring to a 4th Industrial Revolution. Jointly with various business association platforms (like the German Engineering Federation and the Federal Association for Information Technology, Telecommunications and New Media), the government launched the Industry 4.0 platform in March 2015. Main objective is to lead the digital revolution currently happening in various industrial sectors and secure the 'Made in Germany' mark of quality. In a speech for the World Economic Forum in Davos, January 2015, the German chancellor, Angela Merkel, called Industry 4.0 'the way we deal quickly with the fusion of the online world and the world of industrial production'.

In 2016, 22.6% of the German GDP was made up by the industry (Schneider, 2017). The key success factor for this result is the fact that actually the German government 'refrains from active industrial policy'. Instead, the critical factor for strengthening the industrial economy is to 'create economic conditions that intensify competition, promote research and development and open up markets'. The German industrial policy is based on the principle that all stakeholders involved are committed to this principle: no active involvement from the government but a clear facilitating role in making industrial companies successful in global manufacturing markets. Industry in Germany is clearly seen and promoted as the engine of the German economy. The German industrial policy[14] is based upon the renewed EU policy: focus areas are 'Plattform Industrie 4.0: working together to shape the digitalization of Industry' and 'Industry and environment'.

5.5 The United Kingdom

5.5.1 Objective

In the UK, responsibility for its national Industrial policy lies with the Department for Business, Innovation and Skills. In 2013, the Department published 'Industrial Strategy: government and industry in partnership'. The document describes the UK government's approach to Industrial policy. Leading theme in UK's industrial policy is 'working in strategic partnerships with all sectors'. One of the objectives is '*to make the UK more competitive so British businesses can thrive and compete with rising economies'* (Anon, 2014). The subtitle of the document describes specifically the objectives of the Industrial strategy outlined by HM Government: 'securing jobs and a stronger economy'.

5.5.2 Approach

UK's industrial strategy has five main strands, describing how the UK government intends to approach the implementation of the Industrial strategy (Anon, 2014):

- Sector partnerships
    - *Providing support for all sectors to help increase global competitiveness, support innovation and maximize export potential*

[14] https://www.bmwi.de/Redaktion/EN/Dossier/modern-industry-policy.html

- Technologies
    - *Supporting the development and commercialization of technologies where the UK has the research expertise and business capability to become a world leader*
- Access to finance
    - *Helping businesses get the finance they need to invest in people and equipment and to grow*
- Skills
    - *Working to deliver the skills that employers need, giving business more say over how government funding for skills is spent*
- Procurement
    - *Developing UK supply chains and creating a simpler and more transparent public-sector procurement system*

The UK government has selected the following sectors as special focus areas: aerospace, information economy, off-shore wind, agricultural technologies, international education, oil and gas, automotive, life sciences, professional and business services, construction and nuclear. Of this total of 11 sectors, the four underlined are in fact manufacturing sub-sectors. Twice a year, the government monitors various indicators within each sector in order to see what progress has been made in the execution of the Industrial strategy (Anon, 2015). In Appendix 3 an example is shown related the UK's Automotive sector: UK car production, motor vehicle export as well as employment in UK's Automotive industry is measured. Recently, in 2017, the UK government published 'UK Industrial strategy, a leading destination to invest and grow' [15]. The five main strands as described in 2014 are further strengthened through nominating the following foundations to the new UK Industrial strategy: (1) Ideas, (2) People, (3) Infrastructure, (4) Business Environment and (5) Places. Specifically, the element 'Infrastructure' is added referring to the importance of building a digital infrastructure to support businesses.

5.6 The Netherlands

5.6.1 Objective

The Dutch government has the objective to *'continue to provide an excellent environment for effective entrepreneurship, which requires reliable infrastructure and clear regulations. This will improve the quality of our business climate even further, encouraging even more international companies to establish operations here in the Netherlands'*[16]. In the Netherlands, the WRR (Scientific Council for Government Policy) is established to help formulate strategies and long-term objectives for the Ministry of Economic Affairs. In 2013, the council published the report 'towards a learning economy. Investing in the Netherlands' earning capacity' (WRR, 2013). Key message from the council to the government is to focus on an industrial strategy, focused at 'boosting the country's earning capacity' versus a strategy of 'linear forecasting' (WRR, 2013). The Dutch Ministry of Economic Affairs published an update on their Industrial policy called 'Working together for Renovation' (Ministry of Economic Affairs, NL, 2015).

[15] https://www.gov.uk/government/policies/industrial-strategy
[16] www.topsectoren.nl

In this publication, the Ministry describes the following objectives:

- Renovation by new and established companies
- Partnerships for renovation and solutions for societal challenges
- Consistent industry policy aimed at an attractive location climate

Several Key Performance indicators are introduced in order to monitor the results like Labor productivity, Global Competitiveness Index, R&D intensity.

5.6.2 Approach

Several initiatives and programs have been launched to support implementation of the Dutch Industrial policy, like 'Invest in Holland'[17] and 'Smart Industry' (Dutch Industry fit for the future)[18]. Furthermore, the government has put into effect a clear policy around what is called 'Top-sectors': '*our approach is focused on the nine sectors in which we are global leaders: our top sectors. The instruments we use include investments, scale incentives, guarantees and cutting down on bureaucracy and red tape'*[19].

The nine top-sectors selected for special focus from Industrial policy perspective are:

- Agriculture and Food
- Chemical Industry
- Creative Industry
- Energy
- High Tech systems & materials
- Life sciences and Health
- Logistics
- Horticulture
- Water

The underlined sectors are manufacturing sectors. Specific objectives are set for these sectors, e.g.:

- Chemical Industry: 'Remain in the Top 3 in Europe' (after Germany and France)
- High Tech systems & materials: 'Keep the international top position; increase export value with 80% in the next ten years'
- Life sciences and Health: 'Redesign the entire health value chain (prevent-cure-care)'

The Dutch government seems to be very aware of the importance of the factor 'location' for international operating companies. On the Invest in Holland website[20], the first answer to the question 'why invest in Holland?' is clear: 'you can't beat our location'.

In 2017, a new government was put in place and reconfirmed the principles set out in the Smart Industry program. The implementation agenda [21] for 2018-2021 describes three areas where acceleration is promoted. This promotion is seen as necessary to keep up with the fast pace developments in the information technology environment. The first area concerns the Manufacturing strategy: advanced, flexible manufacturing, using a high degree of digitized processes will lead to what is called 'smart products' (connected, personalized etc.). The second area is about

[17] www.investinholland.com
[18] www.smartindustry.nl
[19] www.topsectoren.nl
[20] http://investinholland.com
[21] https://www.smartindustry.nl/smart-industry-implementation-agenda-2018-2021/

the use of digital, connected and sustainable factories. Value chains of manufacturing operations are global and need flawless integration from a supply chain perspective. The third area of required acceleration is about 'smart working'. Machine and people will be more and more connected and working together. Building an environment where people are supported by these new technologies is seen as the final cornerstone to a successful Dutch Industrial policy.

5.7 Recapitulation Industry policy

In the previous section, the highlights of the various government policies in the pre-selected European countries have been described. In Figure 22 a recapitulation of the four selected government industrial policies is presented.

Government	Key objective / Guiding principle	Motto	Manufacturing sector focus?
European Commission	'More jobs and better lives' increase Industrial value add to 20%	'Europe 2020' 'Investing in a smart, innovative and sustainable Industry'	Yes Chemicals, Automotive
Germany	'Guarantee competitiveness and high level of employment'	'Industry 4.0' 'Standort Deutschland' Made in Germany	No specific sector focus
UK	'Securing jobs and a stronger economy'	'Government and Industry in partnership'	Yes Aerospace, oil & gas, automotive, life sciences
The Netherlands	'Provide an excellent environment for effective entrepreneurship'	'Smart Industry' 'Towards a learning economy' 'Investing in earning capacity' 'Fit for the future'	Yes Chemical, High Tech & materials, Life sciences & health

Figure 22 Overview of European industrial policies (Germany, UK, the Netherlands, EU)

Reviewing the government policies in Europe, one common objective was stated in all publications from the various Ministries of Economic Affairs: 'more jobs'. Maximum employment is still an important driver for all economic policies reviewed in this Chapter. The focus areas and approach to implementation however, differ from country to country. Where countries like the UK and the Netherlands have a specific manufacturing subsector focus, Germany does not. The European Industrial policies have all recently been updated with elements coming from the 4th Industrial Revolution. The EC stated this development clearly in their renewed Industrial policy document from 2017: 'the future of industry will be digital'[22]

[22] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:479:FIN

CHAPTER 6

DELPHI RESEARCH

6 Delphi Research

6.1 Introduction

In the previous research chapter 4 and 5, supportive research has been done to get a thorough understanding of what the European manufacturing industry stands for in terms of size, economic impact and employment data. The statistical data output was used to limit the research from geographical and manufacturing subsector perspective, as explained in the Research Methodology chapter. Using the Data research output, four Manufacturing subsectors were selected that will be used for the primary Delphi research: The High Tech, Metals & Machinery, Automotive and Chemical subsectors. These subsectors were chosen based on their relative impact in the overall Manufacturing Industry in combination with the employment decline within these subsectors. The selection also followed Weiss and Tribe's (2016) definition on manufacturing sector importance from economic perspective. In order to find answers to the research question, a panel of senior business experts coming from European based Manufacturing subsectors was formed for the Delphi research.

In this chapter the results of the Delphi study conducted as part of the Made in Europe research will be presented. The objective of this Delphi study is to uncover the specific factors important for decisions about future manufacturing locations. In order to achieve this goal, a Delphi panel was selected that had business knowledge about the manufacturing strategy of global Manufacturing firms. The specific selection criteria of the panel will be explained later in this chapter.

Chapter 3 Methodology highlighted the difficulty in approaching organizational elites (Drew, 2014). Ryan and Lewer (2012) described several case studies in order to find out what strategy to choose to *'get in and find out'* how top industrialists take decisions (Aguiar and Schneider, 2016); a *'dance of seduction'* is necessary keeping in mind the time and location constraints organizational elites have. Attracting attention from business elites means giving them a reason to re-prioritize their agenda to support academic research. How to achieve this? How to seduce them into freeing up their valuable time to support academic research? The approach for seducing these elites to participate in the Delphi study was based on the following principles: (1) attract attention with a promotional video, (2) apply the latest ICT tools for an efficient questionnaire process and (3) upfront answer the question organizational elite will have: 'what's in it for me?'

In order to encourage senior business practitioners and executives to support this academic research project, a special website was launched (www.MadeinEU.biz) including a promotion video explaining potential panel members the relevance of the research. In the website main menu structure, a specific section was dedicated to the question 'why join?' For reasons of efficiency, speed and accessibility, the registration process of the Made in Europe Delphi research as well as all the questionnaires were conducted online through the 24/7 available website. With a personal user ID and password, the individual panel member was able to access the questionnaires and review both their personal as well as the aggregated results from the group. See Appendix 5.0 for a snapshot of the website.

The promotional video on the Made in Europe website was the 'dance of seduction', whereas the 24/7 online availability of the questionnaires removed the time and location constraints for the organizational elite (Aguiar and Schneider, 2016).

6.2 Timeline Delphi Research

The Delphi research was conducted from January 2017 until October 2017. The detailed timeline and milestones are as follows:

- January 2, 2017 — Launch of the website www.MadeInEU.biz
- January 6-10 — Email invitations sent out to target group
- January 6 – February 6 — Registration process of participants
- March 1 — Selection Expert panel participants completed
- March 5 — Invitation sent out for Round 1 Questionnaire
- March 6- April 15 — Input received for Round 1
- April 15 – May 15 — Analysis Round 1 input and preparation Round 2
- May 18 — Invitation sent out for Round 2 Questionnaire
- May 18 – July 16 — Input received for Round 2
- July 16 – August 15 — Analysis Round 1 input, preliminary results Round 1+2
- August 18 — Invitation sent out for Round 3 (Final input/comments)
- August 18 – Sept. 15, 2017 — Input received for Round 3

6.3 Profile of the Delphi panel

How were the potential Delphi participants approached and selected? Following the Data Research output, four Manufacturing sectors were identified for selecting participants for the Delphi research: High Tech, Metals / Machinery, Chemical and Automotive. The majority of global operating industries are member of one or more national, European or international 'Associations' or 'Councils' (see Appendix 5.1). Memberships are published on the web, which formed the basis for drawing up a list of potential companies within the designated manufacturing sector. Based on further website research, only companies operating on the global market and having manufacturing facilities in Europe have been preselected. The world's largest online professional network (LinkedIn) was used as search engine for approaching individual executives, fitting the expert profile. In a personal email to the potential Delphi panel member, the research Made in Europe was introduced with a link to the MadeInEU.biz website. The website was launched January 2, 2017. Email invitations were sent out to a target group of 128 potential candidates based on their publicly available Linked In profile (see Appendix 5.1).

The requested profile of the panel member was described on the website and was part of the panel member selection process:

- Senior management position (current or previous) in a European based Manufacturing Industry (sector Oil & Chemicals, High Tech, Metals & Machinery or Automotive)
- Extensive experience with strategic questions around Operations Management, Supply Chain Management, Location strategies, Outsourcing, Off- and Re-shoring

During the recruitment process, the participants were specifically asked how many years of practical business experience they had in one of the identified Manufacturing sectors. Also, relevant experience related to manufacturing strategies and location decisions was a prerequisite for admittance to the Delphi panel. The registration process closed February 24, 2017.

The participants Linked In profile and resumes were used as verification for admittance to the Delphi panel. Finally, **39** persons were admitted as Delphi expert panel member. This group of industrialists had an average number of 22.6 years of Manufacturing Industry experience. Below tables 4 and 5 represent the registered panel member per Manufacturing sector and position / function title.

The participants came from a variety of manufacturing sectors; some examples of company characteristics:

- High Tech: Consumer electronics, Semiconductor equipment, Medical devices, Energy equipment, Precision parts
- Metals / Machinery: Gears, Aircraft equipment, Foundry and base metals, Engine components
- Chemical: Fine chemicals, Base chemicals, Fertilizers
- Automotive: Automotive OEMs, 1st tier OEM suppliers, 2nd tier OEM suppliers

MANUFACTURING SECTOR	REGISTERED PANEL MEMBERS	DISTRIBUTION
HIGH TECH	15	38%
METALS / MACHINERY	10	26%
CHEMICAL	7	18%
AUTOMOTIVE	7	18%
TOTAL	39	100%

Table 4 Distribution registered panel members per sector

MANUFACTURING SECTOR	REGISTERED PANEL MEMBERS	DISTRIBUTION
'C' LEVEL (CEO, COO, CFO, CPO)	10	26%
VP (VICE PRESIDENT) LEVEL	8	21%
DIRECTOR LEVEL	16	41%
MANAGER LEVEL	5	13%
TOTAL	39	100%

Table 5 Distribution registered panel members per position / function title

6.4 Round 1 statistics

An email invitation to participate in Round 1 of the Delphi research was sent out to all registered panel members March 5, 2017 (see Appendix 5.2). A reminder was sent out to all participants March 21, 2017. Round 1 closed on April 15, 2017. In total 32 participants responded through the online questionnaire (see Appendix 5.3), giving a response rate of 82%. Table 6 represents the response rate per sector.

MANUFACTURING SECTOR	REGISTERED PANEL MEMBERS	ROUND 1 RESPONSES	RESPONSE RATE ROUND 1
HIGH TECH	15	11	73%
METALS / MACHINERY	10	9	90%
CHEMICAL	7	6	86%
AUTOMOTIVE	7	6	86%
TOTAL	39	32	82%

Table 6 Summary response rate per sector Round 1

Table 7 shows the response rate per position / function title.

POSITION	REGISTERED PANEL MEMBERS	ROUND 1 RESPONSES	RESPONSE RATE ROUND 1
'C' LEVEL	10	8	80%
VP LEVEL	8	7	88%
DIRECTOR LEVEL	16	12	75%
MANAGER LEVEL	5	5	100%
TOTAL	39	32	82%

Table 7 Summary response rate per position / function title Round 1

All results from Round 1 were collated, interpreted and analyzed. A preliminary report with the results was composed in order to prepare the participants for Round 2. This preliminary report was presented online, so the participants were able to access the interim report through a personalized link to the MadeInEU.biz website.

6.5 Round 2 statistics

May 18, 2017, all original registered participants were invited by email (see Appendix 5.4) to participate in Round 2 of the research. Once logged in, the participants could view all original research questions, their original input from Round 1 as well as the aggregated results from the other participants from Round 1. Please refer to Appendix 5.5 for details of this Round 2 questionnaire. June 8, 2017 a reminder email was sent to the participants who had not yet submitted their input for Round 2. Round 2 closed July 16, 2017. During Round 2, the participants were asked to review, comment and/or adjust their original input based on the aggregated results from the entire panel of participants. In Round 2, a total of 31 participants responded to the questionnaire, giving a response rate of 79% of the original 39 registered participants. Of the 31 respondents, 28 respondents also participated in Round 2, giving a response rate for both Round 1 and 2 of 72%. A total of 4 participants from Round 1 did not respond in Round 2. A total of 3 participants who did not participate in Round 1, did participate in Round 2. See also Table 8 and 9 for details of the response rate per sector and position.

MANUFACTURING SECTOR	REGISTERED PANEL MEMBERS	ROUND 1 RESPONSES	ROUND 2 RESPONSES	RESPONSE RATE ROUND 2
HIGH TECH	15	11	11	73%
METALS / MACHINERY	10	9	9	90%
CHEMICAL	7	6	5	71%
AUTOMOTIVE	7	6	6	86%
TOTAL	39	32	31	79%

Table 8 Summary response rate per sector Round 2

POSITION	REGISTERED PANEL MEMBERS	ROUND 1 RESPONSES	ROUND 2 RESPONSES	RESPONSE RATE ROUND 2
'C' LEVEL	10	8	8	80%
VP LEVEL	8	7	5	63%
DIRECTOR LEVEL	16	12	14	88%
MANAGER LEVEL	5	5	4	80%
TOTAL	39	32	31	79%

Table 9 Summary response rate per position / function title Round 2

Table 10 gives an overview of the actual additional feedback received from the participants who responded to both questionnaires from Round 1 and 2. On all six Delphi research questions, an average of 27% of the respondents came with additional input and/or adjustments on their original input from Round 1. All other respondents from Round 1 and 2 confirmed their original input or responded they did not had additional input referring to the preliminary report submitted for the Round 2 questionnaire.

DELPHI RESEARCH QUESTION	ROUND 1 & 2 # RESPONDENTS	# RESPONDENTS WITH ADDITIONAL INPUT AND COMMENTS IN ROUND 2	% RESPONDENTS WITH ADDITIONAL INPUT AND COMMENTS IN ROUND 2
1	28	7	25%
2	28	7	25%
3	28	7	25%
4	28	6	21%
5	28	8	29%
6	28	10	36%
AVERAGE		8	27%

Table 10 Summary # and % of respondents from Round 1 and 2 giving additional comments, adjustments on their input from Round 1

6.6 Round 3 statistics

All input, feedback and comments received in Round 2 were collated and analyzed. Because a total of 73% of the participants from Round 1 and 2 did not give any additional input in Round 2, it was decided not to start a formal 3rd questionnaire round. A 'wrap up' report was prepared for the participants with the aggregated results from Round 1 and 2. All original 39 registered participants received an email invitation for a final 'wrap up' on August 18, 2017 (see Appendix 5.6). The Delphi Research Wrap up document can be found in Appendix 5.7. All participants were asked to review the 'wrap up' report and give their closing comments, if any as their final input into the Delphi research Made in Europe. From the original 39 registered participants a total of 19 respondents replied by email, giving a response rate of 49%. From the 19 respondents, 4 participants gave closing comments on the Wrap up document. The remaining 15 respondents confirmed the Wrap up document was conclusive and therefor no additional individual input was submitted. The final wrap up Round 3 of the Delphi research closed September 15, 2017.

6.7 Made in Europe questionnaire – design, approach and results

The first objective of the Delphi method for this research is to reach consensus on relevant future location factors per sector (Linstone and Turoff, 1975). The second Research objective is to develop a decision-making framework to support location decisions. To achieve this the questionnaire was divided into four parts:

I. **De-industrialization in Europe**
   - 2 research questions (open)

II. **Operations strategy**
   - 1 research question (open)

III. **Industrial location factors**
   - 1 research question (semi open, rating of options)

IV. **Decision making process**
   - 2 research questions (open)

Each part begins with an introduction section, so the participant:

- could get acquainted with the topic at hand ('what is this about?')
- could review the relevant data from the supportive research ('what are the relevant data for me / my industry?')
- was stimulated to think freely delivering high quality answers ('what do I really think considering this information and the question at hand?')

Before the research questions on location factors (Part III) and the decision-making process (Part IV) were put to the participants, Part I and II were designed so the individual participant could get better acquainted with the topic of De-industrialization as a whole (Part I) and give his views on Manufacturing operations strategies in general and for his sector specifically (Part II). In Part I and II, a total of three open questions were formulated to stimulate the process of thinking open-mindedly. Synchronizing the participant's individual experience in the Manufacturing industry with preselected data and literature review, the participant is well prepared for the core research questions on location factors and the decision-making process (Part III and IV). Following each question to the participant, a short explanation is given how the individual answers would be aggregated, so it is

clear what the participant could expect as feedback for the next questionnaire round. Three rounds of questionnaires were anticipated to achieve the expected research results.

For categorizing, analyzing and visualizing the answers on the open questions, descriptive analytics was applied. The various answers from panel members were documented, analyzed and subsequently grouped into categories. The output was visualized in charts or tables focusing on the categories with the highest frequency in similar answers.

6.7.1 Part I De-industrialization in Europe

Part I (see Appendix 5.3) is an introduction into the topic 'De-industrialization in Europe', where selected data research results and observations were presented in short. Several drivers for this process of de-industrialization were presented using selected literature review data. An overview of the employment shift per individual Manufacturing sector helped the individual participant to identify himself with the data presented for his sector specifically as part of the overall de-industrialization process. Part I ended with two open questions on the topic of de-industrialization. With the input from the participants, the Researcher could also test and validate the outcome of both data and literature review, to be used for further discussion and conclusion in the final chapters of the research.

6.7.1.1 Question 1

Based on your personal experience in the Manufacturing Industry, what do you see as the most significant factors that have contributed to the shift in employment within the European Manufacturing sector?

In Round 1 the 32 respondents mentioned fifteen different factors. Descriptive analytics were used to identify all relevant factors. Next, the individual factors were grouped in categories based on their similarities. The factors were grouped into the following four categories:

- Cost related factors
    - E.g. Low labor cost, cost leadership, tax rates, energy cost, transport cost, exchange rates
- Technology related factors
    - E.g. automation, productivity
- Market related factors
    - Close to end market, labor availability, raw material availability, improved infrastructure
- Operations strategy related factors
    - Outsourcing strategy, core competence

Figure 23 shows the results from the input received during Round 1 and 2; only the 5 most frequently mentioned factors are shown. The two most frequently mentioned factors (together almost half – 47% - of all responses received) are 'low labor cost' and 'automation'. Round 2 confirmed in general the responses in Round 1. There was general consensus on the Top 5 factors, which jointly represented 76% of all individual factors mentioned. Looking at the four main categories mentioned previously in this section, the individual factors mentioned in the categories Cost and Technology represented 64% of all factors that were considered significant for the employment shift in the European Manufacturing Industry.

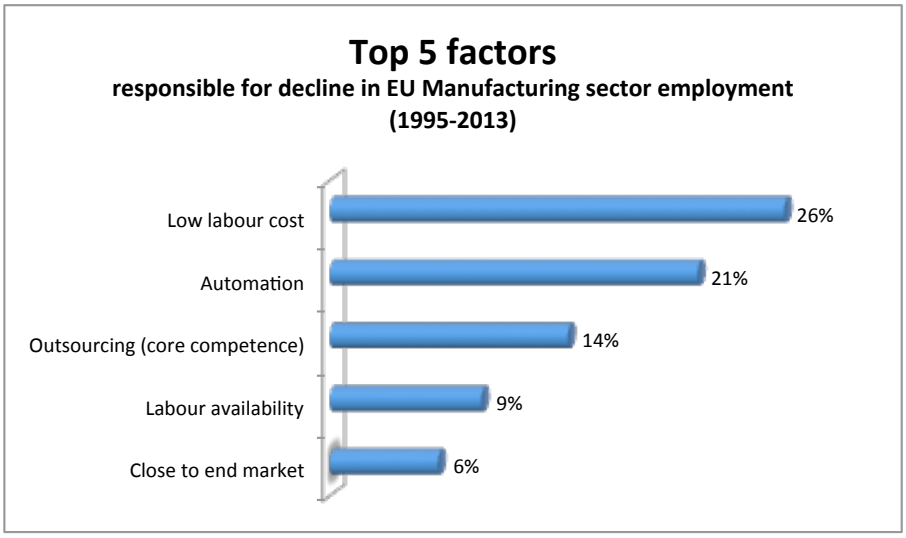

Figure 23 Most significant factors for the decline/shift in Manufacturing Industry employment (1995-2013)

6.7.1.2 Question 2

In the next 10 years, do you expect employment in the European Manufacturing Industry to increase or decrease? Because…

The second question stimulated the participants to look ahead and give a projection or forecast of what they expect will happen in relation to Manufacturing Industry employment in Europe. As Table 11 shows, 65% of the panel expects a decrease versus 30% expecting an increase. 5% expects employment to be stable. As with the previous question, there was general consensus among the participants during Round 1 and 2.

FUTURE EMPLOYMENT IN EU MANUFACTURING	ROUND 1 FREQUENCY	ROUND 2 FREQUENCY	ROUND 1 + 2 ROUNDED AVERAGE
DECREASE	65.6%	62.5%	65%
INCREASE	28.1%	37.5%	30%
STABLE	6.3%	-	5%

Table 11 Frequency of responses on expected employment development in the EU Manufacturing sectors

Following the initial semi-closed question, the participants were asked to clarify or give argumentation. Using descriptive analytics, the variety of answers was grouped in several categories described below.

The main argumentation for an expected decrease was:

- Automation, Robotics, Internet of Things, Industry 4.0
- Ongoing shift towards Low Cost Countries
- High cost of energy
- High cost of investment in Manufacturing capacity

The main argumentations for an expected increase was:

- Automation, Robotics, Internet of Things, Industry 4.0
- Nearshoring
- Increasing transportation cost
- 'Local content' regulations

The argumentation for an expected 'stability' in employment was:

- Automation, Robotics, Internet of Things, Industry 4.0
- Nearshoring versus LCC shift

The arguments for an expected increase, decrease or stability showed a high similarity.

6.7.2 Part II Operations strategy

In Part II, a summary of various Operation strategies, described in the Literature review data, was presented. In addition, the latest developments in the area of Operations and Manufacturing strategies were highlighted, referring to Industry 4.0 (Westkämper, 2014) and the 4th Industrial Revolution (Rifkin, 1995). This approach was taken to create awareness with the participants and stimulate his thought-process for the open question in this part of the Delphi questionnaire.

6.7.2.1 Question 3

Considering the Manufacturing Industry has now entered the 4th Industrial Revolution, what do you currently consider to be main strategic and operational drivers for manufacturing companies working across borders for the coming decade?

In the third open question before focusing on the actual location factors, the participants were asked to think about the current strategies they see in running across border manufacturing operations. To further stimulate their thinking, previous research (MacCarthy and Atthirawong, 2003) on the subject was described. The strategic and operational drivers from MacCarthy and Atthirawong's research from 2003 was described as supportive input for research question 3. In Round 1 and 2 a total of 111 factors were mentioned. 58% of the factors related to the five drivers described in the literature. 42% other (or new) drivers were mentioned by the participants. See Table 12 for further details.

STRATEGIC AND OPERATIONAL DRIVERS	ROUND 1 + 2 FREQUENCY	FREQUENCY %	RANKING
MACCARTHY & ATTHIWARONG (2003)			
ACCESS TO LOW LABOR COST AND LABOR SKILLS	24	22%	2
ACCESS TO MARKETS	17	15%	3
ACCESS TO RAW MATERIALS AND TECHNOLOGY	13	12%	5
TAX INCENTIVES	8	7%	
COUNTERATTACK AGAINST COMPETITORS	2	2%	

OTHER DRIVERS MENTIONED BY EXPERT PANEL			
ACCESS TO COST EFFECTIVE, FLEXIBLE SUPPLY CHAIN	25	23%	1
NEW MANUFACTURING TECHNOLOGIES	16	14%	4
OTHER			
- **STABLE (ICT) INFRASTRUCTURE, CO2 FOOTPRINT, ACCESS TO ENERGY, COST OF TRANSPORT, ADAPTABILITY**	6	5%	
TOTALS	111	100%	

Table 12 Summary responses Strategic and Operational drivers for across border manufacturing

Figure 24 shows the five strategic and operational drivers most frequently mentioned by the expert panel.

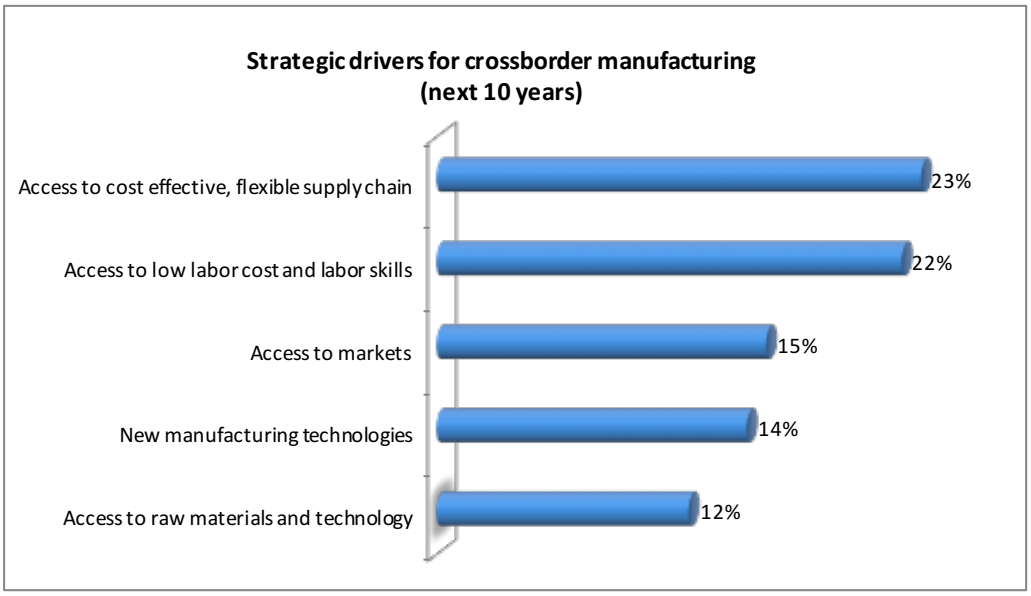

Figure 24 Top 5 strategic and operational drivers for across border manufacturing

6.7.3 Part III Industrial location factors

Part III of the questionnaire deals with industrial location factors, which is the prima focus of this research. The terms Economic Geography and Location strategy are explained with reference to the previous Literature review. Subsequently a list of 14 critical location factors was presented, using sources from the Literature review (Badri, 2007). Each individual factor was explained with practical examples so there was common understanding of the actual definition of the factor; e.g. 'Government attitude' and 'Government regulation' are both unique location factors with their own definition and explanation. This approach prevented unclarity among the participants on the definition of the individual factor. See Appendix 5.3 for more details on the specific description on each location factor used in the questionnaire.

Each of the 14 location factors could be rated using a 4-point Lickert scale (not important, rather important, fairly important, very important). A 4-point Lickert scale was used so that the participant had to choose between either 'not important/rather important' and 'important/very important'. No neutral position could be chosen to prevent the outcome to be unclear or indecisive.

6.7.3.1 Question 4

Based on your professional experience, how would you rate the critical location factors for industrial location of the European Manufacturing Industry in the coming decade?

Following the three open questions as introduction, question 4 is about scoring the relative importance of a variety of industrial location factors mentioned in academic literature (Badri, 2007). Badri's list of Industrial location factors was used based on the following considerations:

- Most recent research document from 2007 delivering a compressed total overview of industrial location factors
- Clear and short explanation of each critical factor, facilitating quick and easy understanding for the reader
- Systematic approach resulting in a clear synthesis of critical location factors from earlier (academic) publications
- Main research objective was to 'develop theory and decision models'
- The list of location factors has been developed, using literature and data research from academics as well as practitioners

Using the four-point Lickert scale, the participants was asked to rate the individual factor in either the basket 'unimportant or slightly important' or the basket 'fairly important, very important' (see Table 12 and Figure 25 for detailed scoring).

LOCATION FACTORS	UNIMPORTANT	SLIGHTLY IMPORTANT	FAIRLY IMPORTANT	VERY IMPORTANT
TRANSPORTATION	0	5	17	10
LABOR	1	4	13	14
RAW MATERIALS	1	12	9	10
MARKETS	0	6	9	17
INDUSTRIAL SITE	2	13	11	6
UTILITIES	3	9	11	9
GOVERNMENT ATTITUDE	0	4	16	12
TAX STRUCTURE	0	6	14	12
CLIMATE	7	12	11	2
COMMUNITY	1	11	17	3
POLITICAL SITUATION	0	1	14	17
GLOBAL COMPETITION	0	7	15	10
GOVERNMENT REGULATION	0	3	16	13
ECONOMIC FACTORS	0	7	17	8

Table 13 Absolute ratings critical industrial location factors based on Badri, 2007 (Delphi Research Made in Europe, 2017)

ADDITIONAL FACTORS EXPERT PANEL	ROUND 1 + 2
IT INFRASTRUCTURE	2
IP PROTECTION	1
ENVIRONMENTAL REGULATIONS	3
EDUCATION & SKILLS	2
QUALITY	1
WORKFORCE ETHICS	1
SOCIAL INNOVATION	1
COMPANY CULTURE	1
LOCATION DIRECT CUSTOMER / OEM	1

Table 14 additional industrial location factors mentioned by expert panel (Delphi Research Made in Europe, 2017)

The scoring was reported back to the participants after each Round visually, to facilitate analysis and interpretation. The different colors indicate the four different Lickert scale points. After the Round 1 input, one participant changed his original input. No other changes were made from Round 1 into Round 2. In Round 2, four participants added new location factors based on the input from other participants in Round 1 (IT infrastructure, Environmental regulations, Education & skills, see Table 14).

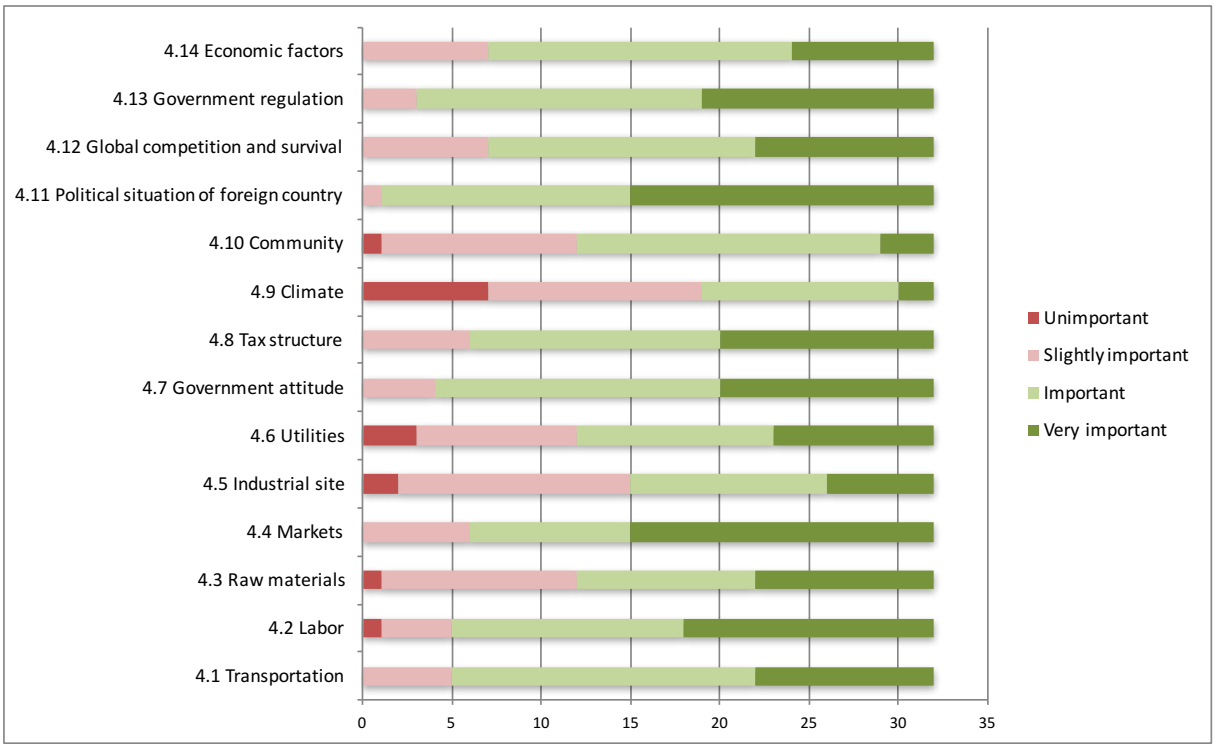

Figure 25 Visual representation of the scoring of each individual industrial location factor (Delphi Research Made in Europe, 2017)

In order to determine what location factors were considered to be relatively most important, the following scoring was applied:

- Unimportant 0 points
- Slightly important 1 point
- Fairly important 2 points
- Very important 3 points

The results of the scoring are visualized in Figure 26.

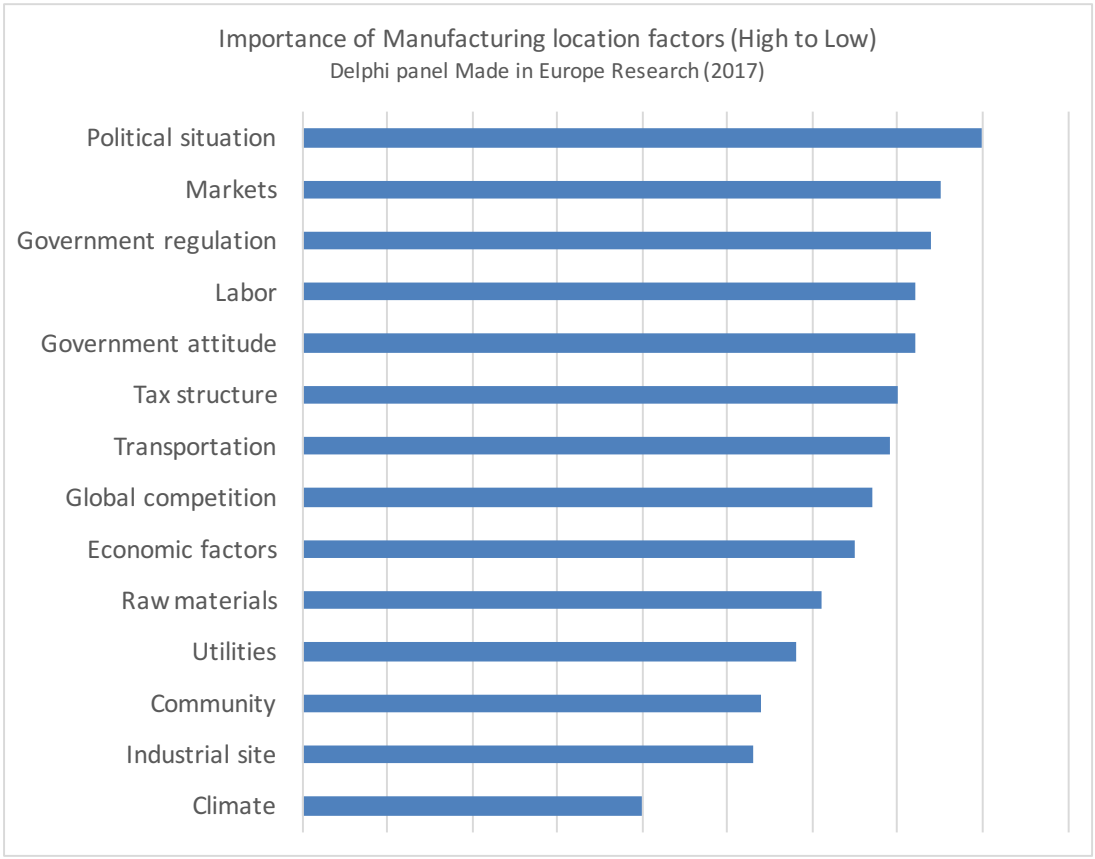

Figure 26 Manufacturing location factor importance rating (Delphi Research Made in Europe, 2017)

The Delphi panel consisted of business professionals with a background in one of the four preselected manufacturing subsectors: High Tech, Metals & Machinery, Automotive and Chemicals. The scoring in Figure 25 represents the sum of all Manufacturing sectors, as is generally the case for the analysis of all the data. However, for this one question only it was decided, additionally, to split the results by sector, as this is the question most likely to generate variations based upon the background of the respondent, in terms of their experience across sectors. Looking at the scoring of the location factor importance for the individual sector, the scoring of the panel members gives a more diverse picture. Below table 15 shows the Top 5 scoring from the panel members split per manufacturing sector.

Sector Ranking	All sectors	High Tech	Metals & Machinery	Automotive	Chemicals
1.	**Political situation of foreign country**	Political situation of foreign country	Political situation of foreign country	Markets	Utilities
2.	**Markets**	Labour	Labour	Political situation of foreign country	Raw Materials
3.	**Government regulation**	Government regulation	Transport	Global competition and survival	Transport
4.	**Labor**	Tax structure	Government attitude	Labour	Government regulation
5.	**Government attitude**	Markets	Government regulation	Government regulation	Government attitude

Table 15 Top 5 important industrial location factors

The importance of individual location factors differs for individual Manufacturing subsectors, as can be expected considering the different cost drivers of various industries. Cost, market and technology considerations are different in the individual manufacturing subsectors. For the four different Manufacturing subsectors, none of the individual Top 5 scoring of important location factors was identical. In the closing Chapter (section 8.8 Recommendations for further research) this specific topic will be referred to and discussed further.

6.7.4 Part IV Decision making process

The final Part IV of the questionnaire focused on the process of decision making within global Manufacturing organizations. The participants were asked to answer two open questions on this topic, giving the participant the possibility to freely give their opinion and describe their experiences.

6.7.4.1 Question 5

Based on your previous and personal experience, what do you consider to be the most difficult problem or problems to overcome when dealing with international manufacturing location decisions?

Part IV of the Delphi research deals with the decision-making process of location decisions. In the first question of this part of the Delphi research, the participants were presented several examples of these difficulties, as described in relevant literature review (MacCarthy and Atthirawong, 2003). In Round 1 and 2 of the research, the participants described a total of 56 problems or difficulties in the decision-making process they have had experience with. With descriptive analytics, the individual input was clustered into 11 categories, as visualized in Table 16. The 'Lack of local in-depth knowledge' was regarded the most important difficulty in the location decision process. Together with 'Lack of objective evaluation criteria' these two difficulties represented 40% of all the expert panel answers on this subject.

RATING	PROBLEMS WITH INTERNATIONAL LOCATION DECISIONS	FREQUENCY IN %
1	Lack of in-depth local knowledge	23%
2	Lack of objective evaluation criteria	16%
3	Cultural differences	13%
4	Sheer complexity of the problem	11%
5	Lack of expertise to support the decision-making process	9%
6	No focus of 'Total Cost of Ownership'	7%
7	High speed of business climate change	5%
8	No government support	4%
9	Imbalance between long/short term focus	4%
10	Environmental regulations	4%
	Other	5%

Table 16 Top 10 difficulties with industrial location decisions (Delphi Research Made in Europe, 2017)

6.7.4.2 Question 6

Based on your business experience, what recommendations do you have to overcome the problems related to the industrial location decision-making process?

In the final question of the Delphi research, the participants were asked to give recommendations on how to overcome the difficulties described in the previous question related to industrial location decisions. Using descriptive analytics, the recommendations are grouped in Table 17. A total of 52 recommendations were received and were clustered into 8 distinct categories. Recommendations, which were only mentioned once, are not shown in below Table.

RATING	PROBLEMS WITH INTERNATIONAL LOCATION DECISIONS	FREQUENCY IN %
1	Understand local dynamics, way of working, culture	27%
2	Apply objective and rational evaluation criteria	17%
3	Keep a long-term view or perspective	15%
4	Take ample time for in-depth analysis	10%
5	Conduct proper Stakeholder analysis & management	6%
6	Link to company's overall vision and strategy	6%
7	Use cross functional teams for decision making	4%
8	Secure proper IT infrastructure	4%
	Other	10%

Table 17 Top 8 recommendations to support the industrial location decision process (Delphi Research Made in Europe, 2017)

6.8 Made in Europe Delphi research in perspective

In the Methodology Chapter 3, the use of the Delphi technique for this specific research was explained. Some basic reference in academic literature was presented from research methodology perspective. Furthermore, reference was made to previous Delphi research published on the topic of location decisions.

In the following section, additional Literature reference will be presented as part of this analysis section of the Delphi research conducted. As the selection of an expert panel is critical for presenting valid academic results, this Delphi research will be compared against selected academic publications on Delphi research to see if these criteria are met. With this approach the Made in Europe results should show reliability, consistency and therefore significance. The expert panel size, expert profile, the number of Delphi rounds, the total duration of the study will be benchmarked against other Delphi studies.

'Delphi operates on the principle that several heads are better than one in making subjective conjectures about the future….and that experts will make conjectures based on rational judgment rather than merely guessing…' (Weaver, 1971). As described in Chapter 3 Methodology and in line with Weaver's quote, the objective of the Made in Europe Delphi research is to have an expert panel with participants with extensive working experience in the Manufacturing Industry. Actual working experience on the topic of location strategy questions is considered to be instrumental in getting research results, that are based on personal, real-life experience versus more conceptual or theoretical experience on the matter. Comparable Delphi research from MacCarthy and Atthirawong (2003) was conducted with a panel consisting of consultants, politicians and economists.

For the outcome of this Delphi study to be significant and reliable (Ludwig, 1997), the Researcher looked at the following dimensions for the 'expert' requirement for the Delphi panel participation:

- Substantial working experience in a specific Manufacturing sector
- Seniority in position or function

87% of the panel members held titles CEO, Vice President or Director. 13% held the title 'Manager'. As indicated previously, the group had an average of over 20 years of relevant business experience in the respective Manufacturing sector. Ludwig described the following prerequisites for a Delphi panel in order to be called 'experts': 'knowledge, experience and self-motivation' (Ludwig, 1997). The seniority level as well as the high response rates in Round 1 and 2 supports the 'expert profile' typing of the Made in Europe Delphi panel. Ludwig furthermore states for a Delphi research to be reliable, the size of the panel has to be at least 13 (Ludwig, 1997). The amount of panel members for Delphi studies varies between 15 and 35 according to Theodore Gordon's paper 'The Delphi Method' (Gordon, 2009). Other research papers talk about 15-20 respondents (Ludwig, 1997). Ludwig stresses the importance of using 'expert' especially because the group size is relatively small compared to other research methods. The Made in Europe panel consisted of 39 registered participants and can therefore be seen as sufficient for meeting the reliability criterion of both Ludwig (1997) and Gordon (2009).

Asking senior business executives to participate in a research project and questioning them about the actual strategy of the company in relation to location decisions on Manufacturing, can potentially 'scare them off' (Drew, 2014). Senior executives of globally operating Manufacturing companies might not be willing to discuss Manufacturing strategies. The confidentiality requirement, which is part of a Delphi study, therefore is critical for getting reliable results. From the original invitation list,

a little over 30% accepted and registered as participant, confirming the need for what has been referred to earlier as 'the dance of seduction' (Aguiar and Schneider, 2016).

Delphi studies on the subject of location factors and location decisions, using an expert panel from the Manufacturing Industry itself have never been conducted according to the researcher's knowledge. Reasons for this, besides the earlier mentioned company confidentiality issues, could be: time constraints and no clarity on 'what's in it for me?' Based on these considerations, the Made in Europe Delphi Research process was designed around the following objectives:

- Full confidentiality based on the anonymity of each participant, using personal ID and password protected access to the questionnaires
- Easy and 24/7 accessibility through the Delphi research website and online questionnaires to have an efficient process during the various rounds of questionnaires; website was configured to support using desktops, laptops as well as mobile devices (phones and tablets); easy accessibility to the Delphi questionnaire should warrant a high response rate
- Presentation of actual Data and Literature results to the participants to stimulate the individual thinking process and secure a high response rate in the first rounds of questionnaires
- Presentation of sector specific data on employment development in the European Manufacturing industry in order to encourage the participants to reflect on their own business experience

The Made in Europe Delphi process for Round 1 and 2 took approximately 16 weeks. Presentation and feedback on the wrap up document (which could be called a third round) took another 8 weeks, making the total throughput time for this research about six months. Overall timeline is comparable to Gordon and Ludwig's benchmark (Gordon, 2009 and Ludwig, 1997). The response rate for Round 1 was 82%. The response rate for both Round 1 and 2 was 79%. 27% of the respondents gave additional input and comments in Round 2; more than 1 out of the 4 participants gave additional comments or changed their input from their earlier input; a clear sign that the regular feedback loop of the Delphi method design functioned. Comparable Delphi Research on the specific topic of location factors (MacCarthy and Atthirawong, 2003) was conducted over two rounds, after which final position was reached. The response rates of the second and third Delphi round support the assumption that consensus was reached with the Delphi expert panel on the research question (Ludwig, 1997).

The Data research on Europe's manufacturing industry and European government policy review as well as the Delphi research chapters are now completed. In the following Chapters, key findings from the conducted research will be summarized and put into the theoretical perspective provided by the initial Literature review. In Chapter 7, the key findings from Data research will be presented. In Chapter 8, the research conclusions will be drawn against the initial research problem statement.

CHAPTER 7

DISCUSSION

7 Discussion

7.1 Introduction

In this chapter the relevant findings from the Delphi research, supported by the Data research and the Government Industrial policy review will be presented and discussed in light of the theoretical background from the Literature review. This will form the basis for drawing conclusions in the closing chapters of this research. Figure 27 gives a visual overview of the conducted research leading to the key findings presented in this Chapter. First, the key findings on the three central research questions from the Introduction chapter as well as the Literature review will be discussed (chapter 7.2): what are the critical manufacturing location factors in the 21st century? What manufacturing strategy is the significant driver for location decisions? And finally, what decision making process or model is best applied to manufacturing location decisions? In section 7.3 of this chapter the relevant findings from Chapter 4 (Data research of Europe's manufacturing industry) and Chapter 5 (Review on European government industrial policies) will be presented as supportive material to the key findings and a sound basis van the concluding Chapter.

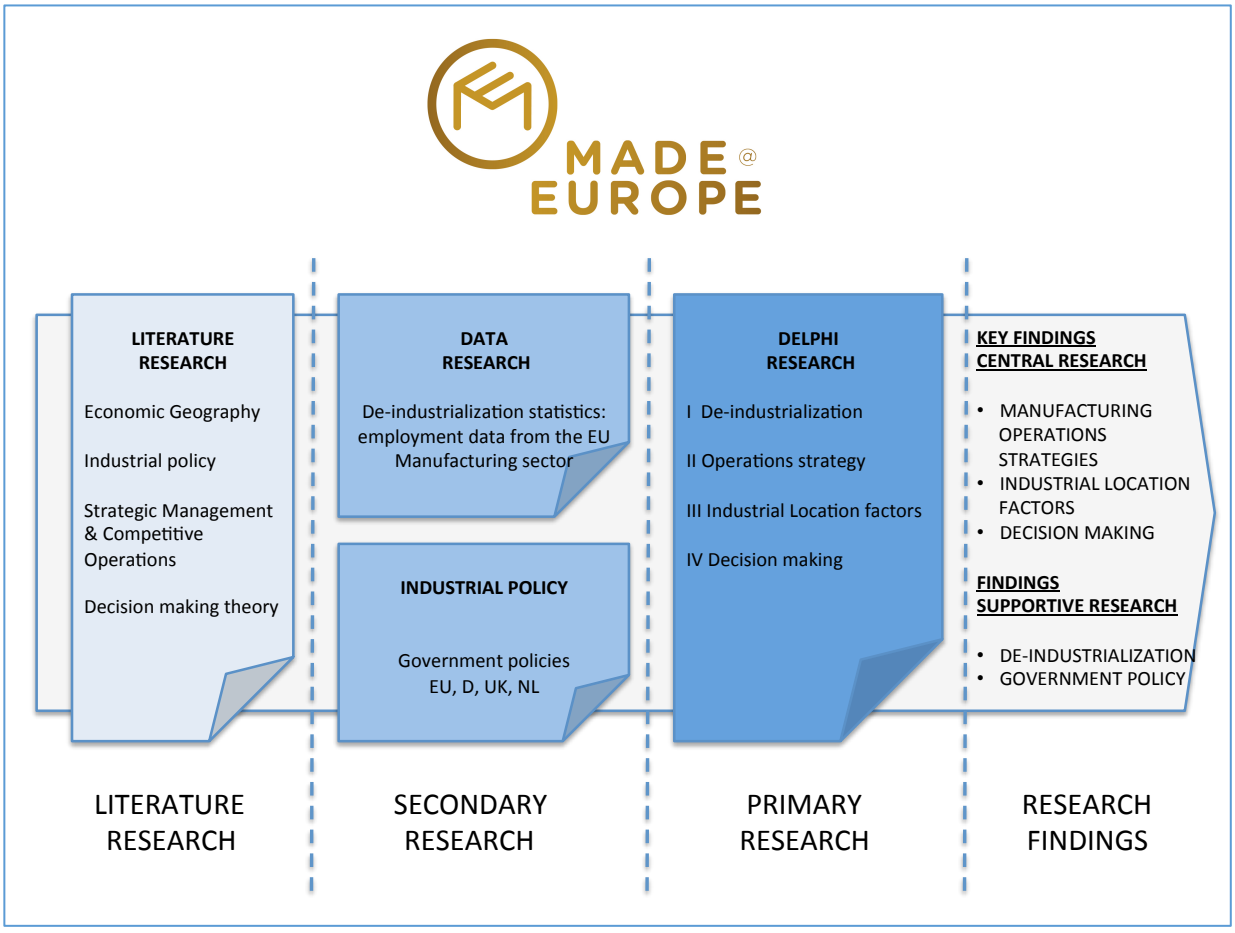

Figure 27 Made in Europe: overview of research leading to key findings

7.2 Key findings central research

In the Literature review several gaps were found related to the central research question of this research. One of the gaps is establishing the link between a company's manufacturing strategy in relation to the selection of critical location factors for companies active in the manufacturing industry. Another gap was the relation between changing manufacturing strategies in relation to critical location factors. A final gap that was highlighted was the absence of research on the decision-making process in relation to manufacturing location decisions. The three core elements that are relevant for this research are closely linked: manufacturing strategy, location and decision-making. First, the evolution of manufacturing strategies during the years of the 3rd and 4th Industrial revolution will be reviewed and discussed based on the findings in the previous research chapters. Second, the findings on the critical location factors will be discussed. Finally, the decision-making process related to strategic and complex issues will be reviewed and discussed.

7.2.1 Manufacturing strategy development

In order to achieve a company's objective, defining a 'strategy' how to achieve this is instrumental. Teece (2009) described strategic management as 'taking important decisions on investments that are required to achieve a firms' objective'. Having a manufacturing strategy is described by Thun (2008) as critical for what he calls 'superior performance'. In the constantly changing global business environment, MNC's need to adapt their enterprise continuously in order to survive and outperform its competitors (Teece, 2009; Tate et al., 2014; Errasti et al., 2017). A core element of a firm's manufacturing strategy is the decision where to locate its core manufacturing operations (Porter, 1990; Meijboom and Voordijk, 2003).

The world of manufacturing changed drastically during the various industrial revolutions (Figure 28). New technical inventions create constant opportunities for people and businesses: from the steam engine in the late 18th century up until the 3D metal printer in the early 21st century. Weber and Friedrich (1929) were among the first researchers to describe the concept 'location theories' in relation to a firm's strategy. These theories were based on one core principle: a manufacturing firm chooses its location to minimize cost. In today's markets, the manufacturing world has become truly global (Gilani and Razeghi, 2010) making the requirement to have a competitive manufacturing strategy indispensable. Where to locate one's operation was and still is considered to be a decisive factor for success in this global marketplace (Porter, 1986, Meijboom and Voordijk, 2003). During the years of the 3rd Industrial revolution, when the world of manufacturing became truly global, the prime focus for many MNC's was to become cost competitive; the majority of manufacturing companies had a strategy to 'minimize cost' (Meijboom and Voordijk, 2003), still predominantly in line with Weber and Friedrich's views almost a century earlier.

This focus on looking for the lowest cost levels for the manufacturing of goods resulted in widespread outsourcing and offshoring towards lower cost countries (Pongpanich, 2000). The result was that many manufacturing companies extended their supply chains to a global level. Since transportation and communication cost were dropping rapidly (Kasper, 2002), the exodus of a wide variety of manufacturing operations got a formidable boost. The data research confirmed this trend and showed that in Europe the majority of manufacturing sectors faced a substantial decrease (20%) in employment during the period 1995-2013. Also, the Delphi panel confirmed that in the main manufacturing sectors employment in Europe has decreased caused by substantial offshoring and outsourcing activities to low labor cost countries. As of 2012, China was the country with the highest Manufacturing output across the globe (see Figure 9 in the Data research Chapter).

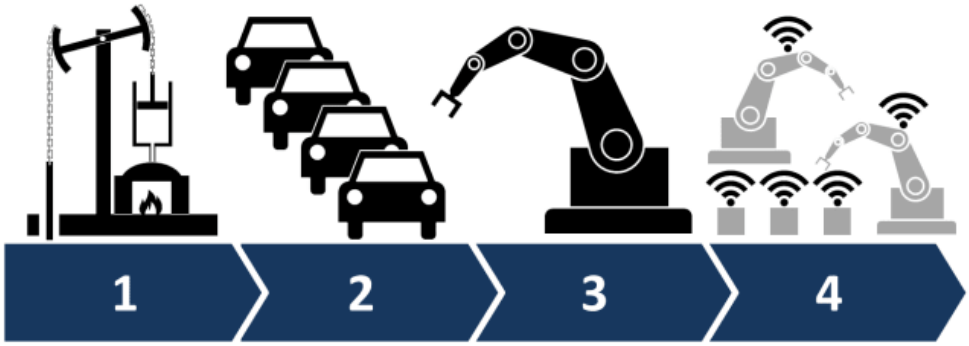

Figure 28 Overview of the four Industrial Revolutions (source: Engineering.com)

Cost minimization was a core strategic driver in the manufacturing sector, but other critical drivers started to come into play as well. In early 21st century different research (Barnes, 2002; MacCarthy and Atthirawong, 2003) showed that also 'access to new markets' and 'access to resources' (labor, raw materials) were defined as a key influencer of the manufacturing strategy in that period. Christensen (1997) was one of the first to introduce a new way of thinking about manufacturing strategies. He claimed that 'doing the right thing, is the wrong thing'. Because the life cycle of new products and new manufacturing methods was becoming shorter and shorter, a too narrow focus on just operational efficiency and cost minimization could become a threat for business continuity. Manufacturing firms started to refocus their manufacturing strategies from 'cost optimization' towards 'value creation'. Westkämper (2014) called this strategic re-orientation: from 'cost and short term profits' to 'competition and sustainability'. A sustainable footprint strategy (Christodoulou, 2007) based on which MNC's chose their manufacturing locations, required a fully new supply chain set-up based on maximum flexibility (Ellram et al., 2013; Tate et al., 2014). The new buzzwords used in the definition of modern manufacturing strategies were: dynamic capabilities (Teece, 2009) and 'enterprise adaptation' (Errasti et al., 2017). Manufacturing firms need the capability to frequently redesign their footprint strategy in order to survive in the competitive global market.

In the Delphi research, the expert panel was presented with the following question:

- *Considering the Manufacturing Industry has now entered the 4th Industrial Revolution, what do you currently consider to be main strategic and operational drivers for manufacturing companies working across borders for the coming decade?*

Key findings from the Delphi study on manufacturing strategy were that the main drivers for cross border manufacturing are:

- Access to a cost-effective supply chain
- Access to labor (low cost and skills)
- Access to end markets
- Access to new technology
- Access to raw materials

In the new industrial setting the manufacturing world is facing, what are the current and near future drivers for companies to operate cross-border? Almost one quarter of the Delphi respondents (23%) gave the answer: *access to a cost-effective supply chain*. Barnes (2002), Teece (2009), Ellram et al. (2013), Tate et al., 2014 and Errasti et al. (2017) described similar key drivers in their publications.

The importance of having a competitive setting of suppliers, partners and other service providers is considered key for a successful cross border manufacturing operation.

The second important driver for cross border manufacturing was the access to low labor cost and labor *skills*. Although labor cost may become less important as a cost factor in the manufacturing operation (Petrick and Simpson, 2013; George et al., 2014; Bals et al., 2016), the availability of the appropriate labor skills remains key for a footprint strategy. Because new and sophisticated production techniques require higher skill levels, this is one of the key drivers in a strategy of near-shoring, re-shoring or insourcing (Bals et al., 2016). One third of the Delphi panel said they expected this could lead to an increase in employment in manufacturing sectors in Europe, as these skills are more available in Europe than in traditional low-cost countries with lower labor skill levels. The availability of high skilled labor also was identified as one of the government instruments, described in the European industrial policies. In the Horizon 2020 program from the European Commission, one of the focus areas is 'skills enhancement'. The German industrial policy described as one of its key objectives the availability of skilled labor. The UK defined as one of the main strands for the implementation of the industrial strategy the delivery of the skills that employers need.

Manufacturing operations require less and less human labor. The various industrial revolutions have resulted in a continuous decline of employment in the sector. The process is similar to what happened in the Agricultural sector (Singh, 1977). As discussed earlier, both MNC's as well as governments recognize this development and constantly try to adapt their strategies and policies to keep up with the constant revolutionizing industrial developments. The need for unskilled labor is losing its importance rapidly in the industrial sector. Where the first two industrial revolutions created employment on a large scale in the industrial countries, the 3rd and the 4th industrial revolutions are eliminating the human factor in the manufacturing process. Jeremy Rifkin wrote a book called 'The End of Work, the Decline of the Global Labor Force and the Dawn of the Post-modern Era' (1995) in which he predicted exactly this development. Other research (Weiss and Tribe, 2016) showed that for lower income economies, manufacturing remains an important source of income. This confirms the notion that in higher income economies like in Europe, the manufacturing of goods requiring low skilled labor is expected to disappear gradually (see also Brakman, 2004).

The third, fourth and fifth strategic drivers for cross border manufacturing mentioned by the Delphi panel was: access to markets, new manufacturing technologies and access to raw materials. None of these elements have a mere cost minimization focus. The drivers for cross border manufacturing have shifted towards value creation opportunities: entering new sales markets, applying the latest production technologies and securing a stable raw materials supply chain, in line with Barnes (2002), MacCarthy and Atthirawong's (2003) research results. The updated Horizon program (European Commission, 2017) recognizes the necessity new manufacturing methods, referring to its goal to support 'smart, innovative and sustainable industry', meaning European industrial policy actively supports building a new digital infrastructure for manufacturing firms within the European countries.

Manufacturing strategies evolve over time. The strategic drivers for defining the appropriate strategy have changed during the last two decades within manufacturing sectors across Europe. Cost minimization is replaced by value enhancement as key driver (Ellram et al., 2013; Westkämper, 2014). Government policies are actively supporting this new trend with the objective to help make and keep the industrial sector competitive on the global market. Literature and Delphi research both acknowledge these findings. A sound manufacturing strategy forms the basis for the implementation of a firm's footprint strategy, leading to this research's core question: what is the best location for the manufacturing operation? Which critical factors need to be considered when deciding where to locate the firm's manufacturing operation? The next section will discuss the findings on this key question of the Made in Europe research.

7.2.2 Location factors

Economic geographers deal with the question where economic activity takes place and why (Fujita, Krugman and Venables, 1999; Hayter and Patchell, 2011). The previous section clarified the everchanging context of this question: manufacturing strategies are continuously adapted to meet the demands of the global manufacturing marketplace. Given the fact that manufacturing strategies are constantly changing over time, the location factors that are the basis for taking decisions on manufacturing location are expected to change over time as well. However, no extensive research Is available on this key topic for MNC's (MacCarthy and Atthirawong, 2003).

The literature review showed that academic location theories can roughly be divided in three areas (van Dijk, 2009): classical (von Thuenen, 1826; Weber, 1909), neoclassical (Porter, 1990) and modern location theories (Krugman, 2008). The timeframes of these theories correlate to the timing of the various industrial revolutions. Weber's classical location theory was born in the era of the 2nd industrial revolution; he described his famous 'Location Triangle' in 1929, which was a pure mathematical model based on three location factors: Transport cost, Labor cost and the Agglomeration effect. Simply do your math and you know what the optimal location for your manufacturing operation is. Clearly transport and labor cost played a dominant role in the location decision process in that period.

As a result of the developments in the 3rd industrial revolution, the importance of Transportation as a dominant factor in location decisions was changing (Hayter and Patchell, 2011 and Fujita and Thisse, 2013). The substantial lowering of transport cost started to have an impact on this location factor and therefor decisions on where to locate your manufacturing operation. Offshoring and outsourcing became the new manufacturing strategy during the 3rd industrial revolution (Barnes, 2002; Meijboom and Voordijk, 2003). The Data research (Chapter 4) showed evidence of this with the 20% decrease in employment in the European manufacturing sector during the period 1995-2013.

Since MacCarthy's and Atthirawong's research in 2003, the amount of research related to manufacturing location decisions has increased. In the previous Literature and Methodology Chapters, when reviewing the different research methods used for Made in Europe's central question, a number of recent academic publications proves the current relevance a well as importance of this question (see also Table 3, Chapter 3.2). The 4th Industrial Revolution with its dynamics in the global marketplace seems to have put the subject of manufacturing location decisions in the academic spotlight. Also, various European governments updated their industrial policies to match the new demands coming out of the marketplace. The EC's Horizon 2020 program was revisited in 2017 resulting in an increased focus on supporting the digitization of the European industries. Same examples can be found in the UK's, the Dutch as well as the German industrial policies. Exemplary for the increased support is the building of the infrastructure, which the German Federal Ministry for Economic Affairs in 2017 calls: 'Plattform Industrie 4.0: working together to shape the digitization of industry'.

The core question of the Delphi research asked the expert panel to rate the importance of manufacturing location factors. A four-point Lickert scale (unimportant, slightly important, fairly important and very important) was used to prevent the panel from taking an indecisive position related to the relative importance of the fourteen industrial location factors. The overall scoring is visualized in Figure 29.

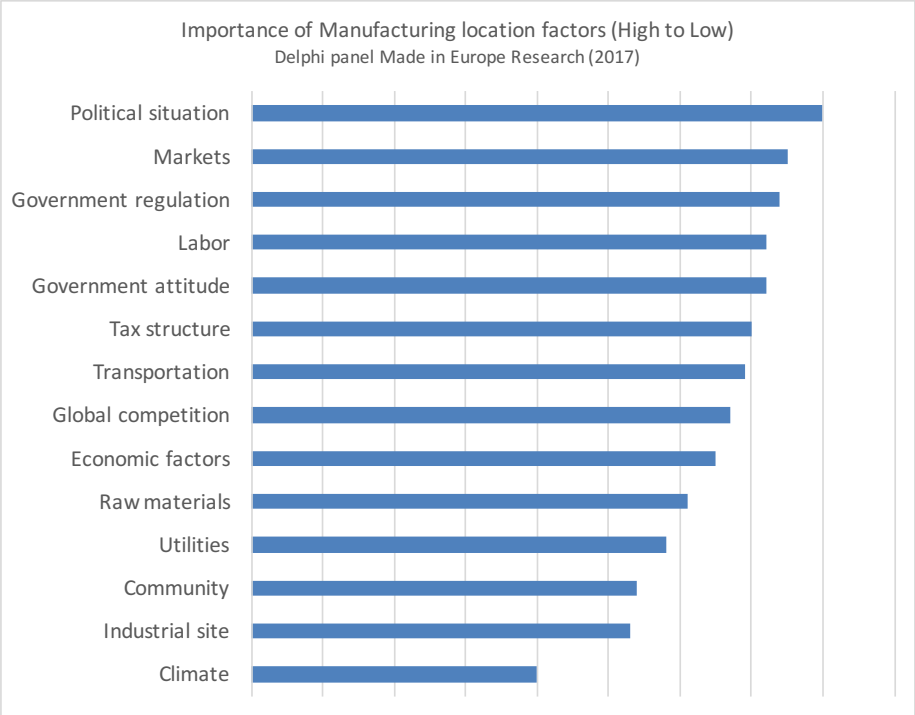

Figure 29 Manufacturing location factor importance rating (Delphi Research Made in Europe, 2017)

The key findings from the Delphi panel scores[23] are:

- The political situation in a country is considered to be the most important location factor for the manufacturing industry
- In the Top 6 manufacturing location factors, four factors are 'government related' (political situation, government regulation, government attitude, and tax structure)
- The 'traditional' location factors ((low cost) labor, transportation and raw materials) are considered to be less important versus earlier comparable research

In the following sections, the three key location factors will be discussed more specifically: government, markets and labor.

7.2.2.1 Government

For the implementation of a firm's manufacturing strategy, which is the basis for cross border manufacturing location decisions, the factor political situation is considered most important. Political situation stands for (Badri, 2007): political and economic stability, protection against expropriation, trade treaties and a country's attitude towards foreign capital. The factor government regulation refers to regulations regarding corporate investment laws, joint ventures and mergers, transfer of earnings out of the country, taxation of foreign owned companies and the foreign ownership laws. Government attitude relates to the country's compensation and insurance laws, safety inspection and building guidelines. Tax refers to corporate, property and sales tax laws as well as tax exemption rules (Badri, 2007).

[23] The Made in Europe Delphi panel consisted of executives from 4 dominant sectors: High Tech, Metals & Machinery, Automotive and Chemical; these sectors combined represent approximately 60% of the total manufacturing sector in EU-15

In previous comparable research from MacCarthy and Atthirawong (2003), the factor 'government and political factors' was ranked 4 in their top 5 location factors. As also discussed earlier in this Chapter, academic researchers (e.g. Friedli et al., 2014; Ambroziak, 2014; Weiss and Tribe, 2016) support the importance of this manufacturing location factor. In today's business and economic environment, the stability factor of a country or government has increased in importance versus research from the early 21st century. In the top section of the Made in Europe Delphi research, three other government related factors are considered to be highly important: government regulation, government attitude and tax structure. The Made in Europe panel members clearly stressed the importance and relevance of the factor *government* as manufacturing location factor. In Michael Porter's diamond model (Porter, 1990), *government* also is mentioned as a key factor influencing a company's competitive advantage. Also, several other academic publications (Britton, 2000 and Kuivanen, 2008) stress the importance of government as key to the competitiveness of its industry, as was also discussed earlier in this chapter. The Delphi results also correlate highly with Mosconi's (2015) views on what he calls 'the new European Industrial Policy': a well-balanced set of public support and intervention measures is regarded instrumental in supporting the manufacturing sector.

Review of the European industrial policies showed a strong focus on building a favorable infrastructure with a strong focus on the future, as discussed also in the previous section. The European Commission claimed that 'the future of industry will be digital', strongly referring to the developments ongoing in the 4th Industrial Revolution. The implementation of this policy however can vary from country to country. A focus on securing employment (the UK: 'securing jobs'; the EC: 'more jobs') shows clear signs of what Lall (2004) calls the 'structuralist approach'. Focused and active intervention from the government (e.g. subsidizing specific companies in targeted sectors) is controversial (Brakman, 2004; Weiss and Tribe, 2016), because how can governments know they are not subsidizing 'industries of the past'? Ambroziak (2014) showed that government support for specifically the manufacturing industry in fact can deteriorate a company's or nation's competitive position.

7.2.2.2 Markets

The 2nd most important location factor mentioned by the Delphi panel was: markets. As per Badri's (2007) definition, markets can be defined as follows[24] : the existing and potential consumer and producer market, the anticipation of growth, demographic trends, future expansion opportunities and last but not least 'nearness to related industries'. The critical location factor 'market' characterizes the shift in how manufacturing companies currently define their strategies: from cost focus to value focus. In the previous section on manufacturing strategy, this development was discussed with examples from a variety of academic research (Barnes, 2002; Teece, 2009; Gilani and Razeghi, 2010; Ellram et al., 2013).

Government policy in Europe also refers to focusing at 'intensifying competition (…) and opening up markets', as the leading German industrial policy described recently (Schneider, 2017). One of the cornerstones of the renewed EU industrial policy[25] from September 2017 is the 'single market', with the objective to reinforce Europe's competitive advantage in the global marketplace. Successful implementation of the 'single market' should increase the attractiveness of Europe as location for manufacturing companies. Friedli et al. (2014) research on the multiplication effect of manufacturing for other sectors in the economy, forms the basis for European government home market focus: $1 additional manufacturing market output generates $1.40 more output in other sectors.

[24] see also Table 1, chapter 2
[25] see also Figure 20 Renewed EU industrial policy, Chapter 5

The positive impact of industrial clustering or agglomeration effects is decisive factor in location decisions in line with Krugman (2008), Dunning (2009) and Beugelsdijk, McCann and Mudambi (2010). Shared resources in the market is expected to generate various benefits for MCN's (Arita and McCann, 2000).

The Made in Europe research showed that the location factor 'markets' has become increasingly important. This critical factor directly links the shift in manufacturing strategies related to location factors. Manufacturing strategies have shifted their focus from 'cost minimization' to 'value creation'. Seeing 'new sales markets and opportunities' as critical location factors when taking cross-border manufacturing location decisions is the tangible proof of this new way of thinking within MNC's.

7.2.2.3 Labor

The location factor 'Labor' can be defined as: low cost labor, skilled labor and also educational level of labor (Badri, 2007). Manufacturing is originally a Latin word meaning: producing something with your hands, referring to the human resource required for this. During the various industrial revolutions, the necessity of people as critical resource for manufacturing has changed drastically. Literature and Data research showed that the GDP of a country can increase with around 200% despite a decrease in people employed in the manufacturing sector with 20%, as discussed also in the previous sections of this chapter. Weber's foundational location theory from 1929 was based on three elements, one being: labor. Throughout the 20th century or more precisely during the 3rd Industrial revolution, the labor factor in Europe's manufacturing industry first moved massively towards low labor cost countries as a result of manufacturing strategies focused on cost competitiveness (Porter, 1986; Meijboom and Voordijk, 2003; Ellram et al., 2013). The 4th Industrial revolution further eliminated specifically the lower skilled manufacturing jobs replacing them with robotics and other new manufacturing production techniques (Kuivanen, 2008; George et al., 2014). With the lower skilled manufacturing labor demand decreasing, the need for higher skilled manufacturing labor is increasing in Europe. Near-shoring or relocating manufacturing operations close to the home market is one of the latest trends in manufacturing in modern western economies (Petrick and Simpson, 2013; Ellram, 2014). Less labor-intensive production techniques are one of the drivers for re-shoring (Bals et al., 2016).

In the Delphi research, the top industrialists came from sectors with high capital intensity and high technology complexity. These sectors are the one's receiving most of the government industrial policy attention: the availability of skilled labor is key in all of Europe's industrial government policies:

- European Commission: 'empowering people and skills enhancement'
- Germany: 'availability of skilled labor is a key factor'
- UK: 'deliver the skills that employers need'
- The Netherlands: 'acceleration of smart working: connecting people and machine in a new digital environment'

The Made in Europe research showed that 'labor' will remain a critical location factor as long as humans are needed for manufacturing operations in complex global supply chain set-ups (e.g. Spallanzani et al., 2016). Where lower skilled labor is expected to gradually disappear from modern European manufacturing locations (Brakman, 2004), the need for higher skilled labor, working closely with robotics and new digital production methods, is expected to increase substantially.

Summarizing the discussion on location factors, the scoring of the Made in Europe expert panel shows that location factor changes with continuous development of manufacturing strategies (e.g. Ellram et al. 2013). Cost will always be a consideration, but global companies cannot compete on just labor cost in today's markets. The (manual) labor cost portion in manufactured products is nowadays becoming negligible. Manufacturing operations are becoming more and more digitized (George, Ramaswany and Rassey, 2014), making the manual labor cost component less relevant in location decisions. In the present days of the 4th industrial revolution, other factors have become decisive for manufacturing location decisions. The political stability of a country, a favorable governmental attitude resulting in supporting regulations, access to new markets and the availability of properly skilled labor are the new key location factors in today's world.

7.2.3 Decision making

The final gap found in the Literature review, was the lack of research was on the decision-making process for manufacturing location decisions. A 'black box' is how Penn (1999) described how MCN's take decisions. The Delphi panel was asked to give their views on the problems they encountered with location decisions how to overcome these.

The key findings on the last two question of Part IV of the Delphi research:

- The main problem with cross border location decisions in recent decades was insufficient knowledge on the local situation of the proposed manufacturing location
- The decision process lacked a structural approach using objective criteria for good decision making
- For making a cross border manufacturing strategy successful, a deep understanding of the local dynamics, culture and way of working is required
- The application of objective criteria for decision making is considered to be critical for 'good decision making'
- The longer-term perspective must be considered when taking international location decisions

The Delphi panel considered 'the lack of in-depth knowledge' to be the most difficult problem to overcome when dealing with manufacturing location decisions. Despite the fact that we live in an information economy, the majority of people argued that getting 'the right information from the right people' (as one of the respondents stated) is considered problematic. Location decisions are considered to be strategic and complex (Nutt and Wilson, 2010) and many of these decisions fail (Nutt, 2002; Grünig and Kühn, 2013). The Delphi panel claimed the lack of proper information to be most problematic. Puranam's research from 2016 came to this exact conclusion when he stated that 'decisions are made with limited information' adding that they 'are not easy to reverse even after better information comes along'. Nutt (2002) uses similar words saying that 'once a decision is made and the initial investment is done, all consecutive decisions are justified'.

The second biggest problem seen by the Delphi participants is the 'lack of objective evaluation criteria'. Business practitioners, responsible for strategic direction setting, still tend to choose the 'rational decision model' (Simon, 1977) when dealing with location decisions. Also, Ordiibadi (2005) suggests a structured 3 staged decision process specifically for strategic outsourcing decisions. Despite the claim in recent publications that naturalistic decision-making (Klein, 1999) or the multiple perspectives approach (Mitroff and Linstone, 1993) is considered to lead to more 'winning decisions', the Delphi panel seems to believe that a more rational and structured model will lead to better decisions.

The third most frequently mentioned problem related to international location decisions is: 'cultural differences'. One of the respondents gave the following clear response to this question: '*culture within countries and/or regions are very often underestimated as a problem by senior decision makers of a company'*. Another respondent gave the following quote: '*Culture eats strategy for breakfast'*. These comments support the idea that more soft factors must be taken into consideration versus a mere rational approach as described by Simon (Simon, 1977) When Bals et al. (2016) researched what are the key drivers for MNC to consider reshoring or insourcing, 'cultural problems' was mentioned as one key driver for companies deciding to reverse their previous offshoring or outsourcing decision.

11% of the Delphi respondents thought that the 'sheer complexity of the problem' was a main issue in dealing with location decisions. In comparable research on this topic (MacCarthy and Atthirawong, 2003) this was perceived as the most important problem dealing with international location decisions. The number of factors and stakeholders to be managed in a strategic decision process like 'location' are enormous. As nobody can predict the future and a rational decision model has its limitations (Klein, 1999 and Mitroff and Linstone, 1993), Nutt's (2002) claim that location decisions frequently fail is recognized by the Made in Europe panel with their response.

'The lack of expertise to support the decision-making process' is considered the fifth biggest problem when taking location decisions. Expertise in some cases is comparable to 'experience', linking this claim to Klein's naturalistic decision model (Klein, 1999). Klein and also Kahneman (2011) point out that 'experience' indeed is a critical factor in making good decisions.

In the last question of the Delphi questionnaire, the panel was asked to give recommendations for improved location decision-making. 'Understanding local dynamics, way of working and decision making' is the most frequently mentioned recommendation, referring to the gathering of appropriate information and data (Schoemaker and Russo, 2001). The second recommendation is 'applying objective evaluation criteria', supporting the concept of Simon's rational decision model (Simon, 1977). A third and fourth recommendation is to keep a 'long term perspective' and 'take your time' when taking location decisions. A final recommendation is to do a 'proper stakeholder analysis' before starting a location decision process, as also proposed by Mitroff and Linstone (1993).

Literature showed that faulty decisions can come from focusing too much on 'the problem' in combination with 'jumping at the first great idea' instead of focusing on the actual decision-making process (Nutt, 2002). Decisions on strategic and complex issues require proper planning. The different decision models presented in the literature by Schoemaker and Russo (2001), Nutt (2002), Ordoobadi (2005) and Kahneman (2011) all a have comparable step by step approach: understanding the issue at hand, collecting data, define solution directions and decide. But whatever decision model or framework is applied for strategic decisions, Puranam's (2016) claim holds truth when he stated: 'good decisions are not equal to good outcomes'. Also, the Delphi panel with their collective 883 years of global manufacturing business experience, acknowledges this view with their extensive list of recommendations for improving strategic decision-making.

7.3 Findings supportive research

7.3.1 De-industrialization

In both the Data and Delphi research, the topic of de-industrialization was researched (see also Figure 30). One of the objectives of the Data research was to get a thorough understanding of what exactly the Manufacturing industry in Europe contributes in quantitative terms; the statistics of the shift in the Manufacturing sector employment is used as the main indicator for the de-industrialization process.

The main findings from the Data research in relation to the process of De-industrialization are:

1. Europe is the second most de-industrialized economy in the world; together with Japan 25% of the people employed work in the Industrial sector; with 17% the United States is the most de-industrialized economy. In China 30% of the workforce are active in the Industrial sector (World bank database, 2015)
2. In the EU-15 countries there has been a decline of 20% in the overall Manufacturing sector employment from 1995 until 2013 (Figure 28); one exception is the Automotive subsector in the EU-15 which showed an increase in employment
3. Employment across the various economic sectors in Europe is split as follows (2013 Eurostat data): Agriculture 5%, Industry 25%, Services (Public and Commercial) 70%
4. Although total employment and Manufacturing value-add decreased, the Gross Domestic Product increased in the three preselected EU countries Germany, the United Kingdom and the Netherlands (jointly 40% of total EU economy, 2012 data); summarized details are presented in Table 18

Indicator	EU-15	Germany	United Kingdom	The Netherlands
Change in Manufacturing employment (1995-2013)	-20%	-13%	-38%	-26%
Share of Manufacturing employment as % of total employment (2013)	15%	20%	10%	10%
Development Value add Manufacturing (1995-2013)	-21%*	-4%	-47%	-29%
Development Gross Domestic Product (1995-2013)	+103%*	+190%	+182%	+202%

*EU-27 data

Table 18 Development employment and economic indicators Germany, UK, the Netherlands (Eurostat data, 1995-2013)

On this process of de-industrialization, the Delphi expert panel responded as follows:

- The five most important factors responsible for the employment decline in the European Manufacturing industry are:
    1. Shift of employment to low labor cost countries
    2. Automation
    3. Outsourcing
    4. Labor availability
    5. Move close to the end market
- 65% of the expert panel predict a further decrease of employment due to (1) ongoing automation and (2) ongoing shift towards low labor cost countries

- 30% predict an increase of employment in manufacturing due to (1) ongoing automation and (2) near-shoring

The trends on the overall development of employment in the Manufacturing Industry are undeniable. Singh (1977) compares the development of employment of the Manufacturing sector with the Agricultural sector two centuries earlier. The farming sector changed structurally as a result of the 1st Industrial revolution: machines replaced manual labor, increasing productivity in the sector on a large scale. The employment moved from Agriculture towards the Industrial sector where all the manpower was now needed to run the new Manufacturing facilities as a result of the 1st and 2nd Industrial revolution. Hayter (1997) recognizes the decline in Manufacturing employment, stating that this does not hint towards an economic recession, but clearly indicated to the structural change the sector is going through. Hayter's claim is backed by the fact that the Gross Domestic Product of European countries is rising while manufacturing is losing its importance in terms of employment.

The decline in manufacturing employment combined with an increase in GDP is what Brakman (2004) pointed out clearly by stating: do not keep jobs that cannot compete on a global basis. Outsourcing and/or moving these jobs to lower cost countries will increase a nation's economic welfare. The data from the preselected European nations Germany, the UK as well as the Netherlands support Brakman's view on this.

Looking more closely at the developments of Manufacturing employment, Manufacturing value add and GDP[26], Germany shows data that deviate from both UK, the Netherlands as well as the overall EU-15 (and EU-27) data. The Manufacturing employment numbers in Germany are relatively high compared to other high GDP countries: 20% in 2013. The subsequent decline in manufacturing value add is low compared to the Netherlands and the UK: -4% versus -29% for the Netherlands and -47% for the UK from 1995 up to 2013. The relative increase in GDP is however comparable to the Netherlands and the UK: +190%. Germany has combined a relative strong position in the Manufacturing sector with a high increase in GDP. Kuivanen (2008) describes this favorable scenario stating that a sustainable manufacturing strategy consists of a strong capability in technology combined with innovative products. Looking at the German data, the country has clearly chosen to go down this path. Germany's unique position will be discussed in the next section as part of the government industrial policy debate. Comparing the German data with Brakman's (2004) views, it can be stated that Germany has succeeded in keeping or creating manufacturing jobs that can compete in the global marketplace. This statement is specifically relevant for the automotive sector, based on the 39% increase in employment (+354,000 jobs) in the automotive sector in Germany from 1995 until 2013.

The development of employment in the different economic sectors in the EU-15 countries shows various directions. The employment in the Manufacturing sector versus Commercial Services, show a decline of 6.3 million manufacturing jobs (-20%) versus an increase of 17.4 million 'services' jobs (+34%). In 2013 the combined sectors Manufacturing and Services represent 56% of total people employed. Hayter, Britton and Gilmour (1980) claim that Manufacturing as a sector is responsible for more than 50% of total employment, indicating that many jobs in Commercial services have a direct link to the Manufacturing sector. An example for this is specialized service activities like maintenance, facilities which have been outsourced to full service providers. The claim of Hayter et al. from their 1980 research cannot be substantiated with the data as presented, lacking recent as well as specific research data on this topic.

[26] see Chapter 4 Data research: World bank database statistics

The decline in manufacturing employment is explained by Prahalad and Hamel (2003) as well as Ellram, Tate and Petersen (2013) as the result of outsourcing manufacturing activities to third parties and/or offshoring to low cost countries. In order to stay competitive, internationalization was a prerequisite for manufacturing companies (Porter, 1986). The setting up of international production gave companies the required strategic advantages compared to the competition (Meijboom and Voordijk, 2003). In the Delphi research conducted by Maccarthy and Atthirawong (2003), the expert panel stated the main drivers for cross-border manufacturing to be: labor cost and skills and counter attacking the competition. Their research also confirmed the developments in the Manufacturing sector: decreasing employment while maintaining global competitive positions. Academic publications on de-industrialization confirm the data collected as part of the Made in Europe research. The share of the manufacturing sector in the European economy has declined substantially, whereas the share of commercial services has increased, according to van der Winden et al. (2016). A recent publication (Weiss & Tribe, 2016; p7) showed that in 'higher income economies, since 1950 a significant decline in the share of agriculture and substantial decline in the share of manufacturing, with services taking a more important role' is common.

The literature of de-industrialization from roughly 1980 up to 2000 mainly highlighted the new strategic direction manufacturing companies took: selection of core competences, the process of outsourcing and the shift of manufacturing operations towards low labor cost countries. More contemporary research described that the decline in industrial employment is more closely related to the application of advanced robotics, 3D printing etc. The digitization of manufacturing activities is making the labor component much less important (see Petrick and Simpson, 2013 and George, Ramaswany & Rossey, 2014).

The 3rd Industrial revolution opened up the global market for all manufacturing industries caused by low transportation cost (the 'death of distance') combined with new information and communication technology (ICT). This led to a significant shift of employment away from the traditional Western economies that flourished during the 1st and 2nd Industrial revolution towards lower cost countries in e.g. Asia. Lowering the cost of the manufactured product was one of the key drivers in this process. With the 4th Industrial revolution, new manufacturing technologies are replacing the manual labor component to a large extent. Not cost, but innovation and the quest for value seem to be the key drivers for the new global manufacturing companies.

The theoretical debate around the decline of employment in Manufacturing in general is focusing on understanding why this is happening, what caused it and is this something to worry about or not. Summarizing this section leads to the following preliminary conclusions or statements (data from 1995-2013):

- The World Manufacturing output increased with 40%[27]
- The employment of people working in the EU-15 in the Manufacturing sector dropped with 20% in number of jobs
- The overall employment in all economic sectors in the EU-15 (Agriculture, Industry and Commercial and Public Services) increased with 14%
- Main drivers for the decline in Manufacturing industry employment in Europe are:
    1. Outsourcing of manufacturing operations to low cost countries (employment is 'moved')
    2. Introduction of new manufacturing technologies leading the replacement of manual labor (employment is 'removed')

[27] World development indicators (www.data.worldbank.org: Manufacturing value added, constant USD 2010, 1995-2013)

In the Made in Europe Delphi research, the expert panel was asked to comment on the process of de-industrialization in the manufacturing subsector of their experience. The one factor that is regarded 'most significant' for the shift in employment within the European Manufacturing sector is: low labor cost. This outcome is in line with Alfred Weber's (Weber and Friedrich, 1929) and also Hayter's (1997) views on one of the company's prime objectives: 'minimize cost'. Labor-intensive industries continue to look for cost reduction opportunities setting off labor cost versus transportation cost. 'Low labor cost overcompensates additional logistics cost' as one of the respondents described. 'Cost leadership' was mentioned in a variety of wordings by the respondents to explain the business strategy of their company which in their opinion has resulted in a shift in employment from 'west' (Europa) towards 'east' (Asia, Eastern Europe).

The second significant factor for the shift or decline in employment mentioned by the panel was: automation. Jobs are being substituted with new manufacturing technologies. The decline in employment in the manufacturing industry (de-industrialization) is seen as a direct result of the adoption of new technologies that are disrupting the global markets (Christensen, 1997). Labor-intensive manufacturing operations are 'digitized' (Petrick and Simpson, 2013) causing human employment to disappear and is not expected to come back in similar shape or form. The third significant factor mentioned was: outsourcing. Outsourcing (the process of transferring portions of work to outside suppliers) can be related to a firm's strategy as described in various management literature publications: e.g. Prahalad and Hamel, 2003 and Ellram, Tate and Petersen, 2013. Outsourcing furthermore is linked to the discussion on what is the 'core competence' of a manufacturing organization. The respondents indicated that outsourcing indeed is a part of their organizations strategy, as also described in Michael Porters diamond model (Porter, 1990).

Also, the fourth and fifth factor measured in frequency, can be related to Porter's diamond model: labor availability and proximity to the end market. Porter described these factors in the broader terminology 'factor conditions' and 'demand conditions' (see also Figure 2 in the Literature review chapter; Porter, 1990). Several respondents not only mentioned closeness to the *customer* market but also closeness to the *supply* market. One of the respondents highlighted this factor important for his business as follows: 'sourcing of raw materials in the same low labor cost region'. Choosing a manufacturing location close to a supply base being able to support the company's business strategy has been described in our literature review as well (Petrick and Simpson, 2013), confirming the significance of the factor in this research.

In the second question on the subject of De-industrialization, the Delphi panel was asked to give a prediction of what they personally expect will happen with the employment numbers in the European Manufacturing Industry. Will employment in Manufacturing increase or decrease? 65% of the Delphi panel expect a further decrease in employment and 30% expect an increase. The remainder of the group was indecisive, arguing that the coin could fall either way. Despite this, a majority of the participants expected the employment in the manufacturing sector to go down. The Made in Europe Delphi panel seemed to agree with Schumpeter's theory of creative destruction: the core driver of modern capitalism is to destroy itself in one place to be able to build up a new presence in another way or a new location (Schumpeter, 1943). Looking at the clarification that was given by the respondents to support their prediction, the similarity in the feedback from participants who predicted an employment decrease versus the ones predicting an increase is something of interest. The general factor mentioned most frequently as clarifications to support their individual prediction was: ongoing automation and the digitization of the manufacturing industry. The majority of the panel argued that this process would lead to a decrease of employment: technology is expected to further de-humanize the majority of the labor based manufacturing operations, leading to increased job losses in the industry (see also Petrick and Simpson, 2013). One third of the panel however argued that this same process of automation would lead to something called 're-shoring' or 'near-shoring'. The ongoing automation of Manufacturing operations (once labor intensive and

moved to low labor cost countries), will lead to a reverse of this former relocation strategy: some respondents gave examples of companies they work for moving from 'east' to back to 'west'. Main drivers for this exodus are: the availability of skilled labor to run these automated manufacturing operations in Europe as well as the avoidance of the increasing cost of transportation. Recent research from Bals et al. (2016) studied examples of this process of re-shoring in Germany and the US. One of the drivers found in this study confirmed the Delphi panel's opinion that as a result of new production methods the manufacturing process has become less labor intensive.

The Delphi panel furthermore mentioned that local government regulations in several Asian countries (e.g. China, India), required MNC's to have a minimum percentage of 'local manufacturing content' in their product in a protectionist effort to support the national manufacturing sector. This government incentive in mainly Asian countries[28] is referred to in Bals et al. (2016) study as one of the drivers for a re-shoring strategy within MCN's. Summarizing Part I of the Delphi questionnaire, the 20% decline in the Manufacturing Industry (EU-15 employment Manufacturing industry 1995-2013, see Figure 18) was recognized by all respondents. The ongoing decline of employment within the manufacturing industry is supported widely by academic publication on this subject (Hayter et al., 1980; Porter, 1986, 1990; Meijboom and Voordijk, 2003; MacCarthy & Atthirawong, 2003; Petrick and Simpson, 2013; Ellram et al., 2013; George et al., 2014; Weiss and Tribe, 2016 and Bals, et al., 2016).

A two third majority of the Delphi experts expect the employment in the industry to keep declining the coming decade as a result of the ongoing automation and digitization of manufacturing operations. On the contrary, one third of the participants expect the employment in the manufacturing industry to increase. Research from Weiss and Tribe (2016) and Bals et al. (2016) confirm the findings from the majority of the Delphi expert. Singh already predicted half a century ago in line with the majority of the Made in Europe Delphi panel: The Manufacturing industry is expected to follow the same path as the Agricultural sector and that is a further and continuous decline of employment (Singh, 1977).

Employment data from the Automotive sector in Europe on the other hand, support the Delphi participant minority who expect manufacturing employment to increase in the European industry. The automotive sector showed a 7% increase in employment in the period 1995-2013 despite the production and assembly technology developments (robotics). The research therefore showed that although for the overall manufacturing industry indeed the de-industrialization trends seems clear, exceptions can be found in specific manufacturing subsectors where in fact further 'industrialization' took place resulting in increased manufacturing value add as well as increased employment in the respective sector.

7.3.2 Government Industrial policy

In the initial Literature review, a gap was identified regarding government policy on industry on one side and the manufacturing and location strategy of MCN's on the other side. No structural research is available on the link between government policy on one side and the chosen business, manufacturing and location strategy on the other side. No profound research could be found to show clear evidence on the success of government policy related to the implementation of business strategies. For this reason, supportive research (see Chapter 5 – Government Policy review) on what exactly these government policies in Europe stand for was conducted. The role of government is

[28] See for more information on 'the local content paradox..': https://www.ictsd.org/bridges-news/bridges/news/the-local-content-paradox-at-the-wto-a-minor-lapse-or-lapse-or-organised

clearly recognized in location theory. Porter's (1990) diamond model explains the direct relation between 'government' and 'firm strategy, demand conditions and factor conditions' on the other side. Governments negotiate trade agreements between countries or economic regions (EU) and have a direct impact on the geography of manufacturing as argued by Nobel prize winner Paul Krugman (2008).

In Chapter 5 Government policy review, the public governing Industrial policies of four governmental bodies in Europe have been researched: the European Commission on Industry and the national policies from Germany, the UK and the Netherlands. In the following section, the findings from the Manufacturing data research, the Government Policy review and the results of the Delphi research will be discussed and related to the theoretical background provided in the literature review. First, the significant findings on government industrial policy will be summarized:

- Both on European as well as national levels, government have specific industrial policies in place for the Manufacturing industry
- The guiding principles of European government policies are comparable: job creation through building a competitive industrial sector
- The implementation of government industrial policies varies per country as well as compared to the overall EU policy
- Government policy is not seen as an important cause for de-industrialization
- Government policy is seen as a key driver in the manufacturer's footprint strategy
- The political situation, government attitude and regulations and the tax structure are seen as critical location factors during the decision-making process of location / footprint strategy implementation

Before discussing these findings, first a recapitulation of the relevant results from Data research and Government policy review chapters. Table 19 summarizes the Government industrial policies in place as well as the manufacturing employment for the EU-15 and the individual countries Germany, the UK and the Netherlands.

Region/country	Summarized Industrial policy	Employment in the manufacturing sector (Eurostat, 2013)
European Commission	focus on 'jobs and better lives', specific sector focus	15% (EU-15 countries)
Germany	'competitiveness' and 'high level of employment' no specific sector focus, structured implementation program	20%
United Kingdom	focus on 'jobs and stronger economy', specific sector focus	10%
The Netherlands	focus on 'entrepreneurship' with specific sector focus	10%

Table 19 Summary of findings from Data research (Chapter 4) and Government policy review (Chapter 5)

7.3.2.1 Government industrial policy in place

The majority of academic research confirms the importance of having a strong industrial policy in place at government level. Friedli et al. (2014) showed that the manufacturing sector has the highest value multiplication effect of all economic sectors: EUR/USD 1, = invested in the manufacturing sector creates EUR/USD 1.40 economic value in other sectors of the economy. Fingleton (2000) is also an advocate of a strong manufacturing sector, arguing its presence is critical to the future of the country. Westkämper (2014) and Kuivanen (2008) both agree with Fingleton's position. One of the three prerequisites that Kuivanen describes in his operation model required to survive in the global industrial market is: government support. For revitalizing the industry, a constant and renewed government policy is needed (Tiemstra, 1994; Ambroziak, 2014). The manufacturing sector remains an important 'source of income and employment' (Weiss and Tribe, 2016), making a strong industrial policy an important foundation for economic development.

Lall (2004) recognized two industrial policy approaches by governments: Neoliberal versus Structuralist. The neoliberal approach advocates minimal intervention by government. The Structuralist approach on the other hand advocates government intervention, based on the idea that independent free markets are not capable of achieving the welfare and wellbeing objectives that individual countries have. In the described government policies on Industry in the preselected countries, there are elements of both approaches. Very generic policy statements like 'more jobs' or 'competitiveness' cannot be segmented in either a neoliberal or structuralist approach. But a specific 'sector focus' tends towards intervention of the local government with subsidies or other aid programs.

Although in general government policies in Europe could be described as more neoliberal that structuralist: there is no central led institute deciding on how global companies should operate in their markets. Having said that, the fact that national governments as well as the European Commission have programs specifically related to supporting industries as well as very specific Manufacturing sectors (like Chemicals) indicates elements of a Structuralist approach. Tiemstra (1994) described a US example where in times of economic crisis, even one of the most liberal economic regions turns towards increased government intervention. Although governments that intervene in the supply and demand side of global marketplaces (import tariffs and other taxation measures) may be seen as old-fashioned by many economic scientists from Western economies (Bailey, Cowling and Tomlinson, 2015), industrial policy is still on the national government agenda. Ambroziak (2014) showed that specific government support to the Manufacturing industry had the opposite effect: The Economic Value Add (EVA) showed a decrease instead of the targeted increase. This reported effect is further supported by Brakman's claim (2004) that governments that try to keep manufacturing jobs in a specific nation or region are in fact damaging the nation's competitive position. If local or national governments subsidize manufacturing jobs, the longer-term effect is that the company receiving this government aid, clearly is not capable of competing on global level with their product (see also Martens and Vandenbempt, 1995). Subsidies tend to end up at companies from the past and not at companies of the future (Tiemstra, 1994).

7.3.2.2 Common guiding principles government industrial policies

Porter's (1990) comment is close to what the research findings showed on this topic: '*governments do not control national competitive advantage, they can only influence it*'. The choice of policy tool government uses, is decisive in creating an economic infrastructure that attracts manufacturing

industries. Martens and Vandenbempt (1995) reconfirm Porter's view stating that government should develop a 'favorable economic context and infrastructure' to support the manufacturing industry. In different wording, Ketolivi et al. (2017) argue that government should 'build an economic ecosystem' for creating the right industrial infrastructure. Mosconi (2015) reflects on the same topic stating that the challenge of any government is to find the 'right mix of public intervention and focus on the manufacturing market'. A pure focus on keeping manufacturing jobs within an economic region may not to be the way forward for both government and manufacturing company. The government's support however is welcome in all areas where industries are supported to become more competitive. Examples are the education systems to secure having the right skills available for companies (Veugeler, 2013). Another example could be the setting up of an ICT infrastructure which enables companies to apply the latest technologies into their manufacturing processes (Petrick and Simpson, 2013), resulting in increased competitiveness which is critical for survival in the globalized manufacturing marketplace.

The Delphi research confirmed the importance of the following governmental infrastructure elements for manufacturing location decisions:

- Political situation
- Government attitude
- Government regulations
- Tax structure

These four factors showed up in the top 6 of the overall list of 14 location factors. The factor 'political situation' was considered to be the most important location factor when taking cross border manufacturing footprint decisions. Building strong industrial sectors can be incentivized through a policy of Agglomeration, i.e. the geographic concentration of industries. Influential academic economic geographers like Weber (1929), Porter (1990), Hayter (1997) as well as Krugman (2008) described this principle to be a strong support for industries regarding innovation, cooperation as well as information sharing. An example is governments that promote specific enterprise zones where unutilized resources are available (Tiemstra, 1994).

The Breughel institute in 2013 published the paper: Manufacturing Europe's Future. The institute is an influencer of national as well as European industrial policies. In the cited publication, Veugeler (2013) argues against government policies focused on increasing industrial 'employment'. He claims that the focus should be on 'productivity increase' leading to increased 'competitiveness' on the global market. In other words, shifting the focus from 'employment' to 'employability'. In this context employability can be defined as creating the possibility for people to get a job through the right education and skills development. Looking at the actual government policy in for instance the United Kingdom ('jobs and a stronger economy'), one can see the policy dilemma a government has on the subject: is our objective employment or employability? Should we focus on 'keeping jobs' or focus on building an infrastructure where our citizens have the appropriate skills level, so they can be employed by the manufacturing industry? The outcome of the Delphi research is generally as well as specifically supporting Veugeler's and other academic publications on the guiding principles of government policy for a healthy manufacturing industry: having a stable political situation with industry friendly government regulations including a favorable tax structure is considered to be a highly important set of location factors for the industry.

7.3.2.3 Government policy implementation

The findings on industrial policy initiated by various governmental agencies show that the three individual nations in the research all had their own specific approach with regard to the implementation of the policy. The findings showed that e.g. Germany focused on 'competitiveness' and a 'high level of employment'. In the German industrial policy there is no specific sector focus within the industrial policy described. The Netherlands as well as the UK did choose for a specific sector focus. The UK combined their focus on sectors with specific focus on the creation of industrial jobs. The Netherlands on the contrary took the angle of looking at what the government calls 'entrepreneurship'. The overall central European Industrial policies promoted from the European Commission in Brussels choose the key elements: jobs combined with a specific sector focus. In 2010, the Vice President of the European Commission for Industry was clear on the objective of European industrial policy: bring up the value of the manufacturing part of the Industrial sector to 20% of total GDP by 2020. Based on World Bank data[29], the manufacturing value added in percentage of GDP in the European Union decreased from 19.5% in 1995 to 15.5% in 2014.

Moving forward from the more theoretical discussion on government policy objective towards more practical policy tools a government can apply: Hart (2001) points out 'antitrust policies, protection of Intellectual property and supporting start-ups'. Tiemstra (1994) argues that in order for industries to accelerate their capabilities on the global market, governments should put their prime focus on the '*removal of roadblocks that obstruct industrial change*'. In different wording, Martens and Vandenbempt (1995) as well as Ketolivi et al. (2017) discuss developing a favorable economic context as well as infrastructure so industrial companies can build stronger positions on the global marketplace. The outcome of the Delphi research related to the location factors importance strongly confirms the argumentation of Martens et al. (1995) and Ketolivi et al. (2017). Government regulations, government attitude as well as tax structure ARE factors with the potential to build this 'favorable economic context' or 'economic ecosystem' as described by both academic researchers.

Veugeler (2013) furthermore points at specific policy tools that government can apply in improving a nation's employability: (1) energy policy, (2) capital markets for SME (small and medium enterprises), (3) the education system and (4) reduction of trade barriers. These factors strongly correlate to the 'government regulation' factor from the Delphi research, which factor was considered to be the 3rd most important one as scored by the Delphi panel of industrialists.

7.3.2.4 Government policy and (de-)industrialization, Manufacturing footprint strategy and location factors

Is there a relation between government policy on the manufacturing industry and the process of de-industrialization? From the data as well as the Delphi research, this correlation cannot be substantiated. Still, in some countries the employment in the manufacturing industry is significantly lower (UK, the Netherlands 10%) than in other countries (Germany 20%). If we measure de-industrialization purely in terms of employment in the manufacturing sector, any correlation must be found in how government policy is implemented.

Some more statistics from the Data research:

- From all countries participating in the European Union, Germany is considered to be the most 'competitive' nation according the Global Competitiveness Index 2015-2016 (World

[29] https://data.worldbank.org/indicators

Economic Forum). Germany combines this with the highest employment percentage of people working in the Manufacturing sector in the EU-15 (20% in 2013, Eurostat data)
- The Netherlands combines the highest GDP (Gross Domestic Product) per capita (IMF data 2012) with the lowest employment rate in the Industrial sector in the EU-15

The German government's focus on 'competitiveness' and 'high level of employment' and the Dutch government focus on 'entrepreneurship' have resulted in favorable economic parameters for these countries and the manufacturing companies operating within these nations. Figure 29 shows an example of Germany's success in the fiercely competitive global marketplace with their Automotive manufacturing industry. Specifically, for the Automotive sector, the data research in Chapter 4 showed that employment in the German automotive sector increased with 39% in the data research period 1995-2013. However, if the success of the German automotive industry can directly be linked to German government policy remains a theoretical discussion and a source for multi-interpretation. The discussion on this is fueled by opinion makers and journalists, like the title of a 2016 article in the UK newspaper the Guardian: 'The UK could learn a lot from Germany's long-term industrial strategy'. The article refers to one key pillar of government support that is also frequently mentioned in academic research: a party publicly financed research organization (Fraunhofer-Gesellschaft) that provides applied science for manufacturing companies that would otherwise not have the funds to invest. Veugeler (2013) and Mosconi (2015) both point at the essence of such governmental R&D support to boost industrial competitiveness.

One of the common agenda points of government as well as business is economic growth. Is government policy an important influencer of a company's manufacturing strategy and location decision and therefore employment potential? Mosconi (2015) argued that for implementing structural growth in the industry, both a manufacturing and industrial policy is needed. In the Delphi research, the expert panel did not consider the 'government' as a key driver for their cross-border manufacturing strategy. However, when a company starts to implement their footprint strategy and considers the following government related critical location factors are decisive: the political situation, government attitude, regulations as well as tax structure (Delphi research Made in Europe, 2018).

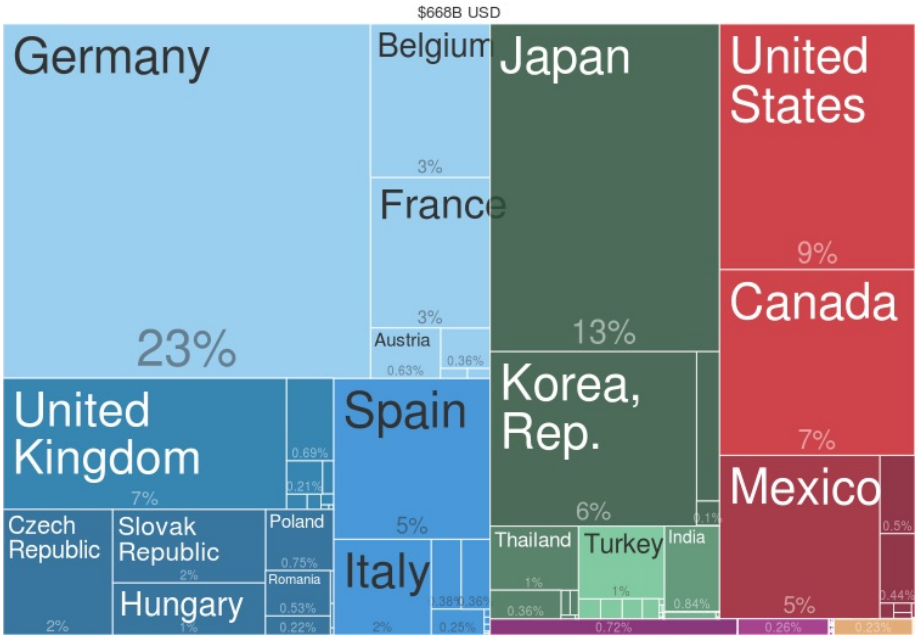

Figure 30 Car exports by country (Harvard Atlas of Economic complexity, 2014)

Porter (1990), Tiemstra (1994) and Weiss & Tribe (2016) all confirm that government plays a limited role in manufacturing strategy setting. The Delphi research confirms this, showing that none of the key drivers for manufacturing strategy setting is government of government policy related. Government policy is no strategic driver of footprint strategy, but government infrastructure (regulations, attitude, tax) do play a critical role in the implementation of the manufacturing location strategy, when location factors need to be considered. In the discussion on the relation between government policy and manufacturing industrial competitiveness, there is general agreement on the fact that government policy can impact the competitiveness of manufacturing organizations. But both Literature, Data and Delphi research showed that this impact is limited to building a favorable economic infrastructure in a preferably stable political environment. Staying in the Automotive terminology: government industrial policy is not the ignition key for manufacturing competitiveness but can act as the fuel that is required for an industrial company to move ahead in the global marketplace.

7.4 Summary key findings

What are the most important location factors for manufacturing companies in the coming decade? Compared to previous and comparable research on this topic (MacCarthy and Atthirawong, 2003), The Made in Europe respondents rate the importance of the various location factors quite differently in 2017. The panel's answers show a shift towards the *importance of the political situation as well as government attitude and environment* in the designated country of manufacture. Secondly, the importance of the availability of an actual *end market* in the designated location is regarded crucial. Relocating a manufacturing facility just for cost reasons is no option anymore in today's economic environment. A cross border manufacturing location needs to have sufficient options for additional sales revenues as well. The more traditional location factors like labor, transport and agglomeration continue to be important but their relative importance has decreased. The increased importance of technology (ICT, skill levels) and more 'soft' and indirect factors (government and political support, environmental considerations) is another sign that manufacturing executives predict a shift in how they rate the importance of these location factors in their cross-border manufacturing location decisions.

Earlier research on what elements determine the strategy for a manufacturing company, listed several single factors like labor cost, labor skills, raw materials etc. Currently manufacturing companies operating in the global marketplace are looking for more *integrated supply chain solutions* from the supply partners (Ellram et al., 2013). A prerequisite for cross-border manufacturing is the availability of a well-functioning integrated supply chain in a future place of production. With the ongoing process of outsourcing entire manufacturing chains to third parties, 'cost minimization' is not anymore the key driver for a manufacturing company. Building agile and efficient operations to serve the international market with products is the latest footprint strategy of MNC's. Manufacturing companies need high skilled labor to design, build and run the innovative plants of the future.

Footprint strategy implementation comes down to making decisions. The Made in Europe expert panel confirmed that any cross-border location decision is complex and needs careful contemplation. The respondents of the Made in Europe research continue to *prefer the rational approach* to a more intuitive approach. Lessons could be learned from academic research conducted in decision-making (Klein, 1999; Mitroff and Linstone, 1993; Lerner, 2015). Research by Turpin and Marais (2004), Gladwell (2005) and Kahneman (2011) showed that 'experience' and 'intuition' must not be neglected when taking strategic decisions about the future direction within international operating

manufacturing companies. Structurally integrating these soft elements in the decision-making process could increase the success rate of location decisions.

Made in Europe research - key findings related to central research questions	
Location factors	The political situation is considered to be a dominant industrial location factor Access to new markets is considered to be the second most important location factor Four of the top six location factors prioritized by the Delphi expert panel are government related: political situation, government regulation and attitude and tax structure Compared to earlier research, the traditional location factors 'labor, transportation and raw materials' have lost significance in manufacturing location decisions
Manufacturing strategies	The main drivers for cross-border manufacturing in the next decade are: (1) access to a cost effective and flexible supply chain, (2) access to skilled labor, (3) access to end market
Manufacturing location decisions	The lack of in-depth knowledge and objective evaluation criteria are considered the biggest problems in taking the right location decisions Understanding local dynamics and maintaining a long-term perspective are recommended for improved decision making on manufacturing locations; experience and intuition are considered important skills required by a preferably diverse group of stakeholders and decisionmakers

Table 20 Overview of the significant research findings from the Made in Europe research

Besides the findings related to the central research question, the literature, central and supportive research (see Chapter 7.2.2.1 and 7.3.2) all pointed at the relevance of 'government policy' in relation to location decisions of MNC's. The findings suggest that 'location' has become a geo-political issue. The Chapter Conclusions will further elaborate on this. Particularly the promotion of agglomeration or industrial clustering could generate a variety of benefits for MNC's as well as the regional economy (Dunning, 2009; Arita and McCann, 2000).

In the final chapter of the thesis, several conclusions will be presented based on the analysis and discussions in the previous Chapters. The central research question from the Made in Europe research will be discussed against the key findings of the researches conducted. Solution directions coming from the various key findings and subsequent discussions will be presented to see if the overall research objective can be met.

CHAPTER 8

CONCLUSION

8 Conclusion

8.1 Introduction

Three Industrial revolutions in the 18th, 19th and 20th century gave many countries and citizens in Europe jobs, welfare and prosperity. The former agricultural economy of the 18th century transformed into an industrial economy in the 20th century. The generations that grew up in the post war years seem to link industrialization with economic prosperity. The ongoing process of de-industrialization in many European countries started in the second half on the 20th century and does not seem to stop. The central research question focused on predicting what are the most important location factors that MNC's need to consider in the 21st century. The world's manufacturing output is still increasing following the growing population, combined with increasing global GDP levels. In general, the world produces more products, but less people in manufacturing are required for this. Especially in the modern European industries the number of people employed in the manufacturing sector has dropped as a result of two main drivers: first of all the shift of manufacturing operations towards lower cost countries and second the ongoing automation as a result of new manufacturing technologies.

The Data research confirmed earlier research that the ongoing decline in manufacturing employment did not result in a decrease of GDP or income per capita. On the contrary, the shift of employment from the manufacturing industries towards the service sector boosted GDP levels by almost 200% in the countries that were researched.

In the previous chapter, the key findings of the research were presented and discussed in light of the theoretical framework provided in the earlier Literature review. These findings were summarized against the initial problem statement from the Made in Europe thesis. In this final chapter, conclusions will be drawn based on the findings of the research. The central research question of 'Made in Europe' is: *what are the critical location factors that need to be considered by manufacturing companies in the coming decade of this 21st century?* An overview of primary and secondary factors will be presented and embedded in a decision framework applicable for current manufacturing location questions, based on the outcome of the research. This framework is visualized as the '*Made in Europe manufacturing location decision circle*'. Based on this framework several practical implications will be noted, stating potential actions for both the management of MNC's and policy makers in governmental institutions. Finally, an overview of the limitations of the research and recommendations for further research on this topic will be presented. This closing chapter will start with a summarized description of the overall process of this research.

8.2 Overview of the research process

Employees working in the European industry sector have been and are affected by the rapid developments in our global marketplace. One economic sector in particular has been severely hit from an employment perspective: the manufacturing industry. One out of five jobs (equivalent to 6 million jobs) in the European manufacturing sector disappeared during 1995-2013. In that same period, the world's global manufacturing output increased with over 40%[30]. Manufacturing industries underwent substantial changes in these years to survive in an economy that became truly globalized.

[30] World development indicators (www.data.worldbank.org: Manufacturing value added, constant USD 2010, 1995-2013)

Understanding the factors that contributed to the process of de-industrialization is the basis for choosing the appropriate manufacturing and location strategy for MNC's. Many of the drivers for cross border manufacturing have changed in the previous decades, as a result of the many changes that took place in the globalized economy: e.g. 'distance' has become a less relevant factor as a result of sharply declined cost of transport. The application of Information and Communication Technologies have further facilitated the process of globalization for many industries. Many companies were 'thrown into global competition' as Kasper (2007) described correctly. Innovative and disrupting manufacturing technologies (3D printing, robotics etc.) forced global manufacturing companies to further review their manufacturing strategies. For several decades, low labor cost was the most important driver for companies deciding to relocate their manufacturing operations. With labor cost becoming a less dominant factor, the relevance nowadays is frequently lost. New manufacturing strategies drive new location factors critical for staying competitive. Location factors that need to be considered in the decision-making process of MNC's in the 21st century.

How the Made in Europe research was conducted is visualized in Figure 32. In the Introduction (Chapter 1), the problem statement as well as the research objective were described. The purpose of this study is to develop *'a framework to support location decisions'* for companies in the European manufacturing industry.

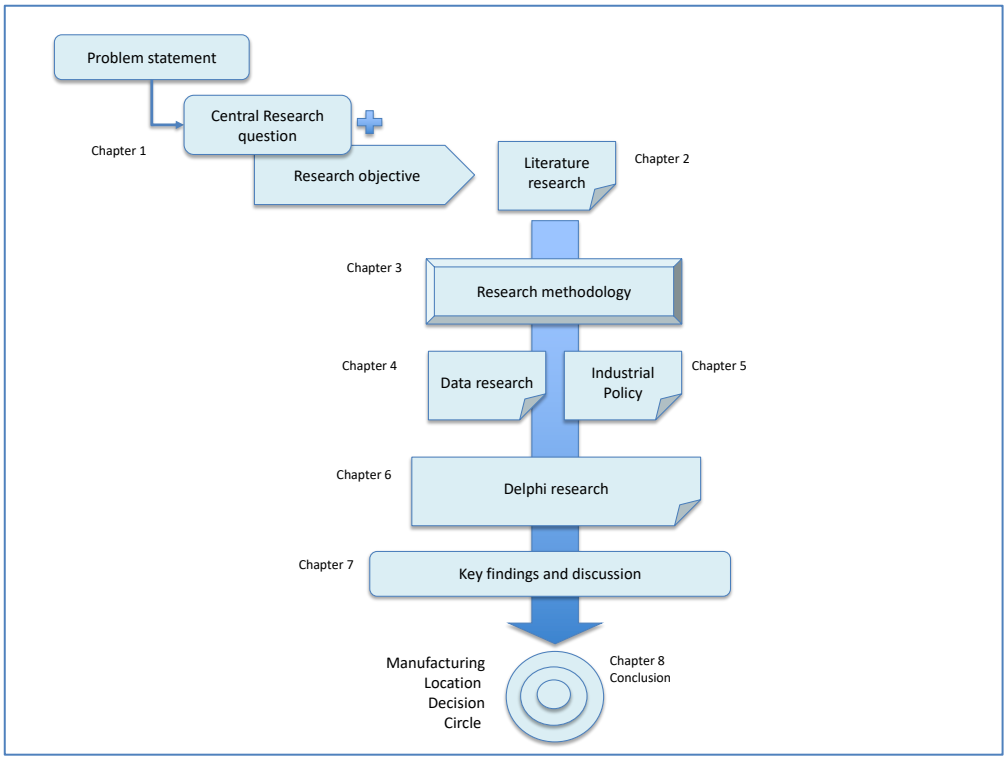

Figure 31 Overview of the Made in Europe research process

In order to understand the relevant theoretical perspectives and dynamics related to the topic of *location factors* that are *critical* for the *Manufacturing Industry*, an initial Literature review (Chapter 2) was conducted. The Literature review covered five specific elements: International Business, Economic Geography (location factors), Strategic Operations Management (remain competitive, survive), Industrial policy (Manufacturing Industry) and Decision-Making theory (decision modeling).

The theoretical perspective from the Literature review formed the basis for choosing a research methodology (Chapter 3), suitable for answering the research questions. Describing the research methodology in one word would be: 'pragmatic'. How to deliver the research objective, fill some of the gaps from the Literature review and use practical research methods? The subsequent research was therefore split in two: primary research (Delphi) and secondary or supportive research (Data research and Government policy review) for creating context and understanding before starting primary Delphi research.

In Chapter 4 (European Manufacturing Data research), the development of direct employment in the various Manufacturing subsectors was researched from 1995 up to 2013 in the EU-15 countries, using Eurostat statistics. The data from three individual countries (Germany, the UK and the Netherlands) generally confirmed the overall EU-15 data trend. Using Weiss and Tribes (2016) sector categorization, four manufacturing subsectors (representing 60% of the overall Manufacturing Industry in the EU-15) were preselected for the subsequent Delphi study panel selection. The sectors High Tech, Metals & Machinery, Chemicals and Automotive were selected based on their relative importance from an employment and technology perspective in combination with their absolute change of employment.

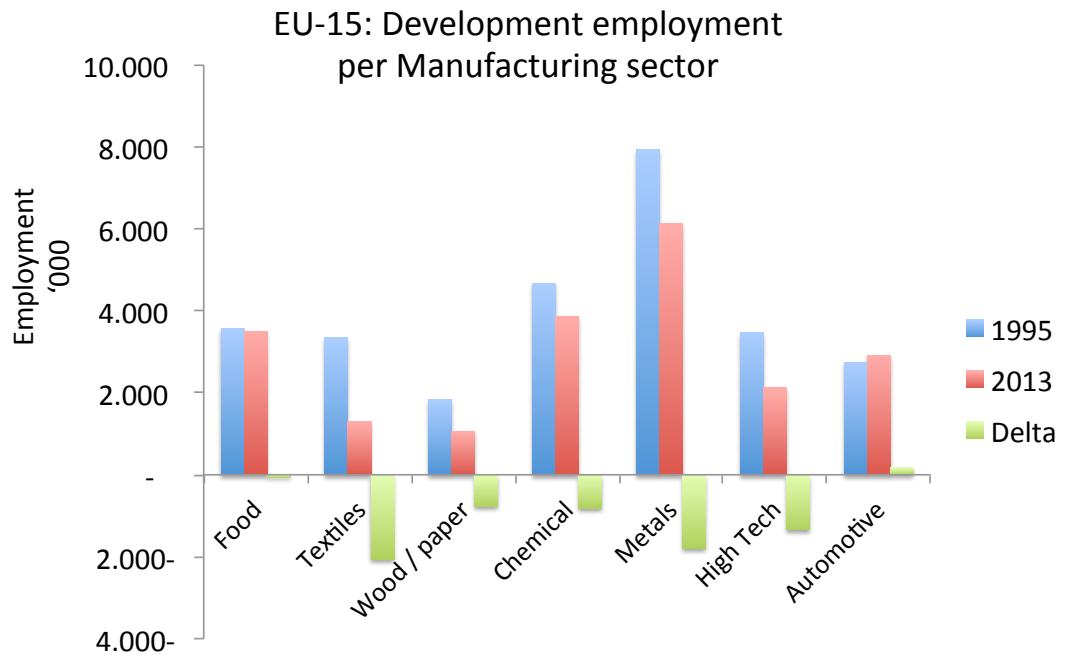

Figure 32 Change in employment in the EU-15 manufacturing sub-sectors (Eurostat database, July 2015, NACE coding)

Understanding how the European government is impacting MNC's manufacturing and location strategies was one of the gaps found in the initial literature review in relation to the Made in Europe research question. In Chapter 5, the current European government policy on Industry was reviewed in order to fill some of these gaps and create context and understanding for the primary research.

Chapter 6 described the central Delphi research. Senior business executives coming from four preselected manufacturing sectors were approached to join the Made in Europe Delphi expert panel. A Delphi research on the subject with executives having 'hands-on' experience with manufacturing, footprint or location strategy issues has never been conducted before. This research was able to engage this 'elite group' by applying the latest digital information technologies in an E-Delphi study. This approach resulted in the onboarding of a highly experienced panel of expert executives coming from the European Manufacturing sector (average > 20 years working experience per panel member). A total of 39 executives with experience in one of the preselected manufacturing subsectors registered and were accepted as panel member. Three Delphi rounds were conducted with questions on de-industrialization, manufacturing strategies, location factors and decision-making. Chapter 7 discussed the key findings from both Delphi and Data researches. In this final Chapter 8, overall conclusions will be drawn and presented considering the original research objectives.

8.3 Gaps, key findings and conclusions

When the central research question (Chapter 1) was put into the academic research perspective (Chapter 2), several gaps appeared, as summarized in Table 21.

Gaps	Additional research questions / missing data elements / gaps
Location factors for specific manufacturing sectors	What is 'the Manufacturing Industry'? What manufacturing (sub-) sectors are relevant for research?
Relevant 'future' location factors	What developments are ongoing in manufacturing sectors? Manufacturing technology, footprint strategy, competitive forces?
Manufacturing strategy vs location or footprint strategy based on changing location factor importance	What are the current manufacturing strategies in the sectors? What location / footprint strategy is best suitable / preferred?
Linking Government industrial policy and manufacturing location strategy	What are the current government industrial policies in place? How does this relate to business footprint strategy and manufacturing location factors?
Decision framework for manufacturing location decisions	What is the preferred decision-making process? Pitfalls, experiences? Future recommendations?

Table 21 Overview of the gaps from the Literature review

The combined research efforts provided insights from various angles and perspectives in relation to the central research questions. In Table 20 (Chapter 7.4) the most significant findings have been summarized. In Table 22, a summary of these significant findings of central and supportive research is described. One significant finding is added to Table 22 compared to Table 20 (Chapter 7) and is related to Government industrial policy.

Made in Europe research - key findings central research	
Location factors	The political situation is considered to be a dominant industrial location factor Access to new markets is considered to be the second most important location factor Four of the top six location factors prioritized by the Delphi expert panel are government related: political situation, government regulation and attitude and tax structure Compared to earlier research, the traditional location factors 'labor, transportation and raw materials' have lost significance in manufacturing location decisions
Manufacturing strategies	The main drivers for cross-border manufacturing in the next decade are: (1) access to a cost effective and flexible supply chain, (2) access to skilled labor, (3) access to end market
Manufacturing location decisions	The lack of in-depth knowledge and objective evaluation criteria are considered the biggest problems in taking the right location decisions Understanding local dynamics and maintaining a long-term perspective are recommended for improved decision making on manufacturing locations; experience and intuition are considered important skills required by a preferably diverse group of stakeholders and decisionmakers
Significant finding supportive research	
Government industrial policy	The manufacturing industry is considered a critical sector in Europe's overall economic development towards the future as a result of economic output spin-off effects (Friedli et al., 2014) Rather securing individual manufacturing jobs, government industrial policy could focus on building a competitive infrastructure through e.g. industrial clustering (**agglomeration**) as the preferred intervention strategy

Table 22 Overview of the significant research findings from the Made in Europe research

8.3.1 Manufacturing strategies, Location factors and Decision making

Applying the latest Industry 4.0 manufacturing techniques result in new manufacturing footprint strategies. Compared to earlier research, this Delphi research showed a clear shift away from traditional cost related location factors (labor, transportation, raw materials) towards value related factors (markets) and factors related to governmental infrastructural prerequisites (government

support and attitude, political situation, tax structure). Re-shoring and insourcing are seen in various manufacturing sectors as an answer to these developments. Low labor cost is rapidly losing its importance as both key driver for the MNC's strategy and a critical location factor.

The key findings from both academic literature review as well as Delphi research confirm that in recent years, there has been a substantial shift in the relative importance of location factors. New digital plants of the future are built with introduction of new manufacturing technologies. Man and machine are more closely integrated making the factor manual labor less important and sometimes even obsolete. The requirement for labor skills is shifting from low to high skilled: computer and data scientists replace operators and maintenance staff in the factory of the future. Government institutions understand these new requirements and focus their industrial policies on facilitating the new educational requirements in today's society. Skills enhancement is top priority in Europe's latest government policies for the manufacturing industry. The shift in the relative importance of traditional factors like raw materials, transportation and labor shows that manufacturing industries are hardly competing on the global marketplace with cost competitiveness. The advantages of cost efficiencies are bottoming out and traditional cost elements (labor, transport, raw materials) are hardly key competitive drivers anymore.

Summarizing these findings from the Made in Europe research, it can be concluded that the manufacturing plant of the 21st century will be:

- Located close to end markets
- Staffed with high skilled labor
- Flexible with a cost-efficient supply chain

These three characteristics come together in **agglomeration economies**. Regions where industries cluster together, co-locate and share the same resources (people as well as materials). The learning effects of these agglomeration (Dunning, 2009) can lead to increased innovation efforts (Beaudry and Schiffauerova, 2008) which are crucial for MNC's global competitiveness. Government play an instrumental role in facilitating agglomeration (see also 8.3.2).

Manufacturing location decisions are complex. The number of elements to consider in the decision-making process are enormous. Weber's location triangle (1929) is not suitable for location decisions in the 21th century. The recommendations from the Delphi panel showed a high similarity with the findings from Turpin and Marais' research (2004): top executives tend to say they favor a rational approach, but in the end are applying experience and intuition for strategic, complex decisions. The rapid and frequently disruptive developments in today's manufacturing environment, furthermore increases the complexity of making the 'right' manufacturing location decision. The findings from academic research highlighted the importance of 'experience' as well as 'intuition'. The highly experienced Delphi panel with organizational elites however, still feel most comfortable with rational decision-making processes considering cultural sensitivity and local knowledge.

What to conclude in this respect? Seizing the opportunities created by new manufacturing technology is required to survive in the 21st century. In a rapidly changing environment, taking a longer-term perspective seems close to 'fortune telling'. The decision-making process on manufacturing locations show strong resemblance to a quote from the opening chapter of this research: 'Many companies think of geographic strategy as a short-term checkers-match rather than as a long-term chess game' (Gerdeman, 2012). The revolutionary developments in the manufacturing industry require the leadership of MNC's to learn how to play the winning chess game of geography. Government institutions can help the win this game.

8.3.2 Industrial Government policy

The research confirmed more than once the importance of 'government' as a decisive element in location decisions, suggesting 'location' is a geo-political issue. However, 'government' is not seen as a key driver for a MNC's manufacturing or footprint strategy. Central in defining a winning manufacturing strategy are elements like flexibility and a favorable labor market. Governments play a supporting role in building this infrastructure. Porter's (1990) quote comes to mind when he stated: *'governments do not control national competitive advantage, they can only influence it'.* The literature research showed that government policy directly related to the manufacturing sector is controversial. Nevertheless, the following conclusion can be drawn on industrial government policy related to manufacturing location decisions: although government policy is not a key driver in the strategy making process for manufacturing industries, government plays a decisive role in manufacturing location decisions. The four government related location factors as described in Chapter 7.2.2.1 (Badri, 2007) can be summarized as follows:

- Political situation: political and economic stability, protection against expropriation, trade treaties and attitude towards foreign capital
- Government regulation: regulations regarding corporate investment laws, joint ventures and mergers, transfer of earnings out of the country, taxation of foreign owned companies and the foreign ownership laws
- Government attitude: compensation and insurance laws, safety inspection and building guidelines
- Tax structure: corporate, property and sales tax laws as well as tax exemption rules

Providing a favorable institutional infrastructure is considered more and more a critical manufacturing location factor in the coming decade. Agglomeration and industrial clustering are regarded as a potentially winning strategy for MNC's as well as government institutions. Nearness to similar industries is one of the characteristics of the 2nd most important location factor: 'markets' (see also Chapter 7.2.2.2).

Germany is an example of a government, that is keen on implementing an infrastructure of innovation and development of the right labor skills, as the findings in the research on Government policy showed. Germany is the country in Europe with the highest percentage of people working in the manufacturing sector (see Chapter 5.4). The German government actively promotes what they call 'Industry 4.0' referring to the 4th Industrial revolution that is taking place. The digitization of the manufacturing industry is regarded as an opportunity to invest in 'high level employment' and refer to the creation of highly specialized jobs. In Germany's case this resulted in high manufacturing employment levels (Eurostat data), a high GPD level (IMF data) and high competitiveness levels (WEF data). The factor of MNC location is

The debate on how to best implement an agglomeration strategy from government perspective is fierce and centered around the method and the degree of intervention. Guidelines for practical implication will be discussed in the next paragraph.

8.4 Practical implications: introducing the Manufacturing Location Decision Circle

Based on the research findings, Manufacturing company strategy and government policy directly influence Manufacturing location factors as well as the location decision-making process. On their turn, the decisions that global manufacturing companies take, directly influence manufacturing strategies as well as government policies. Figure 33 visualizes these interdependencies, which were researched in this Made in Europe thesis. Continuously aligning strategies and policies in a de-industrializing economy, is the prerequisite for manufacturing companies to survive in the 21st century and for governments to help manufacturing companies to stay competitive resulting in a high level of employment and economic welfare for its citizens.

In Europe's de-industrialized economy, both Manufacturing companies and European government institutes develop strategies and policies to achieve their goals: profit maximization to secure business continuity combined high employment levels of skilled citizens leading to economic prosperity.

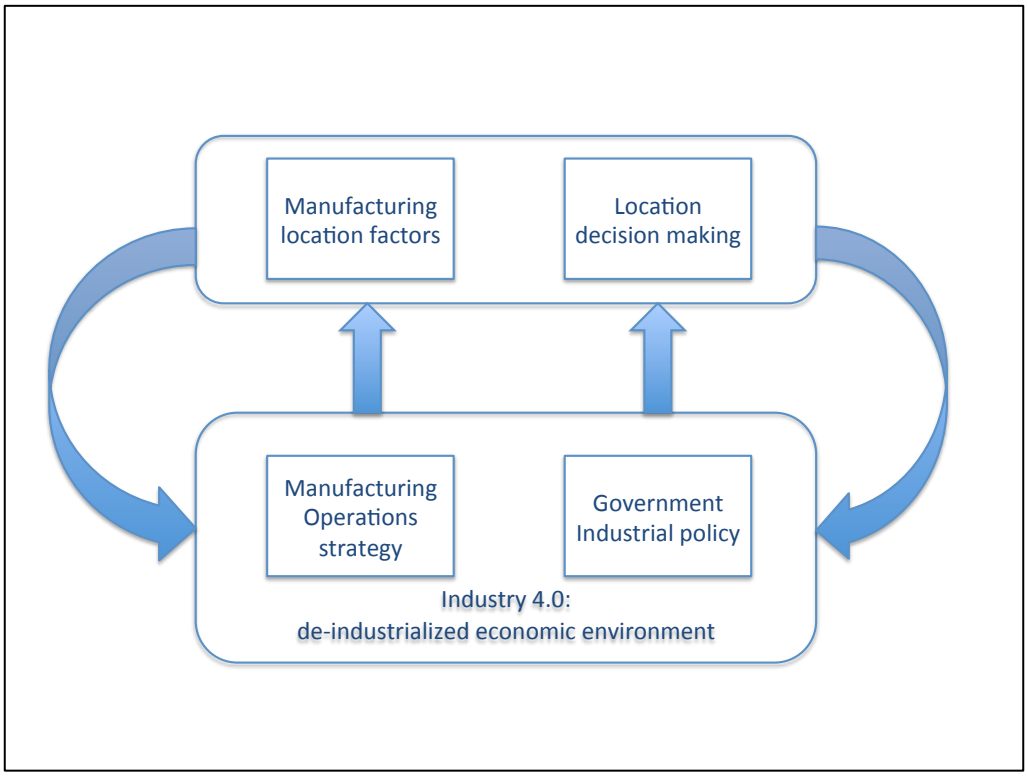

Figure 33 Made in Europe's research areas

The research objective was to deliver a 'framework for manufacturing location decisions'. Based on the key findings and the conclusions presented, the **Made in Europe 'Manufacturing location decision circle'** has been developed (see Figure 34). The circle visualizes the different location factors related to the central research question of this research: manufacturing location decisions as a synthesis of the main findings, translated into a model for both academic purposes and practical business application.

The location factors that based on the primary Delphi research outcome has with the highest importance are visualized closest to the core decision circle: the four government related factors (political situation, government regulation and attitude, tax structure) together with the factors 'skilled labor' and 'markets' (see Chapter 7.2.2).

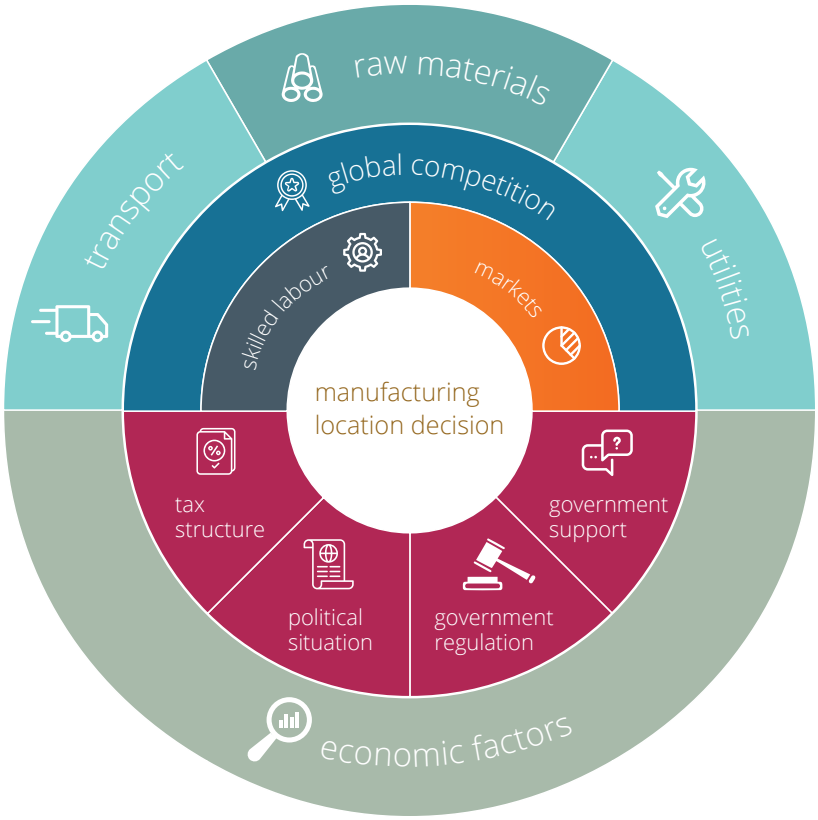

Figure 34 Made in Europe Manufacturing location decision circle

The remaining five factors 'transport, raw materials, utilities, global competition and economic factors' (see Table 1, Chapter 2.3.2) are grouped around the six most critical factors. As discussed earlier, the dynamics of the various factors within the circle can vary per specific manufacturing subsector, as the Delphi research showed (Table 15, Chapter 6.7.3). The location decision circle visualizes the shift from the more traditional location factors (raw material, transportation, utilities, labor wages) towards the factors which seem to play a dominant role in the MNC's footprint strategy in the coming decade (market access, governmental infrastructure and support, properly skilled labor). The relevance of traditional location factors like transportation and (low) labor wages are lost in manufacturing sectors impacted by the 4th Industrial revolution. Referring back to the central research question: for manufacturing companies to survive in the 21st century, competing on cost driven location factors is not expected to secure business continuity. Manufacturing plants of the future are located close to their end markets, are staffed with high-skilled labor to run their fully automated, flexible supply chain operations in an economic region where the local government is stable and has a favorable attitude in terms of regulations and taxation.

How can this decision framework contribute to actions that both managerial practice and government institutions can potentially take? The following tables will present a generic approach on how the findings of this research could be applied in real life by managers and government policy makers.

Table 23 gives an overview of actions management of MNC's could take as a start to prepare themselves for the challenges they face today in relation to the topic of manufacturing location decisions. After aligning corporate and manufacturing strategies, a close look needs to be taken at the current company's manufacturing footprint: where are we now and where should we be in the coming decade, taking into consideration the decision circle (Figure 34)? Finally, implementing a robust decision-making process is vital for management to make 'winning' decisions' (Schoemaker and Russo, 2001).

Practical implications	Potential actions	Questions to be addressed
International Business Management practice	I. Validate corporate strategy (Teece, 2009)	Q: are we sufficiently adapting our firm to outperform the competition?
	II. Review and update manufacturing strategy (Thun, 2008)	Q: does our manufacturing strategy successfully grab the potential of new (Industry 4.0) production technologies? Q: what investments are required for a sustainable manufacturing plant?
	III. Review current footprint strategy and manufacturing location (McCann, 2008; Dunning, 2009)	Q: what are the critical location factors for specifically our business in the next decade? (apply Made in Europe decision circle) Q: does our current manufacturing location sufficiently support the firm's long-term manufacturing objectives? If no, what actions / investments are needed?
	IV. Implement a robust strategic decision making process (Nutt, 2002; Gladwell, 2005; Kahneman, 2011)	Q: how are the following elements secured in the process: long-term focus, experience and intuition, flexibility and adaptability

Table 23 Practical implications for International business management practice

Also for government institutions, the Location Decision Circle can be applied for developing successful intervention strategies aimed at matching regional infrastructure and local MNC needs. Table 24 summarizes a number of potential actions that government institutes can take to match their intervention strategy with MNC needs. Government bodies need to take a critical look at the actual impact of their current development and intervention policies. Do they really match the needs of MCN's as well as the people working for them in a particular region? What does the government really know about the skills requirement MNC's have now and will need to have in the near future? And finally, how can improved agglomeration policies contribute innovativeness and help MNC's competitive advantage in their global market?

Practical implications	Potential actions	Questions to be addressed
Government institutions	I. Review and validate current intervention policy and strategy (Ambroziak, 2014)	Q: how can our institutional infrastructure sufficiently support the strategic objective of regional policy and MNC objectives? (Trade treaties, pacts, regulations for JV's, compensation laws, corporate and property tax etc.)
	II. Match education systems and skills enhancement to future labor market needs of MCN's (Veugeler, 2013)	Q: does the current labor market match the MNC 'knowledge' needs of the future? Q: is our current education system fit for future needs regarding high skilled labor?
	III. Strengthen policy measures aimed at increasing agglomeration and industrial clustering (Dunning and Lundan, 2008)	Q: do current institutional policies generate sufficient innovation initiatives? Q: Are co-location and knowledge sharing efforts sufficiently incentivized in current regional development policies? Q: what measures need to be taken to further improve positive agglomeration effects?

Table 24 Practical implications for Government institutions

For implementing the suggested actions, they need to be further tailored to the specific business needs of the individual MNC or regional development policies of local government. The proposed actions are intended to be used as guidelines for practical application based on the main findings of this research.

8.5 Contributions

In the opening chapter, the relevance of this research for the private sector, the public sector as well as the academic sector was mentioned. For the private sector, the Manufacturing location decision circle can support MNC's in their quest for choosing winning manufacturing strategies that result in choosing optimal manufacturing locations. The findings as summarized in Table 22 related to Manufacturing operations strategies, location factors and decision-making could be applied in business situations that look for guidance in this respect. Potential actions for the management practice were described in the previous section.

The findings and conclusions on 'industrial policy' can help decision makers in government institutes to review, rethink or even reconsider their current industrial policy. The research showed that the Manufacturing industry and the Commercial Services sector show strong interdependencies, which should be considered by government policy makers. Manufacturing jobs and Commercial Service jobs are strongly interdependent and a too narrow focus on only one type of job could be counterproductive. A more holistic approach from government seems to be more productive. Building a global competitive manufacturing industry can be the result of effective government policy. An example supporting this conclusion is the German Automotive sector, as this and other research clearly showed. A practical application for possible policy measures were described in Table 24.

In the academic area, the presented Manufacturing Location decision circle can be used as input for potentially new insights into the Economic Geography discipline. The factor government has gained considerable importance compared to previous research on the topic. The research methodology, where Literature, Data and a Delphi study using business practitioners has delivered useful insights for science in the field of organization theory (strategic management) as well as decision making theory.

8.6 Limitations

The research Made in Europe has limited itself geographically to manufacturing industries in the EU-15 zone, as explained in the Introduction Chapter 1.5. No extrapolation of the research finding can be done to other parts of the world (US, Japan, China, etc.). This limitation is applicable to both the Data and Delphi research.

The research Made in Europe aims to present a Manufacturing sector specific location factor decision model, with a strong focus on expected future developments. Using the Delphi technique with an expert panel from preselected manufacturing subsectors misses insights from other manufacturing sectors. The thorough selection process of the Delphi panel members should safeguard a fair representation of expert opinions but cannot secure this entirely. The selection of only business executives or practitioners is a limitation from a research perspective; a more diverse expert panel group could shed more light from a research perspective but has been put aside for reasons explained in the Methodology chapter. Structurally repeating the research process with a similar expert panel could further increase the value of the research results.

Research on specific government policies was limited to the European Commission of Industry and three European countries. Also, these policies were reviewed during a specific timeframe (2015, 2016). No detailed historic government policy research was conducted for reasons of practicality and limitation in the research scope. Although only three of the EU-15 countries were selected for further research on both employment data as well as government policy, these three countries represent approximately half of the EU-15 economic size.

These limitations and other wider research questions give rise to a number of potential areas for further research.

8.7 Recommendations for further research

The Made in Europe research chose a methodology for approaching the central research question within a preselected geographical context. It is recommended to apply other research methods and wider geographical scope to further validate the research findings and strengthen the location decision framework. The following recommendation can be given for further research:

1. Further Delphi research
    a. The key findings and conclusions of this research are the results of a methodology that was chosen for specific application of location factors relevant for selected European industries, using a Delphi group coming from MNC executives. A larger Delphi panel in a global setting could deliver new insights from industries in other geographical regions and is recommended as an approach for further research
    b. When the Delphi results were broken down into the four sub-sectors, it appeared that there were variations in the importance of different location factors, e.g. in the Chemicals sector, *Utilities* is regarded as the number one factor of importance. For the Automotive sector it is *Markets*. (see also Chapter 6.7.3.1). However, the sample sizes when breaking down the Delphi participants by subsector were so small that the results cannot be used for making general inferences. More extensive research is recommended to investigate differences between sub-sectors. One way in which this could be done would be using a larger Delphi panel coming from specific manufacturing subsectors in order to increase the accuracy of the results. Focusing future research on specific sectors will increase the applicability for decision making for both government as well as business
    c. The Delphi study questioned business elites on their views on a variety of topics. Their views, or what they <u>say</u> on manufacturing strategies, locations factors as well as location decisions however could very well be different from what they (or their businesses) actually <u>do</u>. Further research can be undertaken to link these two

2. Quantitative research which could test the findings of the Made in Europe research in the form of hypotheses is recommended to further validate or strengthen the findings. An example area could be the measurable effectiveness of government policy in relation to the manufacturing industry competitiveness.
3. Alternative research methods are recommended like in-depth interviews as well as group discussions. A more open discussion on location factors versus the approach of presenting preselected factors is recommended as a possible future research approach to increase the focus on considering factors relevant for the future instead of the past. Careful consideration on the methodology is advised to keep some of the important advantages of performing a Delphi study (anonymity, possibility to reflect).
4. Current decision-making processes on location decisions are far from innovative. Traditional ways on taking decisions still seem to prevail in the industry. Research on the application of new decision-making tools is recommended, making use of the latest ICT developments in this area.

EPILOGUE

Epilogue

The topic of choosing manufacturing locations has been part of the majority of my professional career. In different roles I closed down, restructured, moved and started manufacturing operations around the globe. The initial idea for the research project Made in Europe started in 2010 after visiting a DBA introduction meeting at Business School Netherlands in Buren, the Netherlands. My son started secondary school and I thought: he will take six years to finish that, so I plan to keep up with his schedule.

The first draft Research proposal was dated December 2010. With insufficient fellow DBA students at that time and a busy international business travel schedule, the research was put on hold until 2013. I joined the Hora Est curriculum at Erasmus University of Rotterdam, the Netherlands as a substitute of the BSN introduction course to DBA. When I finished the excellent course in April 2014, I joined the international DBA program (Cohort 2) of SHU and BSN in June 2014. I finalized this part of the DBA program in June 2014 and could start with my research. I was appointed 2 promoters: Richard Breese from SHU and Carl van Dijck from BSN who have supported me in my journey since 2015 onwards. In 2015 and 2016 I completed the Data and Literature review and prepared for the closing Delphi research. For the Delphi research, I launched the website www.MadeInEU.biz. As I wanted organizational elites to sit in the expert panel, I needed to deploy a high quality and state of the art, web-based information and data collection platform. The online website with a secure data collection environment formed the basis for making this possible. The Delphi research covered most of 2017, after which I could start writing my final thesis document.

I could not keep up with my son's six-year secondary school schedule as he graduated as planned in 2016. My only excuse was that in these past years, I buried both my parents as well as my wife's parents and one of my cats. Life's priorities are determined not only by yourself.

This research journey has now come to an end. I have enjoyed it immensely and have learnt a lot during these last eight years. I learned that the phenomenal speed of the 4th Industrial revolution has a major impact on all our lives. Our ability to adapt to these changing circumstances will determine if we will benefit from these developments or not. Science, business and government can and need to play a role in this, as I found out during my research. I sincerely hope this research was able to contribute in this respect.

Completion of this research is probably the start of a whole new journey for me. But if you know the future, then you don't have a future. So, we'll see where this goes. I have many people to thank for making this research possible. First and foremost, my gratitude for Richard Breese and Carl van Dijck who as my DBA supervisors supported me with their guiding advice throughout the entire research journey. From Business School Netherlands, I would like to thank Hanna Bakker – de Jong and Marcel van der Ham, responsible for igniting the initial fire in my research heart. For all challenges with the launch of the professional website www.MadeInEU.biz, I would like to thank Derrik van Bemmel (www.DvBmedia.nl), Anna and Marina Ulyashyna (www.Silverbee.nl) and Elmar Kroezen (www.Videofabrique.nl). I am very grateful for Elly Oude Elferink as final reviewer and editor of my thesis.

The Delphi research was the cream on my research cake. Working together with 39 seasoned business executives while uncovering new roads to academic research as well as potentially spark new business strategies was very satisfying. I would like to thank all of the Made in Europe expert panel members for making this possible.

Finally, I would like to thank my wife Monique and son Nino, who stood by me all these years often wondering what I was doing and why I was doing it. Many people I met during my research journey asked me the same question: why are you doing this? My standard answer was: ‘A mountain climber was once asked: why do you climb mountains? His answer was: …because they are there.’

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LITERATURE REFERENCES

Literature references

Abele, E. (2008). *Global production: A Handbook for Strategy and Implementation*. Berlin: Springer.

Aguiar, L. and Schneider, C. (2016). *Researching amongst elites*. Abingdon, Oxon: Routledge.

Allan, J. (2017). *An Analysis of Daniel Kahneman's Thinking, Fast and Slow*. London: Macat International Ltd.

Ambroziak, A. (2014). *Renaissance of EU's industrial policy*. Yearbook of Polish European Studies. [online] pp.37-58. Available at: http://www.ce.uw.edu.pl/pliki/pw/a-ambroziak.pdf.

Anon, (2014). [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/306854/bis-14-707-industrial-strategy-progress-report.pdf.

Anon, (2015). 1st ed. [ebook] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/396740/bis-15-4-growth-dashboard.pdf.

Arita, T. and McCann, P. (2000). Industrial alliances and firm location behaviour: some evidence from the US semiconductor industry. *Applied Economics*, 32(11), pp.1391-1403.

Arrow, K. (1962). The Economic Implications of Learning by Doing. *The Review of Economic Studies*, 29(3), p.155.

Badri, M. (2007). Dimensions of industrial location factors: Review and Exploration. *Journal of Business and Public Affairs*, (2, volume 1), pp.1-26.

Bailey, D., Cowling, K. and Tomlinson, P. (2015). *New perspectives on industrial policy for a modern Britain*.

Bals, L., Kirchoff, J. and Foerstl, K. (2016). Exploring the reshoring and insourcing decision-making process: toward an agenda for future research. *Operations Management Research*, 9(3-4), pp.102-116.

Barca, F. (2009). *An Agenda for a Reformed Cohesion Policy: A place-based approach to meeting European Union challenges and expectations*. Independent report, prepared at the request of Danuta Huber, Commissioner for Regional Policy.

Barca, F., McCann, P. and Rodríguez-Pose, A. (2012). THE CASE FOR REGIONAL DEVELOPMENT INTERVENTION: PLACE-BASED VERSUS PLACE-NEUTRAL APPROACHES. *Journal of Regional Science*, 52(1), pp.134-152.

Barkey, H., Laible, J. (2006). *Europe and globalization: Recasting the dynamics of the relationship.* Contemporary Studies in Economic and Financial Analysis, Volume 88.

Barnes, T. and Gertler, M. (2002). The *new industrial geography*. London: Routledge.

Beaudry, C. and Schiffauerova, A. (2009). Who's right, Marshall or Jacobs? The localization versus urbanization debate. *Research Policy*, 38(2), pp.318-337.

Beugelsdijk, S., McCann, P. and Mudambi, R. (2010). Introduction: Place, space and organization--economic geography and the multinational enterprise. *Journal of Economic Geography*, 10(4), pp.485-493.

Brakman, Garretsen, Van Marrewijk (2001). *An introduction to geographical economics*. Cambridge: Cambridge Univ. Press.

Brakman, S. (2004). *Van oude naar nieuwe globalisering*.

Brakman, Garretsen, Van Marrewijk (2004). *Nations and firms in the global economy*. Cambridge press.

Britton, P. (2000). Competitive PWB manufacturing: what is needed to maintain a viable industry in Europe? *Circuit World*, 26(3), pp.17-23.

Cantwell, J. (2009). Location and the multinational enterprise. *Journal of International Business Studies*, 40(1), pp.35-41.

Christodoulou, P. (2007). *Making the right things in the right places.* Cambridge: University of Cambridge Institute for Manufacturing.

Deloitte United States, (2014). *Global Manufacturing Competitiveness Index | Deloitte | Manufacturing | Articles | Insights*. [online] Available at: http://www2.deloitte.com/us/en/pages/manufacturing/articles/2013-global-manufacturing-competitiveness-index.html.

DG for Enterprise and Industry, EC, (2014). *Helping Firms Grow, European Competitiveness Report 2014*. Luxembourg: Publications Office of the EU, pp.1-45.

Donohoe, H., Stellefson, M. and Tennant, B. (2012). Advantages and Limitations of the e-Delphi Technique. *American Journal of Health Education*, 43(1), pp.38-46.

Doyle, R. (2002). Deindustrialization. Sci Am, 286(5), pp.30-30.

Drew, H. (2014). Overcoming Barriers: Qualitative Interviews With German Elites. *the Electronic Journal of Business Research Methods*, 12(2), pp.77-86.

Dunning, J. and Lundan, S. (2008). *Multinational Enterprises and the Global Economy (2nd Edition)*. Northampton: Edward Elgar Publishing.

Dunning, J. (2009). Location and the multinational enterprise: John Dunning's thoughts on receiving the Journal of International Business Studies 2008 Decade Award. *Journal of International Business Studies*, 40(1), pp.20-34.

Ellram, L. (2013). Offshoring, Reshoring and the Manufacturing Location Decision. *Journal of Supply Chain Management*, 49(2), pp.3-5.

Ellram, L., Tate, W. and Petersen, K. (2013). Offshoring and Reshoring: An Update on the Manufacturing Location Decision. *Journal of Supply Chain Management*, 49(2), pp.14-22.

Errasti, A., Egana, M. and Corti, D. (2017). *GLOBAL PRODUCTION NETWORKS.* 2nd ed. [S.l.]: CRC PRESS, pp.93-128.

Evans, J. and Lindner, C. (2012). *Business Analytics*. [online] Cbpp.uaa.alaska.edu. Available at: http://www.cbpp.uaa.alaska.edu/afef/business_analytics.htm.

EU Manufacturing Industry: What are the Challenges and Opportunities for the Coming Years? Unit B2, Industrial Competitiveness Policy, Enterprise and Industry DG, April 2010

European Commission, (2010). *Europe 2020, A strategy for smart, sustainable and inclusive growth*. Brussels: EC, pp.2-3.

European Commission, DG Enterprise and Industry, (2010). *An integrated Industrial policy for the Globalization Era; Putting Competitiveness and Sustainability at Centre Stage*. Brussels: DG Enterprise and Industry, EC, pp.3-30.

European Commission, (2013). *Competitiveness report 2013*. Brussels, p.1.

Fabian, K. (2007). *Globalization: Perspectives from Central and Eastern Europe.* Contemporary Studies in Economic and Financial Analysis, Volume 89, 1–21

Fingleton, E. (2000). The Forgotten Merits of Manufacturing. *Challenge*, 43(2), pp.67-85.

Friedli, T., Mundt, A. and Thomas, S. (2014). *Strategic Management of Global Manufacturing Networks.* Springer.

Fujita, M., Krugman, P. and Venables, A. (1999). *The spatial economy*. Cambridge, Mass.: MIT Press.

Fujita, M. and Krugman, P. (2003). The new economic geography: Past, present and the future. *Papers in Regional Science*, 83(1), pp.139-164.

Fujita, M. and Thisse, J. (2013). *Economics of agglomeration*. Cambridge: Cambridge University Press.

George, K., Ramaswany, S. and Rassey, L. (2014). Next-shoring: a CEO's Guide. *McKinsey Quarterly*, pp.1-13.

Gilani, P. and Razeghi, Y. (2010). Global manufacturing: creating the balance between local and global markets. *Assembly Automation*, 30(2), pp.103-108.

Gladwell, M. (2005). *Blink*. New York: Back Bay Books.

Gordon, T. (1994). *The Delphi Method*. Futures Research methodology, 2.

Gordon, T. (2009). *The Delphi Method.* The Millennium Project - Futures Research Methodology v3.0.

Greunz, L. (2004). Industrial structure and innovation - evidence from European regions. *Journal of Evolutionary Economics*, 14(5), pp.563-592.

Grünig, R. and Kühn, R. (2013). *Successful decision-making*. Berlin: Springer.

Hassink, R. and Gong, H. (2016). *New Economic Geography*. [online] ResearchGate. Available at: https://www.researchgate.net/publication/308782681_New_Economic_Geography [Accessed 13 Dec. 2018].

Hayter, R., Britton, J. and Gilmour, J. (1980). The Weakest Link: A Technological Perspective on Canadian Industrial Underdevelopment. *Geographical Review*, 70(3), p.362.

Hayter, R. (1997). *The Dynamics of Industrial Location: The Factory, the Firm and the Production System*. Wiley.

Hayter, R. and Patchell, J. (2011). *Economic geography*. Don Mills, Ont.: Oxford University Press.

HBS Working Knowledge, (2012). *Location, Location, Location: The Strategy of Place*. [online] Available at: http://hbswk.hbs.edu/item/location-location-location-the-strategy-of-place.

Helmer-Hirschberg, O. (1967). *Analysis of the future*. [Santa Monica, Calif.]: [Rand Corp.].

Hsu, C. and Sandford, B. (2007). *The Delphi Technique: Making Sense of Consensus*. Practical Assessment & Evaluation. [online] Available at: http://pareonline.net/getvn.asp?v=12&n=10 [Accessed 15 Jan. 2019].

Iammarino, S. and McCann, P. (2013). *Multinationals and economic geography*. Gran Bretaña: Edward Elgar.

Jacobs, J. (1969). *Economy of cities*. New York, NY: Random House.

Johnson, P. and Duberley, J. (2000). Understanding management research. Los Angeles: SAGE.

Johnston, A. (2009). Which Sectors Drive Regional Economic Development? Changes in Employment in Knowledge-based and Consumption-based Sectors and Regional Economic Performance. *Local Economy*, 24(2), pp.125-139.

Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Straus and Giroux.

Kaplan, R. and Norton, D. (2008). *The execution premium*. Boston, Mass.: Harvard Business Press.

Kasper, W. (2002). *Spatial economics*. [online] Econlib.org. Available at: http://www.econlib.org.

Ketokivi, M., Turkulainen, V., Seppälä, T., Rouvinen, P. and Ali-Yrkkö, J. (2017). Why locate manufacturing in a high-cost country? A case study of 35 production location decisions. *Journal of Operations Management*, 49-51, pp.20-30.

Keynes, J. (1936). *The general theory of employment, interest and money*. New York: Harcourt, Brace.

Kezar, A. (2003). Transformational Elite Interviews: Principles and Problems. *Qualitative Inquiry*, 9(3), pp.395-415.

Klein, G. (1999). *Sources of power*. Cambridge, Mass.: MIT Press.

Kobayashi-Hillary, M. (2010). *Who moved my Job?* www.lulu.com.

Krugman, P. 1991. I*ncreasing returns and economic geography.* The Journal of Political Economy, Volume 99, Issue 3 (Jun. 1991), 483-499.

Krugman, P. (1998). What's new about the new economic geography?. *Oxford Review of Economic Policy*, 14(2), pp.7-17.

Krugman, P. (2008). *New trade, new geography, and the troubles of manufacturing*.

Krugman, P. (2010). The New Economic Geography, Now Middle-aged. Regional Studies, 45(1), pp.1-7.

Kugler, T. (2008). *Decision modeling and behavior in complex and uncertain environments*. New York: Springer.

Kuivanen, R. 2008. *The future of manufacturing industry in Europe*. International Journal of Productivity and Performance Management, Vol. 57 No. 6, 2008.

Lall, S. (2004). *Reinventing Industrial strategy: the role of government in building industrial competitiveness*. G-24 Discussion Paper Series. [online] Geneva: UNCTAD. Available at: http://unctad.org/en/docs/gdsmdpbg2420044_en.pdf.

Lerner, J., Li, Y., Valdesolo, P. and Kassam, K. (2015). Emotion and Decision Making. *Annual Review of Psychology*, 66(1), pp.799-823.

Linstone, H. and Turoff, M. (1975). *The Delphi method*. Reading, Mass.: Addison-Wesley Pub. Co., Advanced Book Program.

Ludwig, B. (1997). *Predicting the future: Have you considered using the Delphi Methodology?* The Journal of Extension, #5(5), pp.1-3

Maccarthy, B. and Atthirawong, W. (2001). Critical Factors in International Location Decisions: A Delphi Study. In: *Twelfth Annual Conference of the Production and Operations Management Society*. Nottingham: University of Nottingham, pp.1-8.

MacCarthy, B. and Atthirawong, W. (2003). Factors affecting location decisions in international operations – a Delphi study. *Int Jrnl of Op & Prod Management*, 23(7), pp.794-818.

Marshall, A. (1891). *Principles of economics*. London: MacMillan.

Martens, R. and Vandenbempt, K. (1995). International Strategic Management and the dynamics of government policy. *Research in Global Strategic Management*, (5), pp.169-198.

McCann, P. (2008). Globalization and economic geography: the world is curved, not flat. *Cambridge Journal of Regions, Economy and Society*, 1(3), pp.351-370.

McCann, P. and Acs, Z. (2010). Globalization: Countries, Cities and Multinationals. *Regional Studies*, 45(1), pp.17-32.

McCann, P. and Mudambi, R. (2004). The Location Behavior of the Multinational Enterprise: Some Analytical Issues. *Growth and Change*, 35(4), pp.491-524.

Meijboom, B. and Voordijk, H. (2003). International operations and location decisions: a firm level approach. *Tijdschrift voor Economische en Sociale Geografie*, 94(4), pp.463-476.

Mitroff, I. and Linstone, H. (1993). *The unbounded mind*. New York: Oxford University Press.

Mosconi, F. (2015). *The new European industrial policy*. London: Routledge, Taylor & Francis Group.

Mudambi, R. (2002). The Location Decision of the Multinational Firm: A Survey. *SSRN Electronic Journal*.

Nahtigal, M. (2014). Reinventing Modern European Industrial Policy – A Regional Response to the Crisis. *LEX*, 12(3).

Neary, P. (2009). Foreign Direct Investment: The OLI Framework. In: *The Princeton Encyclopedia of the World Economy*, 1st ed. Princton: Princton University Press, pp.472- 477.

Nielsen, C. and Thangadurai, M. (2007). Janus and the Delphi Oracle: Entering the new world of international business research. *Journal of International Management*, 13(2), pp.147-163.

Nutt, P. (2002). *Why decisions fail*. San Francisco, CA: Berrett-Koehler Publishers.

Nutt, P. and Wilson, D. (2010). *Handbook of Decision Making*. John Wiley & Sons.

Obadia, L. 2009. "*Made in China" – Political and Cultural Valuation of Brand Images, Trade and Commodities: Ethnographis Evidence from Europe and Asia*. Economic Development, Integration, and Morality in Asia and the Americas Research in Economic Anthropology, Volume 29, 255–281

OECD (2009a). *How Regions Grow*. Paris: Organization for Economic Growth and Development.

OECD (2009b). *Regions Matter: Economic Recovery, Innovation and Sustainable Growth*. Paris: Organization for Economic Growth and Development.

Olhager, J. and Feldmann, A. (2017). Distribution of manufacturing strategy decision-making in multi-plant networks. *International Journal of Production Research*, 56(1-2), pp.692-708.

Ordoobadi, S. (2005). *Development of a Decision Model for Strategic Outsourcing*. [online] www.researchgate.net.

Oxfordresearch.eu, (2016). *Transversal*. [online] Available at: http://oxfordresearch.eu/publications/transversal.aspx.

PBS NewsHour. (2009). *Keynes' Economic Theories Re-emerge in Government Intervention Policies | PBS NewsHour*. [online] Available at: http://www.pbs.org/newshour/updates/business-jan-june09-keynes_02-23/.

Pen, C. (1999). Improving the behavioral location theory. In: *European RSA congress*. Groningen: Faculty of Spatial Sciences, pp.1-27.

Petrick, I. and Simpson, T. (2013). Point of View: 3D Printing Disrupts Manufacturing: How Economies of One Create New Rules of Competition. *Research-Technology Management*, 56(6), pp.12-16.

Pongpanich, C. (2000). *Manufacturing location decisions*. Cambridge: Institute for Manufacturing.
Porter, M. (1985). *Competitive Advantage: Creating and sustaining superior performance.* Free Press, New York, United States.

Porter, M. (1986). *Competition in global industries*. Boston, Mass.: Harvard Business School Press.

Porter, M. (1990). *The competitive advantage of nations*. New York: Free Press.

Prahalad, C. and Hamel, G. (2003). *The core competence of the corporation*. [Boston, MA]: Harvard Business School Pub. Corp.

Puranam, P. and Vanneste, B. (2016). *Corporate strategy*. Cambridge: Cambridge University Press.

Rifkin, J. (1995). *The End of Work, the Decline of the Global Labour Force and the Dawn of the Post-modern Era.* Putnam Publishing Group, New York, United States.

Rifkin, J. (2004). *The European Dream.* Penguin Books Ltd, London, England.

Rodrik, D. (2000). How Far Will International Economic Integration Go?. *Journal of Economic Perspectives*, 14(1), pp.177-186.

Rodrik, D, Subramanian and A., Trebbi, F. (2002). Institutions Rule: The Primacy of Institutions Over Integration and Geography in Economic Development. *IMF Working Papers*, 02(189), p.1.

Romer, P. (1986). Increasing Returns and Long-Run Growth. *Journal of Political Economy*, 94(5), pp.1002-1037.

Russo, J. and Schoemaker, P. (2002). *Winning decisions*. New York: Currency.

Ryan, S. and Lewer, J. (2012). Chapter 4, Getting in and finding out: accessing and interviewing elites in business and work contexts (From Aguiar, L. and Schneider, C. (2016). *Researching amongst elites*. Abingdon, Oxon: Routledge.)

Saunders, M., Lewis, P. and Thornhill, A. (2009). *Research methods for business students*. 5th ed. Harlow (Essex): Pearson.

Schumpeter, J. (1943). *Capitalism, socialism and democracy*. London: Allen & Unwin.

Simon, H. (1977). *The new science of management decision*. Englewood Cliffs: Prentice-Hall.

Spence, M. (2011). The Impact of Globalization on Income and Employment: The Downside of Integrating Markets. *Foreign Affairs*, 90(July/August 2011), pp.28-41.

O'Sullivan, A. and Sheffrin, S. (2003). *Economics*. Needham, Mass.: Prentice Hall.

Schneider, S. (2017). [ebook] Frankfurt: Deutsche Bank Research. Available at: https://www.dbresearch.com/PROD/RPS_EN-PROD/PROD0000000000451133/German_industrial_policy%3A_General_restraint_commen.pdf.

Spalanzani, A., Ageron, B. and Zouaghi, I. (2016). Manufacturing operations location decision: what are the main criteria? *Supply Chain Forum: An International Journal*, 17(4), pp.205-217.

Swann, D. (2018). *Competition and industrial policy in the European Community.* Oxon: Routledge.

Tashakkori, A. and Teddlie, C. (1998). *Mixed methodology: Combining Qualitative and Quantitative Approaches*. Thousand Oaks, CA: Sage, p.30.

Tate, W., Ellram, L., Schoenherr, T. and Petersen, K. (2014). Global competitive conditions driving the manufacturing location decision. *Business Horizons*, 57(3), pp.381-390.

Teece, D. (2009). *Dynamic capabilities and strategic management*. New York: Oxford University Press.

Thun, J. (2008). Empirical analysis of manufacturing strategy implementation. *International Journal of Production Economics*, 113(1), pp.370-382.

Turpin, S. and Marais, M. (2004). Decision-making: Theory and practice. *ORiON*, 20(2).

United Nations, (2004). *Reinventing Industrial Strategy*. Oxford: UNCTAD, p.VII.

van der Panne, G. and van Beers, C. (2006). On the Marshall-Jacobs controversy: it takes two to tango. *Industrial and Corporate Change*, 15(5), pp.877-890.

van Dijk, M. (2009). *Locatie theorieën - een historisch overzicht*. Bachelor. Erasmus University, Rotterdam.

Veugelers, R. (2013). *Manufacturing Europe's future*. Bruegel Blueprint Series. Brussels: Bruegel Institute.

Warwick, K. (2013), "Beyond Industrial Policy: Emerging Issues and New Trends", *OECD Science, Technology and Industry Policy Papers,* No. 2, OECD Publishing. http://dx.doi.org/10.1787/5k4869clw0xp-en

Weaver, W. (1971), *The Delphi forecasting method.* Phi Delta Kappan, 52(5), p.268

Weber, A. and Friedrich, C. (1929). *Alfred Weber's theory of the location of industries*. Chicago, Ill.: The University of Chicago Press.

Weiss, J. (2016). *Routledge handbook of industry and development*. London [u.a.]: Routledge.

Westkämper, E. (2014). *Towards the re-industrialization of Europe*. Heidelberg, Germany.

Winden, W., Berg, L., Carvalho, L. and Tuijl, E. (2013). *Manufacturing in the new urban economy*. London: Routledge.

World Bank (2009). *Reshaping Economic Geography*. World Development Report 2009. Washington, DC.

WRR, (2013). *towards a learning economy (synopsis WRR report no.90)*. Den Haag / Amsterdam: Amsterdam University Press.

Zee, F. van der and Brandes, F. (2007). *Manufacturing Futures for Europe – a Survey of the Literature.* TNO, the Netherlands, 24 May 2007.

APPENDICES

Appendices

Appendix 0 – Definition of Terms

Definition of terms

Competitiveness	ability of a firm to offer products and services that meet the quality standards of local and global markets at prices that are competitive and provide adequate returns on the resources employed or consumed in producing them (businessdictionary.com)
De-industrialization	the decline in importance of manufacturing industry in the economy of a nation or area (Collins English Dictionary, 2014)
Delphi method	a forecasting method based on the results of questionnaires sent to a panel of experts (investopedia.com)
Economic geography	study of the role of regions as locations for economic activities, set within a global perspective (RUG.nl)
Economic sectors	definition and coding of NACE (Nomenclature of Economic Activities) is used throughout the thesis. NACE is the classification system used in Europe for economic activities. Economic sectors are divided in five main sectors (Agriculture, Industry, Commercial Services, Public Services, Education & Health). The main sector Industry is furthermore divided in the four sectors: Mining, Manufacturing, Utilities and Construction. The Manufacturing sector can further be divided into 27 subsectors. See also Appendix 1 for further clarification and detailed definition of the Manufacturing subsectors
Employability	the skills and ability that allow a person to be employed (dictionary.cambridge.org)
EU-15	the countries in Europe that were member of the European Union prior to accession of 10 new member states in May 2004. EU-15 is used throughout the thesis to secure consistency and comparability of the data research section of the thesis. The EU-15 countries are (alphabetically): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, the United Kingdom
Footprint strategy	'making the right things in the right places' (Manufacturing.co.uk)
GNP	Gross National Product is an estimate of total value of all the final products and services produced in a given period by the means of production owned by a country's residents (Investopedia.com)
Income per capita	a measure of the amount of money that is being earned per person in a certain area (Investopedia.com)

Industry	the sector Industry refers to the collective business activities of the subsectors 'Mining, Manufacturing, Utilities and Construction' (Eurostat statistical nomenclature – NACE coding)
Location factors	factors that determine business location (Wizznotes.com)
Manufacturing Industry	'Manufacturing Industry' refers the subsector 'Manufacturing' as part of the sector 'Industry' (Eurostat statistical nomenclature – NACE coding, Appendix 2)
MNC or MNE	Multi National Corporation or Enterprise: *a multinational (…) enterprise that engages in foreign direct investment (FDI) and owns (..) or controls value-added activities in more than one country* (Dunning and Lundan, 2008, p3)
Next-shoring	strategy with emphasis on proximity to demand and to innovation (McKinsey Quarterly, January 2014)
Outsourcing	the process of transferring portions of work to outside suppliers (originally: outside resourcing) (Investopedia.com)
Off-shoring	locating activities outside one's national boundaries (Investopedia.com)
Re-shoring	return of manufacturing to developed markets as wages rise in emerging ones (McKinsey Quarterly, January 2014)

Appendix 1 – The Global Competitiveness Index 2015-2016 Rankings

The Global Competitiveness Index 2015–2016 Rankings

	Economy	Score[1]	Prev.[2]	Trend[3]
1	Switzerland	5.76	1	
2	Singapore	5.68	2	
3	United States	5.61	3	
4	Germany	5.53	5	
5	Netherlands	5.50	8	
6	Japan	5.47	6	
7	Hong Kong SAR	5.46	7	
8	Finland	5.45	4	
9	Sweden	5.43	10	
10	United Kingdom	5.43	9	
11	Norway	5.41	11	
12	Denmark	5.33	13	
13	Canada	5.31	15	
14	Qatar	5.30	16	
15	Taiwan, China	5.28	14	
16	New Zealand	5.25	17	
17	United Arab Emirates	5.24	12	
18	Malaysia	5.23	20	
19	Belgium	5.20	18	
20	Luxembourg	5.20	19	
21	Australia	5.15	22	
22	France	5.13	23	
23	Austria	5.12	21	
24	Ireland	5.11	25	
25	Saudi Arabia	5.07	24	
26	Korea, Rep.	4.99	26	
27	Israel	4.98	27	
28	China	4.89	28	
29	Iceland	4.83	30	
30	Estonia	4.74	29	
31	Czech Republic	4.69	37	
32	Thailand	4.64	31	
33	Spain	4.59	35	
34	Kuwait	4.59	40	
35	Chile	4.58	33	
36	Lithuania	4.55	41	
37	Indonesia	4.52	34	
38	Portugal	4.52	36	
39	Bahrain	4.52	44	
40	Azerbaijan	4.50	38	
41	Poland	4.49	43	
42	Kazakhstan	4.49	50	
43	Italy	4.46	49	
44	Latvia	4.45	42	
45	Russian Federation	4.44	53	
46	Mauritius	4.43	39	
47	Philippines	4.39	52	
48	Malta	4.39	47	
49	South Africa	4.39	56	
50	Panama	4.38	48	
51	Turkey	4.37	45	
52	Costa Rica	4.33	51	
53	Romania	4.32	59	
54	Bulgaria	4.32	54	
55	India	4.31	71	
56	Vietnam	4.30	68	
57	Mexico	4.29	61	
58	Rwanda	4.29	62	
59	Slovenia	4.28	70	
60	Macedonia, FYR	4.28	63	
61	Colombia	4.28	66	
62	Oman	4.25	46	
63	Hungary	4.25	60	
64	Jordan	4.23	64	
65	Cyprus	4.23	58	
66	Georgia	4.22	69	
67	Slovak Republic	4.22	75	
68	Sri Lanka	4.21	73	
69	Peru	4.21	65	
70	Montenegro	4.20	67	
71	Botswana	4.19	74	
72	Morocco	4.17	72	
73	Uruguay	4.09	80	
74	Iran, Islamic Rep.	4.09	83	
75	Brazil	4.08	57	
76	Ecuador	4.07	n/a	
77	Croatia	4.07	77	
78	Guatemala	4.05	78	
79	Ukraine	4.03	76	
80	Tajikistan	4.03	91	
81	Greece	4.02	81	
82	Armenia	4.01	85	
83	Lao PDR	4.00	93	
84	Moldova	4.00	82	
85	Namibia	3.99	88	
86	Jamaica	3.97	86	
87	Algeria	3.97	79	
88	Honduras	3.95	100	
89	Trinidad and Tobago	3.94	89	
90	Cambodia	3.94	95	
91	Côte d'Ivoire	3.93	115	
92	Tunisia	3.93	87	
93	Albania	3.93	97	
94	Serbia	3.89	94	
95	El Salvador	3.87	84	
96	Zambia	3.87	96	
97	Seychelles	3.86	92	
98	Dominican Republic	3.86	101	
99	Kenya	3.85	90	
100	Nepal	3.85	102	
101	Lebanon	3.84	113	
102	Kyrgyz Republic	3.83	108	
103	Gabon	3.83	106	
104	Mongolia	3.81	98	
105	Bhutan	3.80	103	
106	Argentina	3.79	104	
107	Bangladesh	3.76	109	
108	Nicaragua	3.75	99	
109	Ethiopia	3.75	118	
110	Senegal	3.73	112	
111	Bosnia & Herzegovina	3.71	n/a	
112	Cape Verde	3.70	114	
113	Lesotho	3.70	107	
114	Cameroon	3.69	116	
115	Uganda	3.66	122	
116	Egypt	3.66	119	
117	Bolivia	3.60	105	
118	Paraguay	3.60	120	
119	Ghana	3.58	111	
120	Tanzania	3.57	121	
121	Guyana	3.56	117	
122	Benin	3.55	n/a	
123	Gambia, The	3.48	125	
124	Nigeria	3.46	127	
125	Zimbabwe	3.45	124	
126	Pakistan	3.45	129	
127	Mali	3.44	128	
128	Swaziland	3.40	123	
129	Liberia	3.37	n/a	
130	Madagascar	3.32	130	
131	Myanmar	3.32	134	
132	Venezuela	3.30	131	
133	Mozambique	3.20	133	
134	Haiti	3.18	137	
135	Malawi	3.15	132	
136	Burundi	3.11	139	
137	Sierra Leone	3.06	138	
138	Mauritania	3.03	141	
139	Chad	2.96	143	
140	Guinea	2.84	144	

Advanced Economies
Middle East, North Africa, and Pakistan
Emerging and Developing Asia
Latin America and the Caribbean
Commonwealth of Independent States
Emerging and Developing Europe
Sub-Saharan Africa

Note: The Global Competitiveness Index captures the fundamentals of an economy. Recent developments, including currency (e.g., Switzerland) and commodity price fluctuations (e.g., Azerbaijan, Qatar, Saudi Arabia), geopolitical uncertainties (e.g., Ukraine), and security issues (e.g., Turkey) must be kept in mind when interpreting the results.
1 Scale ranges from 1 to 7.
2 This shows the rank out of the 144 economies in the GCI 2014–2015.
3 The trend line shows the evolution in percentile rank since 2007; breaks in the trend line reflect years when the economy was not included in the GCI.

Appendix 2 – NACE coding

For the purpose of the Research, NACE coding[31] has been used to categorize the economic activities regarding employment in the Industrial sector in the European Union. In the overview below the full variety of subsectors within the sector 'Industry' is shown in the first two columns. Also, the revision of the NACE coding is shown after its introduction in 2008 (2nd column). Finally, in the 3rd column is explained which individual NACE subsectors have been consolidated for the purposes of this research. This has resulted in a total of 8 sub-sectors within the sector Industry:

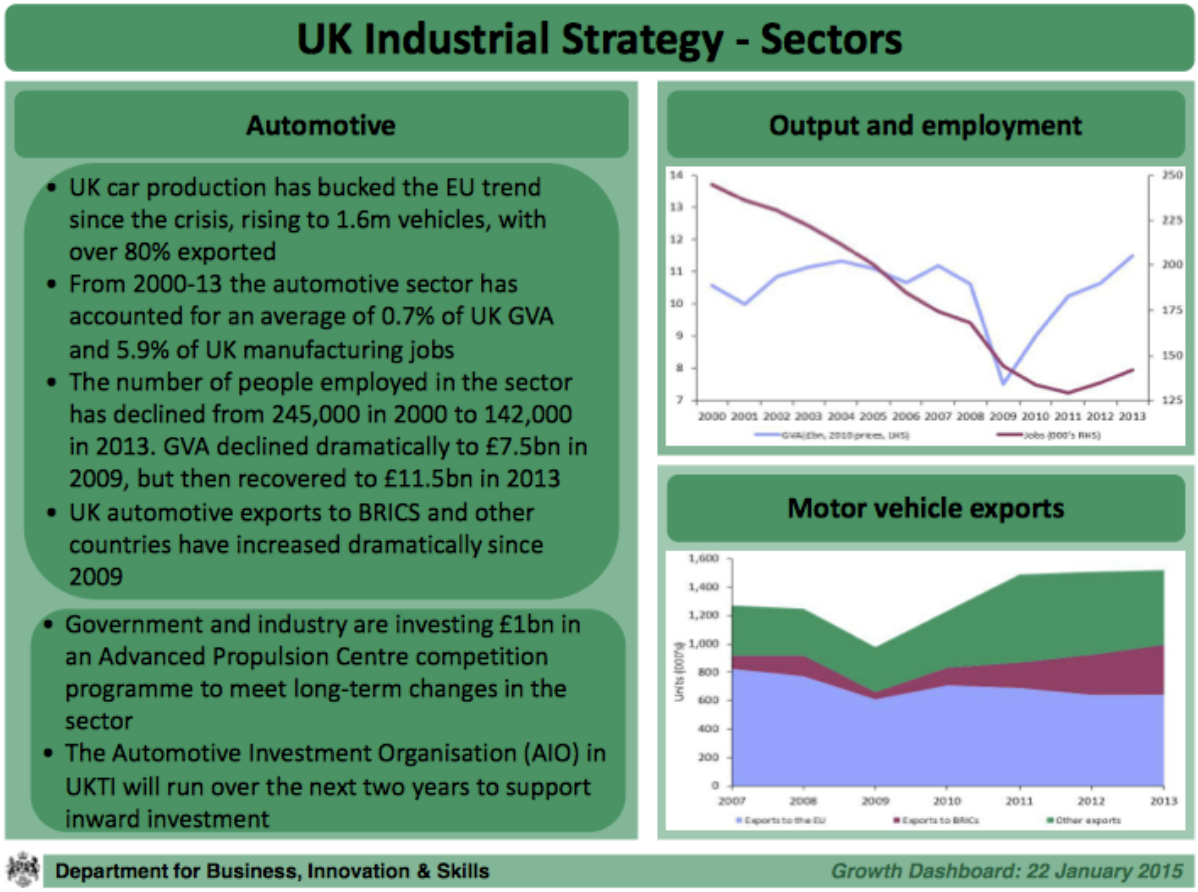
1. Food products, beverages, tobacco
2. Textiles, wearing apparel, leather
3. Wood and paper products
4. Petroleum, chemical, rubber, plastic and other mineral product
5. Basic and fabricated metal and machinery
6. Electrical, computer, electronic and optical product
7. Motor vehicles and other transport equipment
8. Other

NACE coding used for the sector INDUSTRY			
NACE 1995-2008	NACE 2008 - now (2015)		Sector consolidation and definition for Research 'Made in Europe'
CA10 - Mining of coal and lignite; extraction of peat	B05 - Mining of coal and lignite	Mining	
CA11 - Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying	B06 - Extraction of crude petroleum and natural gas	Mining	
CA12 - Mining of uranium and thorium ores	B07 - Mining of metal ores	Mining	
CB13 - Mining of metal ores	B08 - Other mining and quarrying	Mining	
CB14 - Other mining and quarrying	B09 - Mining support service activities	Mining	
DA15 - Manufacture of food products and beverages	C10 - Manufacture of food products	Manufacturing	Manufacture of food products, beverages, tobacco
	C11 - Manufacture of beverages	Manufacturing	Manufacture of food products, beverages, tobacco
DA16 - Manufacture of tobacco products	C12 - Manufacture of tobacco products	Manufacturing	Manufacture of food products, beverages, tobacco
DB17 - Manufacture of textiles	C13 - Manufacture of textiles	Manufacturing	Manufacture of textiles, wearing apparel, leather etc
DB18 - Manufacture of wearing apparel; dressing; dyeing of fur	C14 - Manufacture of wearing apparel	Manufacturing	Manufacture of textiles, wearing apparel, leather etc
DC19 - Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	C15 - Manufacture of leather and related products	Manufacturing	Manufacture of textiles, wearing apparel, leather etc
DD20 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	C16 - Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Manufacturing	Manufacture of wood, paper products
DE21 - Manufacture of pulp, paper and paper products	C17 - Manufacture of paper and paper products	Manufacturing	Manufacture of wood, paper products
DF23 - Manufacture of coke, refined petroleum products and nuclear fuel	C19 - Manufacture of coke and refined petroleum products	Manufacturing	Manufacture of petroleum, chemical, rubber, plastic and other mineral products
DG24 - Manufacture of chemicals and chemical products	C20 - Manufacture of chemicals and chemical products	Manufacturing	Manufacture of petroleum, chemical, rubber, plastic and other mineral products
	C21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations	Manufacturing	Manufacture of petroleum, chemical, rubber, plastic and other mineral products
DH25 - Manufacture of rubber and plastic products	C22 - Manufacture of rubber and plastic products	Manufacturing	Manufacture of petroleum, chemical, rubber, plastic and other mineral products
DI26 - Manufacture of other non-metallic mineral products	C23 - Manufacture of other non-metallic mineral products	Manufacturing	Manufacture of petroleum, chemical, rubber, plastic and other mineral products
DJ27 - Manufacture of basic metals	C24 - Manufacture of basic metals	Manufacturing	Manufacture of basic/fabricated metals and machinery
DJ28 - Manufacture of fabricated metal products, except machinery and equipment	C25 - Manufacture of fabricated metal products, except machinery and equipment	Manufacturing	Manufacture of basic/fabricated metals and machinery
DK29 - Manufacture of machinery and equipment n.e.c.	C28 - Manufacture of machinery and equipment n.e.c.	Manufacturing	Manufacture of basic/fabricated metals and machinery
DL30 - Manufacture of office machinery and computers	C26 - Manufacture of computer, electronic and optical products	Manufacturing	Manufacture of electrical, computer, electronic and optical products / equipment
DL31 - Manufacture of electrical machinery and apparatus n.e.c.	C27 - Manufacture of electrical equipment	Manufacturing	Manufacture of electrical, computer, electronic and optical products / equipment
DL32 - Manufacture of radio, television and communication equipment and apparatus		Manufacturing	Manufacture of electrical, computer, electronic and optical products / equipment
DL33 - Manufacture of medical, precision and optical instruments, watches and clocks		Manufacturing	Manufacture of electrical, computer, electronic and optical products / equipment
DM34 - Manufacture of motor vehicles, trailers and semi-trailers	C29 - Manufacture of motor vehicles, trailers and semi-trailers	Manufacturing	Manufacture of motor vehicles and other transport equipment
DM35 - Manufacture of other transport equipment	C30 - Manufacture of other transport equipment	Manufacturing	Manufacture of motor vehicles and other transport equipment
DN36 - Manufacture of furniture; manufacturing n.e.c.	C31 - Manufacture of furniture	Manufacturing	Other manufacturing
DN37 - Recycling	C32 - Other manufacturing	Manufacturing	Other manufacturing
	C33 - Repair and installation of machinery and equipment	Manufacturing	Other manufacturing
	E37 - Sewerage	Manufacturing	Other manufacturing
	E38 - Waste collection, treatment and disposal activities; materials recovery	Manufacturing	Other manufacturing
	E39 - Remediation activities and other waste management services	Manufacturing	Other manufacturing
DE22 - Publishing, printing and reproduction of recorded media	C18 - Printing and reproduction of recorded media	Manufacturing	Other manufacturing
E40 - Electricity, gas, steam and hot water supply	D35 - Electricity, gas, steam and air conditioning supply	Electricity, gas, steam, water	
E41 - Collection, purification and distribution of water	E36 - Water collection, treatment and supply	Electricity, gas, steam, water	
F45 - Construction	F41 - Construction of buildings	Construction	
	F42 - Civil engineering	Construction	
	F43 - Specialised construction activities	Construction	

[31] see also note 9

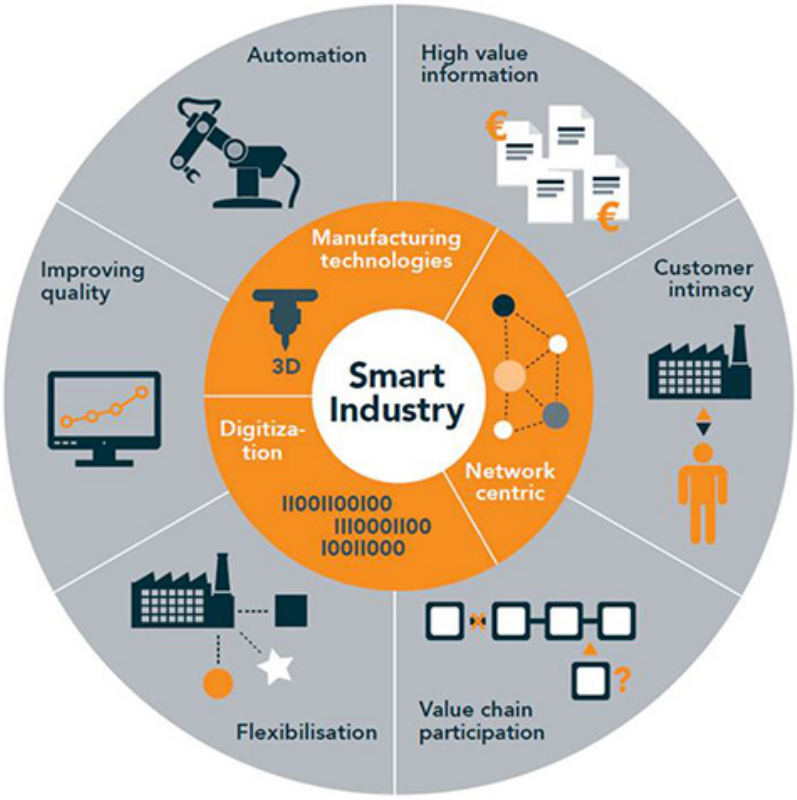
Appendix 3 – UK's Department of Business, Innovation and skills

UK's Department of Business, Innovation and skills: Growth Dashboard 22 January 2015



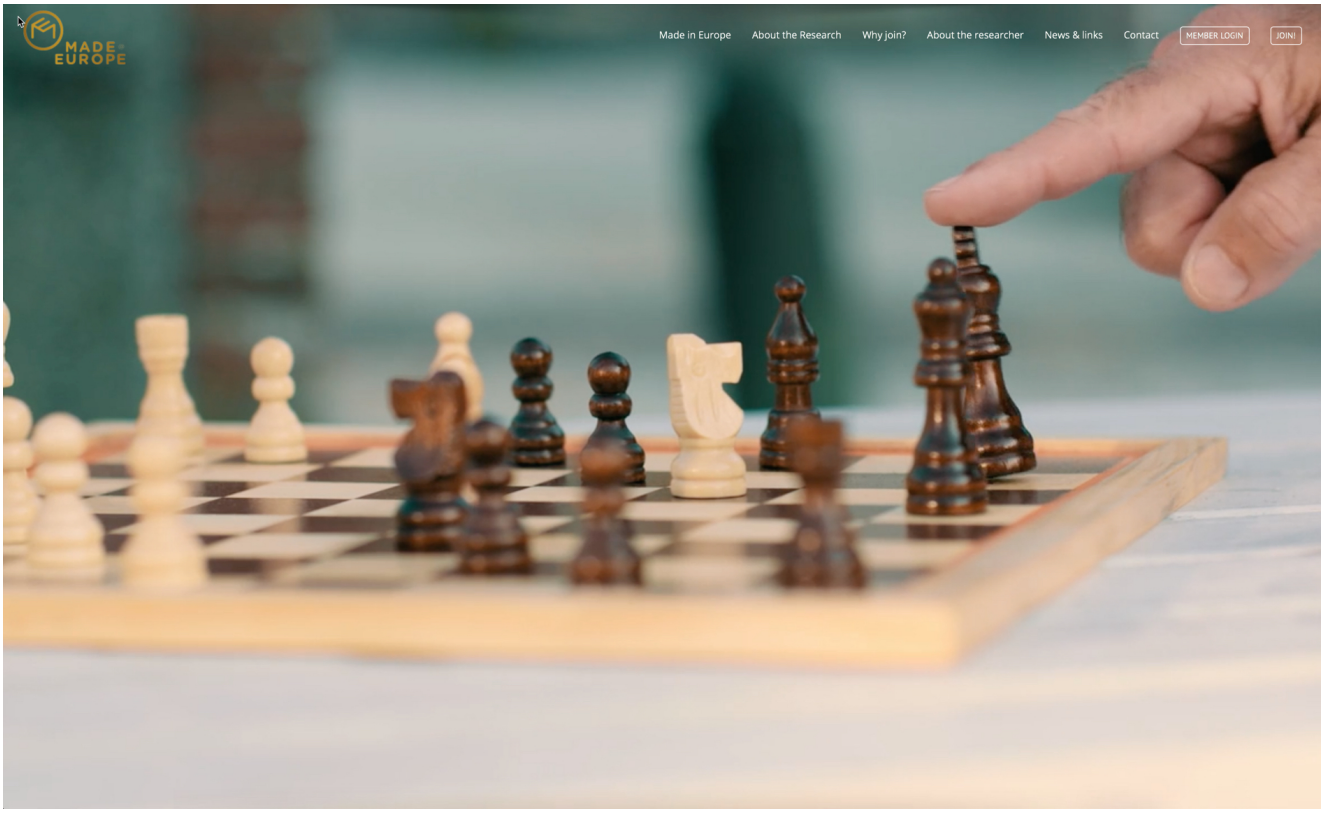
Appendix 4 – Smart Industry (Dutch government policy initiative)

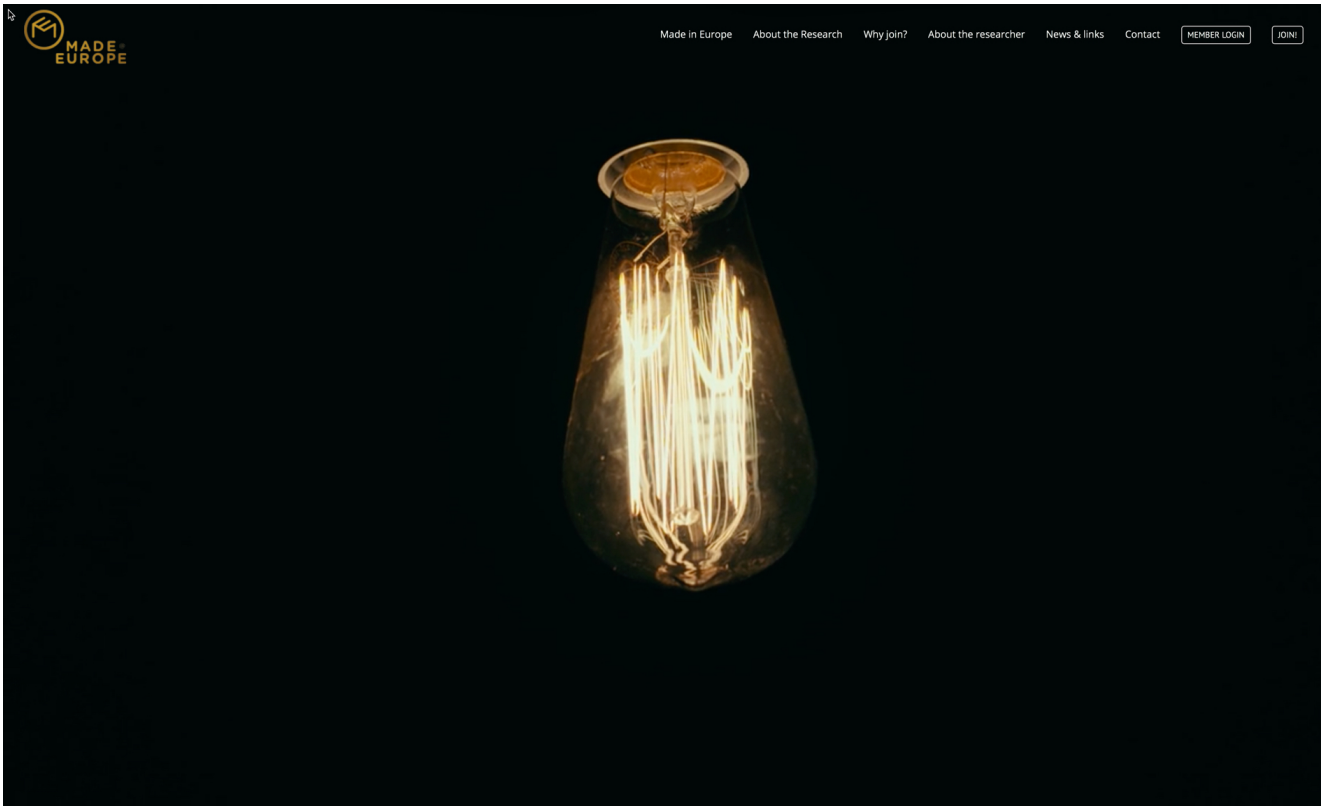
Conceptualization of the Dutch initiative 'Smart Industry'



Appendix 5.0 – Landing page website Made in Europe

Landing page website www.MadeinEU.biz





Made in Europe..?

Many of us regard the **manufacturing industry** as the backbone of our economy. Employment in the industrial sector however, is decreasing every year in all

western countries. In 1995, **31 million** people held a job in Europe's Manufacturing sector. Early 2014, this number was less than **25 million**.

A loss of 1,000 jobs every day.

We call this process **de-industrialization**. Many economists tell us NOT to worry. Productivity increases and new technologies create more economic value than keeping lower skilled labour employed.

Politicians are hesitant. How do you explain 'de-industrialization' to a person who has just lost his job after another plant shutdown?

Business leaders in the manufacturing industry follow their own agenda: value creation for stakeholders. The creation or destruction of employment is secondary. Business continuity comes first.

The European research program Made in Europe connects de-industrialization to business location strategy. Understanding what makes a business decide to 'stop, stay or go' is core to understanding the destruction of employment in the Manufacturing sector.

About the Research

The Research Project **Made in Europe** is part of an international DBA (Doctorate in Business Administration) program, under the supervision and support of the following institutes: Business School Nederland (BSN), the Netherlands and Sheffield Hallam University (SHU) in Sheffield, UK.

The problem statement of the Research is formulated as a question:
What are the critical location factors for the Manufacturing Industry, which will help them decide on where their operations needs to be located in order to remain competitive and survive the 21st century?

The central research question of this thesis is:
'Which location factors need to be considered by Europe's Manufacturing Industries to survive the 21st century?'

The Research objective of 'Made in Europe' is:
Develop a framework to support location decisions for Europe's Manufacturing Industry sectors in the 21st century.

A Delphi research is the final part of the Research program Made in Europe. The Delphi method is a forecasting method based on the results of questionnaires sent to a panel of experts. See also
http://www.investopedia.com/terms/d/delphi-method.asp

Overall planning of the Research:

Why join the expert panel?

The panel will consist of business practitioners only, senior managers from the European Manufacturing industry. No consultants, politicians, economists or other scientists will participate. The professional profile of an expert panel member is:

JOIN NOW!

- Senior management position (current or previous) in a European based Manufacturing Industry (sector Oil & Chemicals, High Tech, Metals & Machinery or Automotive)
- Experience with strategic questions around Operations Management, Supply Chain Management, Location strategies, Outsourcing, Off- and Re-shoring
- Preferably located in Germany, the UK or the Netherlands

Why should you join? 'What's in it for me?'

As member of the Made in Europe expert panel you will:

1. Get detailed **insight into current locations factors** relevant for the Manufacturing Industry in general
2. Develop your understanding of manufacturing **location factors you and your peers consider** most **important**

3. Sharpen your knowledge of **location factors relevant** for your industry now and **in the future**
4. Gain new insights into the **development of new manufacturing location strategies** for the industry
5. Increase your expertise for **improved decision making** related to location strategies for the industry
6. Receive a **personal copy with an Executive Summary of the thesis 'MADE IN EUROPE'**, once completed

In addition to these personal benefits, your input can

- Contribute to scientific research in the field of Economic Geography, Strategic Management and Decision Making theory
- Support the European Manufacturing Industry in general with your insights and considerations
- Contribute to potential new Industrial policy from your national and/or European government

In summary, joining the Made in Europe expert panel will increase your knowledge, expertise, understanding and decision making capabilities related to industrial location strategies vital for the survival of your business in todays highly competitive, global manufacturing industry.

What is your 'investment'?
A limited amount of your time. You will receive three (3) online questionnaires during the first half of 2017. Expected time consumption is less than 30 minutes per questionnaire.
All communication will be fully anonymous, web-based, accessible for you 24/7.

How can you join this research?
Select the JOIN NOW button.
You will be asked to register as expert panel member for the research Made in Europe. Following your online registration, you will receive an online Participation document, asking for some personal and professional details including a request to agree with the terms of joining as a participant to the research.

About the Researcher

The research Made in Europe is conducted by Gerard Ekhart my LinkedIn profile

Gerard Ekhart (1962) is a Dutch National holding Master degree in Supply Chain Management from Business School Nederland (1998). Gerard is owner and founder of the Imengo Group, a strategy and execution firm in the area of Supply Chain Transformation.

Gerard's main area of expertise is working for global operating manufacturing companies. With over 30 years of professional experience, Gerard personally led a variety of transformation programs in several manufacturing sectors. Currently Gerard is leading a Sourcing transformation program in the Chemicals sector in the Netherlands.

News, links, etc

The Brueghel institute

European think tank

No Industry, no future

Manufacturing Europe's future

McKinsey insights

PWC – Price Waterhouse Coopers

Deloitte

Reference for business

De-industrialization

Industrial policy – EU, the UK, Germany, the Netherlands

Science

Top 100 Manufacturing industries in NL (Dutch article)

Our partners

Contact

Your Name

Your Email

Custom Message

SUBMIT MESSAGE

Appendix 5.1 – Delphi research invitation email

Email invitation to support the Research program MADE IN EUROPE (January 2, 2017)

Dear…,

First of all, best wishes for a prosperous and healthy 2017.

Based on your professional business profile available on the web, I expect you to be interested in the Research program MADE IN EUROPE. The Research is part of a doctoral thesis I am working on under the supervision of the **Sheffield Hallam University** in the UK and **Business School Nederland** in the Netherlands.

What is the Research about and why is it important?

Since 1995, about 1,000 jobs every day are lost in the Manufacturing Industry in Europe. We call this process 'de-industrialization'. Several economists tell us not to worry: the increase in productivity as a result of new manufacturing technologies (3D printing, robotics) create more economic value than keeping low skilled labor employed. Politicians hesitate: how to explain 'de-industrialization' to the employee who just lost his/her job in another plant closure. Senior management in the Manufacturing Industry follow their own agenda: value creation for the company's stakeholders. Creating or destroying jobs is secondary, as business continuity comes first.

The European Research program MADE IN EUROPE connects de-industrialization to business location strategy. Understanding why businesses decide to 'stop, stay or go' is core to understanding the job destruction in the European Manufacturing Industry. The central Research question is: '**which location factors need to be considered by Europe's Manufacturing Industry in order to survive the 21st century**'? Objective of the Research is to develop a framework to support location decisions for Europe's Manufacturing Industry sectors in the 21st century.

What is my specific question to you?

Currently I am establishing an expert panel of at least **50 senior managers from the UK, Germany and the Netherlands**, who are / have been employed in the Manufacturing Industry, have experience with location strategy questions and are willing to support the Research program. I would highly appreciate your participation to the expert panel. Participants to the Research will receive three (3) consecutive online questionnaires in the period from March to June 2017. Participation is **fully web based and strictly anonymous**.

What's in it for you?

During the Research, the participants will:

- Get an overview of location factors which are important for industrial location decisions now and in the future
- Gain understanding what other manufacturing industries think about this topic
- Get insight into the latest developments in Strategic Operations Management
- Receive tools how the process of decision making on this topic in your business can be further improved
- And also: …receive an Executive Summary of the thesis MADE IN EUROPE, once completed

How can you join the Research expert panel?

You can register yourself online on the website MadeInEU.biz. Click on the JOIN button and you will be directed to the registration process. On the website MadeInEU.biz , an introduction movie

explains the Research and gives you other relevant information.

I sincerely hope for you to join this Research by registering yourself. In case you are not in a position to participate, but you do know people in your network fitting the participants profile, please forward this email directly to them. Also, if you have any further questions, do not hesitate to contact me.

Thank you for your time and looking forward to your registration.

Gerard Ekhart
Researcher Doctoral thesis MADE IN EUROPE
madeineu@imengo.nl
www.MadeInEU.biz

Appendix 5.2 – Delphi research Round 1 invitation email

Email invitation Questionnaire for the Delphi Research MADE IN EUROPE – Round 1 (March 5, 2017)

Dear Expert panel member,

The questionnaire for the Delphi Research MADE IN EUROPE is now available online. By logging onto the website using your personal User ID and password you can access the questionnaire and submit your input.

Please use the following link .....
Questionnaire for the Delphi Research MADE IN EUROPE

The questionnaire process is self-explanatory, but don't hesitate to contact me if you need support or clarification.

You are kindly requested to submit your input before 31st March 2017.

Thanks for your continued support to my Research!

Gerard Ekhart
Researcher Doctoral thesis MADE IN EUROPE
madeineu@imengo.nl
www.MadeInEU.biz

Appendix 5.3 – Delphi research Questionnaire Round 1

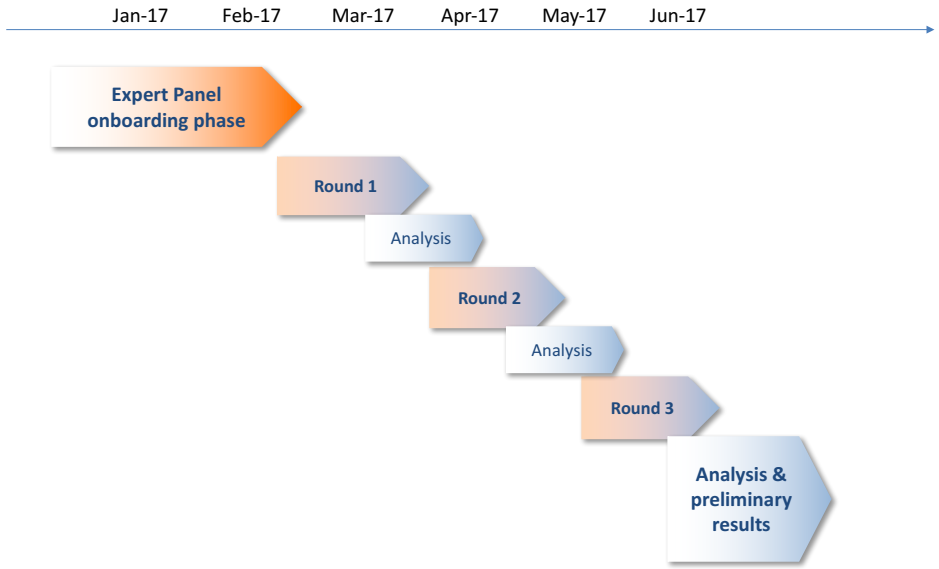
Introduction Delphi Research Questionnaire

Thank you for your participation as 'expert panel member' for the Research MADE IN EUROPE. The methodology for the questionnaires is based on the principles of a Delphi research. The Delphi technique is 'an intuitive methodology for organizing and sharing "expert" forecasts about the future. Delphi operates on the principle that several heads are better than one making subjective conjectures about the future…and that experts will make conjectures based upon rational judgement rather than merely guessing…' (Weaver, 1971).

Procedure and Planning

The procedure of the Delphi research MADE IN EUROPE will be as follows:

- Following this introduction, you will receive 6 questions on 4 topics related to the Research (Round 1)
- All answers from the participants will be collated and returned to you. In Round 2, you are invited to revise your initial input using the collective input from the other participants
- In the final 3rd Round the collated answers from Round 2 are again presented to you for your final revision and comments



Planning Delphi research MADE IN EUROPE

Using the shared and revised expert participants input, the Researcher can explore the level of consensus on the different research questions.

Structure of the questionnaire

The questionnaire is split into four sections:

V. **De-industrialization in Europe**
   - 2 research questions (open)

VI. **Operations strategy**
   - 1 research question (open)

VII. **Industrial location factors**
   - 1 research question (semi open, rating of options)

VIII. **Decision making process**
   - 2 research questions (open)

Each topic will be introduced shortly after which the research questions will be presented. Most questions are self-explanatory with specific notes on each individual question.

Closing Note: The Research questions refer to 'the European Manufacturing Industry'. In your answer, please take the perspective of the specific Manufacturing sector close to your personal and professional experience.

You are kindly requested to finalize your input for this questionnaire **not later than the 31st of March 2017.**

Part I – De-industrialization in Europe

'The first and simplest characteristic of a post-industrial society is that the majority of the labor force is no longer engaged in Agriculture or Manufacturing, but in Services'

Daniel Bell – The coming of Post-Industrial Society (1973)

Introduction

De-industrialization is 'the decline in importance of the manufacturing industry in a region'[32]. The table below shows the development of employment (1995 and 2013) of the main sectors of the EU-15[33] economies.

EU-15 countries
Number of people employed per sector ('000)

	1995	2013	<>%	<>#
Agriculture	7.112	4.448	-37%	2.664-
Industry - Mining	638	377	-41%	261-
Industry - Manufacturing	31.293	25.031	-20%	6.262-
Industry - Utilities	1.356	1.398	3%	42
Industry - Construction	11.571	11.330	-2%	241-
subtotal Industry	44.858	38.136	-15%	6.722-
Services - Commercial	51.787	69.224	34%	17.437
Public Services	11.559	11.922	3%	363
Eduction, Health	31.137	42.861	38%	11.725
Other	348	1.195	243%	847
total employed	146.800	167.785	14%	20.985

From the Data research Made in Europe 2015 (original source: Eurostat)
Some observations are: (1) the total number of people employed increased with almost 21 million people (+14%); (2) employment in the sectors Agriculture and Industry decreased with over 9 million people and (3) employment in the Services sectors including Education and Health increased with almost 30 million people.

What are the main drivers behind de-industrialization? Relevant publications (e.g. Kollmeyer, 2007) sum up the following two main contributing factors: Productivity growth (new innovative technologies, 'machines replacing manpower') and Economic globalization (shift to low labor cost countries, outsourcing, global sourcing).

Taking a closer look at the individual European Manufacturing sectors (see next table), the picture is even more diverse: a decrease of employment in all Manufacturing sectors except for the automotive sector: from -2% up to -62%. One Manufacturing sector shows an increase in employment: The Automotive sector. This increase is mainly due to one country in Europe: Germany.

[32] As per Collins English dictionary (2014)
[33] EU-15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom

EU-15 countries

Number of people employed per sector ('000)	1995	2013	<>%	<>#
Industry - Manufacturing				
Food products	3.561	3.503	-2%	58-
Textile products	3.353	1.289	-62%	2.063-
Wood & paper products	1.837	1.063	-42%	774-
Oil & chemicals	4.674	3.858	-17%	816-
Metals & machinery	7.928	6.135	-23%	1.793-
High Tech	3.468	2.122	-39%	1.346-
Automotive	2.744	2.923	7%	179
Other	3.729	4.137	11%	408
total employed Manufacturing sector	31.293	25.031	-20%	6.262-
% of total employed	21%	15%		

EU-15: employment data (source: Eurostat)

Please look at the Manufacturing sector most relevant for you. The following two questions will be related to your personal experience, with the objective to get a common understanding of the root causes for the substantial changes in manufacturing sector employment.

Research Questions

1. Based on your personal experience in the Manufacturing Industry, what do you see as the most significant factors that have contributed to the shift in employment within the European Manufacturing sector?

Your answer:

Note: your answer will be analyzed collated alongside the other participants, identifying the frequency of factors mentioned. In Round 2 you will receive the ranked input from all participants for further review and revision.

2. In the next 10 years, do you expect employment in the European Manufacturing Industry to increase or decrease? Please choose only one of the boxes for your answer and argumentation.

Your answer:

I expect an **increase** in employment in the European Manufacturing Industry, because…

I expect a **decrease** in employment in the European Manufacturing Industry, because…

Note: please make your argumentation as specific as possible by indicating which influencing factors you consider most relevant for increased or decreased employment. In Round 2, the frequency of factors from all participants will be ranked for your subsequent review and revision.

Part II - Operations strategy

'Manufacturing companies are either mindlessly global or hopelessly local'

Anonymous quote

Introduction

At the end of the 20th century, a new technological revolution emerged: computer technology and the Internet: the 3rd Industrial or Digital Revolution. The birth of the Internet and the use of renewable energies are the main triggers for revolutionizing the industrial sector around the turn of the millennium. The cost of transportation and communication dropped substantially and Manufacturing on a global scale was critical for most Manufacturing companies to secure a competitive advantage.

A previous research (MacCarthy and Atthirawong, 2003) described the following considerations for Manufacturing companies making international location decisions (in order of importance):

1. Access to low labor cost and labor skills
2. Access to Markets
3. Tax incentives from host governments
4. Access to raw materials and technology
5. Counterattack against competitors

In recent years, business leaders and politicians refer to the 4th Industrial Revolution or Industry 4.0. Breakthrough technologies like 3D printing, advanced robotics using artificial intelligence and nanotechnology are introduced into the global market at incredible speed. The Internet of Things is connecting more and more physical devices to each other. With highly outsourced and global supply chains the industrial market is primarily global. A well-designed, cost effective global supply chain however, can quickly become a cost burden as new and disruptive technological developments reshape the manufacturing marketplace.

Research Question

3. Considering the Manufacturing Industry has now entered the 4th Industrial Revolution, what do you currently consider to be main strategic and operational drivers for manufacturing companies working across borders for the coming decade?

Your answer:

Note: Please use MacCarthy and Atthirawong's considerations as reference or add freely other considerations you believe relevant. Your answer will be analyzed and collated alongside the other participants, identifying the frequency of factors mentioned. In Round 2 you will receive the ranked input from all participants for further review and revision.

Part III – Industrial Location Factors

'The advantages of relocation are inevitably complicated by the advantages of staying put.'

Roger Hayter (1997)

Introduction

Research on Industrial Location factors is part of the discipline of Economic Geography and deals with the question where economic activity takes place and why? (Fujita, Krugman and Venables, 1999) Economists and other scientists generally agree that the main objective of a company's location strategy is to minimize cost. What location factors are important for manufacturing companies looking for global capabilities? For determining the criticality and relative importance of various location factors, we will be using the fourteen location factors described by Masood Badri in his 2007 publication as starting point for this questionnaire.

Different Manufacturing sectors have different priorities related to industrial location factors. E.g. the Oil & Chemical sector may consider the factor Utilities (availability and cost of energy) as more critical than some other Manufacturing sectors. You are requested to rate all 14 factors to determine what you consider to be important for the Manufacturing sector of your experience.

CRITICAL FACTORS	EXPLANATION OF CRITICAL FACTOR
TRANSPORTATION	Infrastructural facilities. Shipping cost of raw materials. Cost of finished goods transportation. Warehousing & storage facilities. Availability of postal outlets
LABOR	Low cost labor. Attitude of workers. Managerial labor. Skilled labor. Wage rates. Unskilled labor. Unions. Educational level of labor. Cost of living.
RAW MATERIALS	Proximity to suppliers. Availability of raw materials. Nearness to component parts. Location of suppliers. Availability of storage facilities of raw materials
MARKETS	Existing consumer market. Existing producer market. Potential consumer market. Anticipation of growth of markets. Favorable competitive position. Income & population trends. Consumer characteristics. Location of competitors. Future expansion opportunities. Size of markets. Nearness to related industries.
INDUSTRIAL SITE	Accessibility of land. Cost of industrial land. Developed industrial park. Space for future expansion. Availability of lending institutions. Closeness to other industries.
UTILITIES	Water supply, cost and quality. Disposable facilities of industrial waste. Availability and cost of fuels, electric power, gas, sewage facilities, coal and nuclear facilities.
GOVERNMENT ATTITUDE	Building ordinances. Compensation laws. Insurance laws and safety inspections.
TAX STRUCTURE	Tax assessment basis. Industrial property tax rates. State corporate tax structure. Tax free operations. State sales tax.
CLIMATE	Living conditions. Air pollution.
COMMUNITY	Schools and research institutions. Quality of schools. Bank and credit institutions.

INTERNATIONAL LOCATION FACTORS	
POLITICAL SITUATION OF FOREIGN COUNTRY	Relations with the west. History of country. Stability of regime. Protection against expropriation. Treaties and pacts. Attitude in the UN. Type of military alliances. Attitude towards foreign capital.
GLOBAL COMPETITION AND SURVIVAL	Material and Labor. Market opportunities. Availability of capital. Proximity to international markets.
GOVERNMENT REGULATION	Clarity of corporate investment laws. Regulations concerning JV's and mergers. Regulations on transfer of earnings out of country. Taxation of foreign owned companies. Foreign ownership laws. (…)
ECONOMIC FACTORS	Standard of living. Per capita income. Strength of currency. Balance of payment status. Government aids.

Critical factors of industrial location (Masood A. Badri in Journal of Business and Public Affairs, 2007)

Research Question

4. Based on your professional experience, how would you rate the critical location factors for industrial location of the European Manufacturing Industry in the coming decade? Please rate each factor individually using one of the giving options. Please add critical factors freely if considered appropriate.

CRITICAL FACTORS	NOT IMPORTANT	RATHER IMPORTANT	FAIRLY IMPORTANT	VERY IMPORTANT
TRANSPORTATION				
LABOR				
RAW MATERIALS				
MARKETS				
INDUSTRIAL SITE				
UTILITIES				
GOVERNMENT ATTITUDE				
TAX STRUCTURE				
CLIMATE				
COMMUNITY				
INTERNATIONAL LOCATION FACTORS				
POLITICAL SITUATION OF FOREIGN COUNTRY				
GLOBAL COMPETITION AND SURVIVAL				
GOVERNMENT REGULATION				
ECONOMIC FACTORS				
OTHER MAIN FACTORS				
.....				
.....				
.....				

Note: your rating will be collated with the ratings from all other participants, showing the relative importance of each factor. In Round 2 you will be able to revise your individual input and add any other relevant factors if applicable.

Part IV – Decision Making

'…Research shows that half of the decisions made in business and related organizations fail.'

Paul C. Nutt (From: Why decisions fail, 2002)

Introduction

Long-term success of any business depends on making the right decisions. Research on decision making however showed that decisions frequently fail. Research also showed that the decision-making process for a business is perhaps much less a rational, analytical process than one might think. Gut feel and intuition play a major role in business decisions, same as in everyday life decisions.

Industrial location decisions are strategic and complex. In the previous decades, globalization has resulted in many industrial relocations with the objective to conquer new markets and gain cost competitive advantages. Earlier research (MacCarthy and Atthirawong, 2003) showed that in making international location decisions, the following four problems are considered most difficult:

- Many factors involved in the decision process
- Difficult to get the right information and right people
- Management issues
- The relation of new location and existing manufacturing resources/technology

This last section of the questionnaire will deal with the complex process of taking industrial location decisions.

Research questions

5. Based on your previous and personal experience, what do you consider to be the most difficult problem or problems to overcome when dealing with international manufacturing location decisions?

Your answer:

Note: Please use the problems documented by MacCarthy and Atthirawong as reference and/or add freely other problems you believe are relevant. Your answer will be analyzed and collated alongside the other participants, identifying the frequency of problems mentioned. In Round 2 you will receive the ranked input from all participants for further review and revision.

6. Based on your business experience, what recommendations do you have to overcome the problems related to the industrial location decision making process?

Your answer:

Note: please use the specific problems you selected in Question 5 for your recommendations. Your recommendations will be analyzed and grouped into comprehensive categorized recommendations. In Round 2 you will receive the categorized input from all participants for further review and revision.

Closing

Thank you for your contribution to the Research MADE IN EUROPE. All input from the expert panel members will be processed, analyzed and aggregated. You will receive the aggregated results for the subsequent round in the month April 2017, giving you the opportunity to adjust your initial input in Round 2.

I look forward working with you on the subsequent rounds of this Delphi research.

Gerard Ekhart
DBA Researcher

February 2017
Benschop, the Netherlands

Appendix 5.4 – Delphi research Round 1 invitation email

Email invitation Questionnaire for the Delphi Research MADE IN EUROPE – Round 2 (May 18, 2017)

Dear Expert panel member,

Thank you for participating in Round 2 of the Delphi research questionnaire of Made in Europe. During March and April 2017 all input from the Round 1 questionnaires have been received, analyzed and compiled. Below you will find:
- All formulated questions of Round 1
- Your initial input / response
- The compiled results of the Expert panel
- Response box for your input in Round 2

In Round 2 you have the possibility to:
- Adjust your initial input
- Add your comment and thoughts on the compiled results

If you have participated in Round 1 and have no further comments, adjustments or input, you can leave the response box empty. If you have not been able to participate in Round 1, you can enter your input in the Response box for Round 2.

Please use the following link .....
Questionnaire for the Delphi Research MADE IN EUROPE - Round 2

The questionnaire process is self-explanatory, but don't hesitate to contact me if you need support or clarification.

You are kindly requested to submit your input before JUNE 1, 2017. If a 3rd round of questions will be required, depends on your received input from Round 1.

Thanks for your continued support to my Research!

Gerard Ekhart
Researcher Doctoral thesis MADE IN EUROPE
madeineu@imengo.nl
www.MadeInEU.biz

Appendix 5.5 - Delphi research Questionnaire Round 2

Delphi questionnaire Made in Europe - Round 2

Introduction

Thank you for participating in Round 2 of the Delphi research questionnaire of Made in Europe. During March and April 2017 all input from the Round 1 questionnaires have been received, analyzed and compiled. Below you will find:

- All formulated questions of Round 1
- Your initial input / response
- The compiled results of the Expert panel
- Response box for your input in Round 2

In Round 2 you have the possibility to:

- Adjust your initial input
- Add your comment and thoughts on the compiled results

If you have participated in Round 1 and have no further comments, adjustments or input, you can leave the response box empty. If you have not been able to participate in Round 1, you can enter your input in the Response box for Round 2.

You are kindly requested to submit your input **before JUNE 1, 2017.** If a 3rd round of questions will be required, depends on your received input from Round 1.

Question 1

'Based on your personal experience in the Manufacturing Industry, what do you see as the most significant factors that have contributed to the shift in employment within the European Manufacturing sector?'

Your response from Round 1

....

Aggregated responses from all Expert panel members Round 1

Category	**Factor**	**Frequency %**
Cost	Low labour cost	26%
Cost	Cost leadership	5%
Cost	Taxrates	5%
Cost	Energy cost	3%
Cost	Transport cost	2%
Cost	Exchange rates	2%
Technology	Automation	20%
Technology	Productivity	2%
Market	Close to end market	8%
Market	Labour availability	8%
Market	RM availability	3%
Market	Improved infrastrcture	2%
Operations strategy	Outsourcing (core competence)	15%
Other	Environmental issues	2%
Other	Mergers	2%
		100%

Your Round 2 input (adjustments, comments, thoughts if applicable)

....

Question 2

'In the next 10 years, do you expect employment in the European Manufacturing Industry to increase or decrease?'

Your response from Round 1

....

Aggregated responses from all Expert panel members Round 1

Option	**Factors**	**%**
Decrease	Automation, robotics, Internet of Things, Industry 4.0	65,6%
	Ongoing LCC shift	
	High cost of Energy	
	High cost of investment in MF capacity	
Increase	Automation, robotics, Internet of Things, Industry 4.0	28,1%
	Local content regulations	
	Near shoring	
	Increasing transportation cost	
Stable	Automation, robotics, Internet of Things, Industry 4.0	6,3%
	Nearshoring <> LCC shift	
		100%

Your Round 2 input (adjustments, comments, thoughts if applicable)

....

Question 3

'Considering the Manufacturing Industry has now entered the 4th Industrial Revolution, what do you currently consider to be main strategic and operational drivers for manufacturing companies working across borders for the coming decade?'

Your response from Round 1

....

Aggregated responses from all Expert panel members Round 1

Strategic and operational drivers	**Frequency %**
Maccarthy & Atthiwarong (2002)	
Access to low labor cost and labor skills	20%
Access to markets	17%
Access to raw materials and technology	12%
Tax incentives	9%
Counterattack against competitors	2%
Other factors	
Access to cost effective, flexible supply chain	22%
New manufacturing technologies (IoT, 3D printing, Industry 4.0)	13%
Stable Infrastructure	1%
CO2 footprint	1%
Access to energy	1%
Cost of transport	1%
Adaptability	1%
	100%

Your Round 2 input (adjustments, comments, thoughts if applicable)

....

Question 4

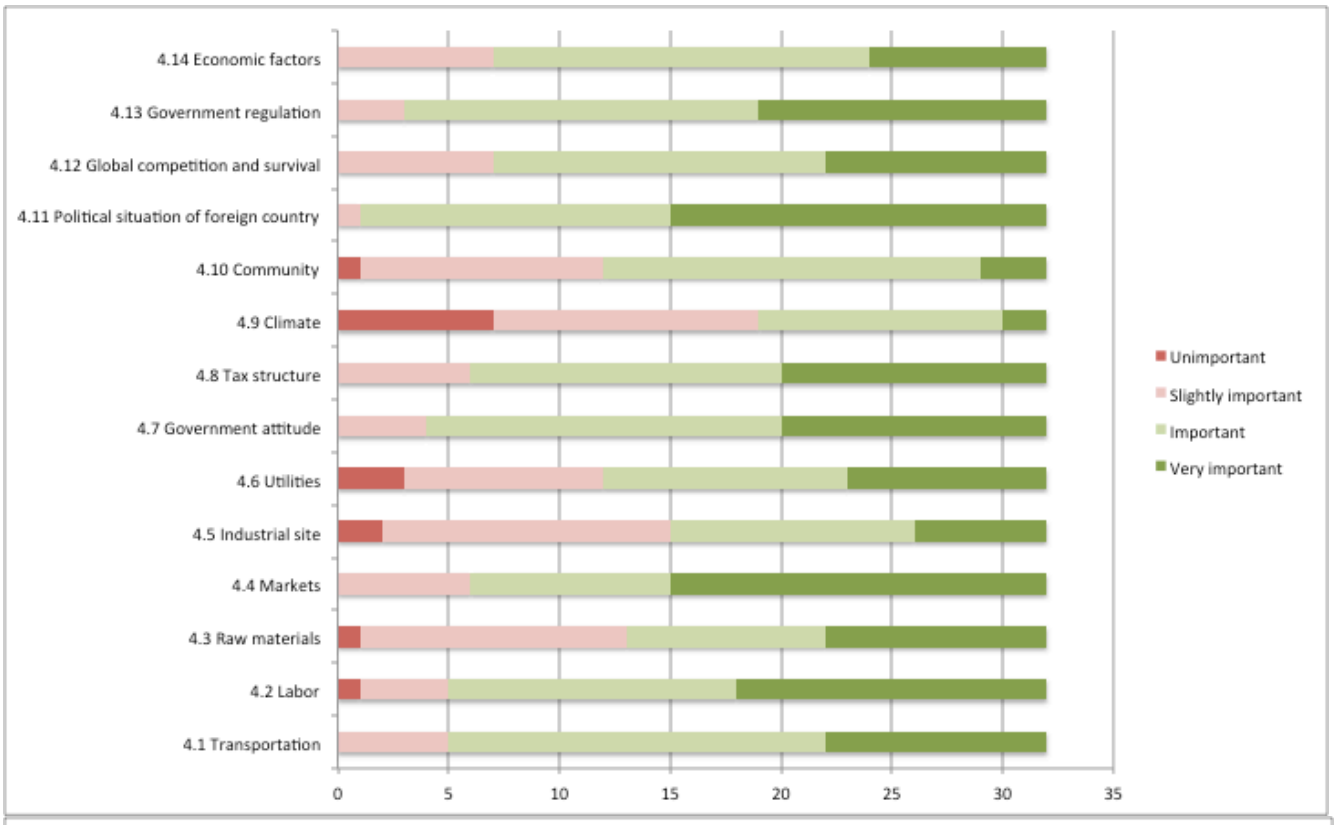
'Based on your professional experience, how would you rate the critical location factors for industrial location of the European Manufacturing Industry in the coming decade?'

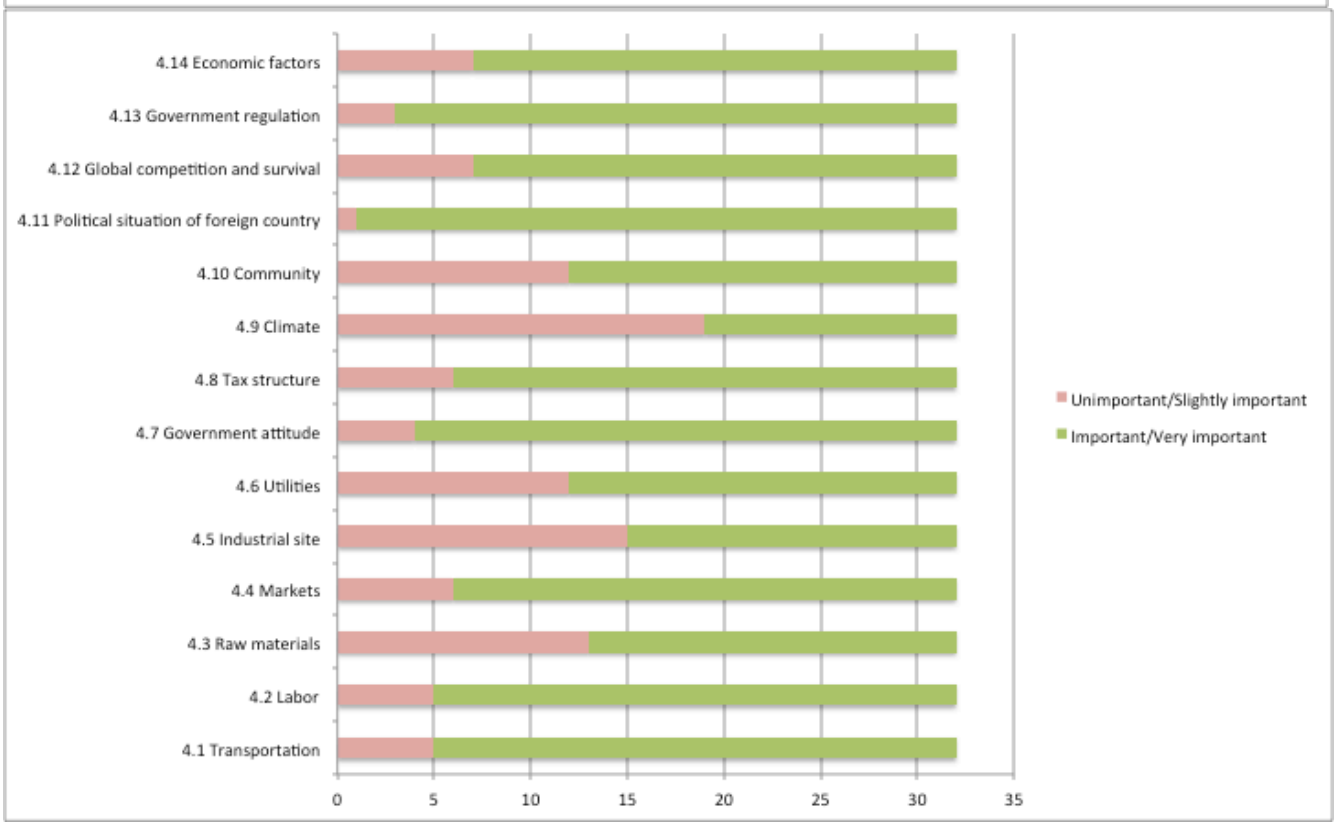
Your response from Round 1

....

Aggregated responses from all Expert panel members Round 1

Location factors	**Unimportant**	**Slightly important**	**Important**	**Very important**
4.1 Transportation	0%	16%	53%	31%
4.2 Labor	3%	13%	41%	44%
4.3 Raw materials	3%	38%	28%	31%
4.4 Markets	0%	19%	28%	53%
4.5 Industrial site	6%	41%	34%	19%
4.6 Utilities	9%	28%	34%	28%
4.7 Government attitude	0%	13%	50%	38%
4.8 Tax structure	0%	19%	44%	38%
4.9 Climate	22%	38%	34%	6%
4.10 Community	3%	34%	53%	9%
4.11 Political situation of foreign country	0%	3%	44%	53%
4.12 Global competition and survival	0%	22%	47%	31%
4.13 Government regulation	0%	9%	50%	41%
4.14 Economic factors	0%	22%	53%	25%
Additional factors				
IT infrastructure				
IP protection				
Environmental regulations				
Education & skills				
Quality				
Workforce ethics				
Social innovation				
Company culture				
Location direct customer / OEM				


4.14 Economic factors
4.13 Government regulation
4.12 Global competition and survival
4.11 Political situation of foreign country
4.10 Community
4.9 Climate
4.8 Tax structure
4.7 Government attitude
4.6 Utilities
4.5 Industrial site
4.4 Markets
4.3 Raw materials
4.2 Labor
4.1 Transportation
0
5
10
15
20
25
30
35
Unimportant
Slightly important
Important
Very important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4.11 Political situation of foreign country
4.10 Community
4.9 Climate
4.8 Tax structure
4.7 Government attitude
4.6 Utilities
4.5 Industrial site
4.4 Markets
4.3 Raw materials
4.2 Labor
4.1 Transportation
0
5
10
15
20
25
30
35
Unimportant/Slightly important
Important/Very important

Your Round 2 input (adjustments, comments, thoughts if applicable)

....

Question 5

'Based on your previous and personal experience, what do you consider to be the most difficult problem or problems to overcome when dealing with international manufacturing location decisions?'

Your response from Round 1

....

Aggregated responses from all Expert panel members Round 1

Problems with international location decisions	**Frequency %**
Lack of in depth local knowlwdge	23%
Lack of objective evaluation criteria	13%
Cultural differences	13%
Lack of capable expertise / mgt to support DM process	13%
Sheer complexity of the problem	10%
High speed of business climate change	8%
No TCO focus	5%
No government support	5%
Imbalance short/long term	5%
Environmental regulations	3%
Bureaucracy	3%
	100%

Your Round 2 input (adjustments, comments, thoughts if applicable)

....

Question 6

'Based on your business experience, what recommendations do you have to overcome the problems related to the industrial location decision making process?'

Your response from Round 1

....

Aggregated responses from all Expert panel members Round 1

Recommendations for international location decisions	**Frequency %**
Understand local dynamics, way of working, culture	28%
Apply objective and raitonal evaluation criteria	18%
Keep a long term view / perspective	15%
Take enough time for in depth analysis	13%
Stakeholder analysis & mgt	8%
Use cross functional teams	5%
Link to overall vision & strategy	5%
Understand government regulations	3%
Risk mitigation plan	3%
Propoer IT infrastructure	3%
Education & selection of right staff	3%
	100%

Your Round 2 input (adjustments, comments, thoughts if applicable)

....

‘SUBMIT’ Button

Thank you for your participation!

Gerard Ekhart
DBA Researcher

Appendix 5.6 – Delphi research Final round invitation email

Email invitation Wrap up Delphi Research Made in Europe – FINAL INPUT (August 18, 2017)

Dear participant,

please find enclosed the preliminary statistical results of Round 1 and 2 the Delphi research in which you participated. You are invited to give your personal, closing comments on the results presented in this document. You can do this by **simply replying to this email**.

You are kindly requested to submit these final comments, observations or closing remarks **before September 15th, 2017**.
If you have nothing more to add, let me know in a short reply note.

Thank you for your valuable contribution to the MADE IN EUROPE research program.

Gerard Ekhart
Researcher Doctoral thesis MADE IN EUROPE
madeineu@imengo.nl
www.MadeInEU.biz

Delphi Research - Wrap up document with preliminary results

DBA Thesis MADE IN EUROPE
Gerard Ekhart
August 2017

Index

Wrap up round Delphi Research

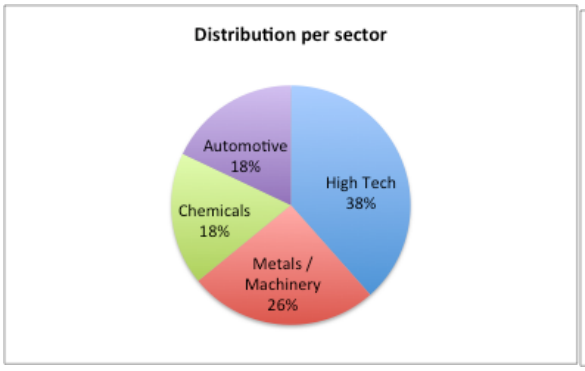
From March up to July 2017, a Delphi research has been conducted as part of the Made in Europe research program. Through the website www.MadeInEU.biz two online rounds of questionnaires have been held to collect information from a panel of Manufacturing Industry experts. This document will outline the aggregated, summarized results of this research. The results are documented in a factual, comprehensive way focusing on the main results only. Detailed analysis and preliminary findings will be presented in a later stage of the research program as part of the final thesis document.

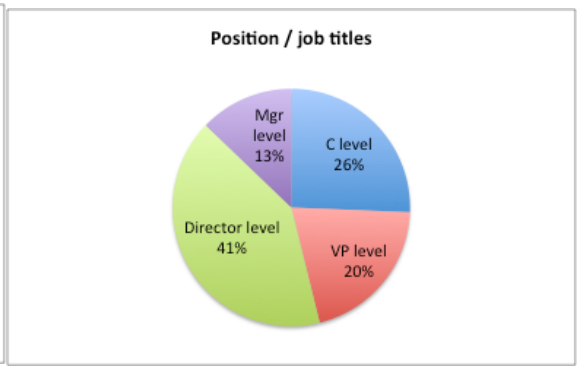
You are invited to give personal closing comments on the results presented in this document. You can do this by simply replying to the email you received. Your personal observations and conclusions will be taken into account as part of the overall analysis of Made in Europe research.

Expert panel composition

Before the research questions and answers are presented, first a presentation of some statistics on the Made in Europe expert panel. All participants are business practitioners with extensive experience in the Manufacturing Industry.

- Total number of panel members registered: 39
- # and % responses round 1: 32 (82%)
- # and % responses round 2: 31 (79%)
- # and % responses round 1 and 2: 28 (72%)
- Distribution per sector: see below graph
- Distribution per position / job title: see below graph





De-industrialization in Europe

As part of the Introduction document presented in the 1st questionnaire, the shift in employment in the European Manufacturing sectors was presented in below overview. From 1995 up to 2013 the total number of people employed in the Manufacturing Industry dropped with 20%. Over 6 million jobs were lost.

EU-15 countries
Number of people employed per sector ('000)

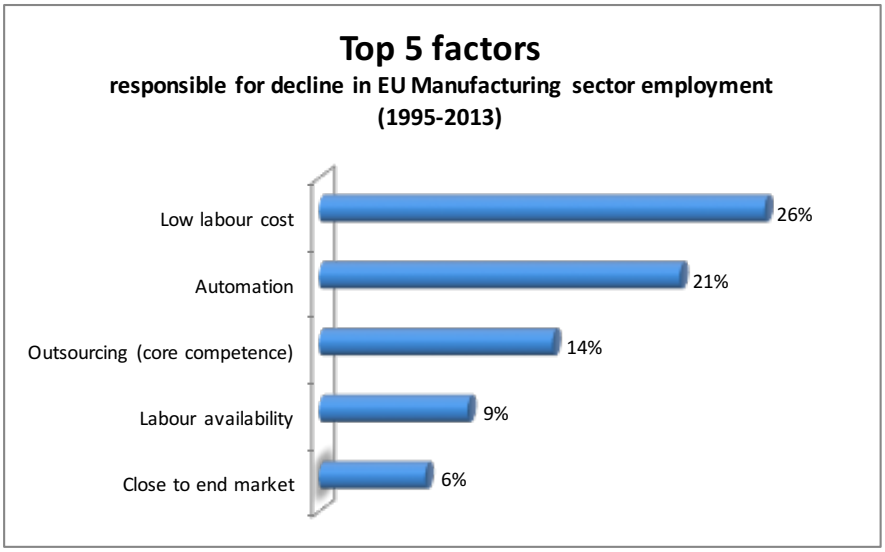
Industry - Manufacturing	1995	2013	<>%	<>#
Food products	3.561	3.503	-2%	58-
Textile products	3.353	1.289	-62%	2.063-
Wood & paper products	1.837	1.063	-42%	774-
Oil & chemicals	4.674	3.858	-17%	816-
Metals & machinery	7.928	6.135	-23%	1.793-
High Tech	3.468	2.122	-39%	1.346-
Automotive	2.744	2.923	7%	179
Other	3.729	4.137	11%	408
total employed Manufacturing sector	31.293	25.031	-20%	6.262-
% of total employed	21%	15%		

EU-15: employment data (source: Eurostat)

Research Question 1

- Based on your personal experience in the Manufacturing Industry, what do you see as the most significant factors that have contributed to the shift in employment within the European Manufacturing sector?

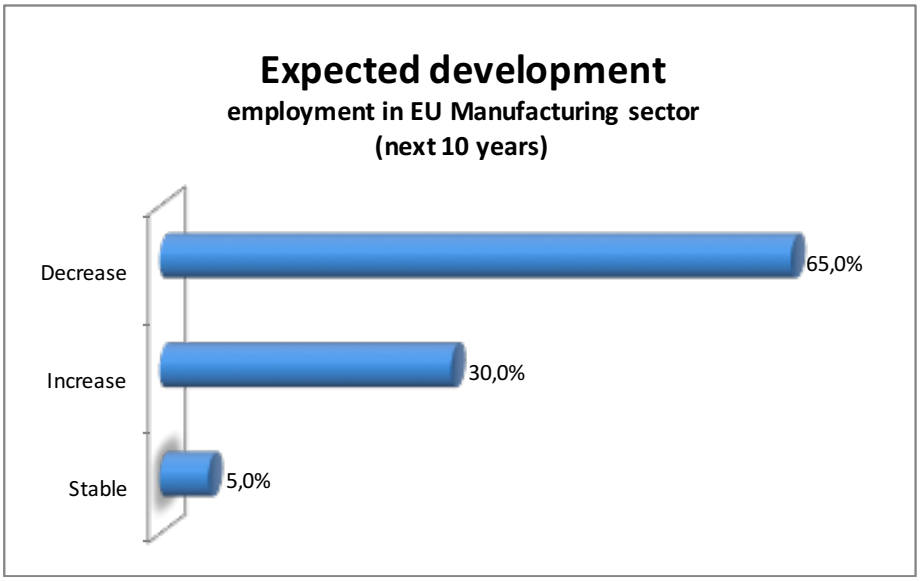
Your responses from Round 1 & 2



Research question 2

- In the coming 10 years, do you expect employment in the European Manufacturing Industry to increase or decrease?

Your responses from Round 1 & 2



Main contributing factors:

- Decrease
    - Automation, robotics, Internet of Things (IoT), Industry 4.0
    - Ongoing shift to low cost countries (LCC)
    - High cost of energy
    - High investment in manufacturing capacity
- Increase
    - Automation, robotics, IoT, Industry 4.0
    - Near shoring / reshoring
    - Local content regulations
    - Increased cost of transport
- Stable
    - Automation, robotics, IoT, Industry 4.0
    - Near and/or re-shoring versus LCC shift

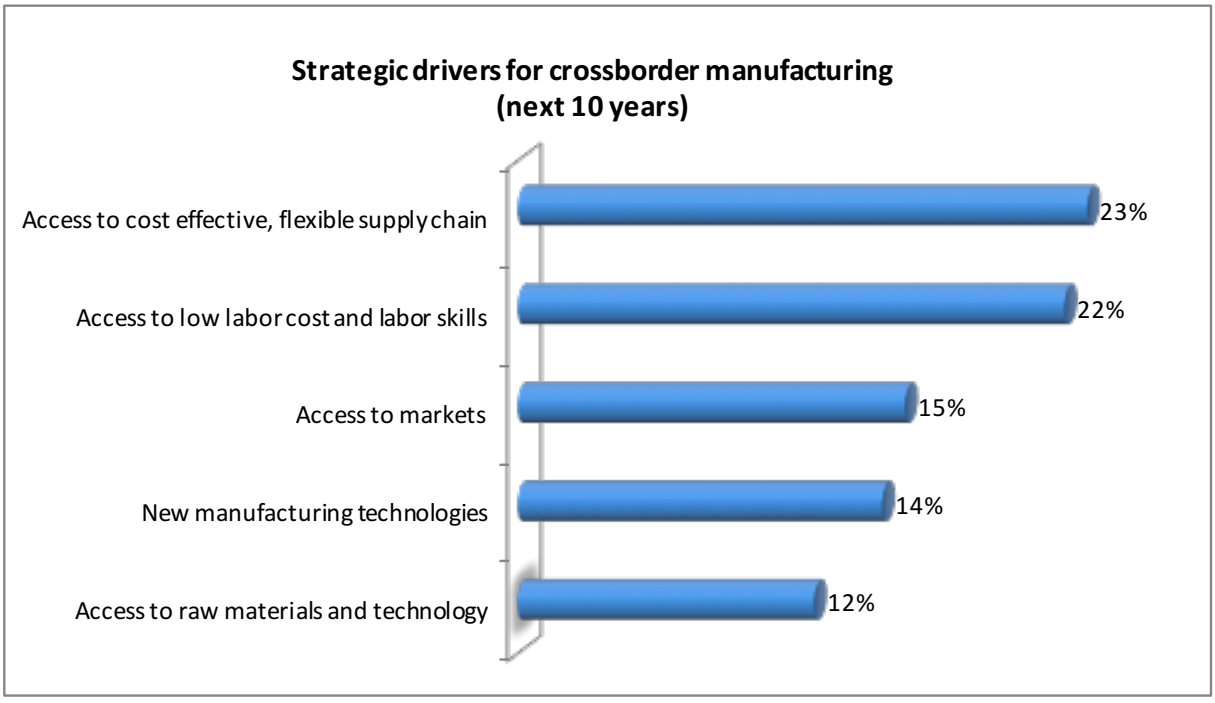
Operations strategy

Recently, business leaders and politicians talk about the 4th Industrial Revolution or Industry 4.0, we are now experiencing. Breakthrough technologies like 3D printing, advanced robotics using artificial intelligence and nanotechnology are introduced into the global market at incredible speed. The Internet of Things is connecting more and more physical devices to each other. With highly outsourced and global supply chains the industrial market is primarily global.

Research Question 3

7. Considering the Manufacturing Industry has now entered the 4th Industrial Revolution, what do you currently consider to be main strategic and operational drivers for manufacturing companies working across borders for the coming decade?

Your responses from Round 1 & 2



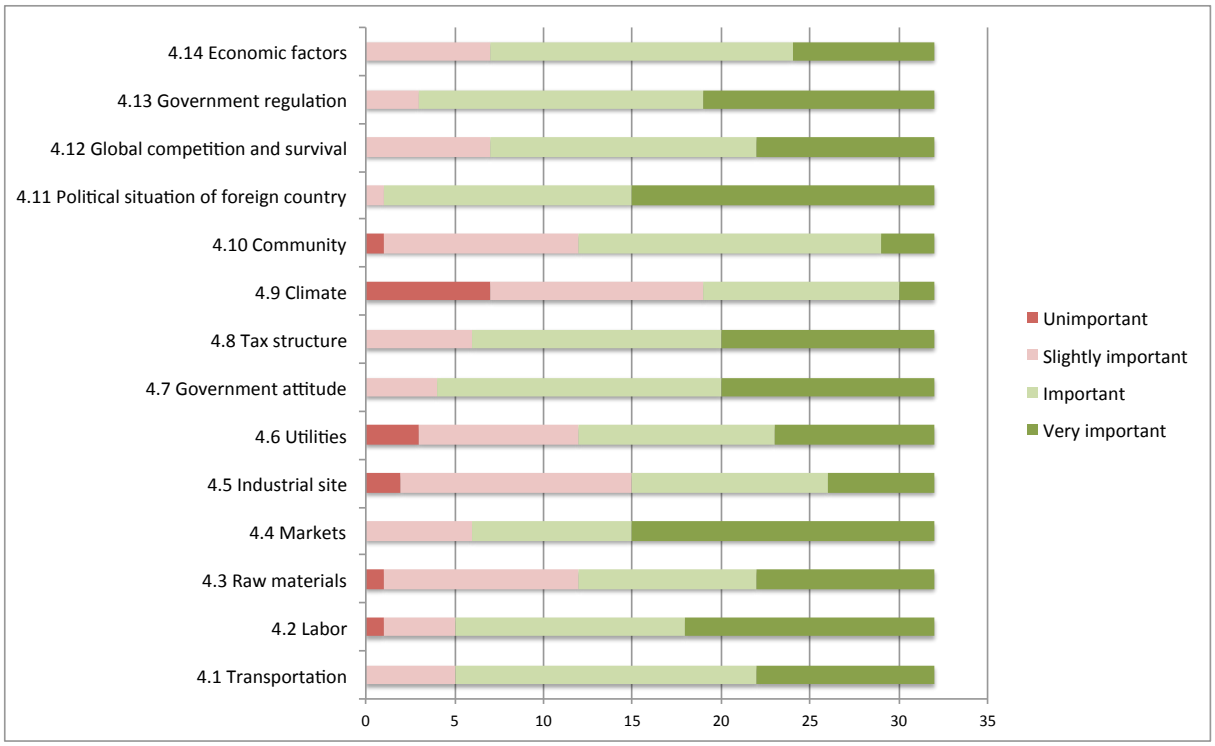
Industrial Location Factors

Research on Industrial Location factors deals with the question where economic activity takes place and why? Economists and other scientists generally agree that the main objective of a company's location strategy is to minimize cost. What location factors are important for manufacturing companies looking for global capabilities? Different Manufacturing sectors have different priorities related to industrial location factors.

Research Question 4

8. Based on your professional experience, how would you rate the critical location factors for industrial location of the European Manufacturing Industry in the coming decade?

Your responses from Round 1 & 2 (all manufacturing sectors aggregated)



An overview of the location factors considered to be most important is presented in below table; both the aggregated results as well as the individual Manufacturing sector results are presented.

Sector Ranking	All sectors	High Tech	Metals & Machinery	Automotive	Chemicals
1.	Political situation of foreign country	Political situation of foreign country	Political situation of foreign country	Markets	Utilities
2.	Government regulation	Labour	Labour	Political situation of foreign country	Raw Materials
3.	Government attitude	Government regulation	Transport	Global competition and survival	Transport
4.	Labour	Tax structure	Government attitude	Labour	Government regulation
5.	Transport	Markets	Government regulation	Government regulation	Government attitude

In addition to the presented location factors (derived from previous research), several expert panel members added a variety of 'new' location factors. The most frequently mentioned location factors were:

1. Environmental regulations
2. ICT infrastructure
3. Education & skill levels

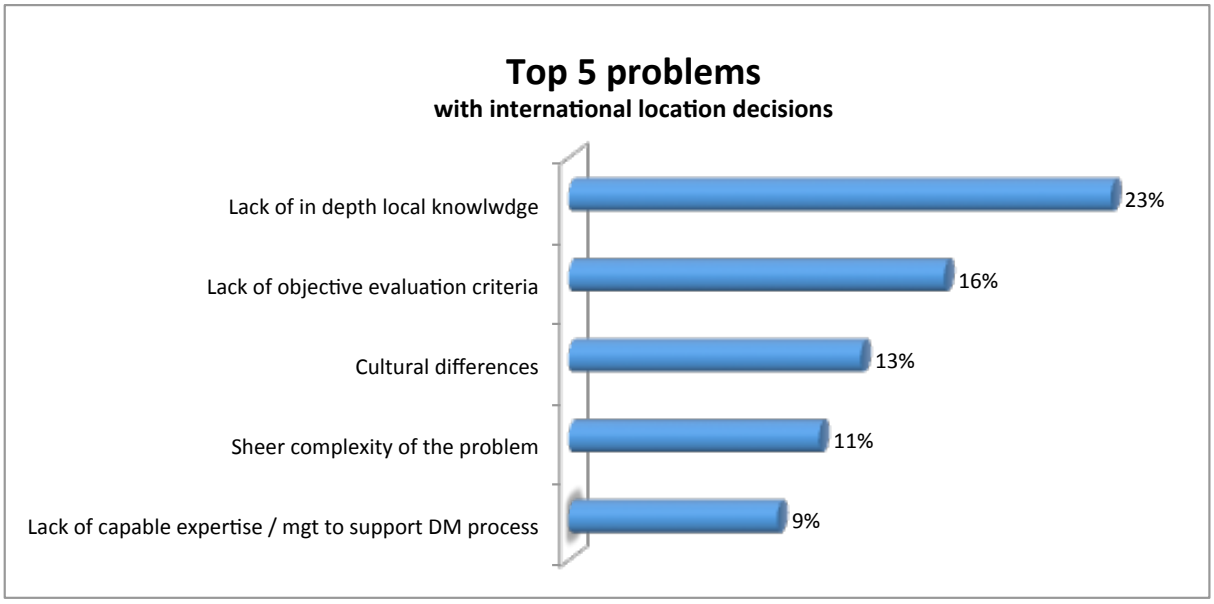
Decision Making

Industrial location decisions are strategic and complex. In the previous decades, globalization has resulted in many industrial relocations with the objective to conquer new markets and gain cost competitive advantages.

Research question 5

9. Based on your previous and personal experience, what do you consider to be the most difficult problem or problems to overcome when dealing with international manufacturing location decisions?

Your responses from Round 1 & 2



Research question 6

10. Based on your business experience, what recommendations do you have to overcome the problems related to the industrial location decision making process?

Your responses from Round 1 & 2

Closing

As indicated in the introduction of this 'wrap up' document, further analysis and interpretation of the results will be part of the remainder of the Made in Europe Research program. This document intended to give the Expert panel members who participated in the Delphi research an objective, fact-based feedback of the research results so far. Reviewing these results, you are invited to give closing comments, feedback and/or your interpretation of the results as presented in this document.

Once the overall thesis is completed and approved (expected in Q4-2017 / Q1-2018), you will receive a personal copy with an Executive Summary of the thesis.

Many thanks for your contribution to the Research MADE IN EUROPE.

Gerard Ekhart
DBA Researcher

August 2017
Benschop, the Netherlands

You are kindly requested to submit your final comments by email to
madeineu@imengo.nl
not later than September 15, 2017.