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Manufacturing in Sweden

How competitive is Sweden as a manufacturing location?

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Summary

In this report we have asked the question whether it is possible, and indeed worthwhile, to sustain manufacturing in Europe. The analysis is based on a macro-economic analysis and interviewed production managers of larger Swedish manufacturing corporations about their view of how competitive Sweden is for localizing manufacturing plants.

The macro-economic analysis shows that manufacturing still represents an important part of a balanced economy. Sweden, like Germany and others, still feature strong contributions of their manufacturing sector to the national Gross Value Added. However, it is also clear that manufacturing fortunes differ greatly across Europe, and that the manufacturing sector is under pressure in many countries. Manufacturing's survival in Europe thus should not be taken for granted.

Our findings from interviewing Swedish manufacturing firms about what it takes to retain manufacturing in Sweden paint a clear picture. First and foremost we find that higher labour cost is not necessarily a "killer criterion" for the locus of manufacturing as many other favourable advantages offset the labour cost advantage: skills, productivity, proximity and quality of suppliers, and others. Secondly, our interview findings also show how collaboration with unions and worker councils is a unique Swedish strength compared to other EU countries, while skill levels and quality of local suppliers are strengths compared to low cost regions. Interestingly though, collaboration with the Swedish government is identified as a unique weakness for Sweden, and the comparatively high failure rate of Swedish firms' offshoring ventures stands testimony to this. Labour cost is not all that matters, but Sweden must be able to compete in total cost comparison and when understanding and utilising its unique strengths.

In conclusion we argue that manufacturing still plays a crucial role in the Swedish economy in terms of Value Added, employment, and exports. Its survival however is not guaranteed. Sweden, like any other developed country, needs to actively support its manufacturing industry. Links to customers and suppliers, and government, matter more than commonly thought. In this context it is important to stress that global manufacturing is a growth sector, and at present other developing countries (e.g. BRICS) and regions are capturing most of this growth, while industrial nations see a stagnation of manufacturing GVA. Manufacturing thus is not the "sunset industry" many make it out to be. It has been, and remains, a prize worth fighting for.

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1. Introduction

In the wake of the global financial crisis in 2007-2008 it has been shown again that the manufacturing sector in particular suffers during an economic downturn. As demand for manufactured goods fell during the downturn, most manufacturing firms in Europe faced strong pressures to reduce cost, some were forced into defensive mergers, while others exited altogether. Coupled with increasing competition from low-cost manufacturing locations and efficient global logistics, a question that has been resurfacing yet again is: "Can manufacturing be sustained in modern industrialised economies?" The answer is far from clear.

What is clear though is that manufacturing still does play an important role in many economies in Europe overall. Its relative importance however varies greatly by country: manufacturing remains a strong contributor to the national economies in Germany, Italy, and Sweden – while it for years has been declining in countries like the UK, Spain and France (Figure 1).

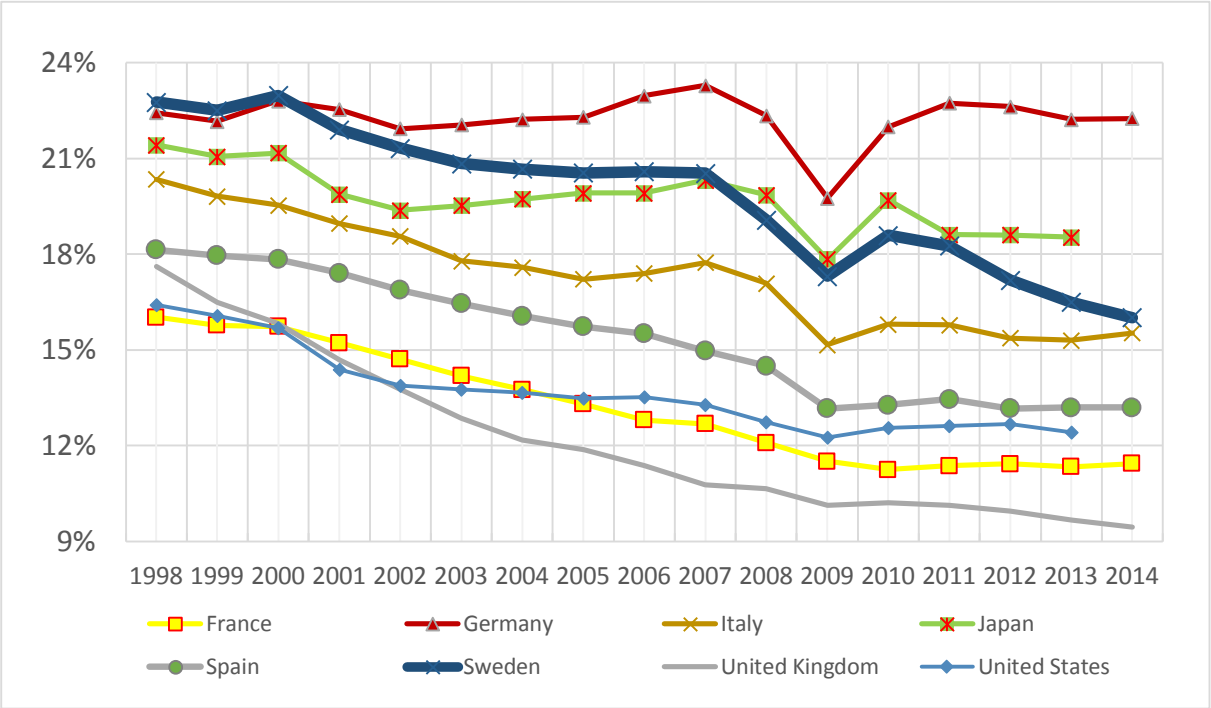


Figure 1: Share of manufacturing value added in the economy (Source: OECD).

So what does it take to sustain a viable manufacturing sector in Europe? This is the central question that was at the heart of a joint research project between Chalmers University of Technology, Sweden, and the University of Oxford, UK, where senior operations executives in the UK, Germany and Sweden were interviewed.

The purpose of the underlying research is to capture industry's perception of the key strengths and weaknesses of the respective manufacturing location in Europe, in order to develop strategies how to sustain manufacturing in a relative high-labour cost context. The research further seeks to inform industrial policy, aiming to identify the key policy levers that can help to retain a competitive and vibrant manufacturing sector in Europe. Focus in this report is particularly on the Swedish manufacturing sector, although we will refer to the German manufacturing sector throughout the report as reference points for comparison. Germany is a good comparator for Sweden due to its strong manufacturing position and therefore could be considered being a role model for the Swedish manufacturing sector.

1.1. Does manufacturing matter?

In the following, the main arguments for and against manufacturing are reviewed in the context of Europe, as merit can be found in the key arguments on either side. One could ask why the manufacturing sector should be sustained at all. Could not the recent economic trends of outsourcing or relocating manufacturing to low labour cost contexts be a sign that manufacturing is no longer economical in Europe, and no longer has any role to play in a "post-industrial" society? That the wise thing to do would be to focus on other, more sustainable, types of activities that are not this sensitive to economic fluctuations? That manufacturing, especially such that is labour-intensive, has its place in emerging economies which still has low cost labour as a norm? Why not pass the torch to these economies and instead import the needed manufactured goods? Does manufacturing have any other role in the Swedish economy and society besides being profitable? And the corporations that choose to stay, what is their reasoning? Key arguments that are recurring are questions like "Why not buy everything from low cost countries?" and "Why is it important to keep manufacturing in Sweden?"

The question whether a modern economy can succeed without a manufacturing base continues to divide economists, practitioners and politicians (Pisano & Shih, 2012). This very subject builds the theoretical foundation for the context of this study. Since the financial crisis in 2007/2008, the topic has once more entered the limelight. Economies with a relatively strong financial services sector, such as the United States and UK, were struggling after the crisis. Germany's economy, au contraire recovered relatively fast and has been performing well since then. Also China recovered quite fast, an economy strongly relying on manufacturing, just like Germany (Lane 2011). Nonetheless, conclusions can hardly be drawn based on the examples mentioned before. Japan's economy for instance has stagnated for almost 20 years, even though its prosperity has been built on manufacturing and exporting products. Moreover, India a country where a large share of employees is providing services impresses the world with similar growth rates as China (Lane 2011).

In the following sequence, arguments pro and con manufacturing's importance are introduced. In most contributions to this discussion the economy is divided into manufacturing and services. This is because the majority workforce of advanced economies is employed in either of the two sectors (Rowthorn & Ramaswamy, 1999).

The argument against

To some economists a shrinking manufacturing sector is no cause for concern. From their perspective it is a good and natural sign for economic development. The erosion of the manufacturing sector releases resources that could be utilized by higher value adding sectors such as services. According to this perspective some manufacturing sectors might move to low-cost countries, yet others requiring greater skills will emerge and take their place (Pisano & Shih, 2012). The latter development, however, cannot solely explain the decline in manufacturing employment, as it can be exhibited in most of the developed nations. In the case of UK the increase in productivity growth in manufacturing caused job losses instead of rising output. Secondly, consumption patterns have changed over the years and thirdly the decrease in manufacturing employment has been accompanied by a deteriorating performance in manufacturing trade (Kitson & Michie, 1997). In a vivid debate[1] on the same topic held in 2011 on "The Economist Debates", Bhagwati[2] opened the discussion with labeling Adam Smith's theories in the Book of

[1] The English-language weekly news and international affairs publication *The Economist* holds regularly moderated online debates on their internet platform, in which academic proponents and opponents discuss an economic topic. This one is on "Manufacturing".

[2] Jagdish Bhagwati is in this debate against the motion which states that a strong manufacturing sector is an elementary and inevitable driver of an economy.

"The Wealth of Nations" (p.197) a fallacy which he calls “manufacturing fetish”. Smith condemned labors of "churchmen, lawyers, physicians, men of letters of all kinds; players, buffoons, musicians, opera-singers, opera-dancers, etc." as unproductive. Bhagwati supports his argument presenting the examples of two highly innovative and productive service providers: DHL and FEDEX. A sector’s productivity contribution to an economic growth is considered a central point in the whole debate. Economists assuming that an advanced economy can continue to prosper even as the manufacturing sector erodes have observed remarkable increases in productivity in services (Bhagwati, 2011). In addition they argue that services are important in international trade across borders, consumed and supplied by subsidiaries abroad, and by people working abroad (Lane, 2011). While most scholars acknowledge that an increase in income per capita is associated with a greater share of manufacturing in the gross national product (e.g. Chenery, 1960; Chenery & Taylor, 1968; Kuznets, 1971; van Gemert, 1987), Bhagwati opposes that it is growth that is likely the cause for the risen share of manufacturing, rather than the other way around (Bhagwati, 2011). At last, Bhagwati points to the conceptual problems that arise when distinguishing between manufacturing and services. He illustrates this problem with the example of a paint job in car manufacturing: in case the car gets painted by an in-house crew of the OEM the value added is part of manufacturing. Suppose, however, that the paint job is done by an external “painting services” establishment. Suddenly the value added created by painting the vehicle is considered “services” value added. Although little of substance has changed the manufacturing value declined (Bhagwati, 2011). Thus, the validity of the measurements claiming manufacturing’s decline could be challenged.

The argument in favour

An opposing side of scholars argues that allowing manufacturing to erode would be hazardous to an economy’s health (Hayes & Wheelwright, 1984). Extrapolating this to the firm level the position can be summarized as a proposition:

> *“Lose control of the manufacturing or production process of your product and you risk losing control of both the technology and the final markets” (Cohen & Zysman, 1987, p. 129).*

They argue that only these firms producing the products understand the market and the product in a way that gives them the opportunity to strive for technology leadership. Thus, after several steps of product innovation the initiative to innovate will eventually pass to the producing firm (Cohen & Zysman, 1987). Modern manufacturing has become knowledge work, which is strongly connected to innovation. Factories producing sophisticated goods such as specialty materials, medical devices and semiconductors require very skilled workers who are able to operate on highly complex processes (Pisano & Shih, 2012). Because innovation is not only R&D, it is rather about moving an idea throughout the value chain to the customer’s hands. A process which requires an extremely close coordination between R&D and Production and which is optimally accompanied by continuous improvement efforts (Pisano & Shih, 2012). Another argument listed by Pisano and Shih (2012) is the assumption that the development of a country’s trade deficit/surplus is largely a function of its manufacturing competitiveness. While Pisano and Shih refer this correlation explicitly to the U.S. economy, the example of India can be applied as an indication that it is also valid for other nations. Thirlwall’s Law (Thirlwall, 1979) states that the growth rate depends on the ratio of the growth rate of exports to the income elasticity of demand of imports. This means that the balance of payments (Table 1) becomes a serious problem if imports outpace exports, incurring a balance of payments crisis in the respective country. Hence, a country needs to direct its political efforts toward making its exporting companies more competitive and attractive while developing import substitutes at the same time (Nabar-Bhaduri

& Vernengo, 2012). Under these premises India's service sector focused economical model has to be scrutinized.

Table 1: List of economies with a positive balance of payment as of the fourth Quarter 2011 (Source: OECD Stat 2013)

Country	Balance of payment in millions (USD) as per Q4 2011
Austria	1,304
Denmark	4,455
Estonia	79
China	27,498
Germany	52,978
Hungary	216
Ireland	237
Israel	260
Japan	23,461
Luxembourg	951
Netherlands	22,604
Norway	15,957
Russian Federation	32,944
Slovak Republic	299
Slovenia	1,685
Sweden	***8,786***
Switzerland	16,067

Baumol and Bowen (1965) raised considerable doubts whether services could significantly increase national productivity. Nabar-Bhaduri and Vernengo (2012) conclude that India's service exports seem incapable of reducing the current trade deficit, which might eventually lead to serious problems regarding the balance of payments, unless service trade surplus increases drastically. The following numbers referring to the time between 2004 and 2009 demonstrate India's dilemma: during that time India's service trade surplus was equivalent to 0.9% of GDP, which however only covered 19% of its manufacturing trade deficit (4.8% of GDP) (Chang, 2011). Contrary to the service's relative slow productivity growth, manufacturing's relatively higher productivity growth can be considered as a central argument listed by multiple economists. Moreover, it is a significant force behind deindustrialization[3] (Rowthorn & Ramaswamy, 1999).

[3] A phenomena describing the continuous decline of the share of manufacturing employment (Rowthworn, Ramaswamy 2011)

Ha-Joon Chang[4], Jagdish Bhagwati's opponent in the above mentioned "The Economist debate" (2011), claims a causal link between higher income and productivity growth in manufacturing: "a weaker manufacturing base means slower growth" (Chang 2011, no page). His argument is based on traditional economic theory, which states that a country's growth occurs by either employing more input or by utilizing the existing resources more efficiently (Solow, 1956). To sum this up: due to economies of scale an extension of the manufacturing sector could lead to increased competitive advantage and hence to increased economic growth (Kitson & Michie, 1997). As to that, it has to be considered that manufactured goods account for about 75 percent of the total world trade (World Trade Organization, 2009). This result is based on the fact that in the past, services have been more difficult to export due to their tendency to require local production. In the case of U.K., a country highly advanced in the export of services, the trade surplus generated by services accounts for 4%, while in the US it represents only 1% of the GDP (Chang, 2011). It is the digitization which has led to recent changes in this regard (Pisano & Shih, 2012). In addition to that, concerns arose that the slow "tertiary growth" can only be maintained at the cost of rising class tensions, in particular by the development of a low-wage workforce in the service sector (Petit, 1986). By acknowledging retail and trade as dynamic service sectors, yet emphasizing their dependency on manufacturing, as they are moving around mostly manufactured goods, Chang (2011) adverts to a main weakness of services. This means that much of the service sectors are dependent on the growth and size of the manufacturing industries (Kitson & Michie, 1997). It can be exhibited that manufacturing firms are usually more export-oriented than companies in other sectors. Thus, they are particularly able to benefit from the growth in emerging countries. Moreover, the high degree of foreign trade dependency leads to a pressure of modernizing and adapting in order to cope with and step in the worldwide competition. As a result a stimulating effect on innovation, productivity and investments in the manufacturing industry can be observed (Unterlöhner & Böhmer, 2012). A deteriorating position in manufacturing trade however, bears many threats to an economy. Kitson and Michie (1997, p. 91) for example point out the specific danger of *"…the deflationary macroeconomic policies which tend to follow any resulting balance of payments deficit or pressure on the currency."* Finally, achieving a balance between manufacturing and services can drastically reduce the risk of relying on one sector within the economy (Unterlöhner & Böhmer, 2012), as the financial crisis has demonstrated (Lane, 2011).

1.2. Method

A mix of macro-data statistics, interview and survey data was collected and analysed. A literature study on the role of manufacturing in modern industrialized economies was conducted, identifying arguments from both sides of the debate on whether manufacturing is supposed to be part of a developed industrial economy or if its place is in low-cost regions and developing economies. An overview of the development of the Swedish manufacturing sector over in recent time was established based on economic statistics retrieved from various databases. The focus in the overview were national economic factors related to economic growth and productivity, including Gross Value Added (GVA), import and export statistics, labor expenses and productivity. Findings from the overview were compared to the results from an identical study conducted in parallel over the German manufacturing industry, where one of the researchers had a coordinating role in both studies.

A questionnaire focusing on competitive aspects of manufacturing localization was developed based on a literature study. The questionnaire was distributed to senior vice presidents of manufacturing companies (or other positions with global manufacturing footprint responsibilities) in 9 of Sweden's 20 largest manufacturing companies. A letter of intent and the

[4] In the Economist debate "Manufacturing" Ha-Joon Chang is defending the motion which states that a strong manufacturing sector is an elementary and inevitable driver of an economy.

questionnaire was e-mailed to the respondents, who were asked to complete the questionnaire before being interviewed about the reasoning behind their answers to the questionnaire. In three of the cases, the questionnaire had to be completed during the interview due to time constraints on the respondent side. All interviews were approximately one hour long and used the questionnaire as basis, where the answers to the questionnaire were discussed in the same order for all interviews. Each interview were voice-recorded and transcribed.

The analysis was conducted in three stages. In the first stage, ratings on the different constructs in the questionnaire were compared between respondents and any difference in rating was traced to any difference in reasoning behind the ratings found from the interviews. The international region in which the company was present was taken into consideration during the first stage. The second stage included a comparison of the ratings in the questionnaire and the reasoning in the interviews with the economic analysis of the Swedish manufacturing sector. In focus was the respondents' perception of the characteristics of the economic state and development of the Swedish manufacturing sector. The third stage comprised a comparison of the study findings with the findings from the parallel study of the German manufacturing sector and with literature, from which the study conclusions could be derived.

1.3. The Swedish manufacturing sector: An overview

To clarify what is meant when using the term "manufacturing sector" in this report, this section provides an overview of the geographical localisation of production sites within Sweden, in addition to an overview of the disposition of companies and employees among company size-categories.

Localisation of the manufacturing sector within Sweden

To visualise where in Sweden the manufacturing sector is localised, the geographic distribution within Sweden of manufacturing companies with more than 500 employees is displayed in Figure 2.

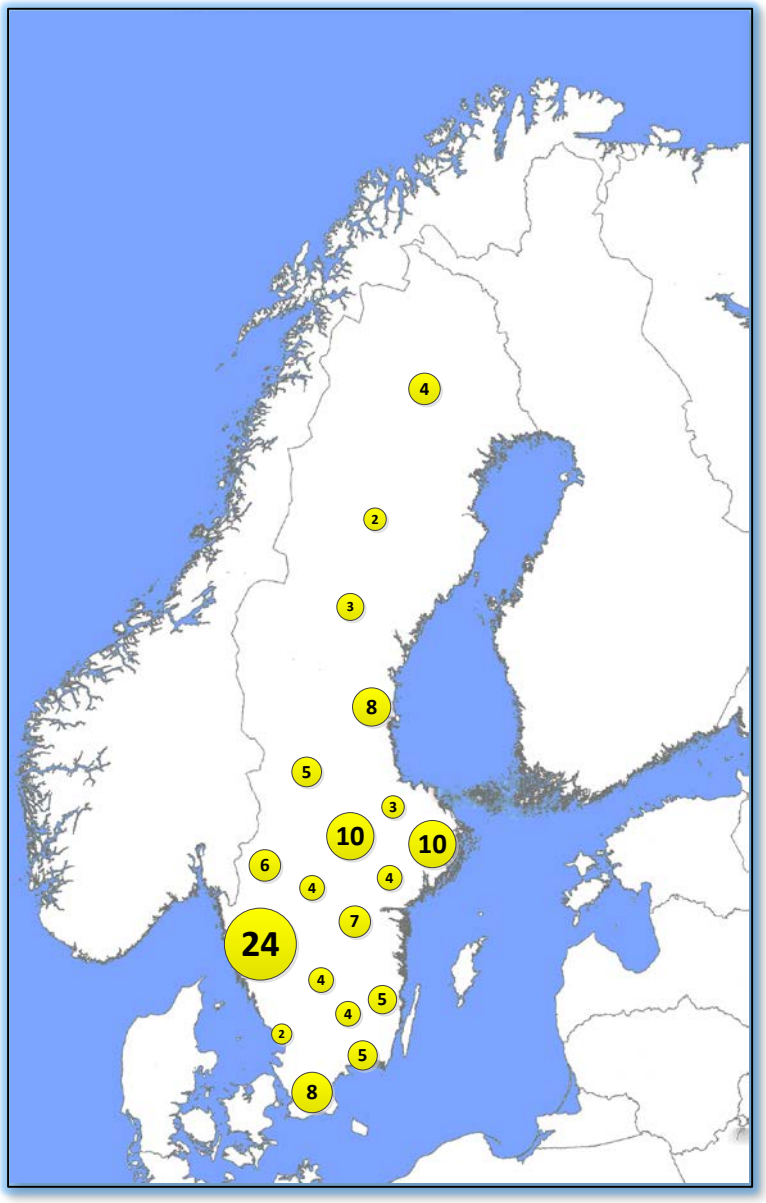


Figure 2 – Geographic distribution of companies in the manufacturing sector with more than 500 employees. The circles represent the area in which the number of companies, i.e. the numbers in each circle, are localised. (Source: SCB, 2012; Map provided by: West Flanders Development Agency (POM West Flanders))

Figure 2 shows that larger manufacturing companies are concentrated around or nearby Stockholm and, especially, Gothenburg. The figure also shows a fairly even distribution of larger manufacturing sites in the southern and middle regions of Sweden, apart from the west coast, while the northern regions are scarcer.

Employees and company sizes in the Swedish manufacturing sector

A central aspect in the structure of a nation's manufacturing sector is the proportion of SME's (Small and Medium sized Enterprises). Figure 3 illustrates this by showing all Swedish manufacturing companies organised by the number of employees per company. In terms of pure numbers, smaller companies with 1 to 199 employees are far more numerous than larger companies more than 500 employees.

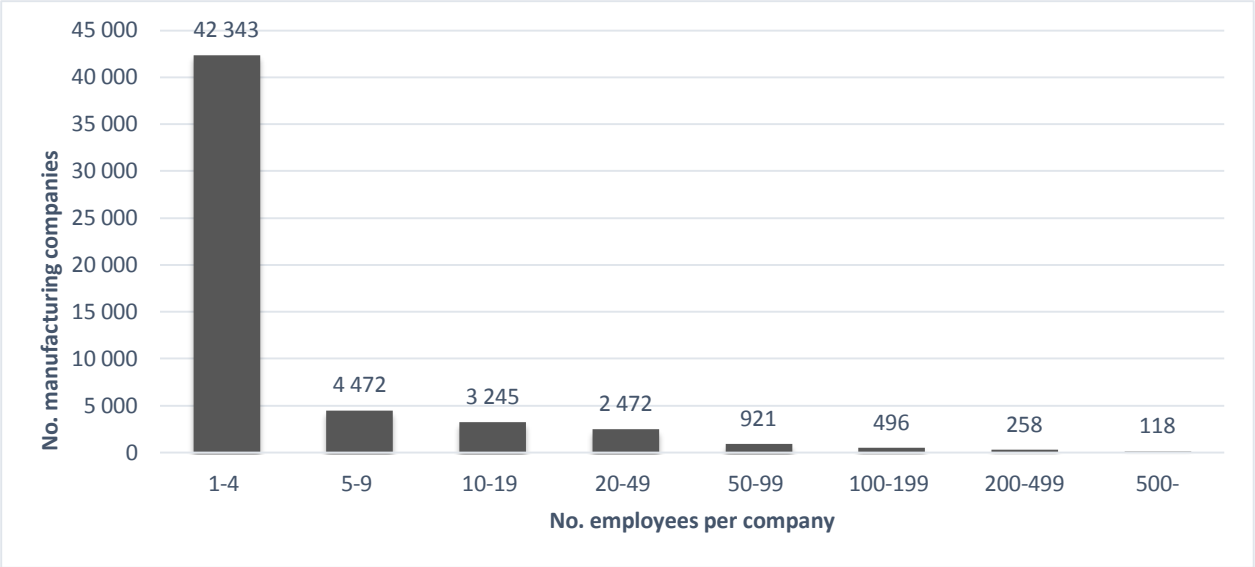


Figure 3 – Depiction of the number of Swedish manufacturing companies, organised by the number of employees per company (Source: SCB, 2012)

However, if the people employed in the Swedish manufacturing sector are organised by the number of employees per company (Figure 4), it can be seen that the larger companies with more than 500 employees employ 38.5% of the manufacturing sector, and that companies with more than 200 employees employ 52.6%. Thus, SME's and larger companies employ roughly half the manufacturing sector each.

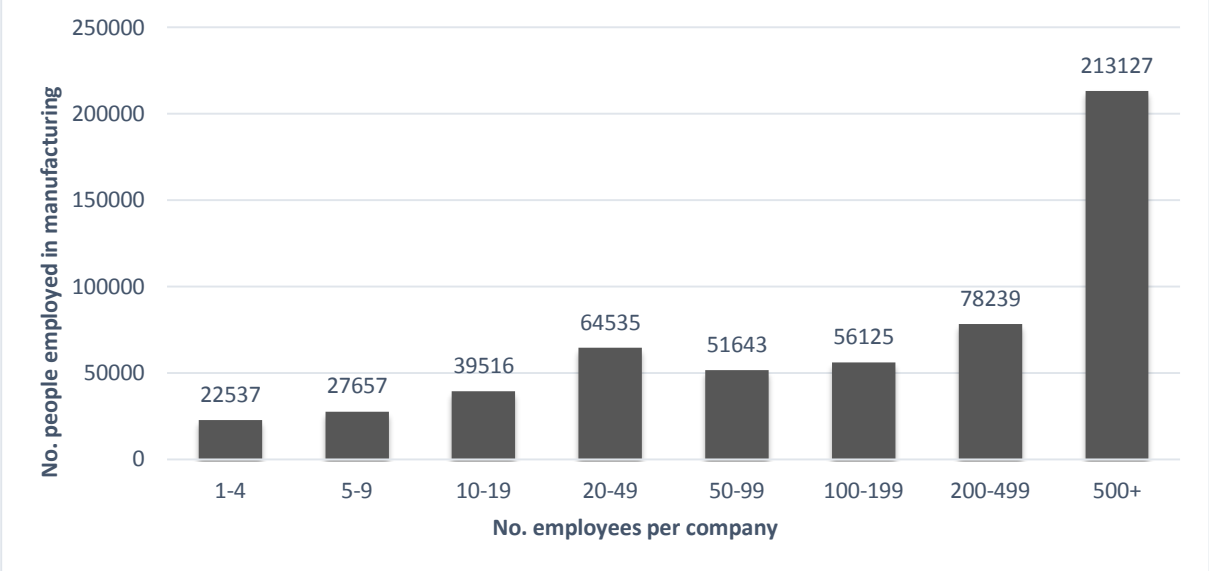


Figure 4 – Depiction of the number of employees in Swedish manufacturing companies organised by number pf employees per company (Source: SCB, 2012)

2. Status of manufacturing in Sweden

This section highlights macro-economic trends and the structure of the Swedish manufacturing sector and contrasts this to the total Swedish economy. Where appropriate, statistics from Germany has been included for comparison.

The section begins with an overview of Gross Value Added (GVA) between 1993 and 2014, i.e. the difference between output and intermediate consumption (Investopedia, 2014), for the manufacturing sector, the total economy and the separate industry sectors included in the manufacturing sector. Thereafter, the number of employees in the manufacturing sector and the total economy are presented and discussed, followed by exports, labour expense and productivity. The section concludes with an overview of the geographical distribution of larger manufacturing companies and a description of the structure and characteristics of the Swedish manufacturing sector as it is constituted today.

For all graphs presented in this chapter, the term "Manufacturing" refers to industry sectors C10 through C33 according to the ISIC rev. 4 industrial classification standard. Please refer to appendix II for more details.

2.1. Gross Value Added

To highlight the manufacturing sector's contribution to the state of the economy, this section presents the GVA for the manufacturing sector (Figure 5) and the manufacturing sector as part of the total economy (Figure 6).

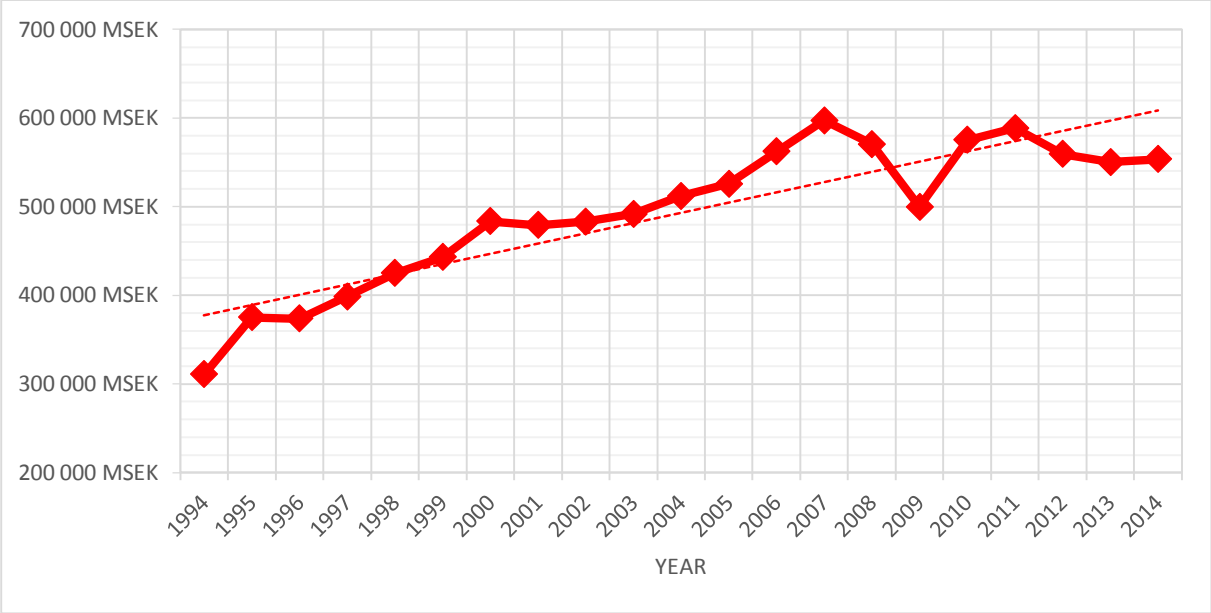


Figure 5 – Gross value added (GVA) of the Swedish manufacturing sector in MSEK current basic prices over the past 20 years (Source: SCB)

As seen in Figure 5, GVA for the manufacturing sector has steadily been increasing during the 1990's and the first half-decade of the 2000's. From 2007 to 2009, the GVA development was interrupted and decreased drastically, by 22% over 2 years of time, and reached the lowest point since 2001. This indicates that the Swedish manufacturing sector was strongly affected by the *Global financial crisis*, which started in August 2007 as a result of the collapse of inflated loans for homes and unreasonable real estate pricing on the U.S. real estate market (Baily & Elliott, 2009). Two smaller temporary decreases can be observed from 1995 to 1996 and 2000 to 2001

respectively. The former recession coincides with the burst of the *Swedish housing bubble*, arising as an effect of a large scale bankruptcy of Swedish real estate agencies during the period from 1993 to 1996, causing a recession of the Swedish economy, manifested nationwide as decreased consumption and increased unemployment (finanshistoria.n.nu, 2010). Investment by industry halved during the period 1989 to 1993, which could be a contributing factor to the stifled GVA development for the manufacturing sector. The latter recession, from 2001 to 2002, was contemporary with the burst of the *Dot-com bubble*, occurring as a consequence of over speculation of newly established companies providing internet-based services and products (Galbraith & Hale, 2004). There may also be other, more local, causes for these GVA decreases.

A comparison between the developments of the GVA for the manufacturing sector to the GVA for the total economy is shown for Sweden and Germany in Figure 6. The ratio of Sweden averages 18% without a clear long-term trend, varying between 20% in 1994 and 14% in 2009, during the studied 20 year period. As can be seen in Figure 6, a similar pattern can be observed in Germany, although without the negative trend apparent in the Swedish share GVA profile.

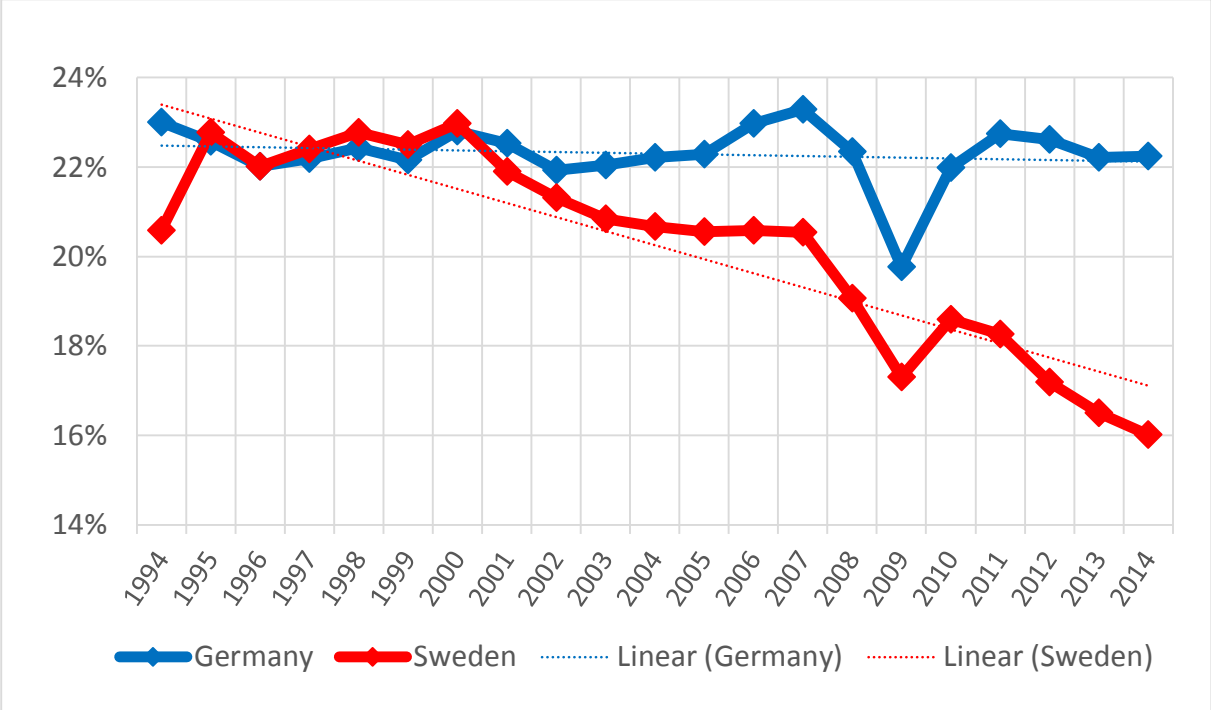


Figure 6 – Share GVA from manufacturing as percent of total economy GVA in Germany and Sweden for the last 20 years (Source: OECD)

From figure 6 it can be observed that the three financial crises described above had a noticeably stronger effect on the manufacturing sector compared to the total economy. Up until 1995 there was a significantly stronger increase in GVA for the manufacturing sector, after which two plateaus occurred, initiated by a significant drop in GVA in the periods 1995 to 1996 and 2000 to 2002, respectively. The drop during the period 2007 to 2009 had a significantly stronger impact on the manufacturing sector compared to the total economy, the ratio dropping over 20% in two years. After the lowest GVA proportion in over a decade was reached in 2009, the manufacturing sector showed a very strong increase in proportional GVA from 2009 to 2010 which indicates a market for the manufacturing sector which is strongly dependent on economic fluctuations. Another observation of the behavior of the GVA ratio in Figure 6 is the plateaus and rebound effects that arise after an abrupt downturn. Consequently, the manufacturing sector is in a short-term perspective heavily affected by the financial climate, but accounts for a stable and important proportion of the economy's total GVA in a long-term perspective. Economic crises arise

occasionally and business cycles change frequently (Christopher and Holweg, 2011) and it is indicated by Figures 5 and 6 that the manufacturing sector is generally hit hard by an economic crisis, but also that the sector quite fast adapts to new conditions, where the corporations necessitates decreased expenditure and through improvement work counteracts the market ramifications.

2.2. Employment in Swedish manufacturing

In relation to the GVA development for the manufacturing sector, the number of people employed in the manufacturing sector shows a similar response in regards to the major financial crises, although the aftermaths differ. In Figure 7, the number of people employed in manufacturing in Germany (left) and Sweden (right) is shown on an annual basis from 1993 to 2013. It can be observed that a distinct increase occurred in Sweden during the period 1994 to 1995, followed by a more subtle increase until 2001. Thereafter, the numbers plummet until 2006 after which a small rebound occurred up until the sector suffered the consequences of the Global financial crisis in 2008, where an abrupt drop of 60,000 employees occurred. From that point up until the end of 2013, the numbers have been on steady decrease, although somewhat less extreme during the period 2010 to 2013 than immediately after the crisis.

Interestingly enough in Figure 5, the temporary GVA reductions during the periods 1995 to 1996 and 2000 to 2001 correspond to two different types of employee number developments. In 1994, the number of people employed in the manufacturing sector increased drastically, by 20,000 people, while a significant negative trend has existed since 2001. This may be the result of a shift in employment policy, where the base workforce was replaced to an extent by labour agency personnel in the aftermath of the global crises, in addition to an adaptation to lower demand levels.

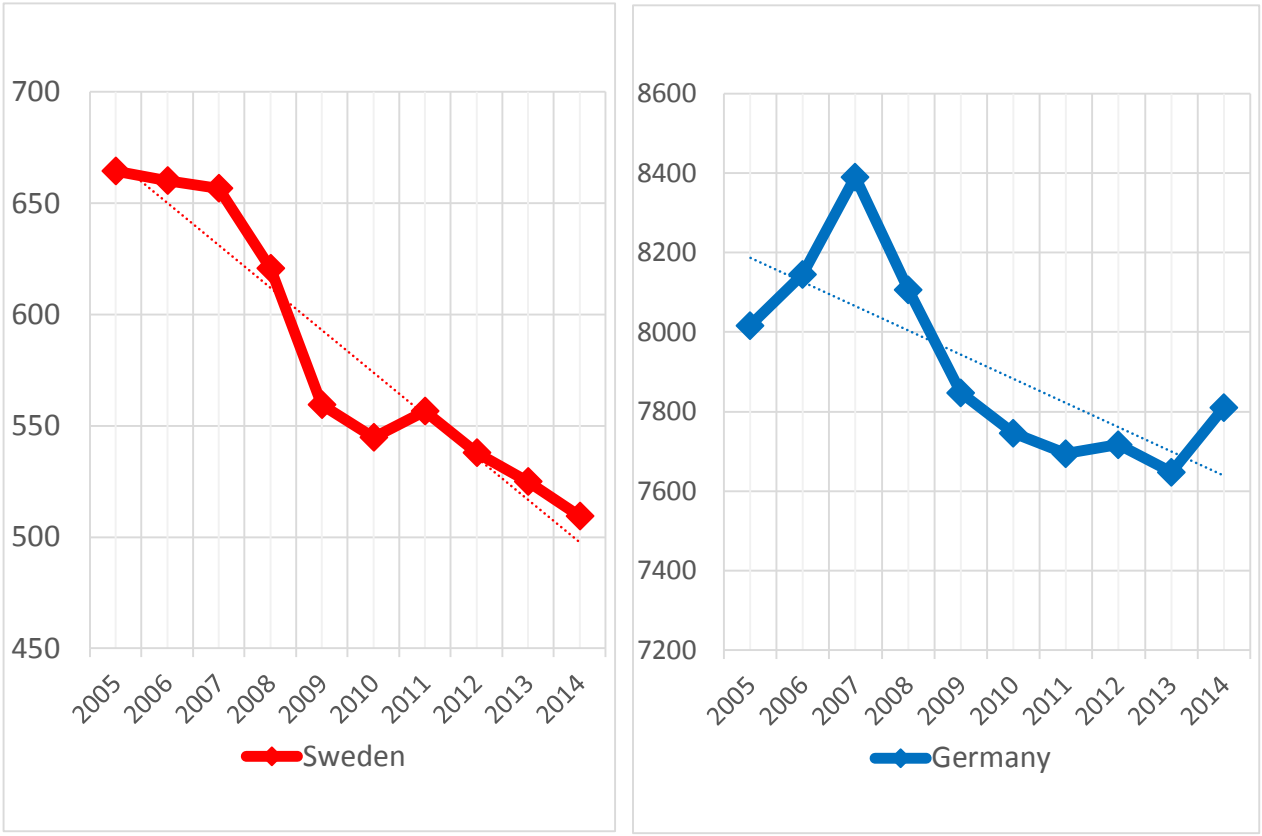


Figure 7 - Employed (thousands of people) in the German (left) and Swedish (right) manufacturing sectors (Source: OECD)

Comparing the number of people employed in the manufacturing sector to the total economy in Figure 8, it can be observed that a shift occurred in the end of the 1990s. Prior, the proportion employed in manufacturing was on a steady increase, whereafter a steady decrease began. As argued above, this could be associated with a shift in employment policy, where labour agencies are being used to a greater extent in the aftermath. In unison with the previous discussion on the GVA development, it can also be concluded that the manufacturing sector in particular suffers more severe consequences than the total economy during an economic downturn. The steady behaviour both prior to and after 1998 supports the conclusion that the manufacturing sector adapts to new demand levels in order to maintain and improve GVA outcome.

Contrasting the behaviour of the development over time of the number of employees for the manufacturing sector in Figure 7 with the ratio between the manufacturing sector and total economy in Figure 8, it can be seen that even though the number employed in manufacturing was on the increase from 1998 to 2001, the proportion employed in manufacturing decreased. This indicates a stronger growth of the total economy compared to the manufacturing sector, which would also explain the steadily decreasing proportion thereafter, in addition to the decrease of people employed in the manufacturing sector itself.

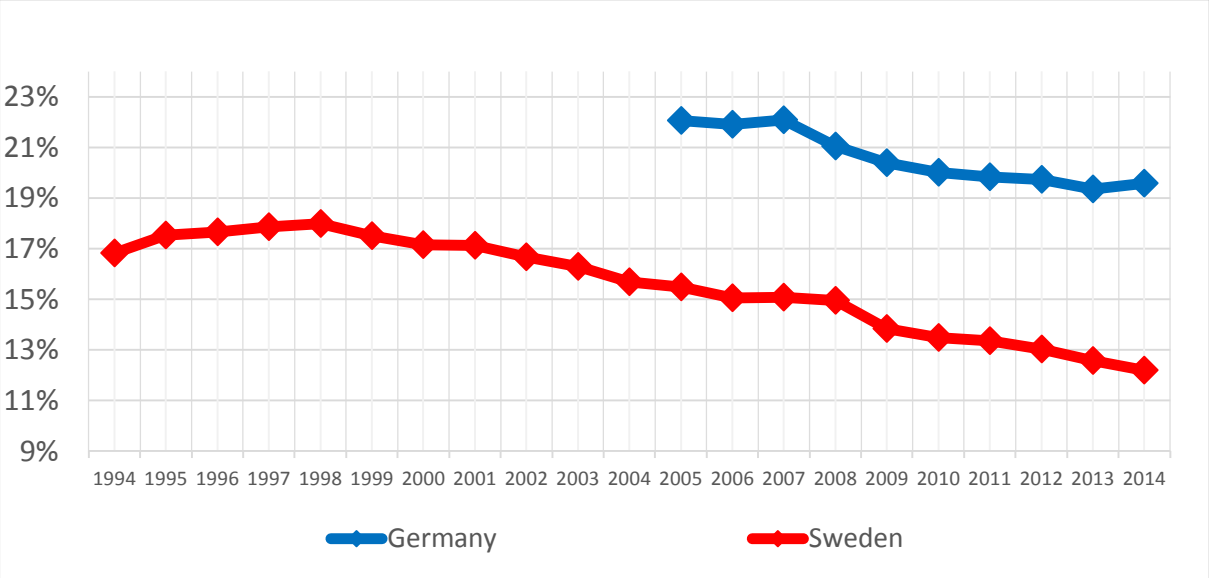


Figure 8 – People employed in the manufacturing sector as percentage of people employed in the total economy (Sources: SCB ; OECD)

2.3. GVA by Industry Sector in Sweden

Figure 9 displays the GVA for each industry category in the manufacturing sector from 1993 to 2013 billion Swedish kronor (BSEK). We can see that categories C10-12 (food, beverage and tobacco) and C12 (machinery) are the manufacturing categories contributing the most to the total GVA of the manufacturing sector. C12 (fabricated metal products), C26 (computer and electronic products), C20-21 (Chemical products), C29 (motor vehicles), and C24 (basic metal products) are other important industry categories. It is important to understand that the categories react differently to economic fluctuations and crises. For example, C26 (computers and electronics) was the only category severely affected by the Dot-com bubble, however, C28-C29 (motor vehicles and transport equipment) was also hurt. However, the great recession in 2008 had a more overall affect, where the important categories C28 (machinery), C26 (fabricated metal), C29 (motor vehicles) and C24 (basic metal) where all heavily hit. The largest manufacturing sector (C10-12, food and beverage) was, however, not affected. This shows the importance for an economy of having a balance of different manufacturing industry categories.

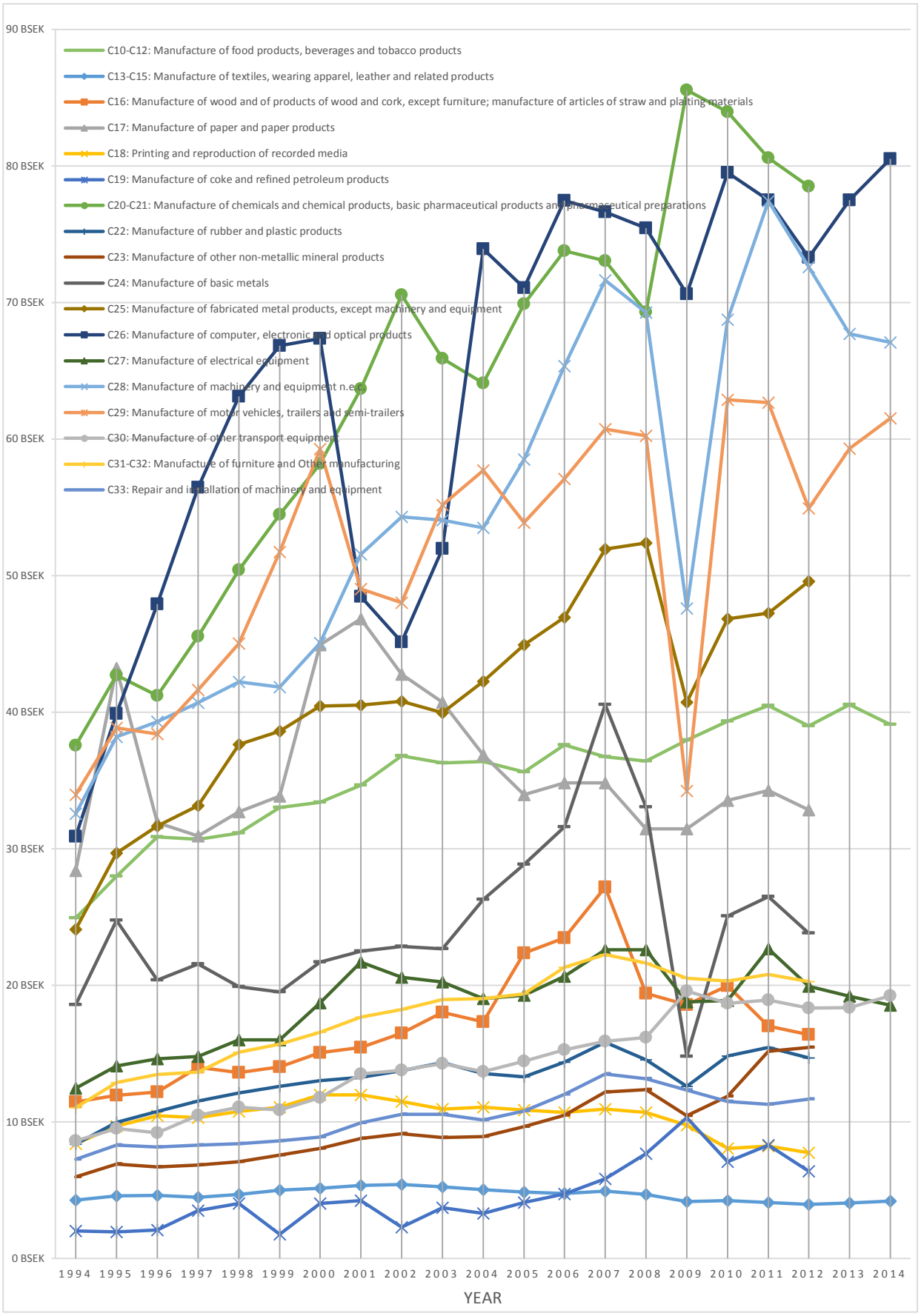


Figure 9 – Gross value added in MSEK current basic prices in the Swedish manufacturing sector by industry sector over the past 20 years (Source: SCB)

2.4. Swedish import and export

The value of exported goods from the Swedish manufacturing sector is shown in Figure 10. A steady increase with a positive trend can be observed up until *the Global financial crisis* in 2008. In the following two years, however, the manufacturing sector seems to have rebounded up to the export levels prior to 2008.

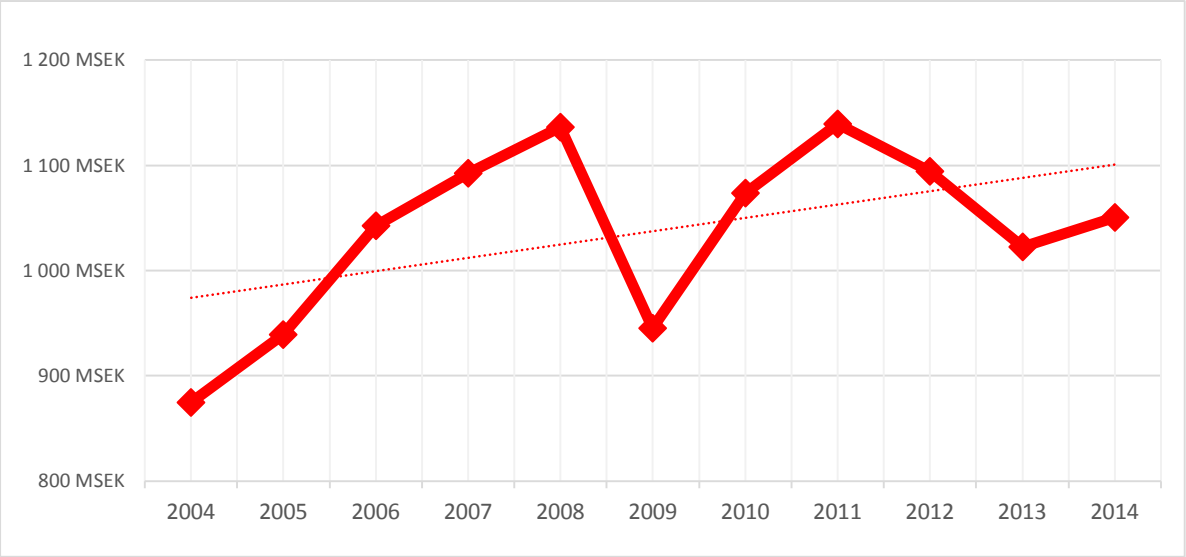


Figure 10 – Value of exported goods in MSEK current basic prices for Sweden in national currency (Source: SCB)

Comparing the exported goods from the manufacturing sector to the total exports of the economy, a steady decrease showing small variations over time can be observed in Figure 11. It can be concluded that in terms of exports, the manufacturing sector and the total economy were affected similarly. However, in the aftermaths of the recession, the proportional decrease restarted, perhaps indicating stronger growth of other sectors. Still, manufacturing is by far the most important export sector and still accounts for more than 65% of all Swedish exports.

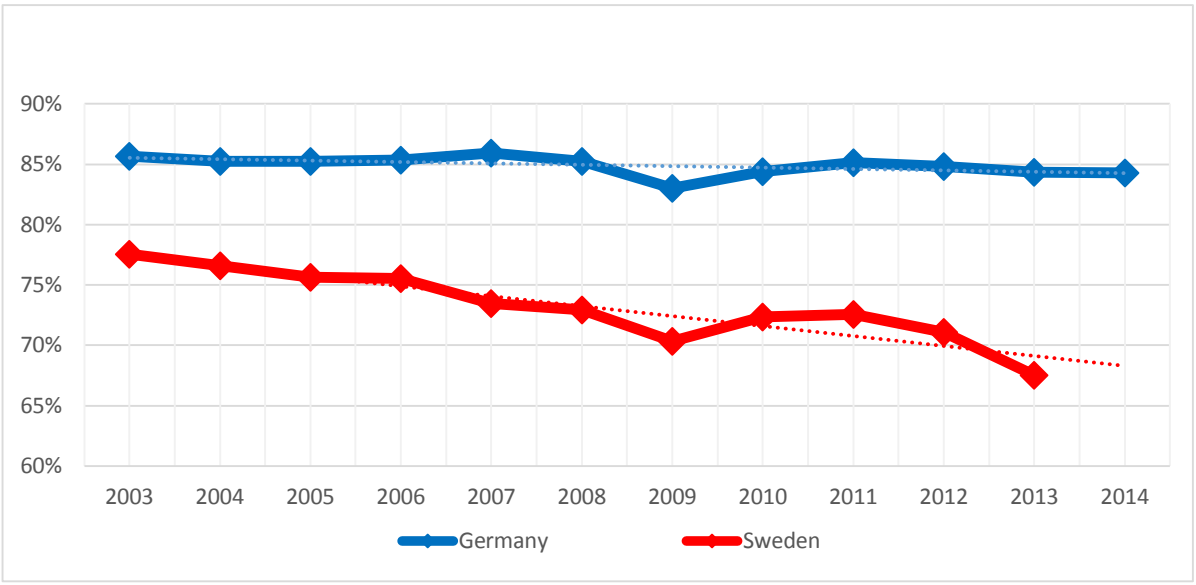


Figure 11 – Share (%) of exported manufactured goods to total export (goods and services) in economy (Source: OECD)

In Figure 12, the ratio of imported to exported goods is shown. The net export can be observed to have been decreasing since 2004, where in recent years the import levels are approaching the export levels. In other words, Sweden is by now importing almost as much manufactured goods as it is exporting.

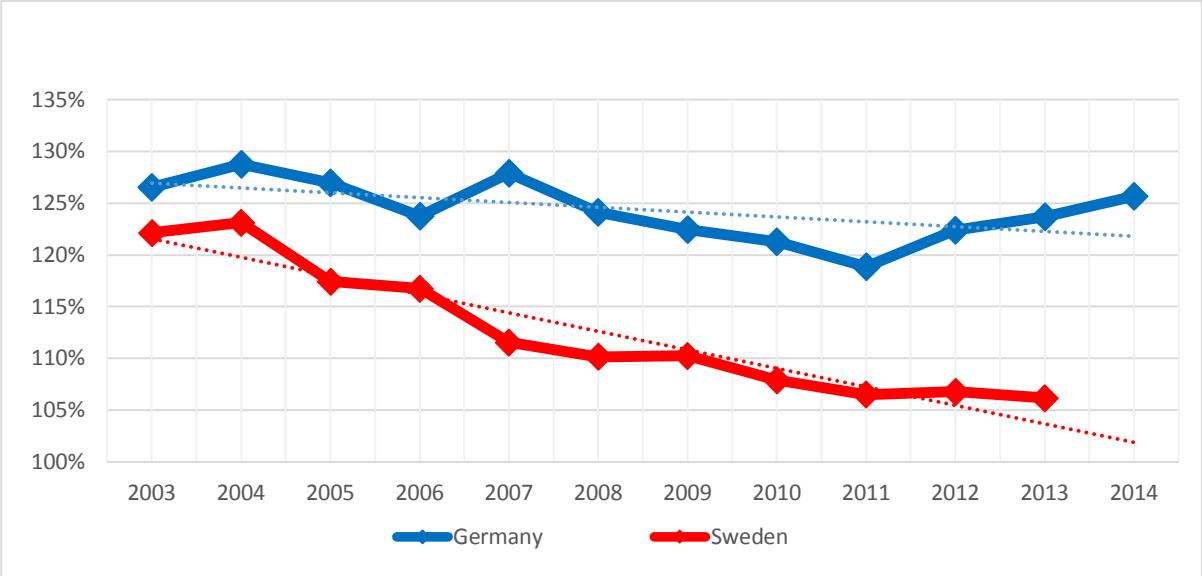


Figure 12 – Share (%) of imported to exported goods in the economy (Source: OECD; SCB)

2.5. Labour expense and productivity

Labour expense in the manufacturing sector (Figure 13) was on steady increase until 2008, even though the number of employees in the manufacturing sector shows a steady decrease since 2001, perhaps indicating a the use of labour agencies to a larger extent after 2001.

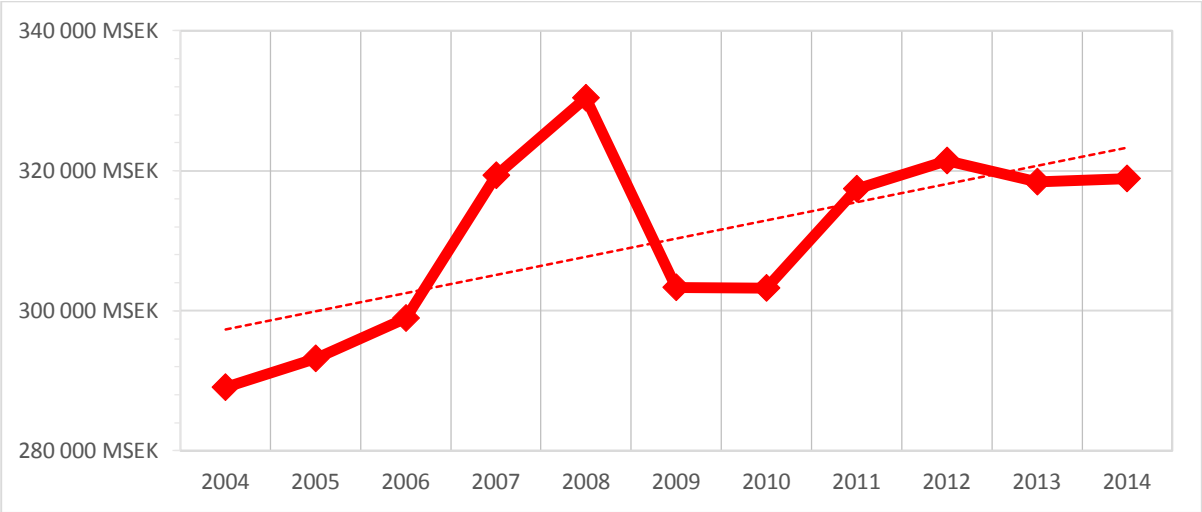


Figure 3 – Labour expense in the manufacturing sector in MSEK current basic prices (Source: SCB)

In comparison to the total economy in Figure 14, labour expense in the manufacturing sector is proportionally decreasing over time. In the period 2008 to 2009, during the global financial crisis, the rate of proportional decrease of labour expense is distinctly higher, indicating that the manufacturing sector made a more sudden and pronounced decrease in labour expense than the total economy.

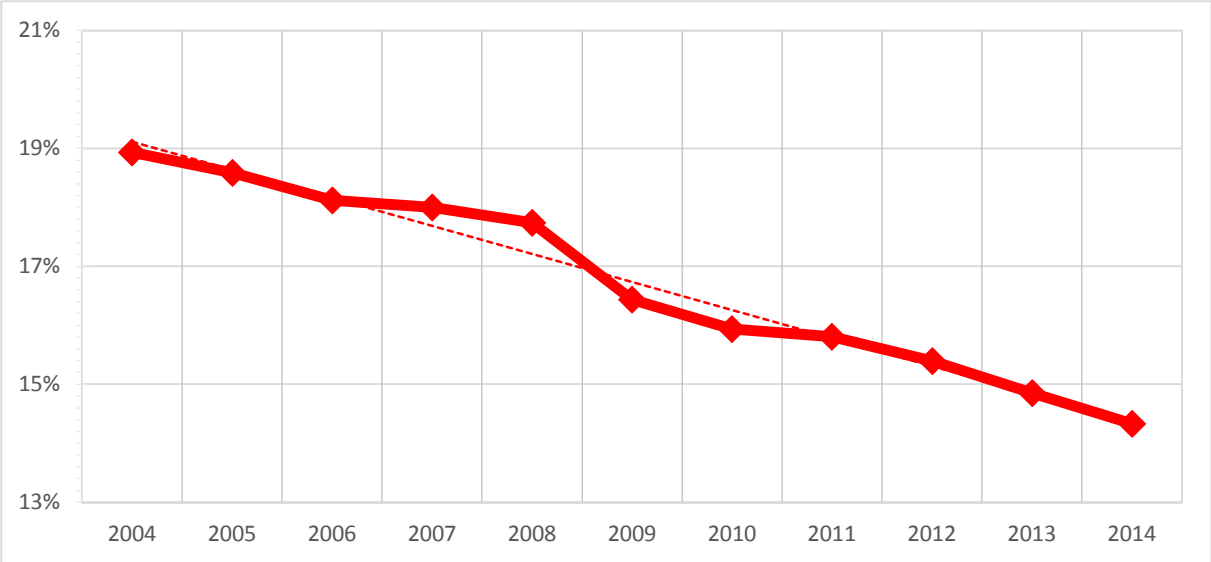


Figure 4 – Ratio (%) of labour expense in the manufacturing sector to total economy (Source: SCB)

Productivity (Figure 15) provides an insight into the difference between value output and resource input. The manufacturing sector shows a loss in productivity both during the *Dot-com bubble* in 2000 and the global financial crisis in 2008, although having recuperated from these drops rather quickly. This is in unison with the employee trends, since lesser personnel costs mitigates and reverts the decrease in demand or sale volumes.

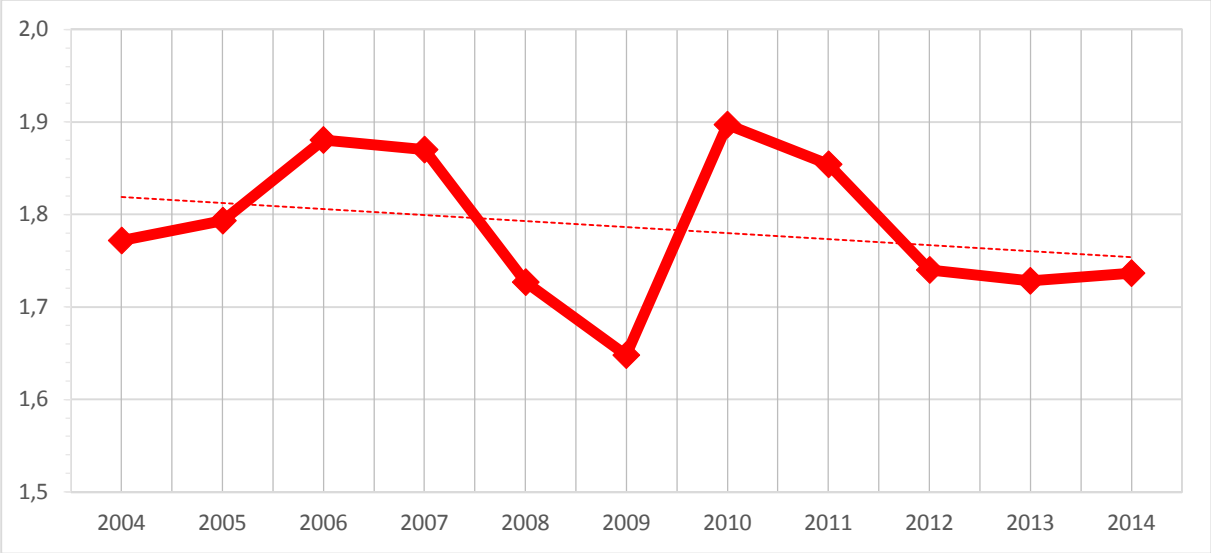


Figure 5 – Productivity (GVA through labour expense) in the manufacturing sector over the past 10 years (Source: SCB).

Interestingly, productivity in the manufacturing sector showed similar development to the total economy up to the global financial crisis, where it was affected more severely (Figure 16). Thereafter, the manufacturing sector shows a much stronger positive trend than the total economy.

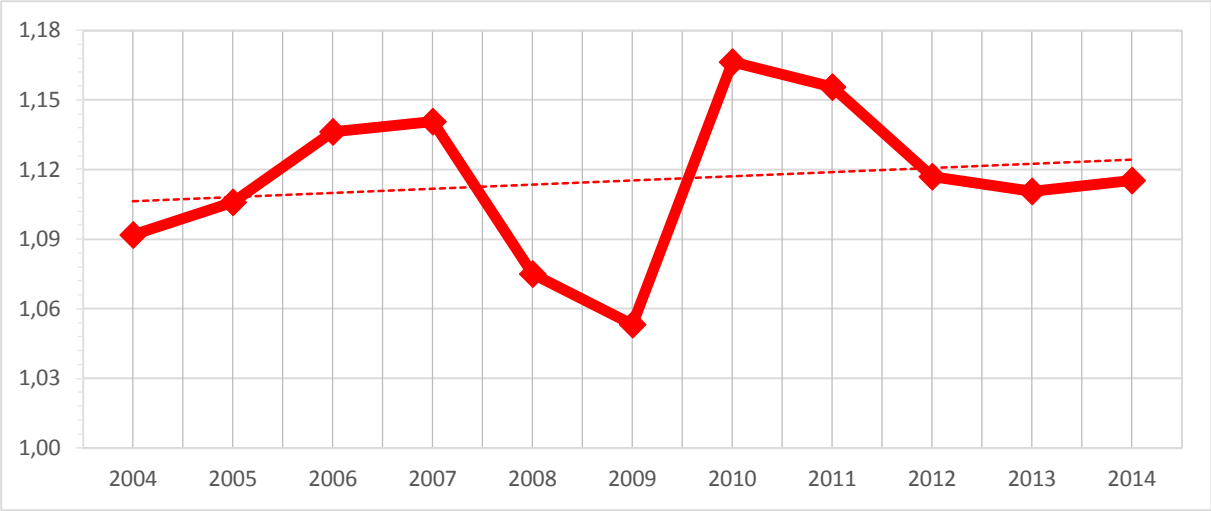


Figure 6 – Ratio of productivity in the manufacturing sector to total economy (Source: SCB).

2.6. Reflections on Sweden's manufacturing status

We have seen that Sweden and Germany remain amongst the countries being very reliant on their respective manufacturing sectors. Especially, Germany is a country that during several years has shown consistently high share of manufacturing value added in the total economy. Sweden, however, has started to show declining figures during recent years. Therefore, Germany is an appropriate country to compare the Swedish data with. The general conclusion is that the results across the two countries are quite similar, however, differences exist.

The study's quantitative analysis in conjunction with the presented literature gives reason to believe that manufacturing is of high importance for both the German and Swedish economy. The quantitative analysis of the OECD/SCB data revealed that the German manufacturing industry is not following the trends valid for most of the other countries in terms of scope. In most of the examined economic performance indicators Germany's stable and increasing development stood out. Sweden shows almost identical patterns as Germany, except for the recent decline in share of the total economy's value added. The strong performances of the two countries' manufacturing sectors significantly contributed to the economy's quick recovery after the financial crisis (Unterlöhner & Böhmer, 2012). Reverting to the original controversy about manufacturing's relevance within an economy, the study findings indicate a fundamental impact of manufacturing on a country's wealth. Manufacturing's share of value added has increased in both Sweden and Germany with exception of the time frame during the financial crisis, and for recent years in Sweden. This development contradicts the general idea of manufacturing's erosion. Even though the OECD/SCB data indicate a decline in direct manufacturing employment due to increased productivity, the sector's contribution to economic wealth has not been decreasing in the same way. We also expect an increased number of indirect employees (employed by agency companies) during recent years. These are not included in the sector employment statistics. The findings of the qualitative research emphasize this implication. Although most interviewees identified a moderate decrease of national suppliers they were convinced that adaptable firms are provided with the prerequisites to successfully produce domestically.

The outcome of the analysis in conjunction with countries' balance of payment reinforces Pisano and Shih's (2012) argument that the development of a country's trade deficit/surplus is largely a function of its manufacturing competiveness. Applying their assumption on Sweden's and Germany's economies one can determine a trade surplus that has been valid for decades on one side of the equation. Following Pisano and Shih's argumentation leads to the consequence that the

two countries' manufacturing bases are competitive. However, one must not neglect to factor in other variables that impact on a country's trade surplus, e.g. currency exchange rates.

Helpman et al. (2004) explain the correlation between a high regional export quota and competitive firms the other way around. Regional firms realizing a part of their sales in external markets are in a more intensive competition than in internal markets. Also, exporting is more costly than serving local customer. Thus, exporting companies are usually more productive and competitive than companies that restrict their sale activities to their home markets.

Other scholars see both factors combined as the decisive reason for Germany's success: its strong and healthy manufacturing base, together with the export success of the nation's companies (Unterlöhner & Böhmer, 2012). Up till recent years we could make the same conclusions in Sweden, but the question remaining is why the Swedish GVA figures show a negative trend in recent years, while Germany's is not. On the other hand, Sweden is following similar trends as other European countries (e.g. Italy), while Germany is one of the few traditionally strong manufacturing economies with not declining figures in recent years. Are these significant trends or just short term effects?

3. Competitiveness of Sweden as a manufacturing location

3.1. Industry leaders' assessment

While the macroeconomic data over Sweden presented in the previous section provides an overview of the nation's current economic state and most recent economic history, it only provides the settings and preconditions in which the manufacturing localisation decisions are made. What is of interest, however, when one contemplates why Swedish manufacturers choose to produce at other locations, is the perception of these conditions by the decision makers, i.e. the industry leaders. Hence, a survey interconnected with a series of interviews was conducted with industry leaders from large manufacturing firms within the Swedish manufacturing sector. In total, 9 in-depth interviews were conducted with leaders from 9 different companies within the manufacturing industry. The interviewees were selected based on whether they could represent the views of a large company, i.e. more than 1000 employees, that have manufacturing operations in Sweden. The company was also required to be globally present and the interviewee was required to have or to previously have had an international responsibility. These criteria were used in order to ensure that the respondent had knowledge on the situation outside Sweden, as well to ensure a focus directed towards only one segment of company sizes. In total, three different perspectives were considered in the study: Sweden from a general perspective, Sweden compared to other EU countries, and Sweden in comparison with emerging markets. The survey responses and the motivations given by the interviewees are presented in the following sections, where each perspective is treated in its own sub-section.

3.2. Sweden's competitiveness as a manufacturing location

From the survey responses, average impacts (from -2 being a major weakness to +2 being a major strength) on a number of different aspects for Sweden as a manufacturing location was calculated. Table 2 shows the results for the general perspective. Each respondent was asked to motivate their impact assessments briefly. The resulting assessments of Sweden's strengths and weaknesses as a manufacturing location are presented in the sections that follow.

Table 2 – Sweden's strengths and weaknesses as a location for manufacturing as perceived by the industry leaders

Factor	**Average impact** +2: major strength 0: neutral -2: major weakness
Skill levels	1.00
Collaboration with Unions and Worker Councils	1.00
Infrastructure and Logistics	0.78
Quality of Local Suppliers	0.67
Availability of Skilled Labour	0.56
Availability of Local Suppliers	0.56
Labour Flexibility	0.44
Labour Productivity	0.33
Cost of energy	0.33
Availability of Finance	0.11
Collaboration with the Government	0.00
Taxes and Duties	-0.11
Environmental Regulation	-0.22
Public Support for R&D Activities	-0.22
Indirect Labour Cost	-0.56
Labour Cost	-1.11

Strengths of Sweden

As can be seen in Table 2, the most prominent strengths of Sweden are "Skill levels" and "Collaboration with unions and worker councils". Other strong aspects include "Infrastructure and logistics", "Quality of local suppliers", "Availability of skilled labour" and "Availability of local suppliers". More modest aspects, although still positive, include "Labour flexibility", "Labour productivity", "Cost of energy" and "Availability of finance".

As was emphasized during the interviews, "Skill levels" was overall considered both a strong and a valuable aspect of Sweden, except for one respondent perceiving "Skill levels" as a having a negative impact and another as perceiving "Skill levels" as neutral. In the case of negative impact, the reasoning was based on a lack of integrating people in an early stage in training programs, hence many people are hired lack practical knowledge on how to perform the work. Another identified reason was that technical jobs do not rank that high on the attractiveness scale, hence young and aspiring workers tend to take other career routes. This development is similar to other countries, such as the UK, where graduates choose other options than the technical jobs. In Germany this is measurably different: here manufacturing firms are desirable employers for graduates.

The majority, however, considered people in Sweden to often have a high level of formal education accompanied with good level of practical knowledge on how to perform the job. It was also mentioned that Sweden has a strong and longstanding industrial culture and that there is an expectation of quality in the society.

> *"There is an industrial culture in Sweden that is tremendous. There is also an expectation of quality in the society in general." – Quote by interviewee 2*

Some respondents also argued that the high skill levels stemmed from the high degree of automation, thus a higher skill requirement, often apparent in Swedish factories.

The other one of the two most prominent strengths of Sweden was the "Collaboration with unions and worker councils". All but one of the respondents agreed that this was a significant strength of Sweden. The outlier here argued that the collaboration varied a lot between sites, and could be practically impossible at some smaller sites. The respondent, however, maintained that this was an area where the respondent's experience was lacking. Other respondents also mentioned that the collaboration varied between different sites within Sweden, but also between different areas in Sweden. One respondent expressed it as that there is a "local dialect" to how the collaboration is manifested at some sites.

Many respondents agreed that the collaboration between unions as the company have improved compared to how it functioned historically 20-30 years ago, but also more recently 5-8 years ago. The main improvement being a more holistic approach from the unions, where nowadays the union and the company can have a shared vision.

> *"The outside world has become a much greater threat than the executive boards in the country." – Quote by interviewee 5*

There is also a trust capital between company and union today, partly because the strong support provided by the unions during the recent financial crisis in 2008. Most respondents, however, maintained that there still are disputes, concerning e.g. wage negotiations that still are difficult to come to an agreement on.

> *"We have a trust capital [towards the union] that we have built up, which means we can handle questions, even the difficult questions, when they show up." – Quote by interviewee 7*

With a somewhat less positive impact, "Infrastructure and logistics" was ranked as having the third strongest impact on Sweden, with an average impact of 0.78. The answers here however many a time where twofold, where the respondent at first interpreted the aspect as the "Location relative the market", in which case the impact was rated the opposite.

> *"If we look then at our position relative to the market, logistics is a negative aspect." – Quote by interviewee 8*

The definition that the score reflects however, is the internal infrastructure and logistics of Sweden. From this perspective, positive aspects mentioned include access to harbours and railways. Roads are often satisfactory, although some routes, e.g. E20 in general and the fact that E45 ends at Trollhättan, are considered as something of a more negative character.

> *"If you think from the perspective of how well road systems and such function, it is satisfactory." – Quote by interviewee 6*

Concerning the aspect "Quality of local suppliers", the respondents ranked this aspect as neutral (0) or higher with little more reasoning than that Swedish suppliers do fulfil the quality requirements.

> *"Are there good local suppliers available? Yes there are, and they do a good job those that we have here." – Quote by interviewee 7*

Several respondents however mentioned that even though Swedish suppliers in general supplied a good quality level, many of the companies used global supply chains and thus the location of the supplier was irrelevant.

> *"We take the full picture into account and even though quality is a fundamental parameter when choosing supplier, it does not really matter where the supplier is located." – Quote by interviewee 1*

The "Availability of skilled labour" is a positive aspect for Sweden as well, with an average impact assessment of 0.56 in table 2. Although the availability is considered good today, a few respondents recognise the availability as a growing issue. Others mentioned that there often is a mismatch between education and the needs of the industry. Respondents also perceive a strong variance in available labour between different regions in Sweden, where smaller cities can have a harder time attracting specific types of skills, e.g. CNC-operators, but also between different skill types.

> *"It might almost be harder to find an operator in Sweden than it is to find engineers." – Quote by interviewee 4*

Also with an average impact assessment of 0.56, "Availability of local suppliers" was considered a strength of Sweden. Responses ranged between neutral and somewhat positive but most respondents maintained that the availability of local suppliers had little relevance to localisation of production. The main argument being that lead-times generally do not become a problem unless the distances are extreme. For example, one respondent mentioned that they could acquire order within 48 hours when ordering from anywhere within Europe.

> *"From a Swedish perspective, I do not think it matters much since we are already established here, which I believe goes for most of the larger Swedish companies. You will probably not make a structural change within Sweden, but rather evaluate whether production should be moved elsewhere. Due to this, this question becomes somewhat redundant." – Quote by interviewee 1*

A few respondents argued that it could be appropriate to have suppliers of high-value items located close to production as well as items subject to change due to increased importance of communication and meeting in person. Suppliers of commodity items were also mentioned as appropriate to have nearby. However, most respondents maintained that they are working with global supplier bases, and that evaluation of the suppliers themselves is more in focus than their actual location.

"Labour flexibility" was rated as having an impact of 0.44 on Sweden, although the variance in answers were large, ranging across the entire spectra (apart from no "somewhat negative" rating). Beginning with the two strongly negative ratings, one of the respondents argued that business cycles have shortened drastically in recent years and that the Swedish level of job security is incompatible with this. The other respondent explained that the Swedish regulations regarding flexibility in working hours and temporary labour are very rigid and thus it is very difficult to establish reasonable agreements in those areas. In general though, respondents agreed that the regulations regarding flexibility in Sweden are very elaborate and clear.

> *"Because we have been through difficult times, everyone has realized that even if one does not very much like it, flexibility regarding working hours and planning, it is essential." – Quote by interviewee 7*

These regulations are also said to have improved significantly in recent years, thus facilitating flexibility of labour in terms of conditions for utilising staffing agencies. Today, levels of 10-20% of staffing agency personnel are used, which one respondent claimed was unheard of just a few years ago.

"Labour productivity" and "Cost of energy" both had an average impact assessment of 0.33. Regarding the former, answers ranged between neutral and somewhat positive impact, with one outlier on somewhat negative impact. Beginning with the outlier, the respondent argued that work with improving productivity in Sweden is very sensitive in terms of putting focus on the individual rather than the process, which makes it difficult to even know how much time different tasks require.

> *"In regards to productivity, I would argue that we have undergone a number of crises in Europe, which means we are quite aware of the necessity to have a high and continuous productivity. I think we all are well tuned in on that track so it is no discussion about getting into it, in contrast to the more newly established countries."* – *Quote by interviewee 7*

However, another respondent stated that nowadays everyone is aware of the importance of the productivity question and thus it is easier to work with productivity improvement. Many of the respondents argued that even though performance per worker might be higher, this gets cancelled out by the higher labour cost.

The impact assessment regarding cost of energy ranged between -1 and 1, where the main difference in argumentation was whether the cost was considered high or low. Many of the respondents agreed on that even though the monthly electric bill was high, it was nothing that affected the localisation of production.

> *"Of course we consume a lot of energy and it is an important part, but is it absolutely critical in regards to where we localise production? Well, no. Not as it stands right now at least, and right now is the energy cost reasonable after all for us and we do not stand out in regards to Sweden, although you sometimes could think that some taxes maybe could be adjusted somewhat further." – Quote by interviewee 7*

It was also argued that the manufacturing engineering (metal and machinery products, etc.) sector in general is not affected by energy cost to any greater extent, compared to for example steel works or paper industry. One of the respondents even stated that the electric bill for the office department was larger than the bill for the production department.

Close to the neutral assessment, with an average impact of 0.11, the perception of "Availability of finance" was quite uniform between the respondents, although ranging between -1 and 1.

> *"In my experience, we do not consider financial support as a critical aspect in regards to investments or in our daily business, we see it more as a delight. A production unit should be financially self-sustained and should be able to get by without financial support of different types. If we were to get such support, then we would see it as a bonus." – Quote by interviewee 3*

The responses with the somewhat negative assessment argued that being localised in Sweden per se is not disadvantageous in regards to banks and credit institutions, but rather that the national funding is small. However, another respondent stated that while financing is not an issue for a company of their size, smaller companies have an advantage of being in Sweden due to the well-structured financing system.

Having a completely neutral average impact assessment, "Collaboration with government" varied ranged between -1 and 1. Most of the respondents answered that they themselves were not involved in any collaborative ventures with the Swedish government, or even knew if they existed on other levels in their companies. One respondent claimed that the structure of the collaboration had changed in recent years where earlier there were many more representatives from each company involved.

> *"Is the cooperation bad once you collaborate? Nah, it's not. But what I might want to emphasize with this specific question, it is the interest in Swedish industry among our Swedish politicians, could it be better? Absolutely. Absolutely. And we need more information and more interest from Swedish politicians to understand the significance of Swedish industry, the importance of Swedish industry." – Quote by interviewee 7*

Two of the respondents however claimed to have insight into and be involved to some extent in their organisations governmental collaboration. Both respondents pointed out the Swedish government's lack of interest in the manufacturing sector, that the government did not regard Sweden as an industrial nation. The points of collaboration between government and company that exist where thought to work to some extent, although both respondents maintained that there is more that can be done.

Weaknesses of Sweden

The (by far) most negative aspect of Sweden as perceived by the respondents, is the labour cost. Multiple respondents mentioned Sweden the most expensive country compared to all other countries in the world, where Norway was mentioned as an exception by one respondent. All respondents ranked "Labour cost" as having an impact of either -1 or -2. Most respondents did not consider it necessary to motivate the assessment beyond the circular tautology "it is what it is". One respondent did, however, mention that automation has been introduced to a great extent in their Swedish factories to mitigate the high labour cost. Respondents also stated that the cost of labour is one of the central aspects considered in decisions regarding localisation.

> *"The difference in labour cost leads to different types of solutions. Since we have a comparatively high salary cost for operators in Sweden, we try to minimize the number of operators through different types of, mainly technical, solutions in regards*

to automation. This in turn leads to that the requirements on the operator's skill level increases." – Quote by interviewee 3

In a similar fashion, indirect labour cost was perceived as having a negative impact on Sweden, with an average impact assessment of -0.56. It was, however, mentioned that while the indirect cost is generally high in Sweden, the situation could be reversed depending on which qualification level is looked at. For example, one respondent stated that a designer in Germany is significantly more expensive than the Swedish equivalent.

"Our perception is that it is a little larger salary dispersion outside of Sweden than within Sweden, which has left us in a better position for indirect personnel than if we would for example be localised in Germany." – Quote by interviewee 9

Swedish engineers on the other hand are perceived as cheap even though their skill are equal or better compared to their counterparts in other countries, which was mentioned by several of the respondents. It was also mentioned by several respondents that the gap between blue collars and white collars is significantly smaller in Sweden compared to most other countries in the world.

Another weakness of Sweden as perceived by the respondents, with an average impact of -0.22, is the support for R&D activities. Although the majority of the respondents, 5 out of 9, rated this aspect as having a neutral impact, three respondents rated -1 and one outlier ranked 1. The neutral impact assessments was motivated by either that the respondent had little experience with those types of questions, or that the impact was neither good nor bad. Those who rated -1 said that while there is support available in general, it often has little to no effect. One respondent also mentioned the amount of support available varies strongly with the type of industry, where the medical and automotive sectors where felt to be prioritised. An example was told where the company was to decide where to locate a new test centre, and the choices were between locating it in Sweden or at another site in another country. The other site showed a much stronger will both locally and from the country to have the centre being located there, which was what happened in the end.

"Public support for R&D activities is relatively weak in Sweden, even though it is advertised as an aspect that Sweden is proud of I would say. You speak about all these millions that go into R&D, but the support is actually quite weak, especially for larger corporations like ourselves. You often hear about small means for large companies or different types of EU-projects, to attract larger companies as ourselves, but it is seldom you see any major breakthroughs in these types of collaborations." – Quote by interviewee 2

Most respondents agreed on that there are many ongoing ventures in Sweden with the aim of supporting R&D. However, all but one of the respondents either did not know whether these had any effect or thought that the support had very weak effect. The outlier here argued that it is a positive aspect that there is support for R&D, even though the respondent also maintained that the effect was weak at best.

"Environmental regulation" also had an average impact assessment of -0.22, but here the answers were a bit more uniform, where 7 respondents rated it as having neutral impact (0) and 2 as having a somewhat negative impact (-1). The main argument brought forward from most respondents were that regardless of where a factory was located, the environmental standard was rather a part of the company policy, thus the same for each factory, than unique for each location.

"I would say that environmental regulations do not affect our decision on localisation in any direction. Instead, we of course try to comply with the legislation that exists in

each country where we operate but we also in many cases try to surpass those requirements and thus keep a higher level. We see this as a competitive advantage." – Quote by interviewee 3

The overall impression of the regulations in Sweden was that they were strict compared to most other places. Some respondents however maintained that environmental regulations had more effect on the requirement of their products, rather than the production, since the product itself when used had a larger environmental effect than the manufacture of it. A few respondents argued that other industries, such as chemical industry, are affected to a larger extent. However, one respondent mentioned a situation where an investigation on noise pollution took a very long time and hence required a lot of resources, due to unclear regulations. This was something that had never been encountered in other countries. Several respondents maintained that a high environmental standard is a competitive advantage, in the sense that investments which will be legally required later have already been made. Environmental regulation is perceived as important and a one respondent emphasised that participation in the forming of environmental legislation is very important, both on a national level and on an EU-level.

"So I think that what is good with the environmental regulation in Sweden and in Europe is that it is still standing on such a solid foundation. Relatively stable in all cases and it is the same rules everywhere." – Quote by interviewee 4

A few of the respondents mentioned the similarity between Sweden's legislation and EU's as being a positive aspect and providing stability. One respondent elaborated upon the authorisation processes of for example increasing capacity. These processes were perceived as being "heavily bureaucratic" and taking a very long time compared to other countries, which was seen as a strong competitive disadvantage.

"It is my opinion and my experience that in the environmental permissions that we still need to produce a certain number of products or components of in our Swedish production sites, all of the environmental authorisation process is very heavy bureaucratic and takes a very very long time" – Quote by interviewee 7

With an average impact of -0.22, "Taxes and duties" are considered a mild weakness of Sweden. The assessments however varied from 3 responses somewhat negative, 4 neutral and 2 somewhat positive impact. Most respondents agreed on that even though taxes are high in Sweden, they do not pose a major hindrance for industrial activity. Legislation regarding export and import was considered good and that it does not create a barrier as in some other countries.

"Taxes and duties is a quite good aspect of Sweden, no major import or export problems. We are a country that is dependent on import and export and the legislation is quite good I would say." – Quote by interviewee 2

One respondent explained that it is mainly the income tax that is higher in Sweden, thus it is rather on an individual, thus the payroll, than at a company level that the conditions differ compared to other countries. Additionally, it was also pointed out that having a Swedish parent company could facilitate setting up ventures in other countries due to supportive mechanisms in the Swedish tax legislation.

3.3. Sweden's relative position in comparison to other EU countries

In addition to the interviewee's perception of Sweden in general, their view on Sweden's competitiveness in relation to other EU countries was discussed. The impact assessments (from -2 to +2) for the discussed factors are presented in Table 3.

Table 3- Perceived strengths and weaknesses of Sweden as a location for manufacturing compared with other EU countries by industry leaders

Factor	Average impact +2: major strength 0: neutral -2: major weakness
Collaboration with Unions and Worker Councils	1.00
Labour Flexibility	0.67
Cost of energy	0.56
Skill levels	0.11
Labour Productivity	0.11
Availability of Skilled Labour	0.00
Infrastructure and Logistics	0.00
Quality of Local Suppliers	0.00
Availability of Finance	0.00
Indirect Labour Cost	-0.11
Availability of Local Suppliers	-0.22
Taxes and Duties	-0.22
Public Support for R&D Activities	-0.22
Labour Cost	-0.33
Environmental Regulation	-0.33
Collaboration with the Government	-0.33

Strengths of Sweden in comparison with other EU countries

The most prominent positive impact was perceived as the collaboration with unions and worker councils, with an average impact of 1.0. Reasoning behind this assessment revolved around the difference in maturity level, where the Swedish unions was considered significantly more mature. As was pointed out by several of the interviewees, the degree of maturity did not refer to any increased levels of hostility in negotiations in the other EU countries, but rather that the behaviour of the unions are simpler in Sweden and hence more predictable.

> *"I think we generally have a positive impact here, as we are not in a continuous fight and lose energy through our interaction. It is the same when compared to other EU-countries where I perceive unions as being significantly simpler here in Sweden." – Quote by interviewee 5*

With an average impact assessment of 0.67, the labour flexibility was perceived as the second strongest aspect compared with the other EU countries. One interviewee explained that increasing and decreasing capacity is not an issue in Sweden, while letting people go in for example France or Germany is extremely difficult. Another interviewee maintained that other EU countries have different types of permutation systems in place, where the government steps in and covers the drop-off in salaries when the production time is reduced. This was perceived as an advantage for those countries in which permutation systems were used.

> *"Compared to Europe, we have a big advantage, it costs nothing to flex really in terms of going up or down. But to pull down, to close down, costs nothing in Sweden, seeing this purely from a business perspective." – Quote by interviewee 8*

The cost of energy was considered having a positive impact, averaging 0.56 with a range between 0 and 1. The interviewees argued that while there are differences depending on which country is considered, the cost of energy does not differ to any significant extent, except in a few extreme cases. Switzerland was mentioned as one such case where the energy cost was stated to be the double of that in Sweden.

> *"Compared to Europe, the impact is quite neutral. There are cheaper countries but there are also more expensive countries, one Swiss supplier pays double what we pay here per kilowatt." – Quote by interviewee 2*

Regarding skill levels, the interviewees overall assessed this a strength of Sweden compared to other EU countries, the average assessment being 0.11. However, the answers ranged between -1 and 1 with a majority of one positive impact assessment. Among the negative impact assessments, the main argument driven was that apprenticeships in e.g. Germany and Switzerland allowed for an earlier introduction for students to the industry, hence facilitating their understanding of what to expect once education is completed. The positive assessments were motivated by the strong industrial culture in Sweden.

Having close to a neutral assessment, where 6 responses were neutral, labour productivity was still considered a strength of Sweden overall with a general impact assessment of 0.11. It was argued that the productivity differed depending on which country was considered. One interviewee explained that the EU countries could be viewed as two distinct groups, a northern and a southern, where the northern group have significantly higher productivity overall.

The availability of skilled labour was considered neutral overall, although answers ranged between -1 and 1. In most interviews, the opinion given was that the situation is very similar in Europe. Germany and France was mentioned as having exceptionally good availability. This was attributed to France's education system and Germany's apprenticeship system.

> *"I think there is a deficiency in this aspect in most countries, but there is maybe a different culture in Germany and perhaps also Austria where there is more of the type of purely practical, technical convention that persists to a larger extent than here. And there might also be a pride in regards to such work in those countries compared to Sweden." – Quote by interviewee 1*

In terms of quality of local suppliers, all but two interviewees rated this factor as neutral. There was an overall consensus that it was not possible to notice a difference between a Swedish supplier and a supplier from another EU country. Availability of finance had a somewhat larger spread, with answers ranging between -1 and 1, although the average assessment was neutral. It was stated by one interviewee that obtaining funding in Germany or France is significantly more likely than in Sweden.

Weaknesses of Sweden in comparison with other EU countries

"Collaboration with the government" and "Environmental regulation" was considered having the most, although still modest, negative impact on Sweden compared with other EU-countries. Slightly less negative, with an average impact assessment of -0.22 was "Public Support for R&D activities", "Taxes and duties" and "Availability of local suppliers". "Indirect labour cost" was also considered a slightly negative aspect with an assessment of -0.11.

Regarding "Collaboration with the government", the general opinion was that the support from the government is stronger in other EU countries. For example, many European countries provides opportunity through legislation for companies to recruit young people with little experience at lower wages, which allows a higher number of younger people to be recruited.

Another interviewee highlighted that the German industry is able to build relationships with other nations through support given by leading politicians. In general, governments in other EU countries is considered much more active, by for example being present at new product launches and visiting factories on a regular basis.

> *"For example, if I come to one of our factories in another EU country, I do not have to ask, I do not have to call the government and ask them to come and talk to me. Instead, they call me and ask 'what can we come and help you with?'" – Quote by interviewee 7*

Although 6 respondents assessed "Environmental regulation" as neutral compared to other EU countries, 3 respondents regarded this as negative aspect. This was motivated by the higher environmental requirements in Sweden creating an unbalance where the Swedish manufacturers often attained the role of forerunners to their EU competitors. Interviewees maintained that it was unnecessary to have higher environmental requirements than the EU directive.

> *"Sometimes we have to be first on the market since we are located in Sweden, while if we would have been located in Poland or the Czech Republic, we could have looked at our Swedish competitors and followed their example, and then maybe saved a few Euros." – Quote by interviewee 2*

As far as "Labour cost" goes, the situation was perceived to differ significantly depending on which country was considered. Some interviewees even disagreed on specific countries, for example Germany and France. England was however considered to have a significantly lower labour cost by several interviewees. The overall opinion was however that Sweden is a high labour cost context, even when compared to other EU countries.

> *"The EU is not a consistent collective in itself. I mean, if we look Poland or some of the other Baltic countries there are the countries that are much more cost effective, or have significantly lower costs. But if we are looking at Germany, France or others of those large dominant industrial nations then of course the picture is different." – Quote by interviewee 5*

Being assessed as neutral by all but 3 of the interviewees, the "Public support for R&D activities" was not considered being significant neither in Sweden nor any other EU country. The reasoning concerning this parameter echoed the opinions regarding the collaboration with government outlined above.

> *"If we look at the EU-budget then the support given French and Polish farmers is orders of magnitude larger than technology development in general. And from that small cake of technology development, Sweden only receives a small slice." – Quote by interviewee 2*

The situation created by "Taxes and duties" for specific countries within the EU were overall considered equal for countries within the EU, Sweden included. 7 of the interviewees regarded this aspect as neutral, where the other 2 considered there to be a small difference depending on which country was considered. The commonality between countries was attributed to the EU directives and legislations.

> *"It varies in Europe, but those aspects that legislation affects is often the same across the EU so there is not so much difference in comparison to Sweden." – Quote by interviewee 2*

Another factor being perceived as quite similar between countries in the EU was the "Availablility of local suppliers", where a majority of interviewees regarded this as having a neutral impact. The

outlier, ranging from -1 to 1, was established in countries where the situation was different. Germany was mentioned as an example where the supplier base is large, while Italy was described as a country with a lot of suppliers, but access was limited due to preferences of working only with local customers.

> *"It can be said in relation to the rest of Europe, Sweden have a somewhat negative impact because if you say that we are looking at the total supply base, it is more centralized to where we have our larger sales volumes." – Quote by interviewee 8*

Finally, the "Indirect labour cost" was overall considered neutral, although the opinions differed whether this factor had a positive or negative impact on Sweden. A German designer for example, was stated to be significantly more expensive than the Swedish counterpart while other interviewees equated the indirect labour cost with the direct labour cost.

> *"Our perception is that it is a somewhat larger difference in salary outside Sweden compared to companies in Sweden." – Quote by interviewee 9*

3.4. Sweden's position in relation to low-cost countries

The third perspective considered during the interviews was Sweden in comparison with low-cost countries. This perspective was framed in regards to two main clusters of countries: Central and Eastern Europe (CEE) and Brazil, Russia, India, China and South Africa (BRICS). Depending on which company the interviewee was associated with, different countries within these groups was in focus in the answers. However, in comparison with the other two perspectives previously outlined, the interviewees had the most extreme reflections and impact assessments regarding this perspective. The average impact assessment is outlined in Table 4 below and the subsequent sections summarises the reflections and motivations provided by the interviewees.

Table 4 - Sweden's perceived strengths and weaknesses as a location for manufacturing compared to low-cost countries

Factor	Average impact +2: major strength 0: neutral -2: major weakness
Skill levels	1.44
Quality of Local Suppliers	1.33
Availability of Skilled Labour	1.11
Collaboration with Unions and Worker Councils	1.00
Infrastructure and Logistics	1.00
Labour Productivity	0.89
Availability of Local Suppliers	0.44
Availability of Finance	0.33
Taxes and Duties	0.22
Cost of energy	0.11
Environmental Regulation	-0.11
Labour Flexibility	-0.33
Public Support for R&D Activities	-0.33
Collaboration with the Government	-0.44
Indirect Labour Cost	-1.44
Labour Cost	-1.89

Strengths of Sweden in comparison with low-cost countries

Three factors was assessed by a majority of the interviewees as having a somewhat positive impact or more on Sweden as a location for manufacturing industry in comparison with the CEE and BRICS clusters, i.e. "Skill levels", "Quality of local suppliers" and "Availability of skilled labour". The three factors "Collaboration with unions and worker councils", "Infrastructure and logistics" and "Labour productivity" was assessed on average to have a close or equal to a somewhat positive impact. Closer to the neutral assessment was "Availability of local suppliers", "Availability of finance", "Taxes and duties" and "Cost of energy", yet still on average being a positive aspect.

With an average impact assessment of 1.44, skill levels was perceived as the most prominent advantage of Sweden. Interviewees brought forth two main arguments during the discussion for this assessment. The first argument focused on the Swedish industrial history and culture and how the longstanding Swedish tradition of manufacturing has established an implicit standard of what excellent manufacturing signifies.

> *"I believe that the skill level is higher in the western world, mainly due to historical aspects where the industrial and manufacturing tradition is not as self-evident in India or China." – Quote by interviewee 1*

> *"If you send the same exact blueprint to a Swedish firm, whichever you prefer, and a midsized Chinese firm, you will get significantly different levels of quality on what is returned to you. And it really is a bit like that you can get skill on the paper, but the feel and industrial standard that we have here in Sweden is really remarkable." – Quote by interviewee 2*

The second argument focused on the difference between theoretical knowledge and practical knowledge, where Sweden was perceived as being exceptionally good at addressing the latter. Interviewees considered this to be a consequence of the Swedish manufacturing tradition and the

societal culture. The latter aspect was explained as Swedish labour being more experienced in how to perform the job and more knowledgeable about the product outside what is taught in education. The education levels were hence in general considered equally good in most low-cost countries compared to Sweden. It was rather knowledge gained from experience outside education that differed. One interviewee explained that that the pressure during education in these countries often is strong, hence not leaving enough room for attaining practical experience in parallel.

> *"In regards to skill levels in Sweden compared to low-cost countries, the major difference, on all levels I would like to say, from assembly- and workshop-level to engineering, is that it is easy find a civil engineer in India, but it is very difficult to find one that has lived anything before employment." – Quote by interviewee 2*

A contiguous factor to "Skill levels" also perceived as a strong aspect of Sweden, with an average impact assessment of 1.33, was "Quality of local suppliers". Interviewees associated this factor with the reasoning concerning skill levels outlined in the previous paragraph but also explained that there often is a possibility of establishing a supplier base in low-cost countries, but in general it requires more effort and support to make the relationship work satisfactory. Reflections also pointed out differences between countries in these regions, where Brazil was identified as being less problematic than China and India.

> *"It is not always the same quality that you buy and more is required of us as buyers to get flows from an LCC region to work." – Quote by interviewee 5*

Regarding "Availability of skilled labour", interviewees assessed this as strong aspect of Sweden with an average impact assessment of 1.11. Interviewees explained that while the availability of labour in general was very good in most low-cost regions, the skill levels in terms of practical experience were often deficient. Several reflections pointed at a mechanism in these countries, where people have a tendency of switching frequently between companies chasing higher salary offers from companies in the same region. This had the consequence of a high personnel turnover and thus created a difficulty of maintaining competence at the production sites, thus making investments in training and education have little effect. The high personnel turnover also affected the stability of the production sites, where considerable effort thus is required for recruiting personnel.

> *"And then you have another problem in China, and that is that once you have trained them, they are very talented and are hence very attractive on the market and thus the turnover is very large, so there is a turnover of perhaps 15 -20 % at least, which creates this stirring all the time to recruit and replace those that have left. So the stability and availability as I said earlier, is of course the overall problem." – Quote by interviewee 7*

Another factor identified as a strong aspect of Sweden by the interviewees was the "Collaboration with unions and worker councils", with and average impact assessment of 1.0. The differences highlighted by the interviewees focused on two main aspects. The first was considering the differences in type of questions and problems which the unions are involved with, i.e. the context of the unions. Here, interviewees explained that questions faced by unions in the low-cost countries are oftentimes more severe from a human rights perspective. These questions were perceived to be a consequence of the culture and societal standard of these regions. In comparison, Swedish unions operate in a more stable environment, where the focus is more on renegotiating salaries or agreements during an economic downturn. The second aspect brought forth focused on the characteristics of the unions themselves. It was mentioned that unions in some countries

were highly bureaucratic and tried to exert political influence on the companies, while other countries lacked unions altogether.

> *"In these countries there are still a lot of abuse and terrible working conditions so the unions have an active role to play out compared to here in Sweden, where we renegotiate salary agreements every year on the white collar side with 3-4 different unions, and with one union on the blue collar side." – Quote by interviewee 2*

Concerning "Infrastructure and logistics", the average impact assessment was 1.0. During the discussion, interviewees considered this factor from two different perspectives. From the one perspective, the interviewees considered the location in relation to the market and in this regard, Sweden was considered be located disadvantageously. From the other perspective, the infrastructure of was considered, and it is this the impact assessment from this perspective that is included in Table 4. Considering the infrastructure perspective, the interviewees made a coherent assessment with 7 "somewhat positive" and 2 "strongly positive" assessments. Although "Infrastructure and logistics was considered a strength of Sweden in the overall assessment, interviewees explained that different situations and trends existed in the countries included in the CEE and BRICS clusters. China was highlighted by several interviewees as improving in this regard, where projects are started and completed swiftly and reliably, although at the expense of human rights to some extent. Improvements were being made across the board from roads and highways to railways with express trains. India was perceived as being underdeveloped in this regard, where logistics was considered overall very slow and borderline chaotic. Russia as well was considered underdeveloped in this regard, while Brazil was considered satisfactory.

> *"We can see a from our distribution of our cars that it is clear that if you come to countries like Russia, then the infrastructure to Russia is troublesome, in Russia troublesome, India is also one such place, not well developed. However when you come to China, you could say that it is an exception." – Quote by interviewee 7*

The factor "Labour productivity" had an overall assessment of 0.89, of which 5 somewhat positive, 1 strongly positive, 1 neutral and 2 somewhat negative. Even though the assessments showed a variation in perception, the reasoning behind the answers was coherent. Most interviewees argued that while Sweden might have a higher productivity on an individual basis, the significantly lower labour cost in the CEE and BRICS compensated for this, making the outcome more or less equal. However, work on productivity improvement was perceived as being higher in Sweden and these efforts was also considered to receive a higher degree of involvement in Sweden, mainly due to cultural differences and the lesser degree of relevance of productivity improvement work in a low-cost labour context.

> *"Regarding productivity improvement work, it is culturally dependant I would say, how well you dare to suggest improvement possibilities and you view equality. It is no coincidence that Lean originated from Japan, with its culture and hierarchy where you never dare make any improvement suggestions before you really ask how it is going to be received, and by then it is a landslide victory. Where here in Sweden, we can send our top-level executive out on the floor and he can be called an idiot, while we do not find this strange although it might be wrong. So there is a different view of what you dare to question and it might be easier for improvements to gain their own momentum in the Swedish culture than in many others. This do however vary substantially in regards to culture and there are right now many different off springs of this in Europe." – Quote by interviewee 2*

"Availability of local suppliers" also had a positive, yet rather weak, overall assessment of 0.44. Several interviewees connected this reasoning to "Quality of local supplier" as outlined above and emphasised that it is a matter of perspective whether it is the quality or the availability that is lacking in these countries. For example, it is not necessarily the case that local suppliers do not exist, but that it is difficult to find local suppliers that can fulfil the quality requirements without the company having to put in large effort to make the supply function satisfactory.

> *"In the low-cost countries, the problem is not that they do not exist but instead to find the right supplier. This is a lot simpler in Sweden." – Quote by interviewee 3*

"Availability of finance" was also assessed closed to neutral, although still positive with an assessment of 0.33. Regarding this factor, one interviewee was an outlier with a strongly positive assessment. This interviewee, in contrast to the others, had financial responsibility and was thus highly knowledgeable in this area. The interviewee explained that for example issuing new shares was significantly cheaper in Sweden due a well-functioning capital market. It was also explained that the credit market and the protection of borrowers is much stronger in Sweden than in most low-cost countries. In an example mentioned as a side note, the situation in Russia was perceived as more corrupt, where many companies avoid taking loans and expanding to avoid banks taking over their businesses. However, the interviewee maintained that this was more of a rumour and not based on concrete sources. Additionally, the Swedish export credit and the European funding bank was also mentioned as advantages.

Concerning "Taxes and duties", the overall assessment was close to neutral being 0.22. However, the assessments regarding this factor varied substantially in terms of whether it was an advantage or a disadvantage for Sweden. Despite the high degree of variation, the answers described a similar picture. The difference was rather associated with the perception of the picture. The picture thus described was a more troublesome situation in the low-cost countries, where taxes and duties often were either high overall or complicated, leading to delays and long lead times.

> *"You could say here that there is of course sometimes with our export some strong barriers, where we may not have a free trade agreement but rather there are large import duties on our products." – Quote by interviewee 7*

> *"Regarding duties, it is definitely an advantage to be within the EU for us. But it is also the case that in some countries the complexity of the tax system is very high, which creates a need for having entirely different levels of tax experts within the company than you need to have in Sweden. There are also tendencies of state control through the tax system, particularly in Brazil and Russia, which means that the way to operate the company and how things are done is attempted to be controlled through taxation, which is not necessarily optimal." – Quote by interviewee 9*

One interviewee explained that the sole reason the company had established a factory in a particular country, was to avoid the high import duties. And it was in this regard the perceptions differed, whether it was an advantage for Sweden to have a reasonable system for taxes and duties, or whether this created a favourable situation for companies based in low-cost regions.

Concerning "Cost of energy", being assessed closely to neutral as 0.11, the interviewees perception differed in terms of whether the focus was solely on cost, or whether environmental aspects and reliability of supply was also considered. In the former case, Sweden was perceived as a disadvantageous location as the energy cost is significantly higher overall compared to low-cost countries. However, when also environmental impact and supply reliability was considered, Sweden was rather perceived as an advantageous location due to its high supply ratio of renewable energy sources such as hydroelectric power. In contrast, many of the low-cost

economies relies on energy from coal plants. Unreliability in supply was associated many of the low-cost countries, examples mentioned were China, India and South Africa. One interviewee explained that the company pre-planned power outages for an entire month due to a forecasted heat wave in one of their Chinese plants. Regarding the cost, a few interviewees highlighted China as becoming increasingly expensive and one interviewee even stated that the energy cost is already higher there.

> *"We had pre-planned power outages a year ago during a month in China due to a heat wave. The same situation is in India where the supply is highly unpredictable. All production sites are aware of this so part of the power-supply comes from diesel-generators, which is not the most cost efficient approach." – Quote by interviewee 3*

Weaknesses of Sweden compared with low-cost countries

The two most prominent weaknesses of Sweden compared to the CEE and BRICS countries was, perhaps not surprisingly, "Labour cost" and "Indirect labour cost", having an overall assessment of -1.89 and -1.44 respectively. Perhaps somewhat more surprising was the "Collaboration with the government" assessed overall as -0.44, "Support for R&D activities" assessed as -0.33 and "Labour flexibility" also assessed as -0.33. Somewhat closer to neutral yet overall a weakness was "Environmental regulation" with an average impact assessment of -0.11.

Beginning with "Labour cost", the interviewee's answer were straightforward, the labour cost is simply significantly higher in Sweden. However, Brazil was mentioned by one interviewee as an exception and was perceived as being a high-labour cost context. Several interviewees also emphasised that the trend in China is an increase in labour cost and that some regions in China is approaching Swedish labour cost levels. One interviewee further explained that there had already been discussions on whether to localise elsewhere within China or whether to move production to another country as a pre-emptive measure.

> *"Labour cost is at present lower in these countries. However one should be aware of that this has a time aspect to it and we can already see that labour cost is increasing in these countries, in China for example, and depending on where in China you look." – Quote by interviewee 1*

The "Indirect labour cost" was perceived as somewhat less negative than the "Direct labour cost", mainly due to two aspects. Firstly, the interviewees perceived there to be a much more distinct hierarchy in companies in these countries, creating large differences in salary levels between management and workforce. In contrast, Sweden was described as providing more alternatives for attaining a higher salary, through for example long time employment or from switching jobs frequently. The other aspect outlined was a trend in recent years where salaries of for example engineers have increased drastically due to limited availability, thus mitigating the difference to Swedish salary levels.

> *"Generally speaking, the low-cost countries are more hierarchical than Sweden. In Sweden you can achieve a high salary in quite many different ways. For example, from working a long time at the company or by being a role-model or by changing job often and so on. While in India or China, the salary is strongly dependent on the hierarchical ladder, so there are very very few who have those really large salaries." – Quote by interviewee 2*

Concerning "Collaboration with the government", 5 interviewees assessed this factor as having a somewhat negative impact, 3 as neutral and one outlier as having a somewhat positive impact. The overall reasoning regarding this factor was that the government in these countries was significantly more active. The differences in perceptions were whether this activity was beneficial

or not. Many interviewees pointed at financial support to be used as an incentive by these nations for the companies to localise their production there. This includes support during larger investments or tax credits and subsidies for establishment. The involvement by the government in these countries is however not exclusively positive where two interviewees described the support as being used as an entry point for micromanagement by the government. When establishing new facilities, authorisation processes was considered to significantly faster in these countries which facilitates operations in these regions. It was emphasised by some interviewees that while the support might be beneficial in some instances, collaboration with the government was not considered a determinant for localisation, but rather a bonus if it was available.

> *"If we look Germany or China, the state has a clear ambition and backs the industry, they see their nations as being industrial nations. Here in Sweden, the government have publicly condemned us as being an industrial nation. But we are still very dependent on the industry in Sweden. I mean, almost 20% of GDP comes from industry and I think that we should consider this and be more humble about it and back the industry even more." – Quote by interviewee 5*

The "Public support for R&D activities" was assessed as neutral by 6 of the interviewees and as having a somewhat negative impact by 3. The somewhat negative impact assessments echoed the reasoning concerning "Collaboration with government" above where financial support was noticeably stronger in the low-cost countries. For example, China was stated to provide significant tax reduction for localised R&D operations and also to approve new R&D centres more rapidly. Apart from China however, R&D support was considered underdeveloped in most other members of the BRICS and CEE clusters.

> *"R&D activities are supported to a larger extent from the government in for example China, then again one can discuss whether it is collaboration or something else." – Quote by interviewee 1*

Another factor showing a large variance between assessments while overall being assessed as a weakness of Sweden, was "Labour flexibility". Assessments ranged across the entire scale, with 2 strongly negative, 3 somewhat negative, 1 neutral, 2 somewhat positive and 1 strongly positive impact assessment. Even though the assessments differed greatly, most pointed at certain mechanisms and characteristics of the low-cost labour contexts and also differences between countries were highlighted. For example, China as well as Russia was described as having a rather low degree of flexibility in terms of termination agreements, but due to the low cost of the labour it was considered economically viable to maintain employments during a downturn to be able to respond to an upswing in demand. In other countries such as India or South Africa, the level of bureaucracy is lower, thus allowing for termination on a day's notice. Interviewees however maintained that these options often conflicted with company policies hence was not utilised in practice. The same reasoning goes for overtime, where for example it would be possible both from an individual perspective and from a union perspective to work on 2 shifts of 10-11 hours instead of three shifts. This was however also something that went against company policy and hence was not used in practice. One interviewee explained that the higher degree of personnel turnover in these countries, forced the company to integrate flexibility in the business to greater extent, thus leading to a higher degree of flexibility in operations in these countries. In contrast, Sweden was perceived as being more bureaucratic and negotiation of flexibility agreements often take require longer time and has less options available.

> *"What we are not looking for is the opportunity to terminate people and then rehire them again, because then you will always have so many newly recruited. You rather want flexibility with the people you already have." – Quote by interviewee 9*

"Environmental regulation" was another factor which received a wide range of different assessments, but as in the factors outlined above, the reasoning behind the assessments showed similar patterns. It was overall consensus that environmental regulation in Sweden is stricter and requires more effort from the companies. Several interviewees, assessing the higher level as something positive, considered the Swedish environmental regulation as being clearer and more distinct, thus making conformance to the requirements simpler. In contrast, there was difficulty in knowing what the requirements actually were in many of the low-cost countries.

> *"The problem in China is really that we do not really know what the rules are. They change all the time." – Quote by interviewee 4*

Many of the interviewees also associated the company's environmental policies to the brand name and market reputation, thus regarding high environmental standard as a customer requirement, which had the effect of the same policy being applied regardless of local requirements.

> *"We want to live up to ISO14001, so that is the requirement on all of our factories. And then there are local regulation and I have no insight as to what exactly applies where." - Quote by interviewee 6*

The more negative assessments pointed at the increased costs a higher environmental standard resulted in and argued that companies located in regions with lower requirements could use Swedish companies as role models when requirements increased, thus avoiding the development cost.

> *"For me, it is an advantage that we have good environmental regulations that we follow and it is not that I see us having an advantage compared to LCC. I mean, our customers also demand that we are not a polluting and sully company. I do not see it as an advantage that the emissions in China do not matter, rather it is the other way around. It creates a problem that it is not sustainable." – Quote by interviewee 5*

3.5. Industry interaction with the Swedish Government

As a separate part of the interview questionnaire, questions regarding the interviewee's perception of its company's collaboration with the Swedish government were discussed. The questions asked focused on how the collaboration today was perceived but also how interviewees would like the collaboration to be constituted and what should be the focus on the political agenda. This section has been organised according to the questions which were asked and highlights the main arguments and reflections brought forth by the interviewees.

Perception of the collaboration with the Swedish government today

The initial question asked was for the interviewees to rate the collaboration in general on how it is perceived today. The average rating is displayed in Table 5, followed by a summary of the reflections from the interviewees.

Table 5- Swedish manufacturing companies' collaboration with the government

Question	Average rating	Range
How good, on a scale of -2 to +2 would you rate the collaboration with the Swedish government?	-0.22	[-1, 0]

Reflections associated with the ratings entailed that the collaboration had both positive and negative aspects. A few interviewees stated that they had little knowledge of how the collaboration was constituted, even though they operated on leading positions in their respective

companies. The overall perception was that the collaborative activities were quite scarce and that it was difficult to have any actual influence of the political agenda. It was also highlighted that some politicians were more interested in being re-elected than making an actual difference.

Effectiveness of points of interaction with the Swedish government

A second question concerned the different forums that were available to interact with the Swedish government and how effective these forums are. The answers focused on different types of interaction points, where governmental organisations and institutions, universities, local authorities and the EU was brought up. Regarding the governmental organisations, examples mentioned includes Svenskt Näringsliv, Teknikföretagen and FMS. Those interviewees who brought up these organisations maintained that there was ongoing collaboration in certain types of questions. Vinnova was also mentioned frequently during the interviews with mostly positive reflections regarding the functionality of the collaboration. One interviewee however maintained that the collaboration structure towards Vinnova and the governmental organisations in terms of roles and responsibilities in the collaboration today was unclear. Another interviewee considered there to be a trait of competitiveness between the different types of governmental organisations and Vinnova, where each unit would hesitate to share credit for different ventures. Overall the interviewees explained that these types of relations were to a large extent handled by public affairs units in their respective companies.

Some of the companies also had ongoing collaboration with universities, where the companies offered internships, thesis projects, post-graduate education and positions for adjunct professors. In return, the companies get the opportunity to market themselves as a future employer. Another interviewee also mentioned collaboration with local authorities within the municipality through different ventures such as study visits collaboration with local businesses. Collaboration with the EU was also brought forth by a few interviewees, where company representatives were involved in the debate regarding different questions, e.g. labour legislation. Lobbying activities was also mentioned, where the government e.g. showcased different companies during visits of politicians from other countries.

Suggestions for supporting the manufacturing sector

In addition to the perception of the current state of collaboration with the Swedish government, the interviewees were asked to suggest what could be done by the Swedish government to support the manufacturing sector. One aspect highlighted in several of the interviews was the Swedish labour legislation. As was explained during the interviews, larger Swedish companies operate on a global scale, supplying a global market and thus are subject to global fluctuations in demand. It was perceived that the current labour legislation did not allow for enough flexibility to manage these fluctuations. Specific improvement examples brought forth included opportunities for companies to improve control of competencies, establishing diversity in the workforce and in society in general, and review current hiring and layoff policies. Regarding the latter aspect, the possibility of recruiting younger people with low experience levels at lower wages was seen as an attractive and reasonable improvement. Also, support alternatives during economic recessions were requested, where for example different solutions for permutation used in other countries could be used as a model.

Another aspect highlighted by the interviewees in this regard was the education system and the technology focus in society in general. This was not only directed towards universities and engineers, but also towards high schools and operators. It was perceived that NC-operators and maintenance personnel such as electricians and mechanics often are difficult to find and that support is required to ensure availability of such personnel categories. Competencies of people finishing education was also emphasised in terms of practical experience. Today, education was

perceived as providing an appropriate theoretical basis but less so regarding the practical knowledge associated with conducting the actual work role. This did not only refer to engineers but also operators which could benefit from a broader, not necessarily deeper, knowledgebase. The apprenticeship systems used in Germany and Switzerland was seen as an attractive solution for strengthening the practical knowledge base. Such a system was seen as providing students with a greater insight into the expectations from industry in earlier stages. To proactively evaluate future needs of the industry in terms of education was also seen as important and should be emphasised more than today.

Collaboration between companies, organisations and the government was also seen as area that could be improved upon. In addition to making the interaction structure towards the government clearer and more active, the interviewees also emphasised that increased collaboration between companies within different clusters was also important. The companies however realised that the responsibility for collaborations to function are twofold, thus half of the responsibility is their own. Research and development was also identified as crucial and there was overall consensus that institutions such as Vinnova are needed and appreciated, although it was maintained that more could be done in this regard.

Understanding and recognition of the Swedish manufacturing industry's importance for Sweden was seen as an aspect in need of significant improvement, in particular from government representatives. This both referred to more actively speaking about industry in the public debate but also towards actively spending time with industry to understand the conditions the industry act in.

> *"I also think it would be appropriate by government representatives to actually speak about the industry and how important it is for Sweden and I think this has not really been done for a number of years. There are some people in the government however, who have an industrial background and who puts effort into highlighting the relevance of industry, which I think is discipline, without politicizing the whole in any way. But I see the importance of Swedish industry for Sweden as being much greater than what the attention it is given reflects." – Quote by interviewee 5*

More consideration towards the industry in decisions concerning infrastructure was also highlighted. The political debate concerning infrastructure was seen as slow and often leading mediocre results from an industrial perspective. Complex and slow moving political decisions regarding environmental regulation was also seen as an area that could be improved significantly. In this regard, the reflections focused on making the process from request to decision faster while maintaining the quality of the decisions.

3.6. Crucial factors driving manufacturing footprint

A final question asked during the interviews was which factors that influenced decisions regarding localisation most. The question was asked to acquire an understanding of the reasoning behind decisions regarding localisation of production. Although the question was open, consistent patterns could be detected and the two main arguments are presented in their own subsections below.

Market development

Depending on how the market develops, production units were considered feasible to establish in other locations if significant volumes could be reached. Although one interviewee maintained that the logistics cost was the reason for producing close to the market, the general view was that this type of localisation rather occurred due to an improved and simplified overall situation in terms

of communication and time to market. It was simply perceived as a natural step to be close to the market. However, as emphasised by one interviewee, a location must also fulfil criteria in terms of availability of skilled labour, infrastructure and also personnel safety, i.e. the region had to be stable. Labour cost also factored into this equation, but rather as a secondary aspect considered after the market location.

Proximity to research and development

Coordination between manufacturing and research and development was considered crucial for the majority of the interviews. To have manufacturing located close to R&D-centres was explained as facilitating this coordination and many of the interviewees maintained that their basis of R&D was still in Sweden. The trend was however that new R&D centres were being established in other regions outside Sweden and that this could imply a different picture for manufacturing in the future.

The debate on the future of manufacturing in Europe is especially relevant for Sweden: on the one hand it has a large manufacturing sector, so a lot to lose, on the other hand it has one of the highest labour costs in the world. As such it is especially important to proactively determine the fate of this industry sector.

4. Conclusions

In this report we have asked the question whether it is possible, and indeed worthwhile, to sustain manufacturing in Europe. First and foremost, the macro-economic analysis shows that manufacturing still represents an important part of a balanced economy. Sweden, like Germany and others, still feature strong contributions of their manufacturing sector to the national Gross Value Added. However, it is also clear that manufacturing fortunes differ greatly across Europe, and that the manufacturing sector is under pressure in many countries. Manufacturing's survival in Europe thus should not be taken for granted.

To further investigate what it takes to retain manufacturing in Sweden, we have interviewed leading Swedish manufacturing firms. Our findings paint a clear picture. First and foremost we find that higher labour cost is not necessarily a "killer criterion" for the locus of manufacturing as many other favourable advantages offset the labour cost advantage: skills, productivity, proximity and quality of suppliers, and others.

Secondly, our findings also show how collaboration with unions and worker councils is a unique Swedish strength compared to other EU countries, while skill levels and quality of local suppliers are strengths compared to low cost regions. Interestingly though, collaboration with the Swedish government is identified as a unique weakness for Sweden, and the comparatively high failure rate of Swedish firms' offshoring ventures stands testimony to this. Labour cost is not all that matters, but Sweden must be able to compete in total cost comparison and when understanding and utilising its unique strengths.

In conclusion we argue that manufacturing still plays a crucial role in the Swedish economy in terms of Value Added, employment, and exports. Its survival however is not guaranteed. Sweden, like any other developed country, needs to actively support its manufacturing industry. Links to customers and suppliers, and government, matter more than commonly thought. In this context it is important to stress that global manufacturing is a growth sector, and at present other developing countries (e.g. BRICS) and regions are capturing most of this growth, while industrial nations see a stagnation of manufacturing GVA. Manufacturing thus is not the "sunset industry" many make it out to be. It has been, and remains, a prize worth fighting for.

5. Bibliography

Baily, M. N. & Elliott, D. J. (2009). *The US Financial and Economic Crisis: Where Does It Stand and Where Do We Go From Here?*. Initiative on Business and Public Policy at Brookings

Baumol, J.W. & Bowen, G.W. (1965), "On the Performing Arts: The Anatomy of Their Economic Problems". *American Economic Review*. 55 (1/2), 495-502.

Bhagwati, N.J. (2010). "The Manufacturing Fallacy". Project Syndicate. Available at http://www.project-synd icate.orglcommentarylthe-manufacturing-fallacy, (Accessed: Feb 21, 2013)

Bhagwati, N.J. (2011). "Manufacturing. Against the motion. Hg. v. John Micklethwait". *The Economis*t. London. Available at http://www.economist.comldebateldayslview1714, (Accessed: May 7, 2013)

Chang, H-J. (2011). "Manufacturing. Defending the motion. Hg. v. John Micklethwait". *The Economist*. London. Available at http:I/www.economist.comldebateldayslview1714, (Accessed: May 7, 2013)

Chenery, B.H. (1960): "Patterns of Industrial Growth". *The American Economic Review*. 50(4), 624-654.

Chenery, B.H. & Taylor, L. (1968). "Development Patterns: Among countries and over time". *The Review of Economics and Statistics*. 50(4), 391-416.

www.finanshistoria.n.nu (2010). *"Svenska bankkrisen"*. http://www.finanshistoria.n.nu/svenska-bankkrisen (Accessed: Jun 23, 2015)

Christopher, M., & Holweg, M. (2011). "Supply Chain 2.0": managing supply chains in the era of turbulence", *International Journal of Physical Distribution & Logistics Management*, 41(1), 63-82

Cohen, S.S. & Zysman, J. (1987). *Manufacturing matters. The myth of the post-industrial economy*. New York: Basic Books.

Dahlsten, K. (2014). *Industrins villkor i västsverige: en studie om industrins förutsättningar och Sverige som industrination*, Report 2014:2, West Swedish Chamber of Commerce, Gothenburg.,

Galbraith, J.K. & Hale, T. (2004). *"Income distribution and the information technology bubble"*. University of Texas inequality project. (Conference paper)

Gemert van, G.H. (1987). "Structural change in OECD countries: A normal pattern analysis". *The Economist*. 135(1) 29-51.

Hayes, R.H. & Wheelwright, S.C. (1984). *Restoring our competitive edge: Competing through manufacturing*. New York: Wiley.

Helpman, E. & Melitz, M.J. (2004). "Export versus FDI with heterogeneous firms", *American Economic Review*, 94 (1), 300-316

European Commission. (2011). *Eurostat*. Retrieved from: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/NACE_backgrounds (Accessed: Jun 23, 2015)

Industry Research Desk. (u.d.). Hämtat från http://www.virtualpet.com/industry/naics/naics.htm (Accessed: Jun 23, 2015)

IVA, 2005a. *"Framtida Produktion. Produktion för konkurrenskraft – Panelrapport"*. Stockholm: Kungl. Ingenjörsvetenskapsakademin (IVA)

IVA, 2005b. *"Produktionens Betydelse. Produktion för konkurrenskraft – Panelrapport"*. Stockholm: Kungl. Ingenjörsvetenskapsakademin (IVA)

Kitson, M. & Michie, J. (1997). "Does Manufacturing Matter?" *International Journal of the Economics of Business*. 4(1), 71-95.

Kuznets, S. (1971). *Economic Growth of Nations: Total Output and Productions Structure*. London: Cambridge University Press.

Lane, P. (2011). "Manufacturing. The moderator's opening remarks. Hg. v. John Micklethwait". *The Economist*. London. Available at http://www.economist.com/debate/daysjview /714, (Accessed: May 7, 2013).

McKinsey & Company, 2012. "Tillväxt och förnyelse i den svenska ekonomin. Utveckling, nuläge och prioriteringar inför framtiden"

Nabar-Bhaduri, S. & Vernengo, M. (2012). "Service-Led Growth and the Balance of Payments Constraint in lndia". *Challenge*. 55(5), 79-93.

OECD (1). (2013). *OECD Statistical Programme of Work.* Paris: OECD.

OECD (2). (2013). *Industry and Globalisation - STAN STructural ANalysis Database*. Hämtat från OECD - Better Policies for Better Lives: http://www.oecd.org/industry/ind/stanstructuralanalysisdatabase.htm (Accessed: Jun 23, 2015)

Office for National Statistics. (2009). *UK Standard Industrial Classification of Economic Acitivities 2007 (SIC 2007).* New York: Palgrave McMillan.

Pearce, E. (1957). Retrieved from http://www.census.gov/econ/census/data/historical_data.html (Accessed: Jun 23, 2015)

Petit, Pascal (1986): Slow growth and the service economy. New York: St. Martin's Press.

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

Rowthworn, R. & Ramswamy, R. (1999). "Growth, Trade, and Deindustrialization" *IMF Staff Papers*. 46(1), 18-41.

Sachs, J. D., Tornell, A. & Velasco, A. (1996). *"Financial crises in emerging markets: The Lessons from 1995"*. Brookings Papers on Economic Activity, 1996:1

Smith, . & Skinner, A.S. (2003): *The wealth of nations*. London: Penguin.

Solow, R.M. (1956). "A Contribution to the Theory of Economic Growth". *Quarterly Journal of Economics*. 70(1), 65-94.

Spinner, S. (2013), *The competitive status of the German manufacturing indus*try. MSc thesis. Kühne Logistics University. Hamburg.

Statistics Canada. (2012). Retrieved from: http://www.statcan.gc.ca/subjects-sujets/standard-norme/naics-scian/2007/introduction-eng.htm#a10 (Accessed: Jun 23, 2015)

Statistics Denmark, 2008. *"International Sourcing – Moving business functions abroad"*. Köpenhamn: Statistics Denmark

Statistics Sweden. (u.d.). *Statistiska Centralbyrån*. Retrieved from: http://www.scb.se/Pages/List___257409.aspx (Latest access: Jun 23, 2015)

Statistiska Centralbyrån - Avdelningen för Nationalräkenskaper. (2013). *Nationalräkenskaper enligt ENS 95, årsvis 2011.* Statistiska Centralbyrån.

Thirwall, P.T. (1979). "The Balance of Payment Constraint as an Explanation of International Growth Rate Differences", *Banca Nazionale del Lavoro Quarterly Review*. 32(128), 45-53.

Teknikföretagen, 2008. "Svensk produktion 2025 – Strategisk forsknings- och innovationsagenda för att möta de globala utmaningarna"

The Economist Intelligence Unit Limited: Country Report July 2011. In: *The Economist Intelligence Unit Limited*, 2011(7), 13-14.

United Nations, Statistics Division. (2008). *International Standard Industrial Classification of All Economic Activities.* New York: United Nations, Statistics Division.

Unterlöhner, R. & Böhmer, M. (2012). *Manufacturing- The Driver of Success. And what the future demands. A study on the importance of industry networks*. Prognos AG & Management Engineers GmbH & CO. KG. Munich and Dusseldorf

United States Census Bureau. (u.d.). Retrieved from http://www.census.gov/eos/www/naics/faqs/faqs.html#q14 (Accessed: Jun 23, 2015)

VINNOVA, 2013. *"Made in Sweden 2030"*. http://www.vinnova.se/PageFiles/0/Made%20in%20Sweden%202030_produktion.pdf

World Trade Organization (2009). *World trade report 2009 – Trade policy commitments and policy measures*. World Trade Organization: Geneva, Switzerland

Appendix I – Sweden's 15 largest manufacturing corporations

Overview of the 15 largest manufacturing corporations in Sweden (figures from year 2012)

	Company Name	Turnover [£e3]	Year established	Main sector (SNI) / products	Empl. Sweden	Empl. Globally
1	Volvo AB	30 484 401	1915	C29 / Motor vehicles, trailers and semi-trailers	22 096	94 832
2	Ericsson Telephone AB LM	25 425 025	1952	C26 / Communication technology	17 712	110 255
3	Volvo Car Group	14 454 309	1927	C29 / Automobiles	N/A	22 552
4	Electrolux AB	12 205 188	1901	C27 / Domestic appliances	2 049	59 478
5	Sandvik AB	11 434 789	1862	C28 / Tooling, mining and construction equipment	app. 6 000	49 385
6	Scania AB	9 711 171	1900	C29 / Commercial vehicles	N/A	36 528
7	Atlas Copco AB	9 380 297	1873	C28 / Tooling, mining and construction equipment	app. 4 000	40 159
8	SKF AB	7 111 372	1907	C28 / Bearings, power transmission products etc.	1 698	45 220
9	Assa Abloy AB	5 421 111	1954	C25 / Locks and security doors	2 073	42 556
10	Autoliv AB	4 286 377	1953	C28 / Automotive safety equipment	1 401	41 700
11	ABB AB	3 798 869	1988	C27 / Robotics, power and automation technology	9 052	146 100
12	Alfa Laval AB	3 459 949	1883	C32 / Equipment for heat transfer and fluid handling	2 158	16 060
13	Husqvarna AB	3 388 908	1689	C28 / Outdoor power products	app. 1 500	14 156
14	Getinge (Group)	2 842 954	1904	C32 / Equipment for health care and life sciences	1 440	15 183
15	SAAB (Group)	2 665 225	1937	C26 and C30 / Aerospace and defence technology	app. 11 200	14 060

Sources: www.largestcompanies.se, www.allabolag.se, Annual reports, Company websites, www.va500.se

Appendix II - An Overview of Industry Classification Systems

This appendix shows the development and the comparability of different industry classification systems in order to provide a background to the statistical data used in this project. The appendix is divided into two sections, where the historical development of these systems is presented in the former, and their comparability is presented in the latter.

Development of Industry Classification Systems

The Standard Industrial Classification (SIC) was developed in the United States 1937 (Pearce, 1957) with the aim of creating a standard that allowed for sharing of data across agencies. The system is still in use in the United States today by some agencies and has been adopted by e.g. the United Kingdom in 1948.

NAICS was released in 1997 which compared to SIC use a product-oriented concept for classifying industry (Industry Research Desk, u.d.). The U.S. variant of SIC was last updated in 1987 and was replaced by NAICS upon the release of NAICS in 1997 as the main classification system used in the U.S. The U.K. version is still being updated, the most recent version being UK SIC 2007 (United States Census Bureau, u.d.).

The United Nations released the International Standard Industrial Classification of All Economic Activities (ISIC) in 1948 which has been reviewed and revised in 1958, 1968, 1989, 2003 and 2008 (United Nations, Statistics Division, 2008).

NACE was developed by the European Union in 1970 and is a more detailed version of ISIC (European Commission, 2011). The Swedish system for classification of industry, SNI, was released in 1992 and was later revised in 2002 and 2007. The current version is SNI 2007 (Statistics Sweden, u.d.), which is a derivation of the NACE rev.2.

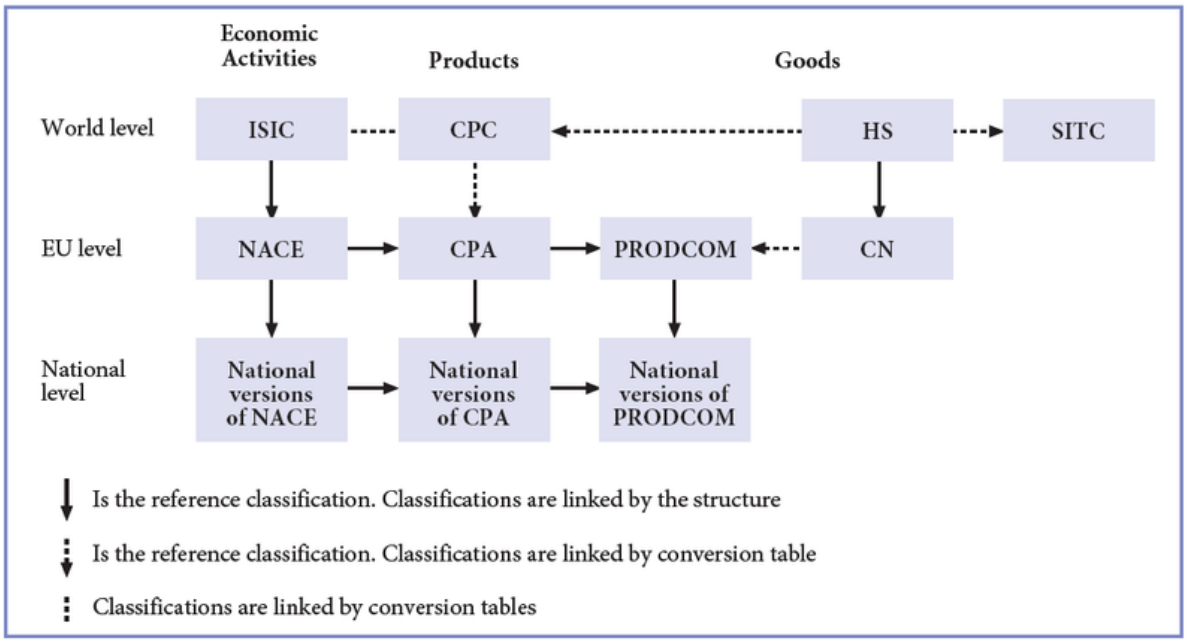


Figure 1 - Relation between ISIC, NACE and SNI (SNI is a national version of NACE)
Source:http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:International_system_of_classifications.PNG&filetimestamp=20090813135519)

Comparability between Industrial Classification Systems

The ISIC, NACE and SNI systems are compatible on the top 4 hierarchical levels (Statistics Sweden, u.d.), (United Nations, Statistics Division, 2008). The UK SIC 2007 follows the NACE rev. 2 up to a 4-digit level (Office for National Statistics, 2009). The top two levels, sections and divisions, are exactly the same in ISIC rev.4 as in NACE rev.2 and UK SIC 2007. The development of NAICS strives for compatibility on a 2-digit level with ISIC but has not fully achieved this in its current version NAICS 2007 (Statistics Canada, 2012).

The complete comparability between the systems is shown in the figure below.

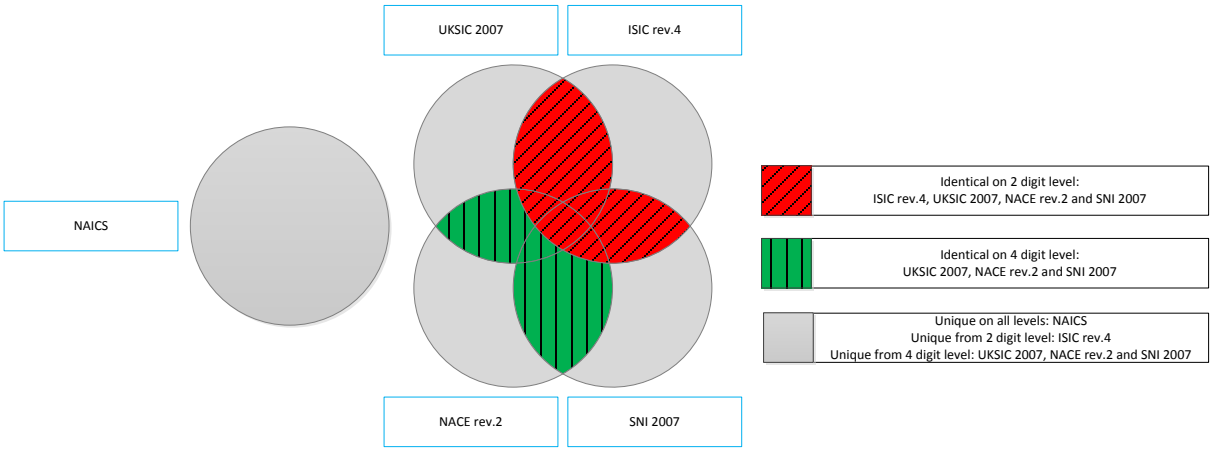


Figure 2 - Comparability between industrial classification systems expressed as a venn diagram.

The above treated classification systems are presented on a 2-digit level in the table below in order to highlight the degree of conformance between the systems. Bold text in the table indicates identical classifications between systems. In the table, the 2-digit level of ISIC rev.3 is also included in the table due to the large quantities of statistical data available online in this revision format.

Table 1: UKSIC2007: http://www.uksiccodes.com/sic07_2.csv , NAICS: http://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2012 , NACE: http://ec.europa.eu/competition/mergers/cases/index/nace_all.html , ISIC: (Office for National Statistics, 2009) , SNI: http://www.sni2007.scb.se/_pdf/080131snisorteradeng2007.pdf

NAICS	ISIC rev.3	ISIC rev.4, UKSIC2007, NACE rev.2, SNI 2007
11. Agriculture, Forestry, Fishing and Hunting 21. Mining, Quarrying, and Oil and Gas Extraction 22. Utilities 23. Construction **31-33. Manufacturing** 42. Wholesale Trade 44-45. Retail Trade 48-49. Transportation and Warehousing	*D. Manufacturing* 15. Manufacture of food products and beverages 16. Manufacture of tobacco products 17. Manufacture of textiles 18. Manufacture of wearing apparel; dressing and dyeing of fur 19. Tanning and dressing of leather; manufacture of luggage, handbags,	*C. Manufacturing* 10. Manufacture of food products 11. Manufacture of beverages 12. Manufacture of tobacco products 13. Manufacture of textiles 14. Manufacture of wearing apparel 15. Manufacture of leather and related products 16. Manufacture of wood and of products of wood and cork,

51. Information 52. Finance and Insurance 53. Real Estate and Rental and Leasing 54. Professional, Scientific, and Technical Services 55. Management of Companies and Enterprises 56. Administrative and Support and Waste Management and Remediation Services 61. Educational Services 62. Health Care and Social Assistance 71. Arts, Entertainment, and Recreation 72. Accommodation and Food Services 81. Other Services (except Public Administration) 92. Public Administration	saddlery, harness and footwear 20. Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials 21. Manufacture of paper and paper products 22. Publishing, printing and reproduction of recorded media 23. Manufacture of coke, refined petroleum products and nuclear fuel 24. Manufacture of chemicals and chemical products 25. Manufacture of rubber and plastics products 26. Manufacture of other non-metallic mineral products 27. Manufacture of basic metals 28. Manufacture of fabricated metal products, except machinery and equipment 29. Manufacture of machinery and equipment n.e.c. 30. Manufacture of office, accounting and computing machinery 31. Manufacture of electrical machinery and apparatus n.e.c. 32. Manufacture of radio, television and communication equipment and apparatus 33. Manufacture of medical, precision and optical instruments, watches and clocks 34. Manufacture of motor vehicles,	except furniture; manufacture of articles of straw and plaiting materials 17. Manufacture of paper and paper products 18. Printing and reproduction of recorded media 19. Manufacture of coke and refined petroleum products 20. Manufacture of chemicals and chemical products 21. Manufacture of basic pharmaceutical products and pharmaceutical preparations 22. Manufacture of rubber and plastic products 23. Manufacture of other non-metallic mineral products 24. Manufacture of basic metals 25. Manufacture of fabricated metal products, except machinery and equipment 26. Manufacture of computer, electronic and optical products 27. Manufacture of electrical equipment 28. Manufacture of machinery and equipment n.e.c. 29. Manufacture of motor vehicles, trailers and semi-trailers 30. Manufacture of other transport equipment 31. Manufacture of furniture 32. Other manufacturing 33. Repair and installation of machinery and equipment

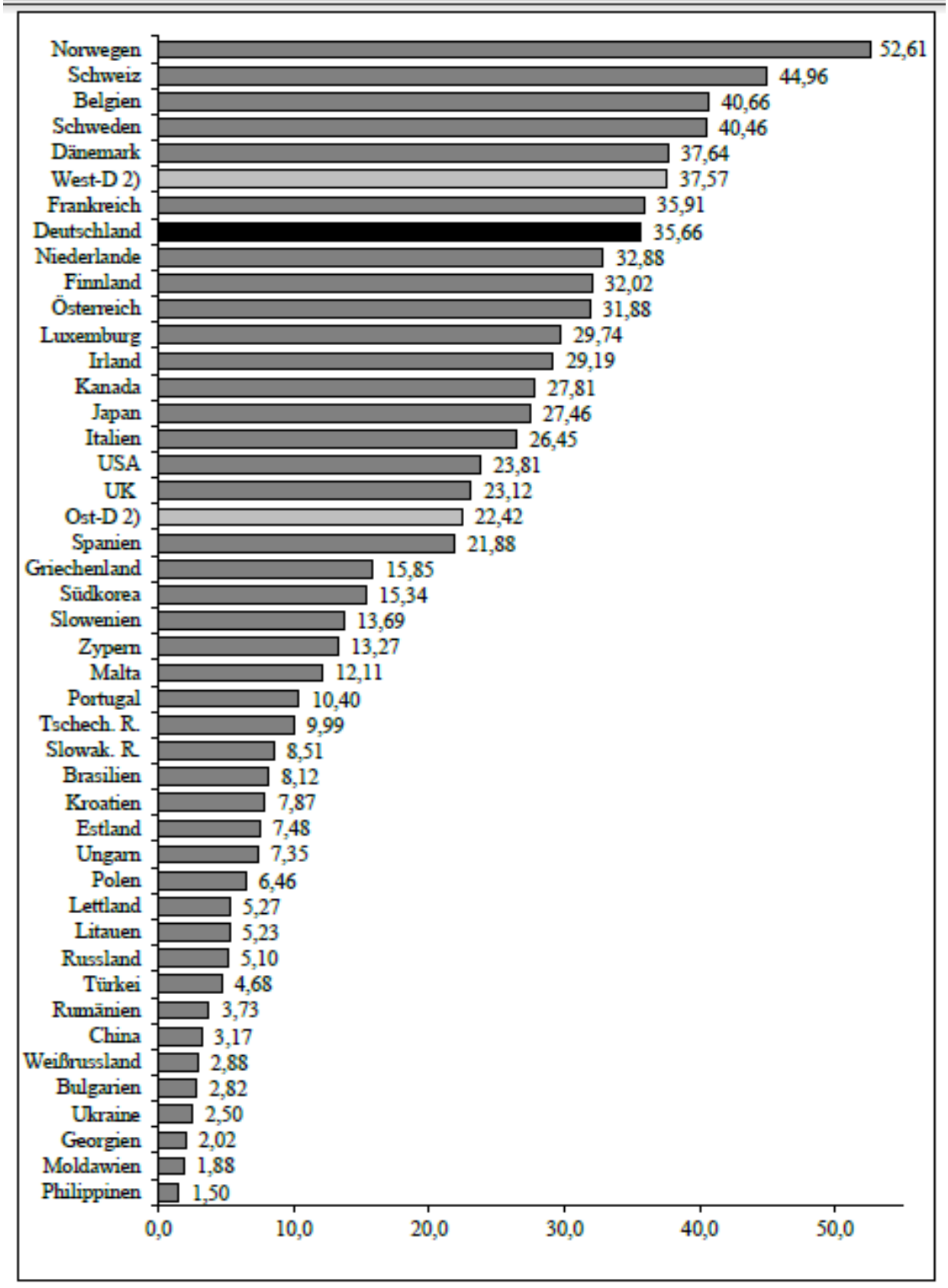
	trailers and semi-trailers 35. Manufacture of other transport equipment 36. Manufacture of furniture; manufacturing n.e.c. 37. Recycling	

About Discrepancy in Data from the SCB and OECD Databases

The OECD provides statistical data from the Structural Analysis Database (STAN), which is classified according to ISIC rev.3 from 2000 to 2010, available for 32 OECD countries, and according to ISIC rev.4 up to 2011 for 15 OECD countries (OECD (1), 2013) (OECD (2), 2013). Due to available statistical data from OECD and STAN being based on ISIC rev.4, and in regards to the above information about comparability between classification systems, the discrepancy between data from the OECD STAN database and the SCB database, which is based on SNI 2007, is not due to the different classification systems being used, since data on a 2-digit level is compared.

According to documentation about dispersion of data from the SCB database (Statistiska Centralbyrån - Avdelningen för Nationalräkenskaper, 2013), SCB reports data to OECD every time new statistics regarding national economic data is published. SCB uses ENS 95 to structure and publish statistical data, which is an internationally comparable accounting system of a national economy, and is consistent with the SNA 93 system which is used by OECD.

Appendix III - Labour costs in manufacturing in 2011 – hourly wage in Euro



Source: Schröder 2012

Appendix IV - Previous studies on Manufacturing in Sweden

Considering the nature of the topic investigated, and its relevance for strategic policy development in the manufacturing sector, it is to be expected that related studies have been conducted. A brief summary of previous works of the Swedish manufacturing sector are presented below, describing the type of study made and highlighting the differences in regards to the study presented in this report.

Two studies conducted by IVA (2005a, 2005b) investigated the future outlook of Swedish manufacturing and the importance of manufacturing industry for the Swedish economy, respectively. Regarding the former study, a panel of representatives from companies, universities and organisations established a future projection of the Swedish manufacturing sector during a series of focus group meetings. An international assessment was also made through a survey conducted in the US, Germany, the U.K. and France. In the latter study, focusing on the importance of manufacturing for Sweden, a similar research approach is used and conclusions regarding different driving forces for localisation of manufacturing are made. The West Swedish Chamber of Commerce (Dahlsten, 2014) have studied aspects of competitiveness for manufacturing firms in western Sweden, and Statistics Denmark (2008) have published a joint report with statistical offices in Finland, Netherlands, Norway and Sweden where the topic of international sourcing was investigated. The survey-based study focused on aspects of sourcing such as competitiveness, motivations and perceived benefits and barriers. Conclusions made regarding the latter two aspects are also related to in the discussion in this report. Agendas for the Swedish manufacturing sector have also been published, see e.g. VINNOVA (2013), Teknikföretagen (2008) or McKinsey & Company (2012).