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THE ROLE OF INDUSTRY IN THE EU: MAKING MANUFACTURING WORK

A Master's Thesis submitted for the degree of
"Master of Science"

supervised by
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Vienna, 3 November 2015

Affidavit

I, **Konstantin Kraus**, hereby declare

1. that I am the sole author of the present Master's Thesis, "THE ROLE OF INDUSTRY IN THE EU: MAKING MANUFACTURING WORK", 55 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted this Master's Thesis as an examination paper in any form in Austria or abroad.

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ABSTRACT

The European Commission announced its ambitious plan of reindustrialising the EU and thus increasing the share of industry to 20% of EU wide GDP. The key research question is how to sustainably attain this goal. Short-sighted government intervention to protect jobs and bail out inefficient operations leads to even deeper structural problems in the long run and is detrimental to competitiveness, growth and thus the prosperity of a region.

A mix of input data, such as labour market data, and output data, such as the level of industry of GDP, were used to evaluate the development of industry in the EU over time. Another question was if the current policies are effective at providing a competitive framework for companies and at the same time allowing workers to participate.

The results were that job preservation is not a compelling industrial strategy and as a result only high value-added processes should qualify for support. In order to achieve this aim it was suggested to reconsider the allocation of subsidies and to support promising emerging industries. It can be concluded that the European Commission's ambitious goal of a 20% share of industry in EU wide GDP is not within reach and it most likely will not be achieved. However, it sends the right signal to firms that are looking for some confidence when investing.

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LIST OF ABBREVIATIONS

BCG	Boston Consulting Group
bn	Bn
BRIC	Brasil, Russia, India, and China
CAR	Center Automotive Research at the University of Duisburg-Essen
DB	Deutsche Bank
EC	European Commission
ECB	European Central Bank
EIB	European Investment Bank
EU	European Union
FDI	Foreign Direct Investment
GE	General Electric
GDP	Gross Domestic Product
IEA	International Energy Agency
IMF	International Monetary Fund
IW	Institut der deutschen Wirtschaft Köln (Cologne Institute for Economic Research)
MNE	Multinational Enterprise
NACE	Nomenclature Generale des Activites Economiques dans les Communautes Europeennes

OECD	Organisation for Economic Co-operation and Development
R&D	Research & Development
SME	Small and Medium-Sized Enterprises
TBT	Technical Barriers to Trade
UBA	Umweltbundesamt
US	United States of America
USD	US Dollar
WEF	World Economic Forum
WTO	World Trade Organisation

I INTRODUCTION

1. Background and Motivation

After the global financial crisis policymakers all over the world acknowledged the importance of the industrial sector. While there are various different strategies to increase the share of industrial activity, there is widespread consensus that manufacturing and related service sectors are beneficial for a country's economy. Germany's strong industrial base has allowed it to better navigate through the financial and economic crisis than most of its European neighbours. It is no surprise that industrial policy reform is high up on the European agenda. Consequently, industrial policy plays an important role in the current agenda of the European Commission. A strong industrial base is perceived as key to preserving prosperity, jobs, and innovation. How can a sustainable reindustrialisation contribute to the economic recovery in Europe? What works and what does not? Should this be planned by European institutions or at the individual Member State level?

This analysis aims at describing the how the goal of reindustrialisation can be achieved. Furthermore this work tries to add value by monitoring the progress over time. For many years, in response to intensifying global competition, companies decided to outsource manufacturing operations in order to reduce costs. But the long-term effects of those choices become visible: in many cases, "once manufacturing capabilities go away, so does much of the ability to innovate and compete. Manufacturing, it turns out, really matters in an innovation-driven economy" (Pisano & Shih, 2009).

The limited scope of the thesis makes it necessary to focus on certain regions and aspects. Although there are many suitable examples, the empirical focus will be on the EU and here especially on Germany due to the availability of data.

Industry plays a large part in our lives, both in society as an employer and a meaningful way to leave positive marks. But also in the goods that we use and the consequences for the environment. The absence of a coherent national, let alone EU wide, industrial policy have sparked my interest. The debate about Industry 4.0 has started but any substantial output has yet to be seen from governments. At the

moment, it is largely private sector companies that drive the change and reshape the manufacturing landscape.

On a different note, I am fascinated by the topic as shifts in output become so visible in our globalised world. The phrase “Made in China” became synonymous with a power shift to emerging markets and decreased poverty but also with reduced job security in developed countries and alarming signs of environmental pollution as evidenced by smog in many Asian cities. The high visibility of the topic and the emerging debate about reindustrialisation strategies, made me immerge into this field. On top of that, Austria with its traditionally strong industrial base, embedded in a network of industrial clusters enjoys a beneficial environment to compete at the global level. It will be interesting to see how policy makers together with industry leaders will align to ensure a dynamic development and participation of the workforce.

The world is facing a new reality after the financial crisis that started in 2008. On the one hand side, developed countries have to cope with high budget deficits and lack of infrastructure investment while emerging market economies struggle to create jobs at a sustainable pace for their aspiring population. On the other hand side, the nature of work is changing constantly and while the increased level of automatisation poses a threat to workers and social coherence it is also an opportunity to boost productivity.

One of the main reasons why the share of manufacturing declined in the US was that it was seen as only seen as a cost center that held no competitive advantage (Pisano & Shih, 2009). Accordingly, decisions on where to locate manufacturing capabilities were made by narrow financial criteria rather than a forward looking, innovation driven view. If the process technology was assumed to be mature, it was tempting to reduce costs by outsourcing operations.

“America has lost not only the ability to develop and manufacture high-tech products like televisions, memory chips, and laptops but also the expertise to produce emerging hot products like the Kindle e-reader, high-end servers, solar panels, and the batteries that will power the next generation of automobiles...” (Pisano & Shih, 2012)

Previous work by Gary Pisano and Will Shih of Harvard Business School emphasizes the role of manufacturing in the innovation process. They argue that

“today’s undervalued manufacturing operations often hold the seeds of tomorrow’s innovative new products” (Pisano & Shih, 2012)

Other factors were active government policies in regions such as Asia (and the lack thereof in the US) as well as a chance in technology that allowed it to separate manufacturing and assembling of goods from R&D.

To counteract years of poor (out)sourcing decisions and too little investment in manufacturing operations, significant investments in both domestic product and process development are needed. To regain competitiveness in the industrial sector, a number of things in the soft and hard infrastructure domains have to be addressed.

2. Research Aim and Research Question

The thesis will try to answer the question how the EC’s goal of increasing the share of industry of EU wide GDP to 20% by 2020 in the EU can be achieved and sustained. Considering the sets of data available on the topic it becomes evident that both policy makers and business leaders struggle to meet the expectations of increasingly self-determined workers on the one hand side and intensified international competition on the other. Ultimately the success of any policy will be measured by what extent it was able to fulfill the goals it was designed for. Accordingly, industrial policies in the EU aim to be sustainable, thereby including the environmental and social dimensions that were neglected in previous years.

The main task for a holistic industrial policy and a concerted push for reindustrialisation is to understand how the defined goals of combining sustainability with economic growth can be achieved. The way to the status quo will be examined in order to get an overview and help achieve the goals of the paper. The overall goal of this work is to give concrete recommendations about the design of industrial policies on both the government and individual firm level. In order to examine this, the following sub questions will add substance to the analysis. Are the aims of the reindustrialisation process the same for all stakeholders, and if not, how do they differ? What is the role of subsidies? What can be derived from the characteristics of the labour market? Is the goal of 20% share in industry meaningful?

3. Structure of the Thesis

To be able to answer these questions, the reindustrialisation agenda of the EU will be assessed and it will be pointed out why the EU cannot just copy the US' strategy. While the US can be treated as a homogeneous entity with regards to culture and business climate, the situation in the EU is a lot more complex and individual Member States exhibit different characteristics. The heterogeneity of the EU becomes especially pronounced when examining the competitiveness of its Member States. The EU's size in terms of populated area, combined GDP and inhabitants are not the decisive factors but differences in the level of industrial output to total GDP as well as the share of high-value added and high-tech goods and services. For reasons of simplification and due to the readily available data Germany will be used as the prime example in Europe. Although the population is significantly higher in the US, Germany's size of the welfare state, the relative contribution of manufacturing to total GDP, and the export ratio, are all significantly higher.

After an analysis of the most important aspects of the reindustrialisation agenda, it will be possible to distinguish the different approaches with regards to their objectives, best practices and aspirations for the future.

With this thesis I aim to, on the one hand, evaluate reindustrialisation strategies at the country level, and on the other, give recommendations how firms can adapt their strategy to successfully compete in an evolving industry landscape.

A mix of input data, such as labour market data, and output data, such as the level of industry of GDP, were used to evaluate the development of industry in the EU over time. Another question was if the current policies are effective at providing a competitive framework for companies and at the same time allowing workers to participate.

The gradual shift away from manual labour has resulted in a serious problem for unskilled workers as there are less jobs available in the industrial sector that require simple qualifications. A brief overview of the reindustrialisation efforts and their goals is given. The principal methodology of the thesis will be the examination of key figures such as the share of industrial production of total GDP, FDI, labour market data as well as an explanation for these figures, thus highlighting the value they bring to the research question.

This is followed by an overview of government intervention and a regional comparison with a focus on how the US did things differently to the EU. After an examination of the different approaches, the significance of the private sector in bringing about innovation will receive a thorough examination. It is argued that subsidies distort the picture and the whole idea of subsidies to govern supply and

demand could be subject to scrutiny. This is done to accentuate the vast chances a reallocation of funds offers.

One of the main aspects of the thesis is an examination of the pressing social issues that can be linked to changes in the way we work. Modularization, the fragmentation of various steps involved in the production of a good, has produced winners and losers. Subsequently, it will be assessed what working conditions might look like in the future and how to best position a country or a firm.

The results of these analyses will be used to produce concrete policy recommendations at the government level and to identify viable strategies for business leaders at the firm level to cope with the demands and aspirations of employees that constantly have to outperform the competition.

II RESEARCH METHODOLOGY

1. Research Design / Introduction

Assessing the success of the European Commission's initiative to boost industrial production is quite an ambitious goal. To strike a balance and create meaningful results, I relied on work by Gary P. Pisano and Willy C. Shih of Harvard Business School who published a thorough analysis on the state of US manufacturing. For data in Europe I relied on Deutsche Bank's EU Monitor, the World Economic Forum's Competitiveness Index, a Deloitte Study on manufacturing, as well as various other strategy papers produced by European think tanks.

The terms "manufacturing" and "industry" are used interchangeably and refer to class C ('Manufacturing') of NACE, the European industry standard classification system.

2. Data Collection

Official figures on various economic performance indicators are obtained from international institutions such as the World Bank, the IMF, the EU (Eurostat), and

strategy papers from think tanks, consultancies, as well as broker notes from investment banks. Occasionally, data from economic research institutes such as the IW or the German Federal Statistical Office is used.

The majority of literature and sources used was readily available in English, which includes books, articles, studies, and to a lesser extent in German.

With regards to data available and finding examples, I relied on work by Garry and Pisano Shih of Harvard Business School who published a thorough analysis on the state of US manufacturing. The insights of the Boston Consulting Group's (BCG) global industry practice in Chicago also proved to be invaluable. Their work gave the best account of the development of industrial clusters.

At the European level, I relied on Deutsche Bank's research notes on the reindustrialisation of Europe. Work of the Fraunhofer Institut was incorporated in the section on energy efficiency and renewable energies and their stance on the commercial viability of the clean technology sectors was especially appreciated.

3. Results and Discussion

Short-sighted government intervention to protect jobs and bail out inefficient operations leads to even deeper structural problems in the long run and is detrimental to competitiveness, growth and thus the prosperity of a region. The results were that job preservation is not a compelling industrial strategy and as a result only high value-added processes should qualify for support.

In order to achieve this aim it was suggested to reconsider the allocation of subsidies and to support promising emerging industries. It can be concluded that the European Commission's ambitious goal of a 20% share of industry in EU wide GDP is not within reach and it most likely will not be achieved. However, it sends the right signal to firms that are looking for some confidence when investing.

III REINDUSTRIALISATION IN EUROPE

The following section draws heavily on Deutsche Bank's EU Monitor from November 2013, Deloitte's Global Manufacturing Index, a study by the Cologne Institute for Economic Research that looks at the quality and conditions of Germany as a location for industrial production, and the online databases of the World Bank and the IMF.

By comparing the historical contribution of industrial output to total GDP, trends throughout eligible countries can be identified, analysed, and ideally explained with the goal of drawing conclusions and producing policy recommendations for political decision makers and managers.

As a next step it is then examined whether the actions taken were effective and the desired goals were reached. Policy implementation always comes with an ideological debate and accordingly actions of nation states and the European Union as a whole will be subject to criticism. Consequently, one can only look at the effectiveness of policy measures and assess whether the desired effects were reached. The mandates and business strategies of governments and companies, respectively, vary considerably and are ultimately determined by a set of factors that change over time. Common priorities should be identified and appropriate action should be taken accordingly.

Table 1 – The EC's four priority areas to increase the share of the industrial sector in the EU; Own table based on text from DB Euromonitor, 2013 with underlyding data from the EC

Investment in New Technologies:
 	
• The markets for these technologies will generate disproportionately strong growth over the long term:
  o 'green' production technologies
  o green motor vehicles
  o bio-based fuels and chemicals
  o intelligent networks
  o key technologies such as microelectronics
  o nanoelectronics
  o material sciences
  o industrial biotechnology
• The EC has suggested that the EU member states should step up their marketing and use of these technologies
• The EC itself plans to ensure that standards for new products are more swiftly devised and internationally recognised in the future
• And it intends to encourage public- private partnerships
	Improved Single Market for Goods:
	
	• simplifying the legal framework
	• integrate goods in the areas of defence and security more effectively into the single market
	• Promoting entrepreneurship education
	• SMEs are to be given better support in protecting their intellectual property in non-EU countries and
	• Support for SMEs using the WTO's Technical Barriers to Trade (TBT) procedure

Improved Access to Finance for SMEs: • Lending capacity of the EIB has been increased for this purpose • The EC set up a website that provides information on financing options available under EU programmes	Investment in Human Capital: • Develop a European recruitment and work placement portal • Quality framework for traineeships • Sectorial knowledge alliances

1. Historical Background – Formation and Development of the Post-Industrial Economy

The 21st century is the era of formation and development of the post-industrial economy and further globalisation of industry and exchange in the world economy. It is the era of deepening international economic integration in its various regions and improving the interaction of various integration formations for sustainable economic and social progress throughout the global community.

Currently the most developed countries of North America, Western Europe and Asia moved into the post-industrial stage of development. Post-industrial society is characterized by maximum imposition of production out of the state with an emphasis on the development of information technologies.

American sociologist D. Bell formulated the basic features of such society: the creation of a service economy, dominance of scientific and technical experts, the central role of theoretical scientific knowledge as a source of innovation and policy development in the society, the ability of self-growth process, creating new "intellectual" products. Analyzing new features in the economy, Bell concluded that there has been a shift from industrial to post-industrial stage of development in society with predominance of the manufacturing and service sectors.

The transition to a postindustrial society occurs in the last third of the 20th century. Society is already provided with food and goods, so another variety of services moves into the foreground, mainly associated with the accumulation and distribution of knowledge. As a result of the scientific and technological revolution science was turned into a direct productive force, which has become a major factor of development of the society and its survival factor.

At the same time a person got more free time and therefore opportunities for creativity and self-realization while at the same time prestige of education increased. Technical developments are becoming more knowledge-intensive, theoretical knowledge has got the most important meaning. Spreading of this knowledge is provided by a highly developed network communication system.

During 25 years of stable economic development of postwar Western Europe a second center of power in the world has begun to be approved. From 1948 to 1973 the total GDP of the region always had positive results. It is necessary to pay attention to the 1950s and 1960s, when the average growth of the economy in Germany and Italy increased 4 times, more than doubled in France, and nearly doubled in Great Britain. This is not only due to the Marshall Plan, but also due to expanding domestic market, development of international trade, an era of cheap oil from the Persian Gulf, restructuring of industry on the basis of implementation of the latest scientific and technical developments since the war, as well as government

policy of the West aimed at supporting economic growth. Under the influence of these factors a special model of post-industrial society with special European features was formed.

The appearance of the modern world economy began to be formed from the late 1940s when most countries were involved in the global system of the industrial economy. The next decades were characterized by increasing economic stratification and the foundation of new world's economic order. The collapse of the colonial empires largely excluded countries from traditional division of labour by making developed economies much more self-sufficient. The development of high technology and science into the main productive force allowed the great powers to abandon their former development pace of its own industrial production, which gave rise to so-called "points of growth" in Latin America and Southeast Asia.

As a result, in the early 90s the world was divided into three parts: developed, represented by postindustrial countries, which were dominants in high technology and were controlling major investment flows. Secondly, newly industrialized countries, importing technology and capital, and exporting the products of mass production. The third part were regions that were specialized at the production and supply of raw agricultural products, entirely dependent on the demand for their products and therefore fully under the control of post-industrial community.

The formation of post-industrial system was prepared by the rapid economic growth of the 50s and 60s resulting in a significant increase in welfare of Western countries and a sharp increase in the role of science and technology in all spheres of public life. The application of scientific and technological progress has changed the structure of production and employment. Increased welfare led to a materialistic view as opposed to traditional values, increased the role of science and education and put individual development goals in a place of a major social priorities. All these factors can be seen in the first post-war decades.

The economic model of post-industrial European countries significantly differs from the USA as countries in the region are oriented on a social market economy with larger participation of the state in it and in corporate structures than in the US. Another major difference is the significantly higher level of social protection of employees. Collective agreements between the employee and the company without the requirement of indexing became widespread in Europe. The US actively used new, more efficient technology, dismissing workers. However, economic growth that supported this technology made it possible to create more jobs. So at the end of 90s the unemployment rate in the US was lower than the level of so-called effective employment, which according to the Phillips curve was 5-6% (in March 1999 it was 4.2%, which was the lowest figure in the last 29 years). While the unemployment rate in Europe reached 15%.

Moreover, Europe is still characterized by an oligarchic structure of distribution of property (a small group of wealthy families), while the US corporations mostly belong to large groups of foreign shareholders. No individual shareholder owns such part of shares, which would allow having a high degree of control. Even the five largest shareholders of large, publicly listed companies usually representing the institutions that accumulate stocks of many individual shareholders collectively, own less of the shares of the corporation that would be needed to have a controlling interest. Shareholders are focused on profitability and high dividends. The biggest part of American corporate profits after tax was paid on dividends. In case of ineffective management of companies shareholders sold shares and invested in more promising projects.

Europe has much less scientific potential additional efficiency. Each country tends to produce very high-tech products, therefore, the scope of European companies is smaller than American. In the US, after the takeover of “Chrysler” by German concern “Daimler Benz” there were only two national car manufacturers, which already were parts of the ten largest companies in the world.

Europe has less scientific researches than the USA since they are often duplicated in neighboring countries. In addition, the funds are mostly spent on basic research, while applied research are primarily related to developments in traditional industries. That is why Europe’s economy produces mainly traditional products and services of the industrial age. In the advanced high technology sectors, European countries can not compete with the US.

European countries have a high share of government in the economy. State expenditures account for nearly 50% of GDP, indicating social focus primarily on economic development and limiting competition, particularly in the EU. Most Western European countries have a relatively limited domestic market and hence limited economies of scale, which determine the export orientation of the economies. Initially, they formed a relatively open economy, which corresponded to the stage of an open postindustrial society.

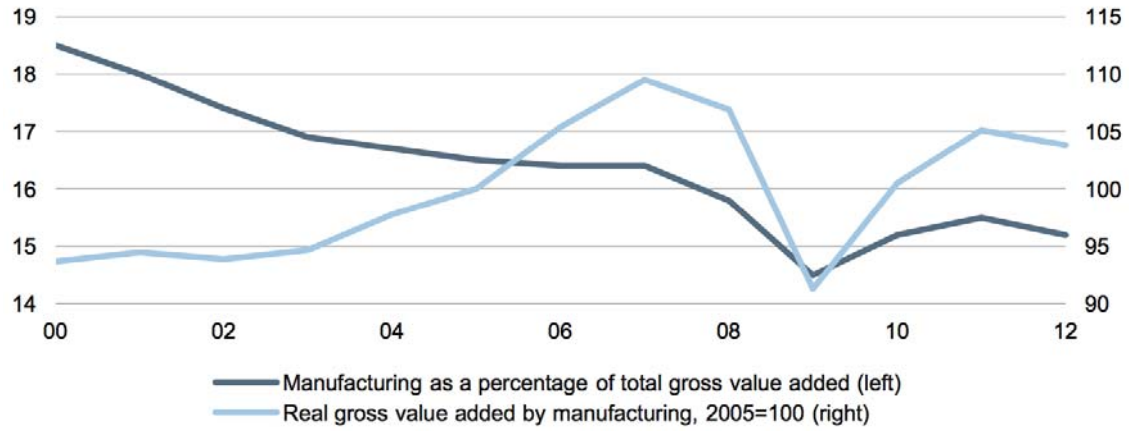
General differences in economic development of leading European countries compared with the United States are also combined with the features of national economies.

2. Output Factors

The European Commission announced its plans to increase the share of the industrial sector from 16% in 2012 to 20% by 2020. In January 2014 the share of

manufacturing in GDP stood at 15.1% with the productivity performance deteriorating relative to competitors (European Commission, 2014).

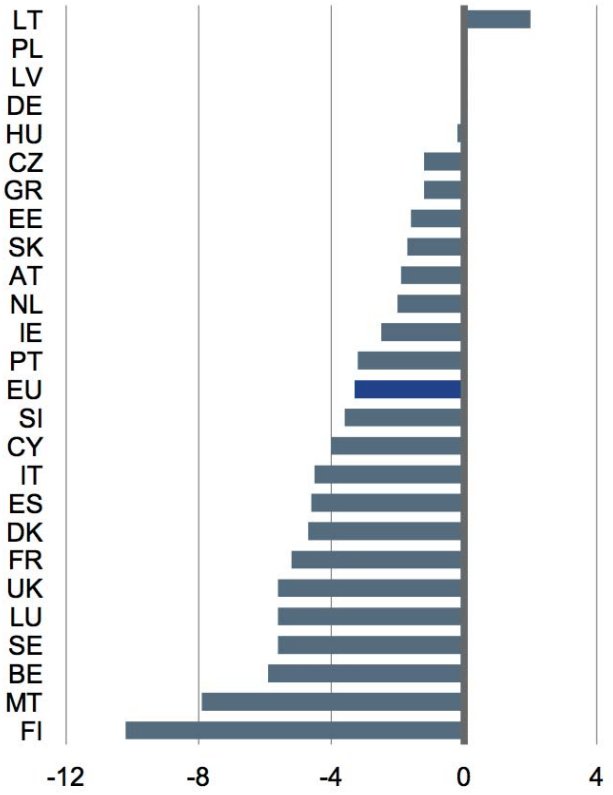
Chart 1 – The share of industry is shrinking (Deutsche Bank 2013, Eurostat)



Overall, the gross value added by manufacturing in relative terms to total gross value has decreased in the EU since 2000 (Chart1).

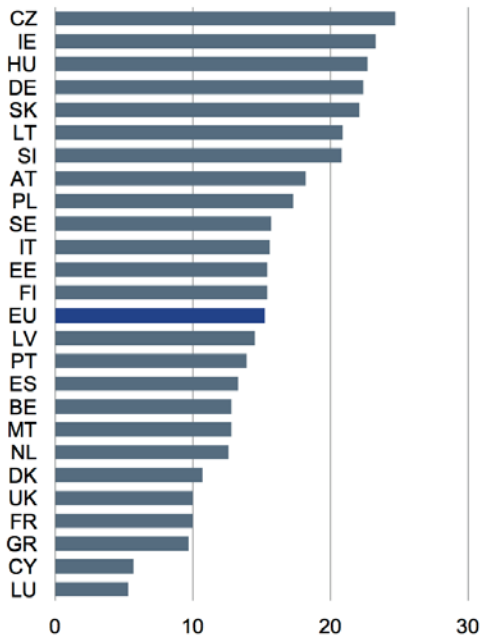
The declining share of industry can be attributed to the declining international competitiveness of some countries on the one hand side and to a growing service sector in others.

Chart 2 – Change in Manufacturing Sector's Share of Total Gross Value Added, 2012 vs 2000 in percentage points (Deutsche Bank 2013, Eurostat)



Comparing data over time is crucial in understanding market dynamics. Germany is the only Western European country where the manufacturing sector's share of total gross value added was not shrinking. This implies that the relative contribution of industry in relation to economic output has declined in the rest of Western Europe (Chart 2).

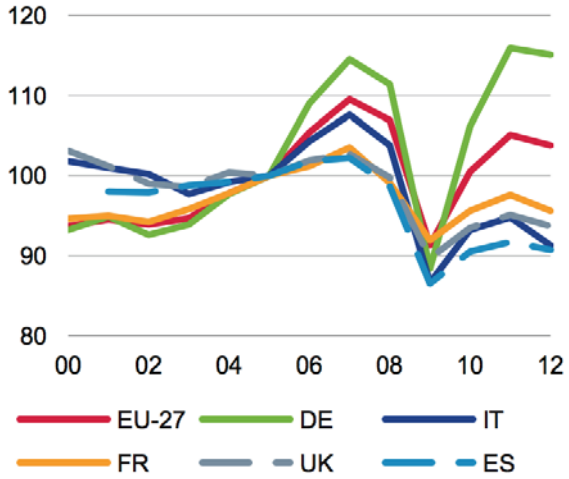
Chart 3 – Manufacturing Sector's Share of Total Gross Value added, 2012, in % (Deutsche Bank 2013, Eurostat)



The results in Chart 3 show a mixed picture. It becomes evident that a relatively large share of industry does not automatically translate into a strong and successful economy. By the same token is a small share not to be seen as evidence for a weak economy.

Germany leads the way with substantially higher real gross value added by manufacturing over the last decade while France, Spain, and Italy are well below their pre-crisis levels (Chart 4).

Chart 4 – Real Gross Value Added by Manufacturing (Deutsche Bank 2013, Eurostat); 2005=100

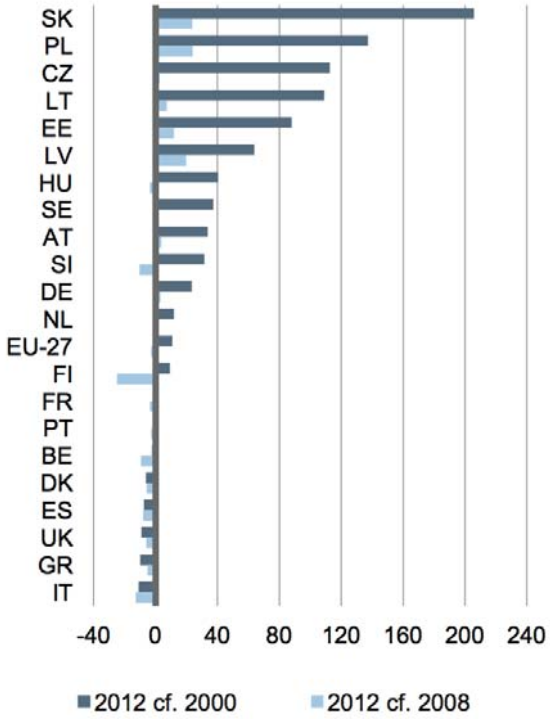


An analysis of the real gross value added by manufacturing as opposed to the contribution of industry to economic output exposes the formidable performance of Eastern European economies, a solid increase by Germany, Austria, and Sweden. The performance of Italy, Greece, and the UK, however, stands in marked contrast to this.

If you go back further and use 2008 as the base year, just before the financial crisis left its mark in underlying industry data, meaningful growth is only achieved by a few Eastern European countries with the exception of Austria, Germany, and Sweden which only just manage to grow positively (Chart 5). Finland appears to be an interesting case but data from 2000 to 2007 shows that the country exhibited high growth during that period that contracted in the years after. It can be concluded that its growth from 2000 to 2012 happened during the period before the analysis starts in 2000.

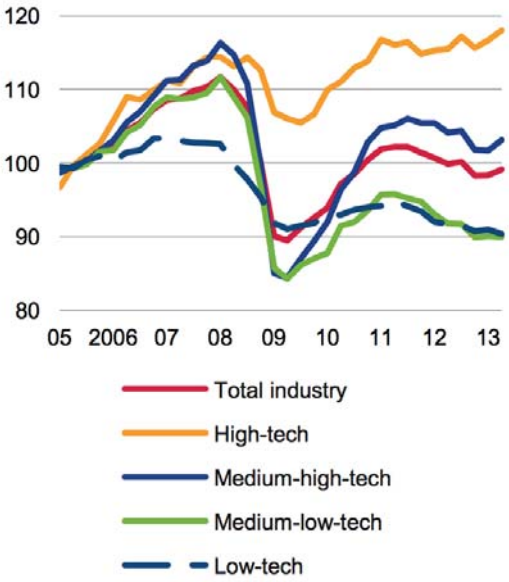
On average, the real gross value added by manufacturing declinded by almost 3% in the EU-27 since 2008, with Italy, Slovenia, Belgium, and Spain notably declining (Deutsche Bank, 2013).

Chart 5 – Change in Real Gross Value Added by Manufacturing (Deutsche Bank 2013, Eurostat)



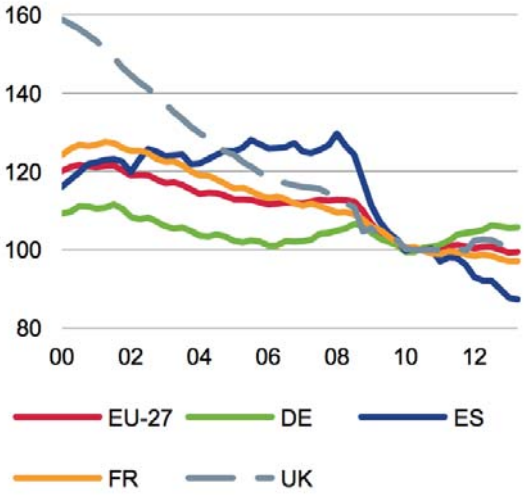
One of the most interesting aspects is the level of technological sophistication when looking at real industrial output throughout the EU. Technology intensive industries are the key drivers of growth as evidenced by considerably increased real industrial output in the high-tech industry (Chart 6). Overall stagnation stems from declining output in the medium-low-tech and low-tech sectors. Given the overarching goal of combining innovation with technology leadership and employment, the results can be interpreted positively. The fact that high-tech industrial output has been above the pre-crisis levels since 2011 underpins the upward tendency.

Chart 6 – Real Industrial Output in the EU (Deutsche Bank 2013, Eurostat); 2005=100



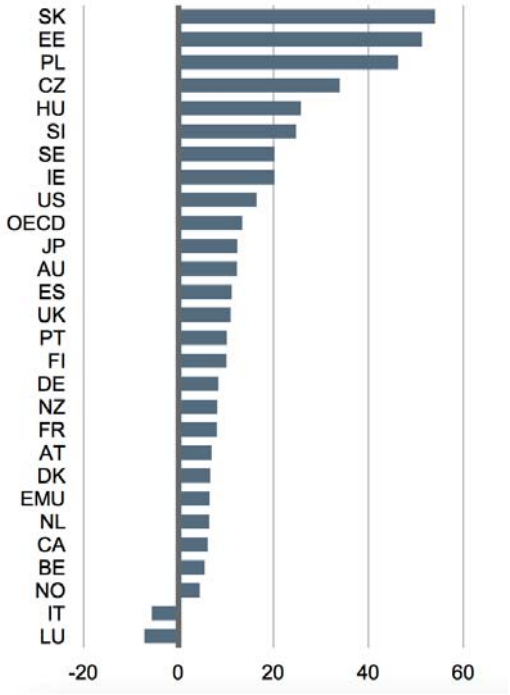
3. Input Factors

Chart 7 – Number of Jobs in Manufacturing (Deutsche Bank 2013, Eurostat); 2010=100



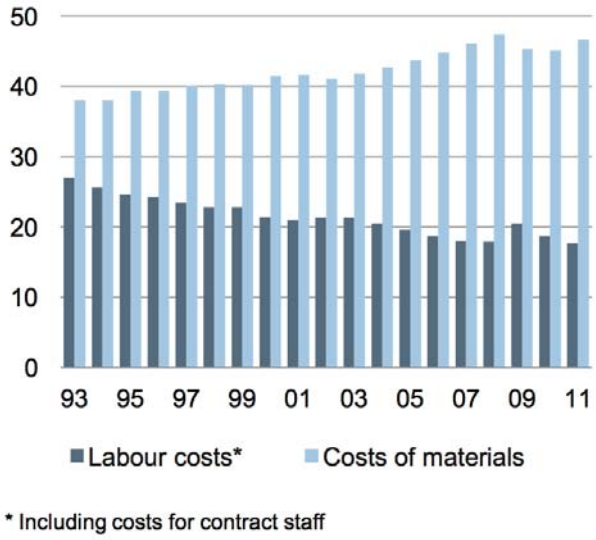
Employment data from Chart 7 confirm the previous observation of the declining relevance of manufacturing. Recently, however employment figures plateaued. One aspect that this graph does not show is the prevalence of regional industrial clusters. While their contribution might be limited on a national level, they can often be central to the local labour market, the value-added-chain, the process of innovation, as well as the local identity of the product and public acceptance.

Chart 8 – Change in Labour Productivity of the Economy as a Whole from 2000 to 2012, in %, (Deutsche Bank 2013, OECD)



Even with higher labour productivity as a result of firstly, increased automatisation and secondly, relocation of processes that require a high labour intensity and were moved abroad to low-cost locations (Chart 7), labour costs will remain a significant factor in the foreseeable future even though their share in gross production value in German manufacturing has been in decline (Chart 8).

Chart 9 – Share of Gross Production Value in German Manufacturing (Deutsche Bank 2013, German Federal Statistical Office, Wuppertal Institute)

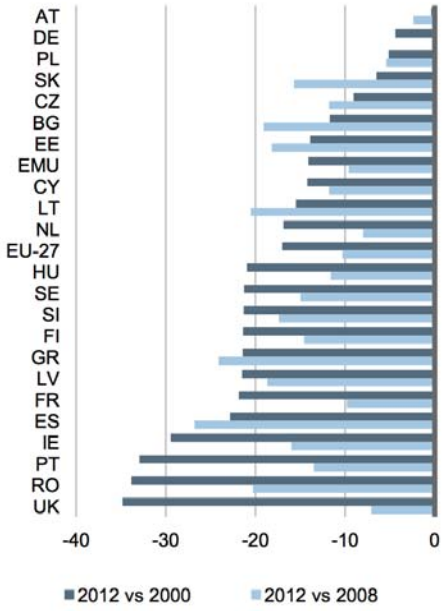


Labour costs still form an integral part of where countries compete. Competition is not restricted to trading blocks but much rather is a reality even on the local level. Neither is high labour intensity a phenomenon exclusive to low-value added work. R&D, strategic and technical planning all require skilled labour that comes at a cost.

Large differences in labour costs imply that for countries at the top different strategies and positioning in terms of their competitive positioning will be applied when competing for manufacturing orders with those at the bottom.

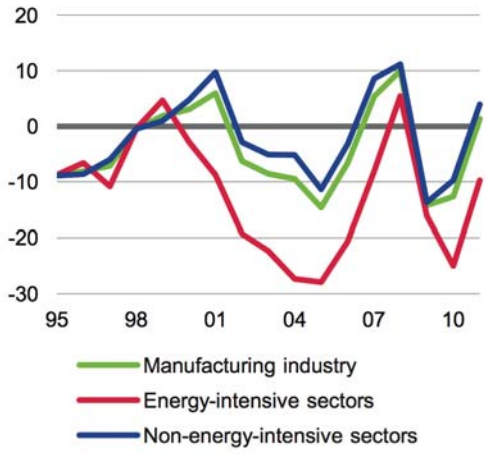
The decreasing significance of industry manifests itself in employment data too. In the UK, the decline in manufacturing jobs has started as early as 2000, 8 years before the financial crisis. During that same period, industrial employment figures in Austria and Germany contracted only slightly (Chart10).

Chart 10 – Change in the Number of Manufacturing Jobs, in % (Deutsche Bank 2013, Eurostat)



While energy costs are amongst the most important input factors for production, the focus of the analysis was deliberately set on labour market data as the implications of social dislocations on the one, and government intervention on the other were subject of examination. However, given the high importance of energy costs in the attractiveness of location for industrial production, Chart 11 will give some indication of the underlying problem.

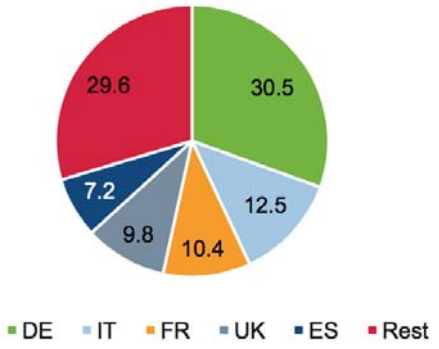
Chart 11 – Net Investment in Plant and Equipment as % of Gross Investment in Plant and Equipment (Deutsche Bank 2013, German Federal Statistical Office)



4. International Context

Germany's share of 30.5% of industrial gross value added in the EU makes it the number one in the EU by a big margin (Chart 12).

Chart 12 – Individual Countries' Share of Industrial Gross Value Added in the EU in 2012, in % (Deutsche Bank 2013, Euostat)



With increased liberalization European companies could benefit from the single market, which now is one of the EU's key competitive advantages that allowed firms to establish production networks and successfully compete with international MNEs (Chart 13).

Chart 13 – The 100 Largest Manufacturing Companies (Deutsche Bank 2013, Industryweek)

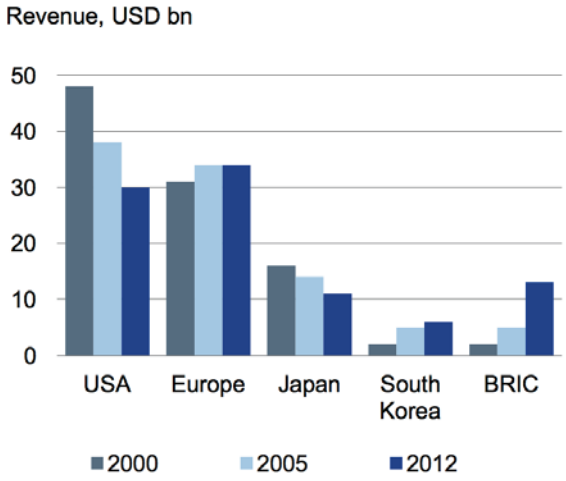
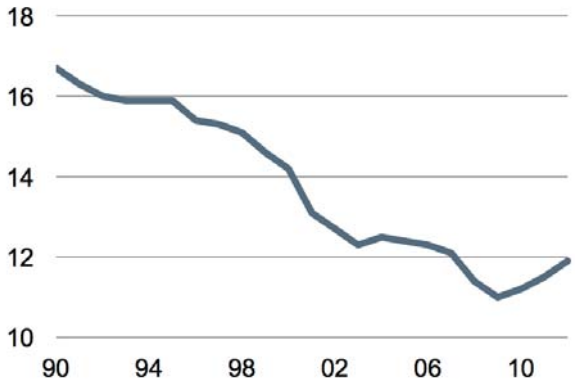
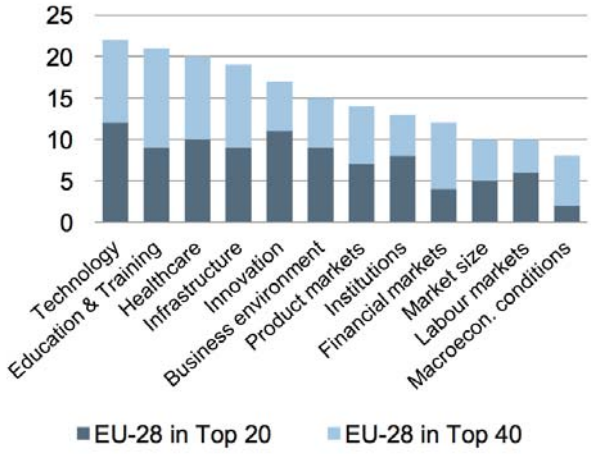


Chart 14 – Manufacturing as % of GDP (Deutsche Bank 2013, Bureau of Economic Analysis)



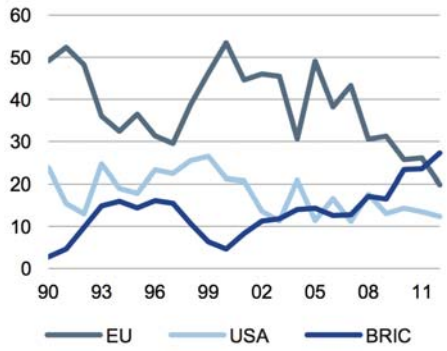
The share of manufacturing of total GDP has recently increased. This could be attributed to a decline in services such as banking after 2008 (Chart 14).

Chart 15 – Number of EU Countries among the Top 20 / Top 40 by Sub-Category (Deutsche Bank 2013, WEF Global Competitiveness Index 2013/2014)



High debt levels (macroeconomic conditions) and a rigid labour market are among the EU Member States' weaknesses. Technology leadership, education, healthcare, and infrastructure enable top positions in the WEF Global Competitiveness Index (Chart 15).

Chart 16 – Share of Global FDI Inflows (Deutsche Bank 2013, OECD)



For the past decades, the EU has attracted the bulk of global FDI. The current downward trend accentuates the growing share of FDI going into the BRIC countries (Chart 16).

The debate on Europe's economy is centered around the theme of competitiveness. Politicians from the whole spectrum only focus on one dimension of it, namely price levels. Despite restrained and in some sectors even cut wages, Europe will never be able to compete via the price with emerging markets such as India or China that offer cheaper labour.

At the same time, public investment in infrastructure projects, education, research and development fell victim to the austerity measures. This has direct, visible consequence that manifest itself in a decline in the number of European patent applications in the high-tech sector since 2001. A reversal of that trend is not in sight (Eurostat, 2014).

Short term measures such as bridge financing for fundamentally competitive firms that face liquidity problems due to restrained lending that allow them to maintain production should be made available by development banks.

While the industrial renaissance is an opportunity to use state of the art technology and to leap frog here are a number of reasons why a revitalization of industry cannot simply be translated into a European context. One of the most important factors, often overlooked, is the fact that in many cases manufacturing was outsourced to Eastern European countries that are now part of the EU. As opposed to overseas manufacturing to, for example Asian countries, that could be brought back. Another

dimension is that the labour cost advantages in many emerging markets are shrinking and therefore overseas production increasingly caters to local markets. With transportation costs continuously in decline and a diminishing labour cost advantage it would not come as a surprise if we were to observe production capacities returning to the EU.

5. Informational Society as a Basis of the Post Industrial Economy

Information, as well as capital can be accumulated and stored for future use. In the post-industrial society, national information resources are the biggest sources of wealth. The post-industrial economy is an economy in which industry gives way to the service sector (which mostly consists of processing information) in terms of employment index rate and its share in the national product.

Considering social development as “changing stages”, followers of the information society theory associate its beginning with the dominance of the information economy sector that comes after the agriculture, industry and service economy.

While in the agrarian society economic activity has been associated with food production, but the limiting factor was the land, the industrial society was primarily the production of goods, and the limiting factor was capital, in the informational society, the main economic activity is the manufacture and use of information for effective functioning of other forms of production, but the limiting factor is knowledge.

While labour and capital were the central variables in an industrial society, the post-industrial society’s main factors are information and knowledge that replace labour as a source of added value.

Since 1993 the United States and Canada develop a concept of the first national and further global “informational highway”. Informational Society in the American version is defined as a society in which better schools and courses are available to all students, regardless of geographical conditions, distance, resources and capacity. The enormous potential of art and literature is available not only in libraries and museums and medical and social services become available online. There is an opportunity to use telecommunications for work, leisure and for gathering information.

Government and business structures can share information electronically, reducing the amount of paperwork and improving service quality. It should definitely be mentioned that the prospect of the informational society for the vast majority of the population concentrated in developing countries is a long way off.

The informational sector of the economy can be presented as branches of informational industry that create and distribute content. This industry includes organizations that create intellectual property. Information is created by writers, composers, artists, photographers, scientists and engineers. Their “assistants” are publishers, producers, broadcasters and organizations providing the initial content’s “appearance“. Also included are organizations that do not provide new information, but compile it by producing directories, databases, statistical compilations, etc. The share of these information providers get a significant portion of the profits received by the informational industry.

The industry of distribution of information is related to the creation and management of info-dissemination networks: telecommunication companies, cable networks, satellite broadcasting, radio and television stations.

The content processing industry includes producers of computers, telecommunication equipment and consumer electronics. In the information industry sector, the content processing part is leading. Most of the added value is made in this industry, which in the mid-90s led to an intense process of mergers and acquisitions information sector’s companies.

In the 90s the concept of the informational society began to be identified as the concept of the post-industrial society, and not by accident. On a wave of the beginning of the third scientific and technological revolution in the 80s the rapid development of microelectronics happened, which led to the emergence of new means of storing, processing and distribution of information: in particular, computer technology.

The development of industry demanded and simultaneously led to the development of high technology and microelectronics. A vicious circle can be traced here: for further development of industry scientific knowledge is needed, while only developed industry allowed to create technical means for accumulation and distribution of the knowledge.

The real roots of post-industrial society can be found in the 90s. By the early 90s finally there were formed preconditions in order to allow knowledge to take a unique place in the production process. The revolution in communications and information processing qualitatively changed the nature of access to it, dramatically increased productivity in the area of data collection and processing.

In these circumstances the character of motivation of businesses has changed. Traditional landmarks were blurred by the end of the industrial age, during the so-called “new industrial society” when predominance of the tertiary sector became significant.

During the last third of the 20th century in the United States, the leader of post-industrial development, 9 of 10 newly created jobs were created in the non-profit sector. What is more, in assessing the effectiveness of investment in such projects characteristics that were taken into account have been more complex and less defined as opposed to longstanding metrics such as dividends on invested capital, for example.

If we look at the situation in the high-tech markets of the United States, Germany and France, we can see that capitalization of them hardly correlates with their profitability and even with the expected returns. Obviously, investors expect their investment to return in something different than just profit. Similar processes occur in Japan.

This change in motivation is not accidental. Production needs not so much educated or informed employee, but a creative figure that is able to bring something new to each process– to create something that didn't previously exist. The identity of such type of person qualitatively differs from dominating in the industrial society type. The qualitative difference is in the motivation.

The current ruling class smoothly flows into the post-industrial one along with the change of generations. Rich families all over the world have always had plentiful financial resources to pay for the education of their children in the university, but such phenomenon had not been observed. The reason here is a change in motivation: the ability of the elite to adapt to the realities of the post-industrial world where wealth and power will be based not on the possession of material resources, but on specific form of capital: unique knowledge and abilities.

The new ruling class already controls almost all final products of modern material production and the process of creating high technology. The competitiveness of industrial-type production, which can be done without new technological advances, is now kept almost exclusively in the field of simple mass services. Low-skilled labour is flocking there not being able to compete with educated workers in other sectors.

Postindustrial activity was incompatible with the classical industrial age of human motivation. The adequate model of behavior for industrial civilization described by Adam Smith and the underlying so-called market economy lost its meaning. The type of behavior (and social cohesion) that generated the industrial society, was incompatible with the economic and social success in the new environment.

Inequality in property and income in the countries of the post-industrial core became obvious in the 80s and especially the 90s. In the countries of the post-industrial core there is a permanent drop in revenue of semi-skilled workers and growing displacement of labour by computers. There has been rapid progress in the level of automation of work and minimization of human participation in the working process.

With the growth of artificial intelligence based on technologies such as logic programming, the establishment of a new type of expert systems will form the basis of a similar process for highly educated people who work in non-creative fields.

A company, which works in the post-industrial manufacturing sector that is represented by just one person, can have global reach. Moreover, the acquisition of real estate for a company ceases to be a significant problem, and its cost become hardly noticeable compared to investments in intangible assets.

We must admit that in Europe the transition to a post-industrial stage of development is associated with globalisation and regionalization of the economy, especially with the formation of the EU in 1957.

In Asia, Japan reached a post-industrial development through the development of high technologies and executing the production process for the nearby “newly industrialized” and developing countries.

Recognizing certain achievements of the United States and other countries in the field of post-industrialization and information, it should be understood that moving a number of material, often ecologically harmful industries to other countries, through so-called “environmental colonialism”, created a significant proportion of “post-industrial” and “informational” content of these countries.

IV THE ROLE OF SUBSIDIES – A DISTORTED PICTURE

For a long time environmental protection was blamed for costing jobs due to strict rules that were associated with higher costs and more bureaucracy. However, environmental protection has become one of the most important factors on the European job market. Climate change and environmental regulations are the driving forces in the energy sector. However, the expectations that environmental protection could become a job engine were not fulfilled. According to a study by the Umweltbundesamt (UBA, 2014) the number of people in Germany employed in the field of environmental protection has increased steadily over the last years and stands at two million people in 2010, almost five percent of the working population, a number that cannot be neglected. A decline was measured in environmental services and renewable energy. Economic researchers do not dispute or ignore the positive effect that environmental protection has had on employment levels but due to stricter legislation, higher taxes and financial support for renewable energy, jobs in traditional areas have been replaced.

Matters are complicated further by the fact that the sector per se does not exist but firms increasingly concern themselves with environmental questions. And their

motive is not primarily to save the planet but rather to gain a competitive advantage from it. What follows is that environmental challenges become relevant for more and more jobs across industries. Aside from industry specific topics, the general outlook is bright as environmental standards are tightened continuously and a larger part of the population cares about the environment. This should translate into a positive net effect on employment. Internationally the demand for environmental and climate protection goods is increasing, and as the pie gets bigger, more competition from overseas follows suit.

The German *Energiewende* is not only very expensive compared to the energy policies of other countries, but also is its progress and impact on climate change limited as shown by a study of the Handelsblatt Research Institute (Heilmann et al., 2014) that was conducted on behalf of GE. For the study the institute has ranked the achievements of 24 countries measured by 51 indicators on the road to an environmentally friendly, economically feasible and reliable energy system. Among the sample are OECD countries and the leading emerging market economies.

Germany ranked eighth while the top places went to countries, which have particularly favorable topographical and meteorological conditions for the use of renewable energy: Denmark, Norway and Sweden as well as Switzerland and Austria. But France and Spain also rank higher than Germany. Alarmingly, however, in the dynamics ranking, which measures the progress of countries in the transformation of energy systems in the past five years, Germany comes last. A major reason for this is the high cost for the promotion of renewable energies, which have not led to a corresponding significant reduction in CO_2 emissions. Furthermore, the energy efficiency of German households and service companies is significantly worse than in comparable countries.

Therefore, the Institute advocates a single European strategy for energy transition and a market-driven, technology-neutral promotion of the conversion of energy systems as opposed to an energy policy that is focused on the national level, and especially on electricity generation (Heilmann et al., 2014).

An energy efficiency stimulus package as opposed to a bond buying programme initiated by the ECB would be a viable option. Without raising the debt level, an additional amount could be invested in the stumbling economies of countries in the European periphery. The idea to grant allowances to both public households and small and medium sized enterprises for energy-saving measures would address the following points: climate protection, financial consolidation, promotion of job creation, social balance, and a step towards energy autarky.

Renewables are booming - not only in Europe but worldwide. On the other hand, they risk becoming victims of their own success. Although the market environment is increasingly complex, there is considerable pressure on investors to find suitable opportunities.

Calderon et al., 2014 substantiate the enormous costs of climate change and plead in favour of investments in climate saving measures, given their high rentability. While renewables are booming, one should consider their vast potential going forward. The next chapter will build on this argument and reveal how public funds are spent.

1. Industrial Policy of the EU

Globalisation of the economy and the markets, causing the intensification of international competition, can not only take advantage of effects of scale, but also provides specialization in narrower market segments. In the context of globalisation European companies must be able to withstand this international competition.

Although the level of labour productivity within the European Union remained the same, it's still somewhere behind similar indicators of American and Japanese industry. Consequently, economic operators and authorities in Europe should pay more attention to factors affecting productivity: technological development, investment in research and development, utilization of production capacity, price and workforce skills, managerial skills and organization of production. Thus low productivity growth rate is a major concern since this is the underlying factor of the increase of competitiveness of European companies.

Great importance is given to improving profitability and reducing production costs in European industry. For this purpose companies get assistance in improving professional training, in learning new methods of work organization, in establishing total control over quality while designing and implementing new technologies. Exactly for all these reasons mentioned above industrial policy is needed.

In the agreement establishing the European Economic Community, terms on the creation of the customs union are stated in a detailed way, especially for the treatment of industrial production turnover of the Member States, but there is no hint of implementing industrial policy at all. In fact, the founders of the EEC at the time of the organization hoped that trade liberalization and increased competition within the common market will contribute to the implementation of structural changes which the common industry needed.

The industrial policy began to emerge in the framework of the ECSC (European Coal and Steel Community) in the early 50s. Capital-intensive industries, often not viable from an economic point of view, were bundled together and a common industrial policy was designed. After the war it was quite difficult for countries to build these sectors up without cooperating and sharing the financial and logistical burden. So it happened that the crucial coal and steel industries were taken under the auspices of the ECSC.

In the late 60s and early 70s a medium-term programme was developed, which provided a general orientation of industrial policy. In 1968 the Directorate General of Industry Affairs was created, the jurisdiction includes other directorates such as industrial Policy, technical rules and standards, basic industries, production of capital

equipment, production of consumer goods, informational technology. In 1970 the Directorate prepared a “Memorandum on industrial policy”.

In 1990 the European Commission has developed a document entitled “Industrial policy in an open and competitive environment”, which formulated the basic principles of industrial policy of the EU. Under this programme, special priority is given to high-tech industries. At the same time the following documents were established: on the organization of research and development, technical standardization, European economic law, the formation of a unified system of power supply and telecommunications, and others. These programmes are called “pragmatic market industrial policy”.

Thus, at the beginning the main purpose of EU industrial policy was mainly oriented at saving industrial structures, but over the years the focus has shifted to ensuring the conditions for fair and honest competition. Today, the main goal of EU industrial policy is to increase competitiveness, and is considered the main instrument to creating a fair, equal and government-free environment for business. The main instruments of industrial policy also include impact assessment of major transactions on the economy and efficiency analysis (these mechanisms are being improved all the time during their practical application).

The role of the European Commission in this respect is not confined only to legislative initiatives, but also includes provisions in the area of competition policy, measures for further liberalization of trade, and regulation of subsidies. Thus, industrial policy covers all areas of the EU industrial complex designed for direct or indirect improvement of the competitiveness of Member States. In addition, the Commission pays particular attention to certain industries. For example, today the main efforts are concentrated on the energy sector.

For the first time the question of industrial policy is reflected in the Maastricht Treaty (Art. 157 of the EC Treaty): “The Community and the Member States should ensure the necessary conditions for competition in the industry”. Article 157 also has an important addition “This provision shall not be used ... for distortions of competition by the Community...”.

The next step, which gave a new impulse to European industrial policy, was the Lisbon Strategy. According to this document increasing competitiveness, which can raise living standards and reduce unemployment, is seen as the main goal of the EU after the year 2000.Furthermore, competitiveness in manufacturing is the basis of the concept of sustainable development of the EU. The Commission considers sustainable development as the harmonious co-operation of three areas: the economy, social sphere and ecology. Failure of any of these areas will lead to the inability of the system. Therefore, industrial policy occupies one of the most important places in the strategy of development of the modern EU, as evidenced by the distribution of spending the EU budget.

Industrial policy creates such conditions where EU activities in other areas contribute to improvement of the competitiveness of European industry. Industrial competitiveness depends on policies pursued in areas such as competition, internal market, education, trade, sustainable development, research and development, regional development, macroeconomics, social affairs and employment, consumer protection, health and the environment. Therefore the main task of industrial policy is to coordinate, accumulate and maximize the results of all areas mentioned above.

One of the effective measures for supporting EU Member States is applying protectionist tariff on imports from third countries. In regulating the industrial development of the EU, the main role belongs to economic activities, while administration is minimized. One of the most effective tools of regulation is tax policy as changes in tax rates are implemented selectively in view of the particular situation. Other measures for support of companies are: subsidies for entrepreneurs, long term concessionary loans and guarantees, involvement of public funds for financing construction projects, upgrading technology and reorganization of enterprises, ensuring public contracts that guarantee the functioning of the market.

Through industrial policy, the EU has focused on the following three areas, which provide a particularly significant impact on the competitiveness of the EU: science and education, innovation, business.

In the field of science and education the European Union is traditionally considered as one of the leaders in the world. Nowadays, after adoption of the Lisbon strategy there is a global strategic goal to achieve better results in education, training and retraining, scientific research, and creating conditions for knowledge to be implemented in industry. Active development of new technologies, including biotechnology and nanotechnology starts, as well as methods for their implementation and use.

Various steps are made to increase the innovativeness of European industry. To this end at the supranational level several projects were implemented for the development of cooperation between innovative clusters. The EU considers its cluster policy as a key tool for improving the competitiveness of industries and regions, increasing innovation capacity and economic development in the medium and long term. Industrial policy should also be innovative, for example, to develop transparent regulatory instruments that can give industry greater freedom in finding its own technological solutions.

The Commission pays particular attention to the stimulation of entrepreneurship, especially within SMEs, for the creation of new and further development of existing companies in this sector. As a result, SMEs have become the basis of the socio-economic model of the EU. They accounted for about 2/3 of the employed people

and 60% value added. By its nature and objectives industrial policy aimed at creating favorable conditions for improving the competitiveness of production in the absence of state interference in market mechanisms. Its instruments regarding individual companies aimed at creating an environment in which small and big business can show more initiative, implement new ideas and expand production.

However, there are specific requirements and characteristics of any separate sector, each one requires an individual approach. For example, specific forms of regulation related to inherent characteristics cover many products such as pharmaceutical, chemical, automotive industries. Thus, industrial policy inevitably implies some "easing" for individual countries and industries.

Industrial policy is aimed at improving the competitiveness of the industry on both the state and the EU level. To achieve this, the following is needed: contribution to restructuring according to scientific and technical progress, encouraging initiative and enterprise development, especially SMEs, promoting cooperation between enterprises, stimulating innovation policy, research and eventually the implementation of new technology in production. Particularly noteworthy are the features of national industrial policy. At the national level, some countries prefer a liberal approach and some chose a more protectionist approach.

At the same time there are several unsolved problems. In particular: legislative barriers and trade restrictions. The management structure of certain sectors prevents the functioning of a uniform single European market. Another problem is the need to improve access to financing for large and especially small businesses, which could be addressed by the further development and efficiency of integrated financial markets.

Part of the problem relates to a common European service market, where there is a very large gap between the strategy of an integrated European economy and the real situation on the market. In addition there's a factor that significantly undermines the competitiveness: inadequate legislation of protection of intellectual property. Another factor are differences in indirect taxation, which may distort intra trade and fragment the market of goods and services.

It should be understood that industrial policy is still only in its infancy. However, with the adoption an industrial strategy, there are a number of positive changes in many areas. In many sectors the EU managed to create a really effective single market, which led to the structural reforms that were needed to create new business opportunities, increase productivity and were the driving force of market expansion. Significant progress was also achieved in sectors such as telecommunications, energy and transport.

The EU economy reflects the post-industrial society, as about 71.5% of GDP in the EU is created in the tertiary sector. However, Europe has traditionally been strong in

industry. It accounts for about a third of industrial products in the world. The share of its secondary sector accounts for roughly a quarter of GDP of Member Countries.

2. Fossil Fuel Subsidies

Intuitively, when fuel is cheaper than water at the petrol station you might think that there could be something wrong. The price of fuel is less than one cent in Venezuela, which makes it cheaper to fill your tank than to buy a bottle of water. The explanation for distorted prices is subsidies with which the government has supported the price of fuel for centuries. The International Energy Agency (IEA) estimates the costs of this for Egypt at more than thirty bn Euro in 2013, equivalent to 11% of GDP and absorbing one fifth of public spending (WEO, 2014). Other governments including the ones of Nigeria, Saudi Arabia, and Russia to name just a few keep fuel prices artificially low. A grand total of 544 bn US Dollar were spent worldwide to subsidize fuel in 2012 (IEA, 2013) , equivalent to almost one percent of global economic output. (Stefanski, 2014) argues that this is both an incredible waste of public funds but also an environmental catastrophe. If fuel is cheap, more people will drive cars and companies have fewer incentives to invest in economical and clean manufacturing plants. He goes on and estimates the amount of CO_2 emissions between 1980 and 2010 that could have been saved if oil and other fossil fuels would not have been subsidized at 36%. Especially densely populated developing countries contribute to this figure. The IEA estimates global CO_2 emissions could decline by six percent if subsidies for fossil fuels were phased out.

Easier said than done. Populist governments depend on it. Paradoxically, these subsidies were introduced to help the poorest that could not afford fuel otherwise. For a long time this was also not costly as the oil price was at a low level when subsidy systems were built up. With every price hike, the promise to keep fuel affordable became more expensive. Nigeria, meanwhile, spends almost twenty percent of its national budget on fuel subsidies. The country in which every fourth child is malnourished, the attempt to lower subsidies ended in a catastrophe. The price of fuel doubled over night and violent mass protests prompted the government to revoke the law and reintroduce the subsidies.

Other countries have suffered the same fate. In Venezuela people died on the streets after protests turned violent after the last fuel price hike. The IMF has analysed 28 attempts to abolish fuel subsidies. More than half failed mainly because of resistance from farmers and poor urban dwellers. Paradoxically, it is not the poorest who benefit the most from fuel subsidies but to a larger extent the middle-class and companies since they use more fuel. It can be concluded that it would be better to

offer targeted as opposed to a comprehensive discounts. People who fall under a defined minimum earning threshold could be compensated via direct payments. This would not only be more just but also considerably cheaper. With the saved money the government could build basic infrastructure like hospitals, schools, and springs which would have a bigger impact on the welfare of the poorest than a full fuel tank.

President Joko Widodo of Indonesia, got his head around this and has announced to gradually decrease fuel subsidies over the next four years of his tenure. A campaign promise that actually got him elected and did not cause riots. In India, where fuel subsidies cost the country more than 18 bn US dollar, Prime Minister Narendra Modi continues the reform that was started under his predecessor Manmohan Singh with a final phase out of subsidies for diesel in 2016. These are small steps, considering that public funds in many countries of the world are still siphoned off to keep fuel prices artificially low.

But subsidies are not a phenomenon of developing countries. UBA, the German Federal Environmental Agency, estimates the total of ecologically harmful subsidies at more than 52 bn Euro (UBA, 2010). It is paradoxical how practices that are detrimental to the environment are first subsidized and then even more money from the budget is spent to compensate for the damage. If these subsidies were to be removed systematically it would not only disburden the environment but also free up budgetary resources. The grant scheme for first-home buyers and subsidies for coal mining are discontinued while the tax refund for agricultural diesel discourages farmers to drive economically or buy fuel efficient equipment. Another example is the provision allowing for compensation of the national electricity price (caused by emission trading).

With an amount of 24 bn Euro the traffic sector is the biggest recipient of environmentally degrading subsidies, followed by the energy sector with 22 billon Euro. The controversial subsidies for the building and housing sector amount to 6 bn Euro (UBA, 2010).

3. Promoting New Technologies

Let us for one moment consider subsidies for electric cars. With the price of diesel and gasoline close to one Euro, not many Germans are ready to switch to an e-car. Norway instead has introduced sponsorship for e-vehicles with the result that there are now more e-cars in this country of five million than in all of Germany combined. Scientists of the automotive research center at the University of Duisburg-Essen have come up with the following proposal: an extra duty of one cent on every liter of fuel

sold for the next three years. This would result in 1.9 bn Euro that could be spent to promote e-cars in three ways: 800 million Euro should be spent on supporting e-car sales, 4000 Euro per car. This would, however, still not be enough to reach the target of one million e-vehicles in Germany until 2020, an ambitious goal set by politicians that seems beyond reach even with demand management policies. Another 200 million Euro would go into carsharing concepts. Another problem that is undermining the acceptance of e-vehicles is the limited number of charging stations. The scientists' proposal would see an amount of 850 million Euro to be spent on the construction of 80,000 additional charging stations in the 60 largest German cities. On top of that, there would be free parking and charging for the next three years before passing the stations on to the municipality (CAR, 2014).

Neither is this a judgment nor an argument for increased public spending and demand management, but rather a reminder that one has become so accustomed to subsidies in certain areas that it might be hard to think outside the box.

Carmakers are seriously considering this proposal but see the necessity to monitor if these additional funds would be used for their designated, specific purpose. Others criticize the missing international dimension and demand a European solution. Carmakers have a vital interest in pushing sales numbers of e-vehicles as they are required to decrease their fleet consumption to 95 gram of CO_2 per 100 kilometer. In order to achieve this number, the share of e-vehicles and hybrids has to increase considerably. Dieter Zetsche of Daimler was quoted as saying that "no premium manufacturer alone with combustion engines, even with the use of the most expensive technology modules, will be able to achieve the set 95 gram target". (Zetsche, 2015). To bring down fleet consumption Daimler and BMW plan to equip their range of models with a plug-in-hybrid.

Along with the globalisation of markets and competition, European industry must be ready for the challenges of a new industrial revolution, which is resulting from the development of informational and communication technologies. These technologies make the distinction between traditional electronics, informational technology, telecom and media obsolete.

European countries are undergoing fundamental changes: they are still experiencing a transition from an industrial to an information society. Technologies of informational society gradually fill all commercial and social activities and are becoming factors for the competitiveness of European companies.

Significant amounts were allocated during the years 2010-2013 for research through public-private partnerships (PPP) with a substantial portion of the funding coming from the European Commission through the 7th Framework Programme on research and development and the other part from industry. Costs were allocated for three large projects: factories of the future, an initiative that was intended to help EU producers, especially small and medium enterprises to adapt to the pressures of

global competition, increasing their knowledge and improving their use of technology of the future. Energy-efficient buildings, an initiative that was intended to spread green technologies, aid to the development of energy-efficient systems and materials in European buildings. “Green cars” was an initiative in the automotive industry, which was aimed at the development of renewable and non-polluting energy sources, safety and reducing traffic congestion. This “greening” is necessary to achieve global goals and aims of the EU to reduce emissions.

The European Commission adopted a decision to continue investing in research and innovation as part of the financing plan “Horizon 2020”. Financing according to the plan for the years ahead should greatly help economic growth and investments, jobs creation, a single digital market, the Union’s energy and climate policies and the internal market with a more competitive industry.

Research and innovation are essential engines of growth in Europe that will help to cope with today’s new key issues such as the problems of migration, climate change, energy efficiency and they are key in creating a healthy society. Carlos Moedas, the European Commissioner for Science, Research and Innovation, over the next years of the Horizon 2020 programme wants to support the most outstanding scientific advances that directly affect the daily lives of people. The new working plan for 2016 and 2017 is offered in the form of various competitions, public procurement and other awards such as the Horizon 2020 award making the financing of projects possible in diverse fields.

The working plan will support a number of closely related initiatives such as the modernization of the European manufacturing industry with a focus on technology and standards of automatic control, the Internet of Things, which will deal with the digitization of the industrial sector of the EU; “Industry 2020” and the so-called “circular economy”, that will form the basis for sustainable growth for future generations, as well as the project of smart cities and sustainable development for the integration of environmental, transport, energy and digital networks across the European Union.

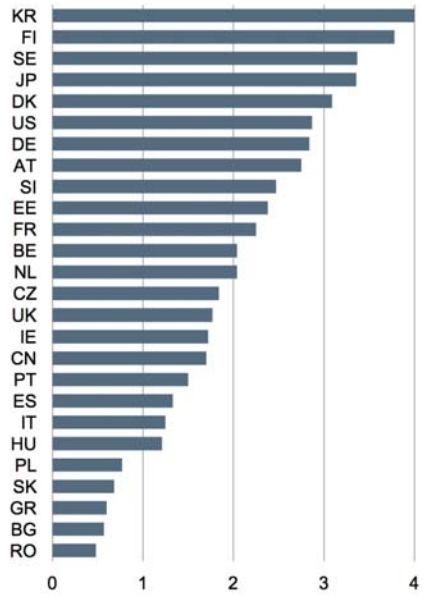
Additional funds will be allocated to investigate the security of external borders of the European Union for the detection and prevention of human trafficking and smuggling of people for the EU border. On top of that, there will be funds allocated to implement technology for the suppression of crimes and terrorism, and for research into the causes and consequences of migration to Europe. The new programme will also continue to support successful research works in the field of public health, for example, related to the Ebola virus innovative discoveries with the support of the programme.

4. Does Manufacturing Deserve Special Treatment?

The general question if manufacturing matters has been asked many times (dela Mothe, 1988; Helper et al., 2012). Many sectors of the world economy, from transport to healthcare, mortgages, agriculture, and education, to mention just a few, receive subsidies. This is not to argue the case for increased government intervention and even more public spending on additional sectors. It is called upon not to consider the status quo as fixed. There is nothing inherently wrong with favouring certain sectors of the economy over others but one should be realistic about the consequences of this and open to reconsider the priorities in a gradually changing world.

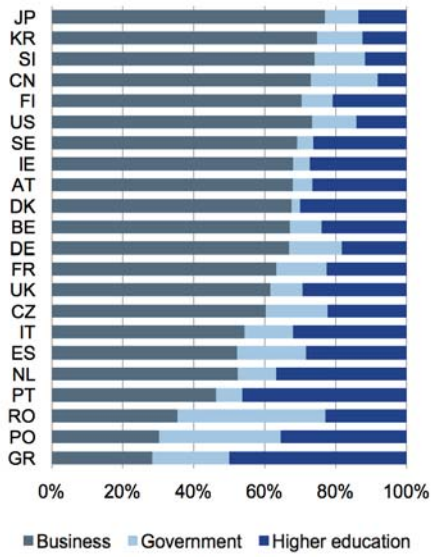
With the case of fossil fuels it becomes evident that subsidies in many cases are mismanaged and do not bring the greatest benefit to society. Rather they are used as a tool to buy votes and postpone essential reforms. If these funds were to be redirected to support renewable energies and other key industrial growth sectors, the debate would look different.

Chart 17 – R&D Spending in 2011, in % of GDP (Deutsche Bank 2013, Eurostat)



R&D spending rather than short-term solutions are part of a sustainable industrial policy. Particularly successful constellations are achieved when both the private sector and businesses work together with research institutes and universities.

Chart 18 – Sector's Share of Total R&D Spending in 2011 (Deutsche Bank 2013, Eurostat)



V THE SOCIAL QUESTION

1. Facing New Realities: Threats and Opportunities

Another thing that becomes evident is the environmental burden and tough working conditions that have been accepted in emerging markets in exchange for increased wealth. With billions of additional people in the workforce since 1990, a globalized world and better communication technology, competition is not local anymore. While technical progress brought new means of communication and also of collaborating, the working atmosphere has changed. With greater flexibility to combine private and working life there is now constant pressure to be available at all times.

At a time when China ramps up its level of industrial automatisation and replaces workers with robots, employees around the world are wondering if there is enough work and whether their jobs are secure. Many job profiles that we know will not

exist in future years, and university graduates are confronted with the reality of a tight job market in which a diploma does not shield you from unemployment.

Even established professions far away from assembly line work are prone to seismic shifts. Job profiles like pilot, truck or train driver, even doctor, are under pressure. Until recently there was common agreement that only job profiles with a low to medium level of qualification would be negatively affected. However, according to a publication by the University of Oxford (Frey & Osborne, 2013), in 20 years time every second job could be affected by automatisation, amongst them many with a high level of required qualifications.

Society and its elected leaders will do good to watch these effects closely and react in a timely manner in order to have enough room for maneuver. While there is no certainty about the future, we can be certain that the old model of being permanently employed at one company for the duration of your working life is a discontinued model of the labour market of rich, developed countries that workers in developing nations aspired to gain access to. Informal forms of employment, project and freelance work, will become the new normal, which reflects a convergence of the increasingly global labour market. A future with less formal working conditions also questions the achievements of past generations: a permanent full-time position, formerly known as a “normal job”.

Business risk is gradually transferred to individuals, which especially amongst developing countries is not a new phenomenon. In many parts of the world, worker rights and social welfare are very limited. On the other hand, many old industrial countries are not well prepared for a model of increased self-responsibility and risk taking at an individual level. While the foundation of the social system in the US is the willingness and readiness of accepting risks, the opposite holds true in most European countries where the transfer of risks to the state is part of the understanding of freedom. Accounting for all the negative aspects of the US system, it will still be harder to adapt to new economic realities for the Europeans that are used to society taking over existential risks.

Another aspect is that the New Economy offers flatter hierarchies, increased flexibility, more goal orientation and faster decision making processes which translates into increased opportunities for entrepreneurial activities and more autonomy also in the working place, as well as remuneration models that reward performance rather than presence. This gain of flexibility, however, comes at a price.

There will not be less work because of the advent of digitalisation and automatisation but the future form of employment will be substantially different to what people in developed countries have been used to for the past century. Going forward, there are many questions in terms of social security. Social security claims and corporate pension schemes should be decoupled from the period of employment and geographical limitations. As a result, employees should not face cuts because of their

occupational biography. On top of that, fluctuation on the financial markets do not make the situation easier for (private) pension schemes.

Two themes will characterize future working conditions: on the one hand the boarders between work and private activities will blur, on the other hand people will increasingly take their work home. The classic employment contract is a phase-out model – a development that will benefit working parents that appreciate the increased flexibility. However, with greater flexibility comes greater insecurity. It will be harder to plan ahead to go on vacation (going there and working remotely will not be the problem but being able to enjoy the time off) or to schedule a doctor's appointment.

US citizens already face a different reality than their peers in Europe. The key phrase work-life balance will first manifest itself as a shock in countries with a rigid labour market that emphasizes regulated working hours amongst other things.

We should look at these challenges with confidence. In the light of tremendous change that the world has seen over time, we should look back 125 years ago when politicians and intellectuals together were fighting industrialisation, mechanisation, and electrification. Global trends like urbanisation actually have changed the world but resulted in better living conditions for the vast majority of people. It was when people moved from poverty to modest wealth and the results became visible that the fear was banned. While future developments are a serious challenge, they should not be perceived as a threat but rather a vast opportunity to change things to the better. We will shape the future of our working life together.

We are experiencing profound technological change at a time when digitalisation is changing our sphere of life at a staggering pace. This radical change, driven by big data, cloud-computing, and the internet of things, influences industrial production. After the mechanisation of the production process in the 18th century through the steam engine, the division of labour through assembly lines, and the use of electronics and IT as part of the automatisation during the 1960s, we are now experiencing another revolution in the field of product creation. A holistic system where products can be identified and localized via integrated sensors and chips with a log file that gives some indication of its history and condition.

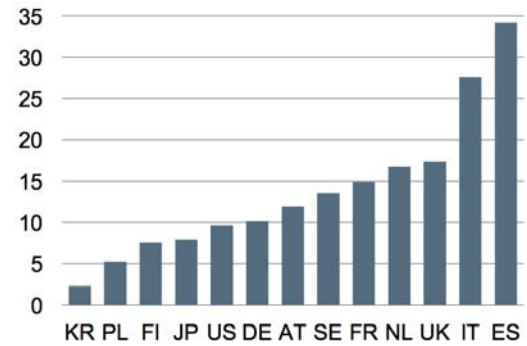
Especially SMEs have understood this well: a human workforce will still be indispensable but the nature of work will shift towards more creative roles on the one hand side and a supervisory and planning role on the other. The gains are increased productivity and lower costs, a lower error rate, and a shorter roll out time of products. Many nations are working vigorously on a reindustrialisation of their economy. The industrial clusters in the EU, however have never lost track of their base and exactly this healthy basis should allow for a head start in exploiting the opportunities that industry 4.0 offers.

2. The Wrong Incentives

Fundamental changes like the industrial revolution have shaped society. The first country to witness this was England that followed a path of industrialisation, deindustrialisation under Thatcher and recently again towards more industry. The havoc caused by harsh conditions for workers has resulted in traditionally strong unions and a culture of roundtable discussions and consensus as opposed to confrontation. Even without political bias, it follows that shortsighted government intervention to protect jobs and bail out inefficient operations leads to even deeper structural problems in the long run and is detrimental to competitiveness, growth and thus the prosperity of a region.

Chart 19 impressively shows the problem that countries are facing. While the case is certainly challenging, as there will always be new forms of jobs for unskilled labour available, the number of jobs available is in decline. Continuing education initiatives and a dual education system like in Austria and Germany are means to effectively counteract these developments. Subsequently, industries requiring low skilled work should not receive government support. Saving jobs for the sake of keeping people employed is not a viable long-term strategy.

Chart 19 – 25 to 34 year olds without vocational training or upper secondary education, in % of total age group (Deutsche Bank 2013, OECD)



VI CONCLUSION AND POLICY RECOMMENDATION

1. **Summary and Findings**

It can be concluded that the EU has lost some of its competitiveness compared to the US and emerging markets. Amongst its pros are the large single market, its infrastructure and skilled labour pool, as well as its potential to reform the bureaucratic system and labour market inefficiencies.

Government policy should focus on bringing together business and academia and treat money spent on basic and applied research as a means to lock in returns as opposed to a mere cost center. To compete with rivals, investment in education, research and infrastructure and in broader terms, a pro-investment climate of confidence, competitively priced energy and regulation that is not prohibiting entrepreneurship are needed.

Two major themes were identified that contribute significantly to the success of reindustrialisation efforts:

1. Rethinking the allocation of subsidies
2. Consider the social dimension of work and continuous learning

Table 2 – Own table drawing from the list of industries by the EC and also used in table 1

Results of the analysis on how to increase the share of the industrial sector in the EU

Rethink the Allocation of Subsidies
 	
• Re-allocate funds to promising emerging industries
  o 'green' production technologies
  o green motor vehicles
  o bio-based fuels and chemicals
  o intelligent networks
  o key technologies such as microelectronics
  o nanoelectronics
  o material sciences
  o industrial biotechnology
• Phase out fossil fuel subsidies
• Fund fundamental research
• Bring the coal lobby aboard
	Social Dimension
	
	• Encourage high value added processes
	• Job preservation is not a compelling industrial strategy
	• Labour-intensive high-value added professions are often overlooked but form an integral part of a competitive economy
	• Promote life-long learning opportunities to tackle youth unemployment
	• Copy best practice models such as the dual education System of Austria and Germany
	• Create a women and family friendly working environment

Public Private Partnerships
 	
• Lending at market rates
• Promote applied research and foster research collabouration between
  o Universities / Research Institutions
  o Companies
  o Government
	Environmental Regulation as Growth Driver
	
	• Push for Environmental Regulation in international negotiations
	• Marketing to establish strict environmental standards as a competitive advantage

Additionally, the following topics will be of relevance going forward. How can the European economy prepare and position itself to benefit from Industry 4.0?

In order to make better use of data, the raw material of the 21st century, firms have to model the whole value chain and the whole product life cycle digitally. Software-aided precise predictions of required maintenance can help to better use machines. As a whole, there is ample opportunity to put all cost positions to the test. Furthermore, capacity building will be on the agenda as the digitalisation requires new skills and specialists, for example in the field of big data and data mining. It follows that firms ahve to concern themselves with how to attract and make employees commit to them. In terms of access to clients the following question should be addressed: what are the contact points to be maintained in order to secure and foster client relationships? Firms have to understand how they interact with existing clients and how to hold steady against competition. Regular updates and constant product improvements are the norm and data security will be increased to account for the enormous importance of completely interlinked production sites. Data security should not be treated as a backoffice task but a priority to be discussed at board level.

Government intervention

Highly labour intensive industrial processes that require unskilled work or work with a low level of qualification will not contribute positively to increased productivity. Helping these industries to weather a storm will only be a short-term solution and implies deferring the solution into the future.

Governments, however, have been successful at large scale investment programmes for defined purposes such as the military. At the fundamental level, basic research will be funded by the state. Cooperation with the private sector can make sense if fundamental research leads to applied research with the ultimate aim of selling a product on the market. While it is hard to predict the outcome of fundamental research efforts and if it will result in the satisfaction of a need for which customers are willing to pay, it becomes clear that systematically supporting user inspired research will result in the development of commercially viable products.

The concrete measures for this include educational reform, tax breaks for companies and individuals that want to invest in R&D, and top facilities at research institutions and universities. Applied research is the base for the commercial application of new technologies. The payoff will materialize in the form of innovation leading to inventions and diffusion.

Because of the long timeframe of investments in basic research, private companies are reluctant to commit. Here the state has to step in and intervene in a dysfunctional market given the enormous earning potential that will not be allocated to a single company but rather benefit an industry and potentially adjunct sectors. This is helped by the fact that, the state stands to benefit in the form of tax revenue, increased attractiveness of the location, spillover effects resulting in more creativeness and competition as well as a bigger pool of skills and workers. Thereby the ultimate goal of increased prosperity and a purpose is achieved. The conclusion is that the US did a fairly good job with coordinating large-scale investment programmes that spurred innovation and led to marketable products in the long run. This contrasts with EU funded projects that resulted in redistribution or suboptimal allocation of funds to infrastructure programmes that did not bring about the desired growth. Another key finding is that outsourcing to low cost manufacturing locations is in decline. The production of goods for domestic consumption returns to domestic markets. This is especially true in the US, where significant amounts of manufacturing capacities were transferred to overseas locations in South East Asia, and to a lesser extent to Europe as outsourcing moved some process to the East but not outside of Europe.

Having in mind the current economic climate and especially the employment situation, countries should focus on improving their competiveness in key sectors that produce high value added goods and services.

Europe's competitive edge lies in high quality, innovative products and services that are designed and produced by a well-trained workforce. This is why Europe needs more than a correction of recent cuts. It needs new, creative instruments to enable fundamental and product innovation in select promising industries. More industrial policy as opposed to fears for the future with the limitation that this should not translate into a set of protectionist policies where each Member State tries to protect its "champions" via preferential treatment. This is exactly what is happening at the moment in many countries of the EU in order to preserve jobs and keep unions happy. In the long run this will lead to higher prices for consumers and further distortions via an increase in public spending (subventions). A transnational industrial policy that reinforces Europe's potential would be rather beneficial for companies that have to compete on the world market. With increased qualitative competitiveness EU firms will be able to compete in key markets.

Within the European Union, the crisis has led to a decline in trade. If this trend were to be reversed, transborder production networks would be consolidated and emerge stronger in order to produce together for the world market. Each production stage can be carried out at the location that offers the best conditions concerning quality, speed, and costs. The united but highly diverse EU market offers vast potential for synergies and efficiency potential. For that to happen, a transboundary infrastructure for R&D, transport, energy, and communication, as well as a continuous effort in the training of engineers, scientists, and skilled workers is indispensable.

As a next step, it could be envisaged to launch an EU wide, vertical industrial policy to promote sunrise industries such as environmental and disposal technology, renewable energy, connected transport, machinery and equipment, or the IT sector via public procurement and joint fundamental research. Coordination is key – only a common approach will tap the EU's full potential, and not interfere with competition rules and national policies.

Such a policy is not backward looking, especially when you take into consideration China's rapid development in recent years that was only possible due to a targeted and wise industrial policy. The myth that the US government does not intervene in the economy could not be farther from the truth when you have a military that coordinates fundamental research and functions as an incubator for large-scale technical projects that need so much launching costs that the private sector alone would never have come up with. Examples include no less than the Internet or the GPS that we know. The IT and pharmaceutical sectors are also supported by incentives for innovation and fundamental research. Wage and cost cuts alone will not suffice to preserve Europe's leading position on the world market and the high standard of living that comes with it.

2. Limitations

The single largest limitation of the research provided is its focus on a set of certain countries, and in many cases on Germany. Due to the heterogeneity of the EU economies one should apply a differentiated view on the analysis. Accordingly, not all aspects of what makes a region competitive were looked at as a differentiation in highly developed countries and less developed countries would result in different findings for the latter group.

While the author has tried to assemble a balanced report and to consider the EU as a whole, there are certain shortcomings when it comes to the level of analysis and especially to the results of recommended action. Due to the scope of the work the focus was primarily on developed countries that are keen to foster their industrial profile as technology leaders.

3. Directions for further Research

It would be interesting to perform an analysis on

a) regions involved in a manufacturing process along the value chain
b) regional clusters that have experienced extreme growth or decline over time
c) less developed Member States of the EU that do not focus on high value added services but are looking to build a basic industry and are able to compete via labour costs
d) the level of effectiveness of industrial policy measures when controlling for other factors that could distort the result
e) the effect of low oil prices on the relative competitiveness of the energy intensive industry

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List of Tables, Graphs and Figures

APPENDIX

Country Codes and Names of EU Member States

BE	Belgium
BG	Bulgaria
CZ	Czech Republic
DK	Denmark
DE	Germany
EE	Estonia
IE	Ireland
EL	Greece
ES	Spain
FR	France
HR	Croatia
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg
HU	Hungary

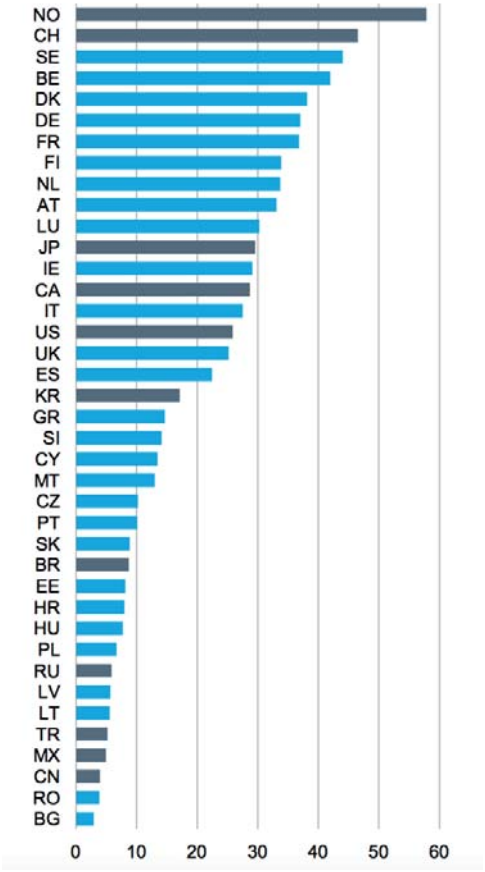
MT	Malta
NL	Netherlands
AT	Austria
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
FI	Finland
SE	Sweden
UK	United Kingdom

Additional Country Codes and Names

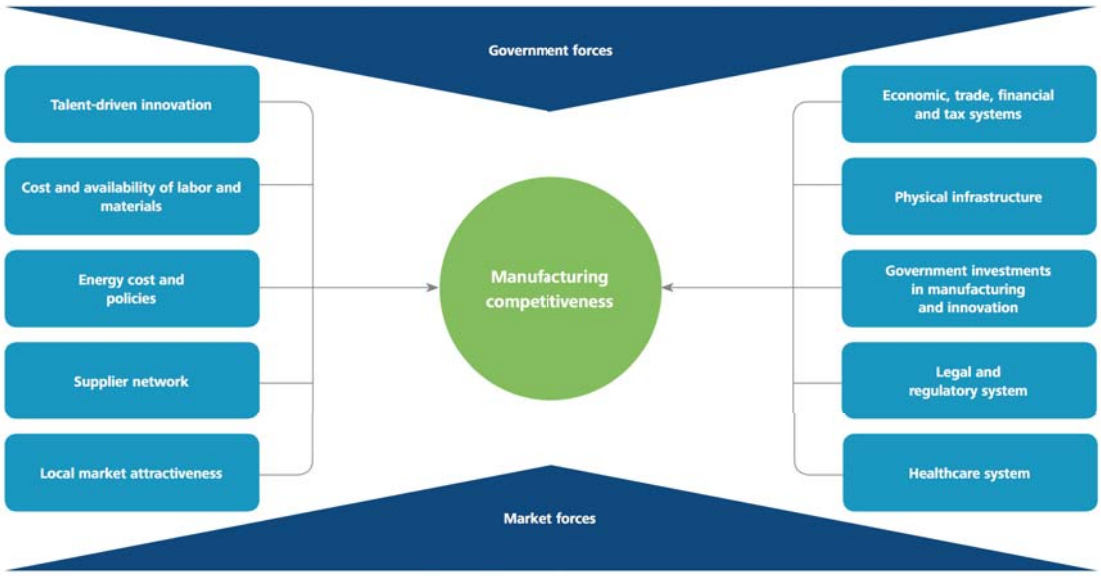
KR	Korea
JP	Japan
US	United States of America
SI	Singapore
CN	China
DK	Denmark

Additional Charts

A1 – Manufacturing Labour Costs in EUR per Hour Worked (Deutsche Bank 2013, IW)



A2 – Drivers of Global Manufacturing Competitiveness (Deloitte 2013 Global Manufacturing Competitiveness Index)



A3 – Industry 4.0 Readiness Index (Roland Berger, 2015)