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# Supporting Europe's new phase of re-industrialisation

En este artículo se aborda el papel fundamental que desempeñan las actividades de fabricación en la economía europea y las dificultades a las que Europa se enfrenta para mantener una fuerte base industrial. Desde hace ya varios años dicho papel está siendo objeto de un interés renovado y ha vuelto a ocupar los primeros puestos de la agenda política. Existen varias razones para ello. La primera es que la crisis sacó a la luz la vulnerabilidad de la industria europea con respecto a las tendencias actuales de aceleración y apertura de mercados. La segunda es que la crisis puso de manifiesto importantes desequilibrios económicos; en particular, los riesgos asociados a una elevada dependencia del sector financiero y de servicios. Con este telón de fondo, los responsables de formular políticas de la UE han comenzado a reconsiderar el papel de las actividades de fabricación y a reconocer como una cuestión preocupante el declive de la producción europea. En paralelo a esta forma de pensar, una nueva retórica se ha difundido por toda Europa. Por ejemplo, La Comisión Europea ha resaltado el papel central de las actividades de fabricación para apuntalar la recuperación del crecimiento y los puestos de trabajo, así como para acometer los retos planteados por la sociedad. Para poder hacer frente a dichos retos, este artículo propone tres opciones estratégicas: (1) la promoción de nuevos modelos de negocio; (2) la creación de ecosistemas industriales a través de la innovación sistémica; y (3) el apoyo a una auténtica cadena de valor europea que, en su conjunto, podría estimular una nueva fase de reindustrialización en Europa.

*Artikulu honetan bi gai jorratzen dira: ekoizpen-jarduerek Europako ekonomian jokatzeko duten oinarriko rola, batetik, eta Europako oinarri industrial indartsu bati eusteko dituen zailtasunak, bestetik. Urte batzuk dira horrek berriz ere interesa pizten duela eta agenda politikoaren lehenetsunetako bat bilakatu dela. Hainbat arrazoik azaltzen dute hori. Alde batetik, krisiak agerian utzi zuenez, Europako industria ahula da gaur egun nagusitzen ari diren azeleratzeko eta merkatuak irekitzeko joeren aurrean. Gainera, krisiak desoreka ekonomiko handiak azaleratu zituen; bereziki, finantza- eta zerbitzu-sektoreekiko gehiegizko mendekotasunaren arriskuak. Egoera horretan, EBko politikak ezartzeko arduradunak ekoizpen-jardueren rola birplanteatzen hasi dira, eta Europako ekoizpenaren gainbehera kezagarritzat jotzen hasi dira. Pentsaera berri horiekin batera, erretorika berri bat zabaldu da Europa guztian. Esate baterako, Europako Batzordeak zera nabarmendu du: ekoizpen-jarduerek ezinbesteko rola jokatu behar dutela hazkunde eta lanpostuen sorrera finkatzeko eta gizarteak planteatzen dituen erronkei heltzeko. Erronka horiei aurre egiteko, hiru aukera estrategiko proposatzen dira artikulu honetan: (1) negozio-eredu berriak sustatzea; (2) ekosistema industrialak sortzea sistemaren berrikuntzaren bitartez; eta (3) European balore-kate erreal bat bultzatzea, bere osotasunean Europaren berrindustrializazio-fase berriaren pizgarri izan litekeena.*

This paper addresses the pivotal role that manufacturing activities play in the European economy and the difficulty that Europe faces to maintain a strong industrial base. That role has been subject to a resurgence of interest for already a number of years and has resurfaced at the top of the policy agenda. There are several reasons for this. First, the crisis brought out the vulnerability of the European industry into the open and accelerated on-going trends. Second, the crisis highlighted some major economic imbalances. In particular, the risks associated with a high reliance on the financial and service sectors. Against this backdrop, EU policy makers have started to re-consider the role of manufacturing activities and to recognise the decline of manufacturing production in Europe as a matter of concern. Along this line, a new rhetoric has spread all over Europe. For instance, the European Commission has highlighted the key role of manufacturing to underpin the recovery of growth and jobs and to address societal challenges. In order to cope with such challenges, this paper proposes three strategic choices: (1) the promotion of new business models; (2) the creation of industrial eco-systems through systemic innovation; and (3) the support for a genuine European value chain, which together could stimulate a new phase of re-industrialisation in Europe.

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**Palabras clave:** Industria manufacturera, reindustrialización, cadena de valor europea.

**Keywords:** Manufacturing industry, re-industrialisation, European value chain.

**JEL codes:** O14, O31.

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### **1. INTRODUCTION**

The role that manufacturing activities are playing in European economies has been subject to a resurgence of interest for already some years and has resurfaced at the top of the policy agenda in the aftermath of the economic and financial crisis of 2008-2009. There are several reasons for this. First, the crisis brought out European industry's vulnerability into the open and accelerated on-going trends, including the intensity of global competition and the inadequacy of several policies decided both at the European and national level. Second, the crisis shed light on some major economic imbalances. In particular, it highlighted the risks associated with a high reliance on the financial and service sectors, the steady decline of manufacturing activities in our economy as well as the urgent need to look for new sources of growth. Such observations were rapidly confirmed by the fact that the economic recovery proved more difficult in countries with a weak industrial base.

In this context, policy makers, including EU leaders, have started to re-consider the role of manufacturing activities in our advanced economies and to recognise the decline of manufacturing production in Europe as a matter of concern. Deindustrialisation is no longer perceived as a natural process of economic development. The mere focus on the service sector that was, until recently, seen as the way to go in many EU countries, has appeared as not being a sustainable choice in the long run. Along this

line, a new rhetoric has spread all over Europe, with the European Commission playing a central role in this. Several communications have been published in which the European Commission repeatedly affirmed the importance of a strong industrial base. For instance, the Commission highlighted in the 2010 Communication on an *'Integrated Industrial Policy for the Globalisation Era'*<sup>1</sup> the key role of manufacturing in underpinning the recovery of growth and jobs and addressing societal challenges such as climate change and ageing population. A list of priority actions was set, including horizontal measures in the different areas affecting European industry's competitiveness. The importance of a coordinated approach in EU policies, as well as the need for increased cooperation between Member States, was stressed. In its 2012 Communication entitled *'A stronger European Industry for Growth and Economic Recovery'*<sup>2</sup>, the Commission called for a partnership between the EU, its Member States and industry at large, and decided to complement its horizontal approach with a more vertical one, giving emphasis on specific technologies. It announced intentions to focus investment and innovation on six priority action lines: advanced manufacturing technologies for clean production, key enabling technologies, bio-based products, sustainable industrial policy, construction and raw materials, clean vehicles and vessels, and smart grids. Finally, the Commission reiterated its message in its 2014 Communication *'For a European Industrial Renaissance'*<sup>3</sup>, which called on Member States to mainstream the support to industrial competitiveness in all policy areas and to raise the contribution of industry to GDP to as much as 20% by 2020<sup>4</sup>. With the new college of Commissioners starting its mandate at the end of 2014, the 20% target became less of a priority and the rhetoric on re-industrialising Europe slightly changed in nature. In line with initial statements, the new Commission decided to put more emphasis on improving and simplifying already existing EU laws instead of creating new legislation<sup>5</sup>. In addition, policy advocates have questioned whether the content of manufacturing activities is not more relevant than its exact volume. Thus, greater importance (at least in the public discourse) has been put on smart and clean industries as a way to create a comparative advantage *vis-à-vis* other regions of the world.

<sup>1</sup> European Commission (2014), «An Integrated Industrial Policy for the Globalisation Era - Putting Competitiveness and Sustainability at Centre Stage», COM (2014) 614.

<sup>2</sup> European Commission (2012), «A Stronger European Industry for Growth and Economic Recovery», COM (2012)582 final.

<sup>3</sup> European Commission (2014), «For a European industrial renaissance», COM (2014)14/2.

<sup>4</sup> Today's manufacturing contribution to GDP accounts for about 15%. It is worth noting that other countries do also have similar targets. In China, the GDP share of the industries considered as strategic is targeted to rise by 15 percentage points by 2020. In India, the share of manufacturing value added in GDP is targeted to rise from 16% to 25% by 2022. See Manyika J., Sinclair J., Dobbs R. *et al.* (2012), «Manufacturing the future: the next era of global growth and Innovation», McKinsey Global Institute.

<sup>5</sup> See: <http://www.euractiv.com/sections/industrial-policy-europe/eus-revamped-industrial-policy-dogged-better-regulation-dispute>

All this shows that there is growing awareness on the role that manufacturing sectors play in our economy and the need to maintain a strong and diversified industrial base. However, many inconsistencies arise across Europe, and EU industrial policy is still far from being a fully fledged and integrated strategy. The new global environment, be it increased global competition with traditional and new competitors, growing global demand for resources and high volatility of commodity prices, changing consumption patterns, and the spread of technological innovations for manufacturing, will require structural changes and new strategic choices on behalf of stakeholders in manufacturing activities. Europe will have to make a number of clear decisions in the face of global competition and concentrate its efforts on actions, which can boost its competitiveness in the long run.

This paper<sup>6</sup> aims to contribute to the current policy debate, by identifying the kind of choices that will have to be made in the current context. To start with, chapter two depicts some recent developments in the role and evolution of industry across Europe and highlights the main elements of concerns for Europe's future competitiveness. Chapter three takes a forward looking approach and presents a series of policy options focusing on three main areas for action to revamp industry in Europe and to make it better equipped to deal with today's global challenges. The paper is finished by a section with conclusions (chapter four).

## **2. EUROPEAN INDUSTRIES IN THE FACE OF GLOBAL CHALLENGES**

Facts and figures leave no room for ambiguity: manufacturing is facing major challenges in Europe and the sector is losing ground in our economies. This chapter shows, through empirical evidence, the gradual decline of manufacturing and puts it into perspective by comparing EU manufacturing trends with the ones occurring in other economies. Current developments raise major concerns for Europe's future competitiveness. In addition, it is shown that significant divergences exist between Member States with regard to the performance of the manufacturing sector and its weight in the economy. Such divergences clearly highlight the important role that public policies play in providing the manufacturing industry with the right tools for its development.

### **2.1. The gradual deindustrialisation process in Europe**

The decline of manufacturing in Europe is nothing new and all studies providing evidence on this issue convey the same message: Europe has been going through a process of deindustrialisation for several decades, and this process was

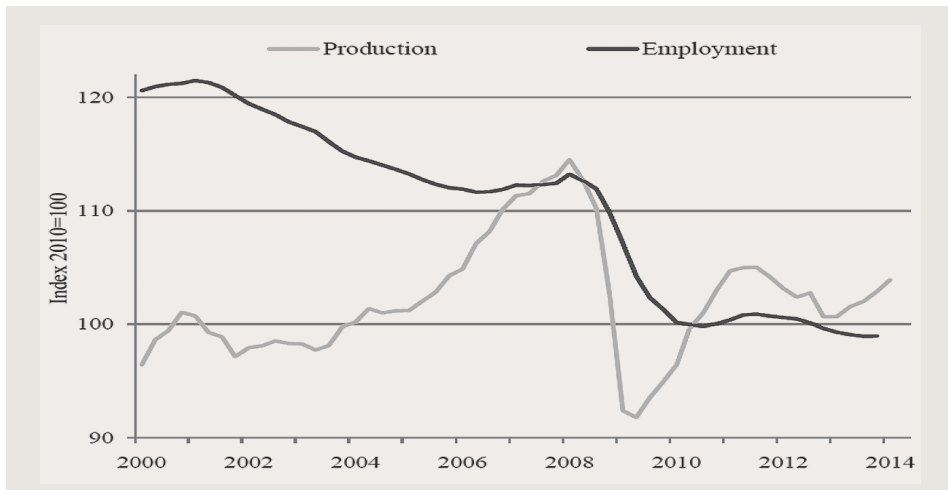
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<sup>6</sup> For a longer version of this paper, see: Dhéret C., Morosi M. with Frontini A., Hedberg A., and Pardo R. (2014), «Towards a New Industrial Policy for Europe», EPC Issue Paper n°78.

accelerated some years ago as a result of the financial and economic crisis. Manufacturing in Europe has been facing serious difficulties for a long time, which can be illustrated by the constant reduction of the manufacturing share in almost all macro-economic indicators.

Figure 1 displays the tremendous effect that the crisis has had on manufacturing activities and the slow recovery that has occurred since then. This shows that employment in manufacturing sectors has fallen sharply and continues to do so. Three and half million jobs<sup>7</sup> have been lost in Europe's manufacturing since 2008.

Figure 1. **PRODUCTION AND EMPLOYMENT IN EU MANUFACTURING 2000-2014**



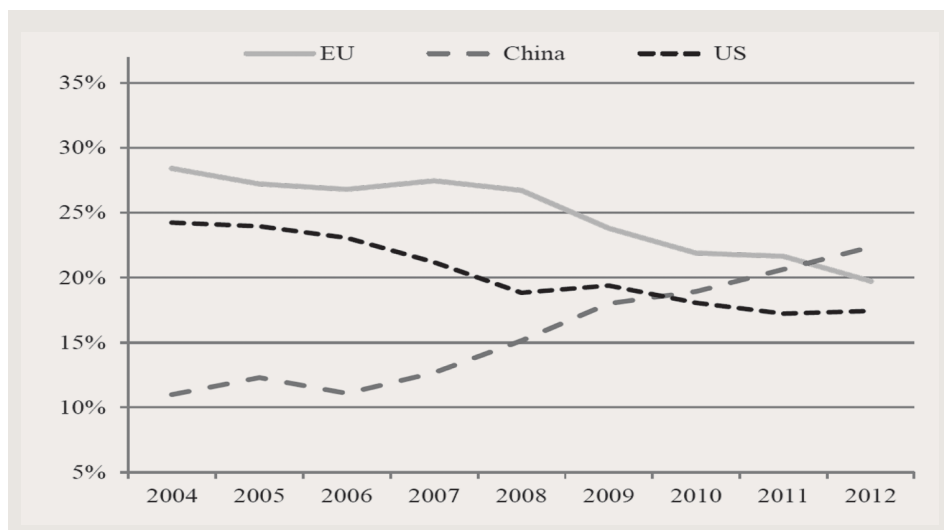
Source: European Commission (2014), «Helping Firms Grow, European Competitiveness Report 2014», European Commission Staff Working Document SWD (2014)277 final, p. 19. Data: Eurostat.

Downwards trends even go beyond production and employment. The share of manufacturing in GDP has fallen from 15.8% before the crisis to 15.1% in 2013<sup>8</sup>. While such trends reflect, to some extent, a structural shift to the service sector and the changing nature of manufacturing which is becoming increasingly knowledge-intensive and therefore less conducive to job creation, they also reveal profound weaknesses in European manufacturing. Furthermore, its strategic competitive position in the global economy is increasingly challenged by other economies, mainly the US and Asian countries.

<sup>7</sup> European Commission (2014), «Progress in industrial competitiveness per EU country», Memo 14/526, September.

<sup>8</sup> European Commission (2013), «European competitiveness report 2013, Towards knowledge-driven reindustrialisation», European Commission Staff Working Document SWD (2013)347 final.

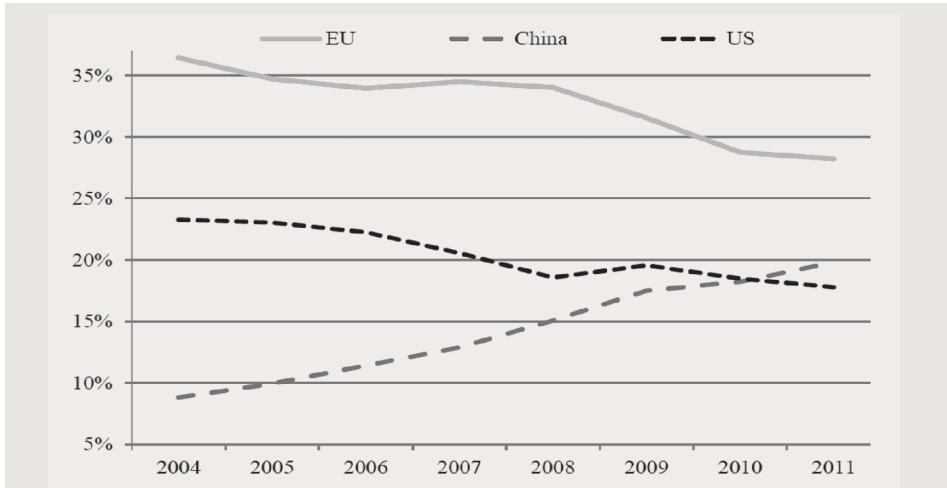
Figure 2. **EU, CHINESE AND US SHARES OF WORLD MANUFACTURING PRODUCTION VALUE, 2004-2012**



Source: European Commission (2014), «Helping Firms Grow, European Competitiveness Report 2014», European Commission Staff Working Document SWD (2014)277 final, p. 22. Data: EC calculation based on UN national accounts main aggregates database.

Such challenges are also well illustrated by the following figures. Figure 2 indicates that the EU share of world manufacturing production value has steadily declined since the start of the economic crisis, while it has been booming in China from 2006 onwards. A decline can also be observed in the US between 2006 and 2009. But it has since stabilised and US manufacturing now seems to have entered onto a path of recovery. When looking at Figure 3 and the distribution of the world manufacturing added value, the situation seems to be far less dramatic for Europe. Europe is still generating around 28% of world manufacturing added value and is well above the US and China. This is an important aspect to take into consideration when assessing the position of EU manufacturing in the global economy. Yet, trends are often more telling than absolute figures. The EU's share has been sharply decreasing since 2008, while the opposite trend is occurring in China. Looking at the ranking of individual countries in the global manufacturing gross value added (see Figure 4) confirms the evidence of a loss of European countries' competitiveness. On the contrary, emerging economies such as Brazil, India and China, which have traditionally played a secondary role in the global value chain, have now begun to catch up and are getting top positions in the ranking. All this shows that these countries have now entered the world of complex and innovative value chains, which were previously considered the preserve of developed economies.

Figure 3. EU, CHINESE AND US SHARES OF WORLD MANUFACTURING VALUE ADDED, 2004-2011



Source: European Commission (2014), «Helping Firms Grow, European Competitiveness Report 2014», European Commission Staff Working Document SWD (2014)277 final, p. 22. Data: EC calculation based on UN national accounts main aggregates database.

Figure 4. TOP MANUFACTURERS BY SHARE OF GLOBAL NOMINAL MANUFACTURING GROSS VALUE ADDED

Rank	1980	1990	2000	2010
1	United States	United States	United States	United States
2	Germany	Japan	Japan	China
3	Japan	Germany	Germany	Japan
4	United Kingdom	Italy	China	Germany
5	France	United Kingdom	United Kingdom	Italy
6	Italy	France	Italy	Brazil
7	China	China	France	South Korea
8	Brazil	Brazil	South Korea	France
9	Spain	Spain	Canada	United Kingdom
10	Canada	Canada	Mexico	India
11	Mexico	South Korea <sup>1</sup>	Spain	Russia <sup>2</sup>
12	Australia	Mexico	Brazil	Mexico
13	Netherlands	Turkey	Taiwan	Indonesia <sup>2</sup>
14	Argentina	India	India	Spain
15	India	Taiwan	Turkey	Canada

Source: Manyika J., Sinclair J., Dobbs R. et al. (2012), «Manufacturing the future: the next era of global growth and Innovation», McKinsey Global Institute. Data: Based on HIS Global Insight database sample of 75 economies, of which 28 are developed and 47 are developing; manufacturing here is calculated top down from the HIS Global insight aggregate; there might be discrepancy with bottom-up calculations elsewhere. Note: (1) South Korea ranked 25 in 1980. (2) In 2000 Indonesia ranked 20 and Russia 21.

The next section will show why a loss in manufacturing competitiveness is a matter of concern. It will also provide evidence on manufacturing's positive externalities on the whole economy.

## 2.2. Manufacturing matters!

Strong evidence has shown that manufacturing is essential and creates strategic links with other parts of the economy. In the 2013 Competitiveness report, the Commission indicates that an «*additional final demand in manufacturing generates around half as much additional final demand elsewhere in the economy*». In addition, manufacturing represents the major source of investment in research and development (R&D) (62.3% in 2011)<sup>9</sup>, a key source of exports (80% of total EU exports)<sup>10</sup> and a main driver for employment in other sectors, including services. In this respect, economists have demonstrated that each additional job in manufacturing creates between 0.5 to 2 jobs in other sectors. In other words, ceding capacities in manufacturing can have very detrimental effects on the economy as a whole. Moreover, it might result in the loss of R&D, exports, design capabilities, and innovation in the longer term<sup>11</sup>.

The increased linkage between manufacturing activities and manufacturing-related services also needs to be seriously taken into consideration. Manufacturing firms are no longer limited to production activities as such. They increasingly develop pre- and after-sales services and provide customised solutions to customers. Today, the share of service-related jobs in manufacturing employment represents around 40%<sup>12</sup>. Experts are therefore talking about the 'servitisation' of manufacturing as the service content in manufacturing final output has significantly increased over the last decades. Furthermore, it is becoming increasingly clear that it is not only the quality of the product that determines a firm's market share, but also the quality of the service (or solutions) attached to it.

In light of this, there is no doubt that production activities and services are complementing each other, or even more so, are depending on each other. This is something that needs to be taken seriously into account when designing policies as the development of high quality support services can play a pivotal role in maintaining manufacturing production and employment in Europe. Indeed, many services are closely linked to manufacturing activities and located where the local demand is. In

<sup>9</sup> Eurostat data. This figure relates to the share of business enterprise sector's expenditure in total EU R&D expenditure.

<sup>10</sup> Eurostat data.

<sup>11</sup> Warwick, K. (2013), «Beyond Industrial Policy – Emerging issues and trends», *OECD Science, Technology and Industry Policy Papers*, Paris.

<sup>12</sup> Data based on the EU Labour Force Survey. See, Veugelers R. (2013), «Manufacturing Europe's growth», Volume XIII, *Bruegel blueprint series*, Bruegel, Brussels, p. 28.



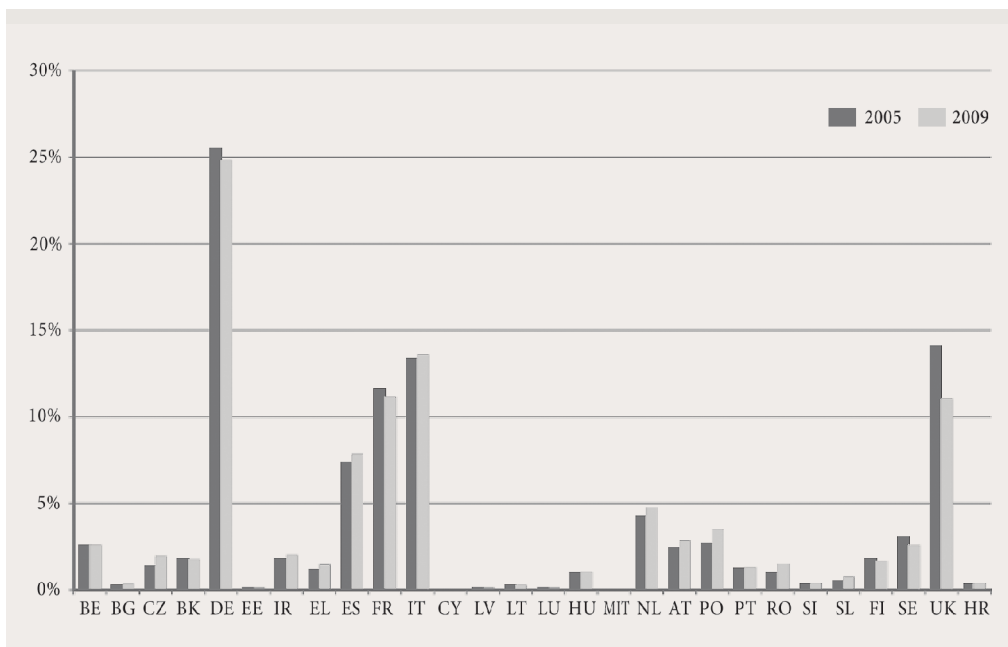
other words, building new and innovative capabilities in services could reduce off-shoring trends.

Notwithstanding the wide deindustrialisation process occurring across Europe, it is worth noting that the trend is uneven between Member States. There are indeed disconcerting divergences in the weight and performance of manufacturing across Europe.

### 2.3. Increased divergences of manufacturing performance across the EU

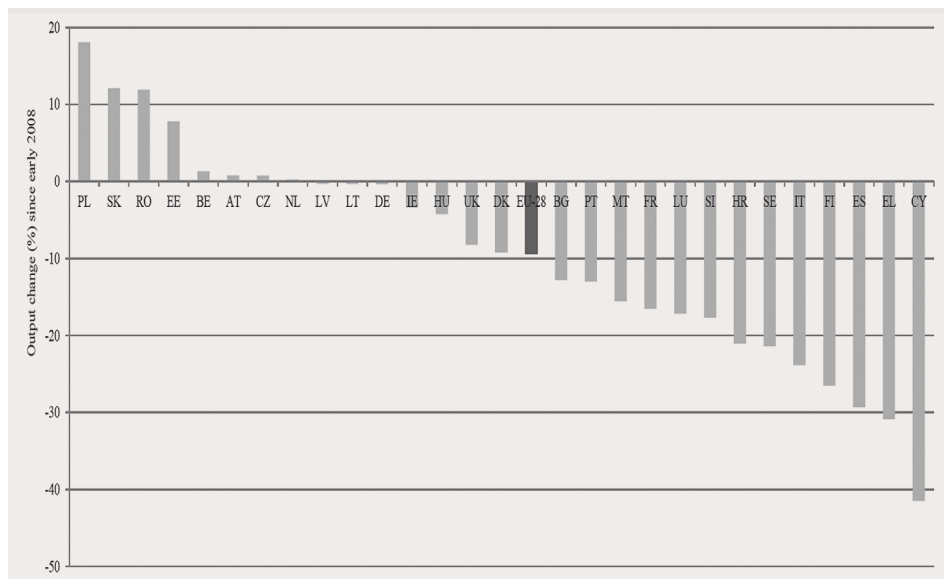
The EU's industrial base has always been characterised by significant differences in industries' structure and their capacity to grow. Such differences are both perceivable at the firm level, depending on their size and innovation capabilities, but also across the EU territory. Divergences between countries have even increased over the last years, not least due to the effect of the crisis. Figures 5 and 6 provide evidence in this respect. While Figure 5 shows the wide discrepancies of national share in EU manufacturing by Member State, Figure 6 indicates that manufacturing recovery has been very uneven across the EU.

Figure 5. **SHARE IN EU MANUFACTURING BY MEMBER STATE** (% of total)



Source: European Commission (2013), «Competing in Global Value Chains, EU Industrial Structure Report 2013», p.18. Data: Eurostat.

Figure 6. MANUFACTURING RECOVERY BY MEMBER STATE 2008-2014



Source: European Commission (2014), «Helping Firms Grow, European Competitiveness Report 2014», European Commission Staff Working Document SWD (2014)277 final, p.19. Data: Eurostat.

Different trends in Member States are explained by different factors as industrial policy is a cross-cutting area. Therefore, manufacturing performance relies on a wide range of competitiveness drivers. It is the interaction between those drivers, which determines firms' competitive position and focusing merely on one of them while neglecting the others would be wasteful. Therefore, differences in national manufacturing performance are explained by divergences in the major drivers of competitiveness. Understanding the factors behind a high level of productivity and competitiveness has been the subject of numerous studies. In this respect, the World Economic Forum has set up the Global Competitiveness Index, a comprehensive tool that measures the micro-economic and macro-economic determinants of national competitiveness<sup>13</sup>. These determinants are grouped into 12 pillars of competitiveness<sup>14</sup>. They sketch out the contours of good framework conditions in which European firms should operate and have a direct impact on input factors, i.e. the factors utilised in the production of goods. This section sheds light on some of them, in particular the level of labour pro-

<sup>13</sup> For more information on the performance of EU countries in the Global Competitiveness Index, see the online ranking available at: [http://www3.weforum.org/docs/GCR2014-15/GCR\\_Rankings\\_2014-2015.pdf](http://www3.weforum.org/docs/GCR2014-15/GCR_Rankings_2014-2015.pdf), last accessed on: 10 November 2014.

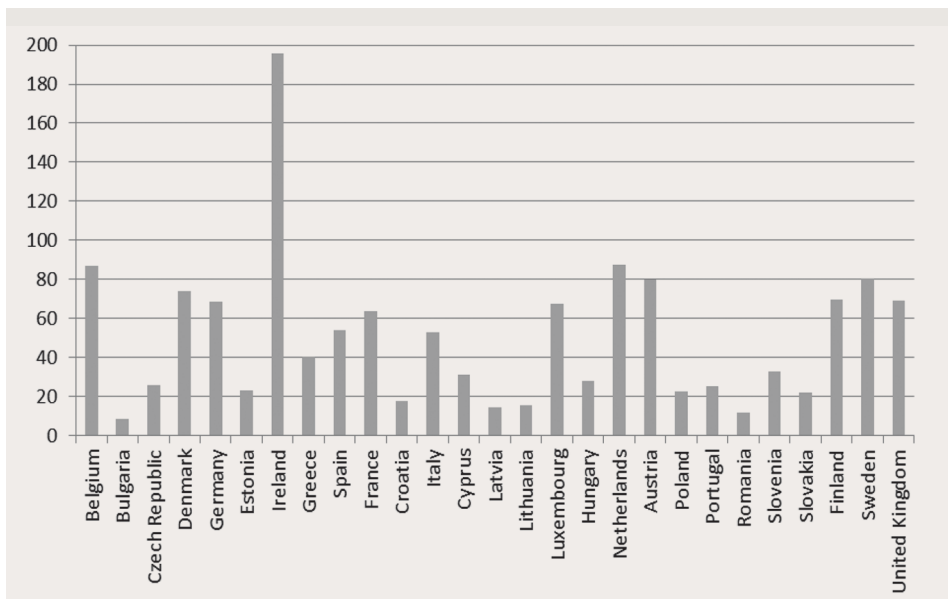
<sup>14</sup> See, Sala-I-Martin X., Bilbao-Osorio B., Di Battista A., Drzeniek Hanouz M., Galvan C., Geiger T. (2014), «The Global Competitiveness Index 2014-2015: Accelerating a robust recovery to create productive jobs and support inclusive growth», World Economic Forum, Geneva.

ductivity, access to finance, and innovation performance, and points out to the profound divide between Member States.

In Figure 7, one can see that the level of labour productivity varies considerably between Member States. While countries from Central and Northern Europe are the top performers, Southern and Eastern ones have a relative low level of labour productivity.

Figure 7. **APPARENT LABOUR PRODUCTIVITY IN MANUFACTURING  
(BY NACE REV. 2) BY MEMBER STATE, 2011**

(thousand of euros per person employed)

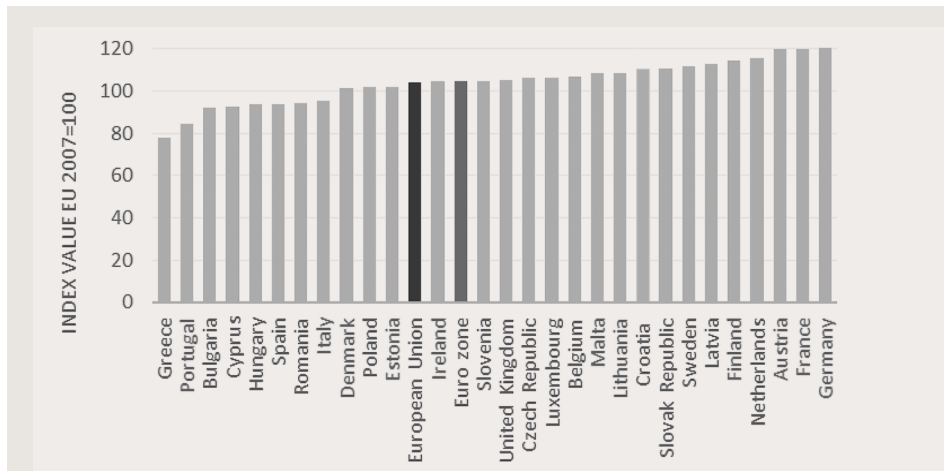


Data: Eurostat (data not available for Malta). Note: Apparent labour productivity is defined as value added at factor costs divided by the number of persons employed. This ratio is generally presented in thousands of euros per person employed.

Figure 8 gives an indication of SMEs' access to debt and equity finance across the EU. Most of the countries which were more severely affected by the economic crisis, like Greece, Portugal, Spain and Italy, figure among the worst performing countries.

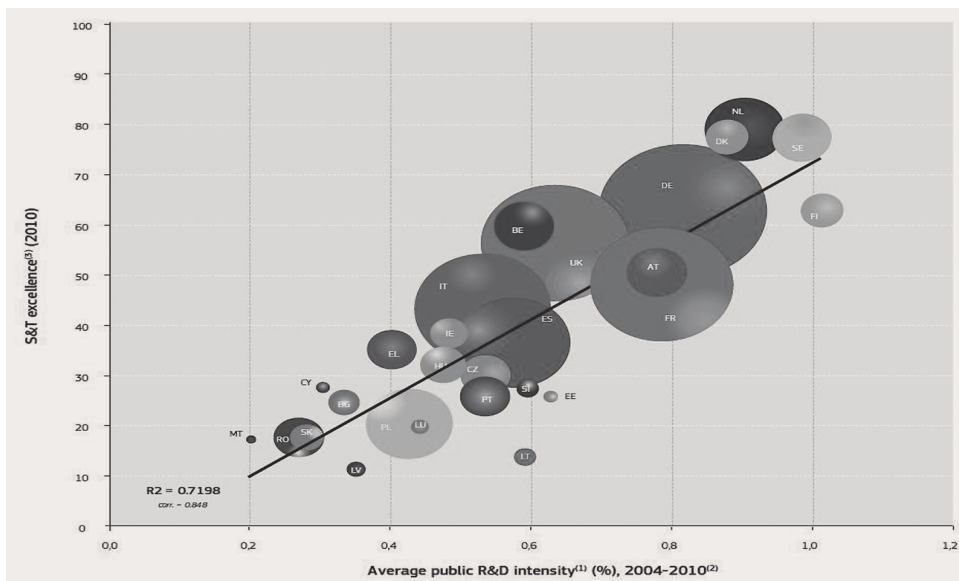
Figure 9 gives an idea of public R&D expenditure in each country and the performance in Science and Technology excellence, showing that there is a strong correlation between the two. However, this correlation does not hold true for all countries, indicating that the quality of spending also matters. This point is further illustrated by Figure 10, which shows that other factors also play a role in a country's innovation performance.

Figure 8. **SMAF INDEX, EU MEMBER STATES, 2012** (Index value EU 2007=100)



Source: SMEs and access to finance Index, European Commission, DG Enterprise and industry.  
 Note: The SMAF index provides an indication of the changing conditions of SMEs' access to finance over time for the EU and its Member States. The index is calculated using a baseline of EU 2007=100, allowing comparison between countries and over time. The base reference of 2007 deliberately provides a baseline before the onset of the financial downturn. The index comprises two main elements or sub-indices: access to debt finance and access to equity finance. These sub-indices are calculated using data from the following sources: European Central Bank (ECB) for debt; European Venture Capital Association (EVCA) and European Business Angel Network (EBAN) for equity; and the EC and ECB's Survey on the Access to Finance of SMEs (SAFE) for both sub-indices.

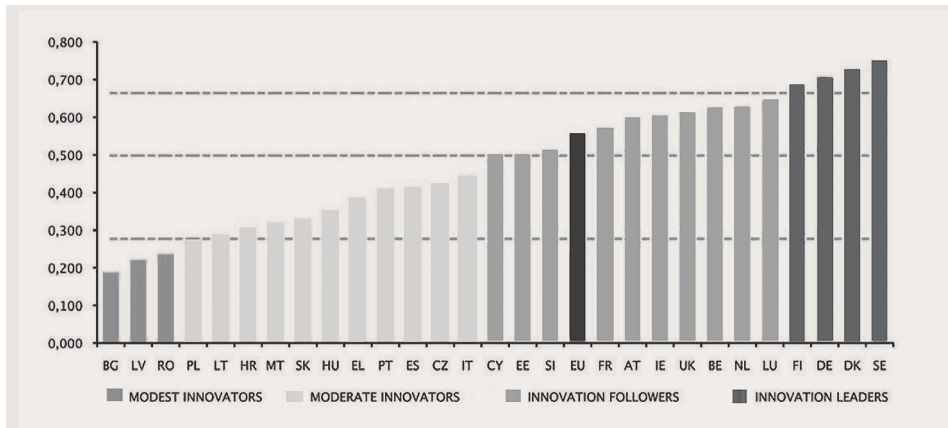
Figure 9. **INVESTMENT AND RESEARCH EXCELLENCE**



Source: European Commission (2012), «State of the Innovation Union Report 2012, Accelerating Change», p. 9. Data: Eurostat.  
 Note: (1) Average public R&D Intensity (public Gross Domestic Expenditure on R&D as % of GDP). (2) EL 2004-2007; SE-IT: 2005-2010; LU 2009-2010. (3) Composite indicator on Science & Technology (S&T) excellence (feasibility study of JRC).

It is thus a set of factors which explains the long and persistent fragmentation of the European industrial landscape and which has contributed to the co-existence of different industrial models in Europe.

Figure 10. EU MEMBER STATES' INNOVATION PERFORMANCE



Source: European Commission (2014), «Innovation Union Scoreboard 2014», p.5.

Note: The vertical axis represents the average innovation performance and it is measured using a composite indicator building on data for 25 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. The performance of Innovation leaders is 20% or more above that of the EU27; of Innovation followers it is less than 20% above but more than 10% below that of the EU27; of Moderate innovators it is less than 10% below but more than 50% below that of the EU27; and for Modest innovators it is below 50% that of the EU27.

For more information see, Hollanders H, Tarantola S. (2011) «Innovation Union Scoreboard 2010 - Methodology report», January.

### 3. POLICY OPTIONS FOR A NEW PHASE OF RE-INDUSTRIALISATION IN EUROPE

The previous chapter has both highlighted the key role that the manufacturing sector plays in our economy as well as the difficulties that Europe's industry is facing to maintain its competitive advantage. Against this background, it becomes crucial for the EU and its Member States to develop a strategic vision on where Europe's industry should position itself and to reflect on what choices need to be made to implement such a vision. Certainly, Europe cannot compete on price with emerging economies. Another route, based on research, innovation, skills and high ecological standards, has to be taken. This chapter presents three courses of action occurring at different levels of governance and that should be at the core of a new phase of re-industrialisation in Europe. Going from the firm level to the European level, these actions consist in: (1) taking the lead in new business models, (2) promoting industrial eco-systems through systemic innovation, and (3) supporting the emergence of a genuine European value chain.

### 3.1. **Becoming a leader in new business models**

Our economic and industrial model is based on a «take, make and dispose» approach. Together with a growing and evermore consuming middle class in the world, this puts an enormous strain on global resources, including energy sources, water, land, food and minerals, and at the same time on the environment. It is becoming clear that this linear approach is no longer sustainable. Over-exploitation of resources and environmental destruction are leading to resource scarcity, which can have far-reaching and unforeseeable economic, social, environmental and security implications.

European industry is extremely vulnerable in the face of this global resource challenge. European companies outsource the largest share of resource extraction in the world. In 2013, raw materials, including energy imports, were worth 704 billion<sup>15</sup>. The EU is dependent on energy imports such as oil and gas from just a few suppliers – including Russia. It relies on outside sources of raw materials for chemical, construction and other industrial sectors. For example, it needs rare earths from China to feed its high-tech and environmental industries. As global competition for resources continues to increase, resource supplies become less secure. It is in the EU's and European industry's interest to reduce this vulnerability<sup>16</sup>. Companies which improve their resource productivity will be more competitive in resource-scarce markets and less affected by resource and environment-related challenges, supply disruptions and volatile prices.

It is a great contradiction that while Europeans acknowledge their resource-dependency, waste keeps on accumulating at the same time, not enough materials are recycled and valuable materials are continually lost or shipped outside the EU. Every year, the EU produces around three billion tonnes of waste, of which manufacturing activities generate 360 million tonnes and construction activities bring about 900 million tonnes<sup>17</sup>. As only 40% of solid waste is recycled, this accounts for a significant loss of resources for a resource-dependent Europe. In addition, recycling manufactured products could have significant benefits for European industries. For instance, 6,000 used mobile phones contain about 3.5 kilograms of silver, 340 grams of gold and 130 kilograms of copper<sup>18</sup>.

The benefits of implementing new business models and moving towards a circular economy, i.e. a model based on the recycling and re-use of materials, would be tremen-

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<sup>15</sup> See the website of DG Trade, European Commission: <http://ec.europa.eu/trade/policy/accessing-markets/goods-and-services/raw-materials/>, last accessed on: 4 November 2014.

<sup>16</sup> For more information see: Ahtonen A., Chiorean-Sime S. (2012), «Green revolution: making eco-efficiency a driver for growth», *EPC Issue Paper no. 68*, Brussels.

<sup>17</sup> European Commission brochure (2010): «Being wise with waste: the EU's approach to waste management».

<sup>18</sup> Science Daily (2009), «Set World Standards For Electronics Recycling, Reuse To Curb E-waste Exports To Developing Countries, Experts Urge», 17 September, available at: <http://www.sciencedaily.com/releases/2009/09/090915140919.htm>, last accessed on 31 October 2014.

dous both for the planet as well as for European industries. A McKinsey study suggests that, if done on a global level, the transition towards a circular economy would lead to global material savings of more than \$1 trillion a year by 2025<sup>19</sup>. With respect to the benefits on the European economy, the Commission Communication «Towards a circular economy: A zero waste programme for Europe» estimates that increasing resource efficiency could help to reduce material input needs along the value chains by 17%-24% by 2030, and that more efficient use of resources could help European industry to save annually €630 billion<sup>20</sup>. On a national level, it has been estimated that British businesses would gain around €28 billion annually by taking no-cost or low cost measures to improve the way they use energy and water, and by reducing waste. Indeed, a better use of resources would help European industries to cut costs and thus improve competitiveness.

Some companies, such as French car company Renault, have already taken steps to change their business models, to reuse more products or components and restore important material, energy and labour inputs – while enjoying the benefits. For instance, producing remanufactured parts compared to new parts has enabled Renault to use 80% less energy, 88% less water, 92% less chemical products, and generate 70% less waste. In the model implemented by Renault, waste has become a resource for the supply chain. Materials are used to their fullest potential and manufacturing pieces are reused as much as possible while closing the loop of product lifecycles.

Such a model requires a strong collaboration with all stakeholders involved in the innovation and production chain. Contrary to the linear economy, which is built on complex and geographically dispersed value chains, the circular economy relies on network activities in which products are turned into components and materials. Manufacturers that adopt new business models, redesign their products and practices have to work closely with suppliers and waste professionals. By doing so, manufacturers can maximise the number of consecutive product cycles, bring their costs down and increase their competitiveness. Waste professionals will no longer have a product at the end of its life cycle at their disposal but a resource fit to be re-incorporated into production. In other words, all pre- and post-production activities need to be put into a coherent and coordinated system. For instance, strict eco-design requirements are necessary to optimise the remanufacturing and the reuse of components and such requirements have to be implemented by all stakeholders and suppliers. In the case of Renault, the company is working closely with INDRA, which is specialised in the dismantling of end-of-life vehicles in France and coordinates a network of 400 SMEs distributed throughout the French territory in order to collect local end-of-life vehicles. The company develops processes and permanent tools for optimising the dismantling of vehicles, the sorting and collection process of

<sup>19</sup> Nguyen H., Stuchtey M., Zils M. (2014), «Remaking the industrial economy», *McKinsey Quarterly*, February.

<sup>20</sup> European Commission (2014), «Towards a circular economy: A zero waste programme for Europe», COM (2014)398.

materials and the distribution of reused spare parts, which are all made possible thanks to an appropriate eco-design.

In addition to increasing resource efficiency, circular economy models are also changing the role of consumers, which are no longer considered as buyers but rather as users of a specific product. In the case of Renault, end-users are put at the heart of Renault's business models and new types of offers are made to Renault's clients. For instance, clients have the possibility to lease batteries, or to use remanufactured mechanical parts. Thus, after-sales services have been developed for offering reused spare parts in order to prolong the life of old vehicles. Besides the positive ecological impact, this is also having positive effects for the end-users, as it reduces the price of the vehicle while continuing to ensure high quality products.

Another interesting example is provided by a division of Royal Philips. **Philips Healthcare** has shifted its activities from selling products to selling services: it leases equipment to its customers and after the service contract with initial users of equipment has been completed, it upgrades and refurbishes the product, before leasing it to other customers. The Dutch company estimates this part of their activity to be worth €200 million<sup>21</sup>. Also the Lighting division has started to sell lighting as a service. As a result customers can have latest technology lighting with high energy efficiency, without paying the upfront costs. At the same time Philips is in a better position to collect and recycle the lamps, and reduce its use of new materials.

These examples illustrate perfectly the growing interconnectedness between a manufactured product and the services that are developed around it and highlight a key potential for the future of the manufacturing sector in Europe. It would indeed open up new markets and support local employment as creating services capabilities attached to a specific product would create non-relocatable jobs, increase the need for having some of the production stages close to where services are delivered and reduce the need for offshoring. In addition, such a model responds to some growing expectations among European consumers, i.e. to use products with high level ecological standards.

On the side of the industry, it makes sense for European companies to make their business models more sustainable and reap the benefits of it. At the same time, it is worth to acknowledge that the benefits would be even greater if the system as a whole supported more sustainable production and consumption patterns. This would require further collaboration between business and research centers, policy makers and investors. Transition to a circular economy, where resources and materials would be restored and reused across value chains would require changes not only to business and market models, but also to product design, how waste is turned into a resource, and to consumer behaviour. For example, while companies can themselves aim to maximize the reusability of products and components when designing them, the ben-

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<sup>21</sup> Fleming T., Zils M. (2014), «Toward a circular economy: Philips CEO Frans van Houten», McKinsey Quarterly, February.



efits would be greater if an industrial system would be in place where products are designed and optimised for disassembly and reuse, and if the components and resources were used over and over again in the system – to the extent that this is possible.

To encourage industry to adopt new business models that would support a transition towards a circular economy, requires -first of all- a better understanding of the positive impacts and needed measures. It is easy to stay locked into linear models or fear that the costs of the transition outweigh the benefits, if there is no evidence to prove otherwise. More research is needed to demonstrate the positive impact of this transition on companies' competitiveness and to identify what kind of business models and investment decisions are the most successful. This requires identifying sectors and materials that would benefit the most from a circular approach and lead to greatest economic and environmental gains. In its 2014 report, the Ellen MacArthur Foundation shows that in the manufacturing sector, the materials-intensive automotive, machinery, and equipment industries would enjoy the highest long term gains<sup>22</sup>. For its part, the European Commission commissioned a scoping study to identify potential circular economy actions, priority sectors, material flows and value chains<sup>23</sup>. The study identified agricultural products and waste, wood and paper, plastics, metals and phosphorus as priority materials and packaging, food, electronic and electrical equipment, transport, furniture, buildings and construction as priority sectors.

Investment and access to finance are also important challenges. Companies must have the resources to change their business models and invest in product design and innovative processes. Policy makers must provide a framework fit to stimulate private investments. Encouraging investments in resource efficiency by shifting taxes from labour towards pollution and resources as well as phasing out environmentally harmful subsidies are some good examples of how policies can influence industrial activities. In the same vein, public procurement has a central role to play to steer innovation into the right direction. Promoting green public procurement and businesses that implement a circular economy model can help companies to reduce the initial costs that such a transition implies. Lastly, using public funds to develop waste treatment infrastructure is a necessity as companies, in particular SMEs, cannot always cost-effectively repair or reuse their products<sup>24</sup> and do not have the resources to adopt a new business model.

An additional question to address, also in the light of the complexity of global value chains, is: at which geographical scale should one attempt to set up circular loops? An industrial symbiosis model, where companies can sell their by-products

<sup>22</sup> World Economic Forum, in collaboration Ellen MacArthur Foundation and McKinsey & Company (2014), «Towards the circular economy - Accelerating the scale-up across global supply chains», *2014 Report*, January, Geneva.

<sup>23</sup> European Commission (2014), «Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains», *Final report*, August.

<sup>24</sup> European Commission Communication (2014), «Towards a circular economy: A zero waste programme for Europe», COM (2014)398.

and waste to each other, works better if they are geographically close. This physical proximity would also help to bring down costs as it would encourage using common infrastructures and treating different waste types more efficiently. Also leasing and pay-per-use formulas as if the goods to consume were services rather than products, would benefit from physical proximity. Having manufacturers operate close to where the products are used, would also allow companies to strengthen ties with customers. However, as the circular economy follows the rules of supply and demand, the loop can also work on a larger scale. As China is a major exporter of consumer products, there is natural demand for recyclates that can be turned into finished goods, and then sold back to Europe. More information is needed to understand the benefits of different scales for operations and to determine if there are any re-shoring opportunities<sup>25</sup> for Europe, for example, in the recycling sector.

Using Europe's dependence on foreign resources as a springboard to improve its own competence in re-using and refining resources, eco-design and waste treatment solutions could make the EU a global expert and world leader. This could have the additional benefit of helping the EU, in close cooperation with its trade partners, to become a standard-setter for the global market.

### 3.2. Promoting industrial eco-systems through systemic innovation

In line with a change in industrial policy thinking in the early 2000s, greater attention has been put on systemic innovation abandoning the traditional interventionist rationale of the 1960s and 1970s as well as the more horizontal<sup>26</sup> approach prevailing in the 1980s and 1990s. The new systemic approach aims to ensure that the system does not contain any obstacles to firms' growth and industrial development. As part of this new rationale, systemic innovation with meso-level networks of businesses and relevant organisations and complete industrial eco-systems play a key role. The attention is therefore no longer focused on technological innovation or the performance of a single firm and /or product but rather on how a transformation of the system can lead to more innovation.

Some European regions have already succeeded to develop strong meso-level networks, which have helped them become leaders in high value added and knowledge-rich products. Two important choices lie at the heart of their economic success and have enabled them to build up a complete industrial eco-system: specialisation and clustering.

These regions generally specialise in the production of complex durable goods (such as cars, aircrafts or production machinery) thanks to industries with comple-

<sup>25</sup> Reshoring is the practice of bringing outsourced personnel and services back to the location from which they were originally offshored; for more information see: EPRS (2014), «Reshoring of EU manufacturing», *Briefing*, 21 March.

<sup>26</sup> Many scholars also describe this period as the one dominated by *laissez-faire* policies. For more details on the evolution of the industrial policy thinking, see Dhéret C., Morosi M. with Frontini A., Hedberg A., and Pardo R. (2014), «Towards a New Industrial Policy for Europe», EPC Issue Paper n° 78.

mentary capabilities that are located near each other to create a complete industrial ecosystem. Specialisation therefore takes place within a complex web of relationships in which production tools, parts and components are exchanged between hundreds of suppliers, sub-contractors and original equipment manufacturers to be integrated with the help of highly skilled workers and sophisticated production systems. This is valid especially for industries in which a dialogue between actors in the value chain is important for quality production and innovation.

The economic theory on industrial agglomeration suggests that firms tend to cluster near each other in order to reduce transport costs, namely the costs of moving goods, people and ideas. Geographical concentration helps manufacturing to reduce shipment costs between suppliers and customers. Moreover, firms benefit from the flow of skilled workers and ideas (the so-called knowledge spill-overs) across firms and industries.

Yet, globalisation and the rise of emerging economies have come to undermine the key components of industrial eco-systems in some European regions. Attracted by public investment, an innovation-friendly environment and booming market demand, some major European industries have relocated parts of their production process to emerging economies, in particular Asia, over the last decades. These economies have invested substantial resources to build strong innovation hubs to attract foreign investment<sup>27</sup>, which could ultimately contribute to the development of their local industry. As a result, European original equipment manufacturers, who shifted their production outside Europe, were sometimes followed by their large suppliers. This has created large holes in the European industrial eco-system. Moreover, equipment manufacturers fear that better opportunities to exploit scale effects in emerging markets could induce key European component suppliers to dismantle capacities in the EU, endangering strategic upstream linkages<sup>28</sup>.

In order to tackle these new challenges and to repair the holes in its industrial eco-systems, Europe has to ensure that industries can benefit from key advantages while locating their activities in Europe. In this vein, clusters remain one of the adequate responses. Research has shown that clusters' success requires a balanced interaction of four determinants: demand conditions (i.e. market demand), input (or factor) conditions, presence of supporting industries and company rivalry (or competition)<sup>29</sup>. Among the input conditions is the co-location of technology and research centres. Such centres can play a catalytic role in boosting the innovation and

<sup>27</sup> Roland Berger Strategy Consultants (2012), «Innovation - How the emerging markets are driving the global innovation agenda», Global Topic Initiative, Munich.

<sup>28</sup> Vieweg H. G. (2012), «An introduction to mechanical engineering: Study on the competitiveness of the EU mechanical engineering industry», Within the framework contract of sectoral competitiveness studies-ENTR/06/054, *Final report*, Munich.

<sup>29</sup> Zadeh R. M. (2007), «Cluster Development and Initiatives in Traditional Industries», *Paper for International Cluster Conference: Patterns of Clusters Evolution*, Yorkshire Forward, Brussels; see also Porter M. (1990), «The competitive advantage of nations», Harvard Business Review, Cambridge, U.S., March/April.

economic development potential of a cluster as they might stimulate collaborative relations between industry and universities, and thus help bridge research, i.e. the generation of knowledge, with the market. At a time when the fourth industrial revolution is emerging, it is essential to ensure that Europe's industry integrates disruptive technologies such as additive manufacturing, artificial intelligence, and automation. In order to integrate these technologies into products in a timely manner and to accelerate their commercialisation process, manufacturing companies need to work together with research and technology institutes. In addition, the costs of innovation have to be affordable. By enabling all agents of the innovation chain<sup>30</sup> to pull their resources and skills together and connecting them to a vast pool of know-how and capabilities, clusters allow for a reduction of the innovation costs.

Finally, the systemic approach based on strong and specialised industrial eco-systems is particularly relevant to the need (as highlighted in the previous section) for Europe to become a leader in new business models. It should even be considered as one of the pre-conditions for their development. Indeed, the new business models that can address ongoing trends indicated earlier in this paper, such as the growing demand for tailor-made products with high-ecological standards, the increased attention devoted to societal challenges such as climate change, require the presence of strong industrial eco-systems where the relevant agents are located near each other.

### 3.3. Facilitating the Europeanisation of the value chain

The international fragmentation of production in global value chains (GVCs) is the major element shaping the new environment in which European industry operates today. As defined by the OECD, a value chain is «*the full range of activities that firms engage in to bring a product to the market, from conception to final use. Such activities range from design, production, marketing, logistics and distribution to support to the final customer*»<sup>31</sup>. Every activity embodied in the production of a good generates a certain value added and the position of a country in the GVCs it participates in determines to what extent it benefits from it. The structure of the value chain and the value of each production stage may vary from one product to another but generally speaking, upstream activities such as R&D and design as well as downstream activities such as branding and marketing create more value added than assembly.

Nowadays, a product is no longer created by a single firm in one location. Progress in information and communication technologies, the increased digitalisation of our economies, trade liberalisation, and cheaper transport costs have enabled companies to slice up production into separable stages and to look for the best suited location for each

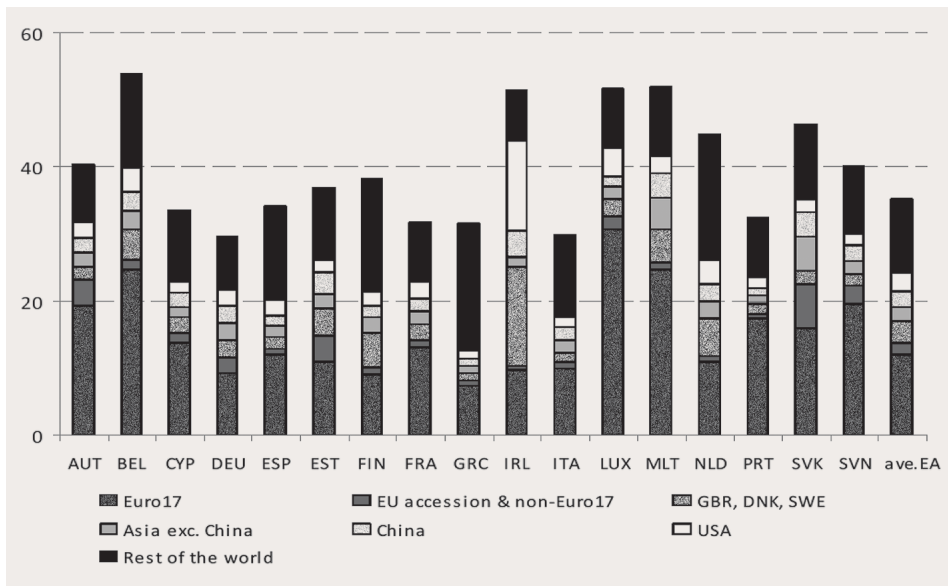
<sup>30</sup> The innovation chain entails different steps, including technological research, product development and demonstration activities.

<sup>31</sup> OECD (2013), «Interconnected economies: Benefiting from global value chains – Synthesis report», *OECD Publications*, Paris, p.8.

of them. Thus, many European manufacturing firms have broken up their value chain and outsourced parts of it to external companies located either inside or outside Europe. As a result, the production of a good involves a growing number of intermediate firms and value chains have internationalised and become increasingly complex.

The growing fragmentation of manufacturing activities has raised significant opportunities for European firms, contrary to what is usually assumed. Firm level analysis has shown that firms, which are integrated in GVCs -either through offshoring or outsourcing<sup>32</sup> activities, importing components or exporting their goods- have better productivity performance, and are more open to complex innovation strategies involving both production processes and components. Those firms, although few in number, are also driving the creation of a country's total value added, trade flows and employment<sup>33</sup>. In addition, the fragmentation of production led to an industrial restructuring both across the European economies and between Europe and the rest of the world, which enabled European firms to specialise in the higher value added segments of the value chain<sup>34</sup>.

Figure 11. **SHARE OF FOREIGN VALUE ADDED (IN EXPORTS) BY ORIGIN 2011** (percentages)



Source: Amador J., Cappariello R., Stehrer R. (2013), «Global value chains: A view from the euro area», Paper presented at the CompNet Conference, 16-17 April, Washington DC.

<sup>32</sup> While offshoring refers to the activities performed by foreign manufacturing affiliates, outsourcing means contracting with other manufacturing firms abroad.

<sup>33</sup> See Veugelers R. (ed.) (2013), *op. cit.*

<sup>34</sup> *Ibid.*

Manufacturing products are, therefore, increasingly ‘made in the world’ and parts and components cross borders many times before the final product arrives on the market. Against this background, the national discourse recently adopted by national policy makers promoting ‘Made in...[national country]’ might sound anachronistic. This seems to ignore the functioning and the benefits of GVCs as well as the fact that globalisation and the international fragmentation of the value chain are not expected to stop. That being said, it is worth thinking about how the EU could better support Member States’ efforts to climb up the value chain and reflecting upon the benefits of the Europeanisation of the value chain, i.e. the possibility for firms to organise their value chains across EU countries. In this respect, the question of how the Europeanisation of the value chain could contribute to maintaining a healthy share of manufacturing in Europe and to having a strong industrial base spread over the whole territory needs to feature high on the policy agenda.

Developing such an approach requires taking two empirical elements into consideration. First, the participation of European firms in GVCs is mainly EU driven<sup>35</sup>. Looking at the euro area, one can see that the foreign value added in exports is –while increasing as share of exports– largely sourced from other euro area countries (see Figure 11). Looking at the EU as a whole, one can also observe that some countries, like Germany, have strongly integrated their economies with Eastern European countries<sup>36</sup>. Second, this EU orientation does not disadvantage European firms. European value chains seem to generate as much benefits as GVCs do. Indeed, the evidence suggests neither a productivity premium nor a discount for European firms that concentrate their international value chain in Europe<sup>37</sup>. In addition, the Europeanisation of value chains can generate additional benefits, such as avoiding high coordination and transportation costs compared to GVCs. Against this background, looking at ways to further integrate European value chains has real significance. It would create important benefits for the European economy as a whole and help to have an industrial base evenly distributed across the whole territory.

Enabling the emergence of the Europeanisation of value chains should, however, not be equal to protectionism. In this respect, it should be kept in mind that trade has positive effects on Europe’s industry. This is indeed EU’s most important source of growth as manufacturing achieves a trade surplus of 300 billion. Instead of protectionism, European value chains should be based on excellence, strong differentiation factors relative to goods produced elsewhere and on the advantages of being part of a fully integrated Single Market. That being said, Europe should not be naive either. As already mentioned earlier in this paper, many industrial nations

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<sup>35</sup> Variations among countries do, however, exist. The size of a country’s economy is the determining factor, as smaller countries generally display higher share of foreign value added than bigger countries.

<sup>36</sup> Di Mauro F. Hedwig P., Stehrer R. (2013), *op. cit.*

<sup>37</sup> Veugelers R. (ed.) (2013), *op. cit.*

have launched ambitious strategies and put in place protective measures to defend their industries. While respecting trade agreements, the EU should also make sure its firms face the same conditions as foreign companies and are not put at a disadvantage in international competition.

In addition, moving towards further integrated value chains at EU level does neither contradict with an external strategy for manufacturing nor with off-shoring and outsourcing certain activities. Production stages should still stay where they can be performed most efficiently. It is rather in the high value added segments of the production chain where efforts need to be deployed and where Europe needs to look at how to make industries work better together. Limiting the foreign value added embodied in EU exports and consumption goods to activities in which Europe's industry cannot offer a comparative advantage, be it due to labour costs, lack of natural resources or other production factors, should therefore be the ultimate objective.

#### 4. CONCLUSION

This paper has both shown the pivotal role that manufacturing activities play in our economy and the difficulty that Europe faces to maintain a strong industrial base. Europe's manufacturing activities have been in decline for several decades now and the downward trend will continue if no strategic choices are made. These choices have to take current global challenges into account, including the increased competition from emerging economies as well as the new waves of disruptive technologies, as highlighted at the last 2016 World Economic Forum in Davos<sup>38</sup>, that will alter the nature of manufacturing activities.

In order to cope with such challenges and to fully embrace the fourth industrial revolution, Europe will need to create new capabilities and use the full potential of having specialised and diverse economies across its territory. Against this background, this paper proposes three strategic choices: (1) the promotion of new business models; (2) the creation of industrial eco-systems through systemic innovation; and (3) the support for a genuine European value chain, which together could stimulate a new phase of re-industrialisation in Europe. These choices are complementary and the large benefits that they could generate on a European scale depend on how well each of them is implemented. These choices imply important changes at different levels of governance and will require a strong support from public authorities at each level and also a great degree of cooperation among them. Moreover, public authorities, be it at the national or European level, will have to rethink their role in supporting European industries' competitiveness. This will require certain important paradigm shifts both in the way public authorities make use of some policy instruments, such as public procurement, and how industry is organised across the European territory.

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<sup>38</sup> For more information on this point, see the website of the World Economic Forum: <http://www.weforum.org/>, last accessed on: 11/02/2016.



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