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Innovation and Knowledge in Creation of European Union Global Competitiveness and Social Security from Regional Perspective

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Abstract

The main aim of the paper is analysis of the innovation and knowledge in creation of European Union global competitiveness and social security from regional perspective. To the particular goals of the research belong the presentation of the Knowledge-Based-Growth (KBG) theory, the concept of innovation system, the innovation system and innovation process, constructed advantage, the Triple Helix model, Europe 2020 strategy and Innovation Union and Horizon 2020 as the financial instrument implementing the Innovation Union. The important results of the research is the conclusion that in the innovation process also in the European Union very important are the connection between science (universities), market (industry) and government at the regional level. There is positive dependence between innovation activity and effectiveness of the innovation process. The more interaction and cooperation also the creation of enterpreunership it can observe on the regional level than on the state. The new programme of the scientific and innovation research Europe 2020 and Innovation Union are very important factors of the economic growth, social security and global competitiveness of the European Union. The new economic narrative of the European Union is built around three main strands–boosting investments, pursuing structural reforms and fiscal responsibility.

Keywords

region, innovation system, innovation process, knowledge, global competitiveness, Innovation Union, Horizon 2020, Europe 2020

1. Introduction

Europe 2020 and the Innovation Union initiative have clearly signalled the EU's intention to rise to the challenge. Europe 2020 focuses on achieving smart growth, while the Innovation Union sets out measures to contribute to this aim, including increasing investment, refocusing R&D and innovation policy on major societal challenges, and strengthening the links from frontier research right through to commercialisation. A key challenge for the EU in implementing its strategy will be to build a next-generation expenditure programme, which matches this level of ambition in both its budget and its aspirations.

Financial market situation has improved on the back of the steady implementation of the reform agenda, including the advancements in the European Monetary Union (EMU) architecture, and by the important policy decisions in the euro area, including by the European Central Bank (ECB). The significant reform efforts in the vulnerable Member States are also bearing fruit: leveraging has decreased in the private and public sectors and competitiveness is improving in countries with

large competitiveness gaps creating conditions for further adjustment going forward. Exports are contributing increasingly to improvements in large current account deficits, which bodes well for the lasting nature of the correction. The large growth differences among the EU countries are also a reflection of the ongoing adjustment: temporarily lower or negative growth is often a feature of deep adjustments, but they open the way for more sustainable growth and convergence. Program Europe 2020 is the European Union's growth strategy for new budget perspective 2014-2020. The main aim of the paper is analysis of the innovation and knowledge in creation of European Union global competitiveness and social security from regional perspective.

2. Method

Paper prepared in the framework of the Grant OPUS, Narodowe Centrum Nauki-NCN (National Centre of Science–NCS), Nr UMO–2013/11/B/HS5/03572. The analized problems were solved with the use of both quantitative and qualitative research methods. The main research method applied in this analysis, was a method of scientific study used for splitting the whole (of individual items, their sets, phenomena) by means of logical abstraction. It was also used the analogy (comparative) method, which consists in finding similarities and differences between the items under study, the documentation method and statistical methods. It were applied the descriptive method, as well as methods of descriptive statistics and forecasting. Additionally, it were used the methods of deductive and inductive forecasting.

3. Result

What indicates the importance and innovativeness of the research is the presentation of the innovation and knowledge in creation of entrepreneurship and global competitiveness of the European Union. According to the new theory of growth being the best theoretical foundation for the concept of the innovation system, the primary factor influencing the economic growth is the endogenous technical progress. In the endogenous theories workers are seen as an element capable of active interaction and creating changes in the production process, and therefore a huge role in increasing productivity is ascribed to human capital and knowledge.

The research into the innovations in companies demonstrate that there is much more interaction and cooperation among the elements of the innovation system that occurs at the level of the region than the country. This results in the emphasis in recent years to research the potential and the regional innovation systems. In response to the need and assuming greater efficiency of the actions taken nearer to the entities, most regions that possess their own local authorities creates their own policy and proinnovation strategy.

Constructed advantage is both a means of understanding the noted metamorphosis in economic growth activity and a strategic policy perspective of practical use to business firms, associations, academics, and policy makers. In the Triple Helix model constructed advantages conceptualize as the surplus value of an overlay of relations among the three components of a knowledge-based-growth: (1) the knowledge-producing sector (science), (2) the market, and (3) governments. Those places with research universities witness a growing demand for knowledge transfer to industry and, through government, to society.

Knowledge will thus be main driver of growth in the future and policies geared towards enhancing Knowledge-Based-Growth (KBG) will be crucial. Two classe of policies are considered in this section: public policies to support knowledge creation development and absorption of new

technologies, and policies that influences the effectiveness with which new technologies are used.

It is important to underline that the Innovation Union is one of the seven flagship initiatives of the Europe 2020 strategy for a smart, sustainable and inclusive economy. An efficient innovation system introducing innovation and competitiveness of companies must have the proper linkages between science, industry and governance. The Europe 2020 Strategy aims to strengthen the Single Market of Europe by putting together seven flagships actions that aim to promote sustainability towards economic growth, competiveness and continuous increase of employment. Europe has many strengths and a number of European Member States are amongst the most innovative economies in the world due to people's talent and creativity as well as strong industrial base. The diversity of European countries should be looked as advantage and potential to be leveraged. Resource efficiency, in particular, is called for and represents a source of future economic growth.

Horizon 2020 is the financial instrument implementing the Innovation Union a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. Running from 2014 to 2020 with a budget of just over €70 billion, the EU's new programme for research and innovation is part of the drive to create new growth and jobs in Europe. Horizon 2020 maximises cost-effectiveness. On the cost side, its farreaching integration, simplification and harmonisation reduce costs for the EU and for applicants. At the same time, the Horizon 2020 option maximises the benefits through a close integration of research, innovation and training. This provide the best approach for ensuring that investments made at EU level. Structural reforms, which improve competitiveness, wage responsiveness and price flexibility are key to improving adjustment capabilities and to stimulating the transfer of resources from declining to growing sectors.

International cooperation is an important cross-cutting priority of Horizon 2020. In addition to Horizon 2020 being fully open to international participation, targeted actions with key partner countries and regions will focus on the EU's strategic priorities. Through a new strategy, a strategic and coherent approach to international cooperation is ensuring across Horizon 2020. International cooperation is also essential as challenges outlined in the Europe 2020 strategy are of global scale. Therefore, building partnerships with international innovation leaders to learn from their best practices as well as connecting markets in order to address shared challenges and found solutions is an important component of reaching the overall vision of a sustainable future for the citizens of the world.

Smart, sustainable and inclusive growth targets are set in the Europe 2020 strategy. These targets are central for an acceleration of transformation of economy and for economic growth. Indicators show progress in the investments in Research and Development (R&D) and climate targets. Progress can also be identified in the indicator on education, but indicators on employment as well as poverty and social exclusion show little progress. Nevertheless, slow economic growth has affected the outcomes of the indicators and it remains to be seen how future growth adheres to the targets of the Europe 2020 strategy. Balance between smart, sustainable and inclusive growth is still sought for as well as growth itself. Public participation is essential at all levels, especially when resource efficiency, climate change and low-carbon economy related actions are in question. Smart, sustainable and inclusive growth sets up a vision of Europe's social market economy for the next decade. While the European Union and its Member States provide governance and stakeholder engagement at many levels, the strategy nevertheless represents a topdown rather than publicly participatory approach to growth.

4. Discussion

4.1 Konwledge-Based-Growth (KGB) Theory

According to the new theory of growth being the best theoretical foundation for the concept of the innovation system, the primary factor influencing the economic growth is the endogenous technical progress. In the endogenous theories workers are seen as an element capable of active interaction and creating changes in the production process, and therefore a huge role in increasing productivity is ascribed to human capital and knowledge. It was Schumpeter who first recognized the importance of knowledge in the economy by his reference to "new combinations of knowledge" at the heart of innovation and entrepreneurship (Schumpeter, 1911). Nonaka and Takeuchi (1995) also show that Marshall (1916) recognized that capital consists in a great part of knowledge and organisation knowledge is our most powerful engine of production, organisation aids knowledge.

Typically, however, neoclassical economics neglected what was not contained in price information and made no effort to add to economic knowledge by trying to measure its economic contribution. There after, Hayek (1945, 1948) identified "the division of knowledge as the really central problem of economics as a social science" and saw its key question how localized knowledge held by fragmentary firms and individuals nevertheless produces an ordered market demand and supply. "The most significant fact about this system is the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action. In abbreviated form, by a kind of symbol, only the most essential information is passed on, and passed on only to those concerned" (Hayek, 1948, p. 86).

A further progenitor of the view that knowledge is a most important economic resource was Penrose (1959). She founded what has now evolved into the "dynamic capabilities of firms" approach to microeconomics (Teece & Pisano, 1996). She referenced the firm's characteristics as an administrative organization (Marshall, 1916, Coase, 1937) and home to accumulated human and material resources. The latter are inputs to services rendered, and these are the product of the firm's accumulated knowledge. "A firm's rate of growth is limited by the growth of knowledge within it, but a firm's size by the extent [of] administrative efficiency" (Penrose, 1995). In effect, in the words of Nonaka and Takeuchi (1995), "the firm is a repository of knowledge". Penrose (1995) also acknowledged that had the term been available in the 1950s, she would have referred to the dynamic capabilities of firms residing in knowledge networks (Quéré, 2003). Thus, Penrose (1995) noted the following crucial feature of the massively increased value of transferable knowledge to the wider economy for the firm. "The rapid and intricate evolution of modern technology often makes it necessary for firms in related areas around the world to be closely in touch with developments in the research and innovation of firms in many centres" (Penrose, 1995). Importantly, Penrose continues, the rise of business knowledge networks represents a metamorphosis in the contemporary economy. The key to the knowledge-based economy is at least partly revealed as this metamorphosis in the nature of industry organization to facilitate interaction with valuable knowledge, and not to conceal it, as was common in the previous phase of the global economy (Cooke & Leydesdorff, 2006).

Whereas the concept of a "knowledge economy" emerged within the context of the economic analysis of the quality of the input factors in the production process (Schumpeter, 1939), the term "knowledge-based economy" finds its roots in more recent discussions from a systems perspective (e.g., Sahal, 1981, 1985). National governments, for example, need a systems perspective for

developing science, technology, and innovation policies (Nelson, 1982). The modern approach to innovation, namely the so-called chain model, underlines the complexity of the innovation process and the uncertainty of its results, which increase often the need to return to the earlier stages. The chain model shows at the same time that applied research may lead to fundamental discoveries, which means that innovation of companies depends on the quality of relations between others companies that generate knowledge and innovation in the economy. (Wójnicka, 2008). Companies are a critical element in the innovation system, and their health determines the competitiveness of countries and social well-being.

By the second half of the 1950s, it had become increasingly clear to both policy makers and economic analysts that the continuing growth rates of Western economies could no longer be explained in terms of traditional economic factors such as land, labour, and capital. The "residue" (Abramowitz, 1956; OECD, 1964) had to be explained in terms of the upgrading of the labour force, surplus generated by interaction effects, and more generally the role of knowledge in the economy (Rosenberg, 1976). The Organization for Economic Co-operation and Development (OECD) was created in 1961 in order to organize and to coordinate science and technology policies among its member states, that is, the advanced industrial nations. This led in 1963 to the Frascati Manual in which parameters were defined for the statistical monitoring of science and technology on a comparative basis (Cooke & Leydesdorff, 2006).

It is a short step to link insights like these to the earliest work to operationalize a notion of the "knowledge economy" arising from the pioneering work conducted by Machlup (1962). He sought to identify those sectors with a heavy concentration of knowledge assets. He next attempted to map the production and distribution of knowledge sectors in the United States economy. Machlup classified knowledge production into six major sectors: education, R&D, artistic creation, communications media, information services, and information technologies. He showed that these account for the largest sectoral share of GDP and employment in the economy, and predicted that this share was destined to grow both absolutely and relatively over time. With brief interventions from Eliasson et al. (1990) and Burton-Jones (1999) who further specified the knowledge intensity of sectors by value and labour qualifications respectively, on reach the statements of the Organization for Economic Cooperation and Development (1996, 1999) calling for the measurement of the knowledge-intensity of national and regional economies (OECD/Eurostat, 1997).

The regionalization is to extract the spatial units of relatively homogeneous characteristics (geographical, demographic, cultural, and economic) in order to ensure the proper growth pace for regions by giving them a specific amount of self-control. This causes a problem of the content-relation nature of the topics under the freedom of decision-making. Among the regions that are weak and strong, crucial and peripheral, stagnant and developing, we distinguish border regions called also the cross-border regions. Their particularity is that are situated along the borders separating adjacent two or more countries. In view of the processes of globalization, the role of regional cooperation will increase. In the future corporatism and regionalism may become the dominating factors in the development of the world economy.

Studies of the knowledge-based growth focus not only on human capital, but also on the sectoral characteristics of the knowledge factor (Nelson, 1982; Pavitt, 1984). Technological trajectories and regimes shape innovation systems, but with a dynamics different from those of economic or geographical factors (Nelson & Winter, 1982). The recombination of the economic dynamics of the market, the dynamics of knowledge-based innovation, and governance generates the systems

perspective. An innovation system can then be defined at the national level (Freeman, 1987, 1988; Lundvall, 1988, 1992; Nelson, 1993), at the regional level (Cooke, 1992; Cooke et al., 2004), or in terms of a dynamic model like the Triple Helix of university-industry-government relations (Etzkowitz & Leydesdorff, 2000; Leydesdorff, 1994).

The general argument about the salience of the organization of knowledge in the sectoral, skills, and spatial composition of the economy embraces the position of Castells (1996), who is widely known for the observation that productivity and competitiveness are, by and large, a function of knowledge generation and information processing, and that this has involved a Penrose-type metamorphosis entailing a different mode of thinking about economies. Thus the balance between knowledge and resources has shifted so far towards the former that knowledge has become by far the most important factor determining standards of living-more important than land, capital, or labour. Today's most advanced economies are fundamentally knowledge-based (Dunning, 2000). Even neoclassicists like Paul Romer recognize that technology (and the knowledge on which it is based) has to be viewed as an equivalent third factor along with capital and land in leading economies (Romer, 1990). Inevitably this leads to issues of the generation and exploitation of knowledge. How is the system of knowledge production organized and controlled? (Whitley, 1984, 2001; Leydesdorff, 1995).

In a knowledge-based growth, inequality is generated by mechanisms of inclusion and exclusion only partially overlapping those of a traditional (capitalist) economy. With less emphasis, one can also say that another variant of capitalism is induced (Hall & Soskice, 2001). The mechanisms of inclusion and exclusion are no longer tightly coupled to one's class position in the production process as in an industrial economy. The geographical component can be expected to play an independent role in the knowledge-based dynamics because the newly emerging system is grounded in communication networks (Cooke & Leydesdorff, 2006).

It is important underline that the core city moves away statistically from the periphery, in the intensity with which it accumulates knowledge-based activities. Simultaneously, new high technology satellite towns "swarm," to use a Schumpeterian term, around the mother city. Even static analysis reveals this pattern, with some satellites scoring much higher than the main city around which they aggregate. Peripheral islands and regions or localities may score as low as 37% of the index average of 100% compared to 157% for Stockholm (e.g., Aegean Islands in the EU context; Cooke & De Laurentis, 2002; Dannell & Persson, 2003). Compared to GDP disparities a five-to-one ratio in the knowledge economy measure is approximately twice that given by measuring economic welfare differences more conventionally (Cooke & Leydesdorff, 2006).

Hence, for the industries of the future, the core cities are highly privileged in most countries while the peripheries are generally impoverished and becoming more so, presaging major out-migration of youth and the metamorphosis of such areas into socially deserted or playground economies. The policy imperative to devise mechanisms by which non-metropolitan regions may, in future, participate in the knowledge-based-growth is clearly overwhelming.

4.2 The Concept of Innovation System

The modern approach to innovation, namely the so-called chain model, underlines the complexity of the innovation process. The innovation of companies depends on the quality of relations between others companies that generate knowledge and innovation in the economy (Wójnicka, 2008). It has been seen in the concept of an innovation system that translates the observations of nonlinearity and the chain-like nature of innovation process into the functioning of the economy, development of

which depends on the generated innovations (Wójnicka, 2008).

According to this concept, the economy is not only the institutions which create it (meaning entities), but also the results of synergies, which arise as a result of mutual cooperation. Therefore, apart from the institutions that generate innovation (companies), the research-and-development sphere or intermediaries in the transfer of innovation in the concept that sees the importance of different interactions that occur between them. The innovation system consists therefore of institutions and relations between them, thanks to which the particular economy creates an efficient mechanism for the distribution of knowledge with a view to its further processing. A significant role for the efficiency of the innovation system plays the environment, especially the consumers of innovation, who create the demand. They are important in particular nowadays in the times of the market-driven economy. Companies monitoring the tastes of consumers, create new needs through innovations.

Also important for the efficiency of the innovation system is the infrastructure of the environment, meaning the legislation, and in particular the protection of intellectual property rights as well as the systems of education, financing and transport. A key feature of the systems is the historically established culture and the accumulation of knowledge and experience making their character unique. Moreover, for the efficiency of the innovation system as distributing knowledge, its openness to influences and knowledge from other systems and the interactions with them (Wójnicka, 2008).

An efficient system also has to be fully developed, i.e., it should not be missing any needed elements. The system will be the system if its entities are linked, because the system is a ordered arrangement of elements, between which there are certain relationships which constitute a whole. Such a system will be as strong as its weakest link (Wójnicka, 2008).

Companies are a critical element in the innovation system, and their health determines the competitiveness of countries and social well-being. In the view of the new theory of economic growth developed by such researchers as Kenneth Arrow, Paul Romer and Robert Lucas, knowledge is the primary factor in determining productivity. According to the new theory of growth being the best theoretical foundation for the concept of the innovation system, the primary factor influencing the economic growth is the endogenous technical progress. In the endogenous theories workers are seen as an element capable of active interaction and creating changes in the production process, and therefore a huge role in increasing productivity is ascribed to human capital and knowledge.

P. Romer has enabled the analysis of learning process, noticing that thanks to the gained external benefits from it, the knowledge inspired by private investments becomes publicly available. In addition, the latest examining of endogenous progress assumes that it is the result of investments by companies in the work of R+D. As Carlsson reckons every theory that is trying to endogenize the technological change must take into account the diversity of products, processes, economic entities and institutions. In addition, the interdependence of these different actors will be important, i.e., it must relate more to the system than individual units. From the perspective of the theory of growth based on the endogenous technological progress, the efficient innovation system–distributing knowledge, meaning accelerating the learning processes in the economy, will stimulate a higher general level of the particular economic development (Wójnicka, 2008).

The concept of the innovation system emphasizes the cooperation as well as the flow of technology and information and various relationships and interactions between individual elements as a condition conducive to the success of the innovation process. OECD gives, among others, the

following definitions of innovation systems derived from analyses on national innovation systems:
-the network of public and private sector, whose activities and interrelations initiate, import, modify, and expand new technologies;
-the group of institutions which both together and individually contribute to the development and diffusion of new technologies, and creates a skeleton, within which the governments formulate and implement the policies influencing the innovation process; the system of interconnected institutions that create, store, and transfer knowledge, skills and tools that define new technologies (Wójnicka, 2008).

Innovation systems are tested at various levels. The majority of analyses are conducted on national innovation systems, since it is considered that the characteristics distinctive to individual nations most affect the distinctness of the innovation process in companies: the type and number of institutions and their behavior (Wójnicka, 2008). It innovative firms provide frames and value systems that emphasise innovation as central of the company's mission and put their money literally where their mouts is. Encouraging innovation, however, is a complex balancing act that consist of three components: first, the balancing of goals which have to be linked to the corporate mission, but not be overly specific; second, the balancing of reward through a system that recognises members' contribution, but does not encourage overly risky behavior, and third, the balancing of time pressures (Greenberg & Baron, 2003, pp. 536-538) (Anheier & Fliegauf, 2013).

4.3 Innovation System and Innovation Process

The concept of the innovation system is a comprehensive look at the innovation process. Fumio Kodama points out that the existing categories of innovation and the measurements still do not cover all types of innovation. After Charles Freeman, he distinguishes, besides radical and improving innovations, other kinds of technological change like the change of the technological system and techno-economic paradigm. In the modern economy, the innovation can be realized by combining products and processes held by various companies from various sectors of the economy, as well as businesses and other entities, particularly from the field of research and development. In many industries new economy causes modularity of innovative activity. Innovations–their individual modules, are subcontracted to particular vendors, so that the company achieves flexibility and reduces costs (e.g., large automotive factory). The necessary response to the modularity of economy is a comprehensive approach to the innovation process (Wójnicka, 2008).

Technological change, is now very fast, but often meets a deep inertia among social institutions. Innovations determining the competitiveness have not only technological dimension, but also the organizational and personal one–the quality of human resources is extremely important for the profitability and the development of an organization. Moreover, significant is the nature of the innovation process that is interactive and based on the cooperation. The today ground-breaking technologies are so complex that individual companies would not be able to develop them alone. Their complexity makes it impossible to understand all the details by a single expert, as well as the knowledge on this topic may not be fully and thoroughly transferred to the other people (Wójnicka, 2008).

Managers of many successful companies often are ashamed to admit that they cannot understand the reasons for the success of their corporations. Usually however, these are companies largely based on a variety of networks. In the case of the complex technology, a network includes a dozen of companies and different governmental agencies and organizations of the non-profit sector, such as universities. In addition, such a network, integrating various skills, must not be static. Innovative

networks are continually evolving. Similarly, particular elements are still subject to common learning process. Often cited here as an example is Japan, where companies can effectively implement complex technologies. The factors of success that are mentioned here is the participation of the government in the innovation process–the support from his part and the specific culture which fosters cooperation, trust and building innovation on non-material knowledge (Wójnicka, 2008).

The new nature of the innovation process makes it necessary to adapt not only to its standards of measurement, but also the law (Wójnicka, 2008). For example, in the United States of America in the 1980s. the anti-monopolistic law was changed so as to enable the creation of consortia of research and development between companies. In a later period it appeared that companies must obtain a permit for a consortium, if it relates to companies from the same industry. In the European Community in 1985 there was introduced a block exclusion from the article 85 of the Treaty of Rome setting out the rules of competition law for certain categories of consortia of research and development (Wójnicka, 2008).

The concept of the innovation system is a comprehensive way to view the innovation process. It draws attention both on the institutional aspects–the need to bring other institutions supporting the innovation process of companies, but especially on the relations between companies and those institutions, as well as between companies (Wójnicka, 2008). The interactions between companies and institutions shall mean their mutual openness and knowledge about the generated innovations, which will enable a more rapid diffusion of knowledge and innovation in the economy and social system to adapt more rapidly to technological change (Huges & Irfan, 2008).

Companies and other innovation system actors can be linked in the innovation process in many ways. The basic traditional method are the transactional links based on the market. However, the increasingly frequent are non-market links, which are manifested in the cooperation agreements concerning joint research and development and innovation activity. The cooperation between the partners in the economic process and particularly the innovative one shows increasingly popular concepts of networks and clusters and innovation systems, among both researchers and politicians (Wójnicka 2008).

An efficient innovation system introducing innovation and competitiveness of companies must have the proper linkages between science, industry and government. The scientific and technical policies of the countries moving towards the knowledge based economy favour the linkage between universities, industry and government. At the same time, the science sector should fall within the network of links with local, regional, national and foreign partners. As a result of such activity the boundaries between institutions shall disappear, and the entire system becomes more dynamic. The national policy can affect the science sector more than companies, so stronger links between science, industry and government can be inspired by the reform of the educational system.

The research into the innovations in companies have demonstrated that there is much more interaction and cooperation among the elements of the innovation system that occurs at the level of the region than the country. This results in the emphasis in recent years to research the potential and the regional innovation systems. In response to the need and assuming greater efficiency of the actions taken nearer to the entities, most regions that possess their own local authorities creates their own policy and proinnovation strategy. The reflection of the importance of the regional level for the innovation process are the European Union programs supporting the creation of Regional Innovation Strategies–RIS, regional initiatives for the Innovation and Technology Transfer–RITTS, and similar national programmes as e.g., InnoRegio in Germany (Economic Bulletin, 2002).

The latter point highights the political nature of the innovation process (Kim et al., 2007) that requires intra-organisational leadership as well as bargaining and persuasion across multiple levels. The compleks nature of the innovation process often results in failurs where invention simply do not take off and remain nothing more than intriguing ideas. Ther invention make it, but their subsequent success varies widely (Anheier & Fliegauf, 2013).

4.4 Constructed Advantage

It has been suggested that the idea of absolut advantage in foreign trade originates with Adam Smith and developed by Ricardo and Torrens to comparative advantage and after was developed by Marshall and Ohlin. Foray and Freeman (1993) re-introduced it yet scarcely explored it. More attention has been devoted to it in comparison to other well-known forms of economic advantage by De la Mothe and Mallory (2003), as follows:

-Comparative Advantage-This idea, deriving from David Ricardo and foreign trade theory, explained economic welfare in terms of initial resource endowments traded between regions and nations. While policies were not excluded from such an analysis, they mainly added up to forms of mercantilism, and Ricardo advocated intervention regarding technological change. The overwhelming framework which government policy gave rise to and which promoted comparative advantage was laissez-faire (Cooke & Leydesdorff, 2006).

-Competitive Advantage-Thus countries with a large labour supply would naturally export goods that were labour-intensive (e.g., China), while countries that were technologically advantaged (e.g., the United States) produced and exported technologically advanced products. The paradox arose when advanced economies exported labour-intensive goods as well as technologically intensive goods. Krugman (1995) and Porter (1990, 1998) noted the competitive advantage of firms in which distributed supply chains and the role of large domestic markets became accepted. (Cooke & Leydesdorff, 2006).

-Constructed Advantage-The "new competitive advantage" (Best, 2001) highlights regional development economics, the dynamic of which draws upon constructed advantage. This knowledge-based construction requires interfacing developments in various directions,

-Economy–regionalization of economic development; "open systems" inter-firm interactions; integration of knowledge generation and commercialization; smart infrastructures; strong local and global business networks (Desai & Vreeland, 2011),

-Governance–multi-level governance of associational and stakeholder interests; strong policy-support for innovators; enhanced budgets for research; vision-led policy leadership; global positioning of local assets.

-Knowledge Infrastructure–universities, public sector research, mediating agencies, professional consultancy, etc. have to be actively involved as structural puzzle-solving capacities,

-Community and culture–cosmopolitanism; sustainability; talented human capital; creative cultural environments; social tolerance. This public factor provides a background for the dynamics in a Triple Helix of university-industry-government relations (Leydesdorff & Etzkowitz, 2003).

In the scenario growth, becomes increasingly dependent on rising multifactor productivity, with the contribution to GDP per capita rising from around 54% to 88% in OECD countries between 2010 and 2060 and from 79% to almost 91% in non OECD G20 countries. Knowledge will thus be main driver of growth in the future and policies geared towards enhancing knowledge-based-growth (KBG) will be crucial (Johnson & Olaberia, 2014). Two classe of policies are considered in this section: public policies to support knowledge creation development and absorption of new

technologies, and policies that influences the effectiveness with wich new technologies are used.

Growing international trade integration and improving comunication technologies will spread the benefits of public R&D further generating larger positive global spillovers. However, as international knowledge spillovers from government funded R&D increase, countries will find it more difficult to appropriate the benefits associated with such research. This may lower the willignes of governments to invest in basic R&D, pointing to potential benefits of international coordination in funding such work (Johnson & Olaberia, 2014).

Through encouraging the accumulation of KBG, more effective competition and innovation policies can also help generate additional investments, for example in skills, capital or organisational change. The ability of organisational to restructure is a key determinant of the extent to which they benefit from new technologies. For example, in order to extract the maximum benefit from ICT, firms typically need to adopt ICT as part of a "system" of mutually reinforcing organisational changes (Johnson & Olaberia, 2014).

4.5 The Triple Helix Model

Studies of the knowledge-based economy focus not only on human capital, but also on the sectoral characteristics of the knowledge factor (Nelson, 1982; Pavitt, 1984), (Dunning 2000). An innovation system can be defined at the national level (Freeman, 1987, 1988; Lundvall, 1988, 1992; Nelson, 1993), at the regional level (Cooke, 1992; Cooke et al., 2004), or in terms of a dynamic model like the Triple Helix of university-industry-government relations (Etzkowitz & Leydesdorff, 2000; Leydesdorff, 1994).

In the Triple Helix model constructed advantages have been conceptualized as the surplus value of an overlay of relations among the three components of a knowledge-based economy: (1) the knowledge- producing sector (science), (2) the market, and (3) governments. Those places with research universities witness a growing demand for knowledge transfer to industry and, through government, to society (Etzkowitz & Leydesdorff, 1998; Etzkowitz et al., 2000). Moreover, the spread of universities is reasonably uniform in advanced industrial countries. For research knowledge, industry and government can be expected to pay more for privileged access to knowledge-based growth opportunities by funding research, stimulating closer interactions among the three institutional partners, subsidizing infrastructure (e.g., incubators and science parks), and stimulating academic entrepreneurship skills and funding (Cooke & Leydesdorff, 2006).

Early work on regional innovation systems (Cooke, 1992; Cooke & Morgan, 1994) attempted to capture the integrative and interactive nature of the knowledge-based economy examined from the regional perspective. The list of networking partners includes the base institutions like universities, research laboratories, research associations, industry associations, training agencies, technology transfer organizations (TTOs), specialist consultancies, government development, technology and innovation advisory agency programme-funding, and private investors. This knowledge exploration, examination and exploitation base supports the innovation efforts of large and small firms in many industries. Not all interactions are only intra- regional; many are also national and global, but in the most accomplished regional economies like Baden- Württemberg, a majority of such institutional networking interactions were regional, and on such regular terms that the networking had become systemic (Cooke, 2001).

It may conclude that as the base of knowledge evolves institutionally, an increasing portion of the economy becomes knowledge-intensive. One key difference, however, is that science-based industries like genomics, research, software and nanotechnologies generate value from producing

analytical knowledge while most others create value from exploiting synthetic or symbolic knowledge. Thus, the old definition of knowledge economy in terms of a few important and growing sectors is redundant, while the structural idea of a knowledge-based economy linking the knowledge generation sub-system (mainly laboratory research) to the knowledge-exploitation system (mainly firms and, say, hospitals or schools) via technology transfer organizations in regional innovation systems is analytically useful (Cooke & Leydesdorff, 2006).

The effect of the growth in importance of regional (and other) innovation systems is to pervade the regional and other economies with scientific, synthetic and symbolic knowledge to a greater extent than ever before. The organization of pure and applied knowledge can increasingly pervade the economy when scientific and technological knowledge is institutionally produced and systematically controlled. R&D management and S&T policies at relevant government levels enlarge the set of options. These, however, are not fixed but evolving distributions in which some regions are more developed as knowledge-based economies than others. Hence, the post-1970s fascination with "high-tech" regions worldwide. Today, however, as the Triple Helix perspective suggests, with universities and their related research laboratories spread throughout most regions, many more economies have the chance to access not only yesterday's "global" knowledge announced on the Internet and exploitable by all, but local knowledge of potentially high value generated from research conducted in relation to regional capabilities. Thus, as the knowledge base becomes pervasive, the knowledge economy is further reinforced (Cooke & Leydesdorff, 2006).

The Triple Helix challenge is picked up also in an attempt to identify the factors that affect the ability of universities both to create new knowledge and to deploy that knowledge in economically useful ways and thereby contribute to economic growth and prosperity. It seems therefore that constructed advantage based on regional innovation systems that transceive over long distances as well as through regional networks is becoming the model of choice for achieving accomplished regional economic development. Leydesdorff argues that the knowledge base of an economy can be considered as a second-order interaction effect among Triple Helix interfaces between institutions and functions in different spheres. Proximity enhances the chances for couplings and, therefore, the formation of technological trajectories. In this manner, connections between regional innovation systems and markets (an understudied aspect in the broad field of innovation studies) may be facilitated (Cooke & Leydesdorff, 2006).

4.6 Europe 2020 Strategy and Innovation Union

The budgetary and economic policies with the Stability and Growth Pact and the Europe 2020 strategy are the basis for building a common understanding about the priorities for action at the national and EU level as the EU seeks to return to a path of sustainable growth and job creation. The key driver of the problems is Europe's structural innovation gap: compared to its competitors, Europe's patenting performance is weak and it lags behind in developing new products, new processes and new services. To boost productivity and growth, it is critically important to generate breakthrough technologies and translate them into new products, processes and services. Europe has taken an early technological lead in many key technology areas, but in the face of growing competition its advantage is tenuous, and has not translated into an innovative and competitive lead. A timely and targeted European policy is needed for bridging the "valley of death" if Europe is to remain competitive (SEC 1428 final 201).

This key driver is underpinned by the following structural problem drivers:

-Insufficient contribution of research and innovation to tackling societal challenges,

-Insufficient technological leadership and innovation capability of firms,
-The need to strengthen the science base,
-Insufficient cross-border coordination.

The EU recognizes the urgency of the situation, and is responding with new policy strategies. It is important to underline that the Innovation Union is one of the seven flagship initiatives of the Europe 2020 strategy for a smart, sustainable and inclusive economy. The Innovation Union plan contains over thirty actions points, with the aim to do three things:

-make Europe into a world-class science performer;
-remove obstacles to innovation–like expensive patenting, market fragmentation, slow standard-setting and skills shortages–which currently prevent ideas getting quickly to market;
-revolutionise the way public and private sectors work together, notably through Innovation Partnerships between the European institutions, national and regional authorities and business.

Innovation Union is the European Union strategy to create an innovation-friendly environment that makes it easier for great ideas to be turned into products and services that will bring economy growth and jobs (Figure 1, Figure 2).

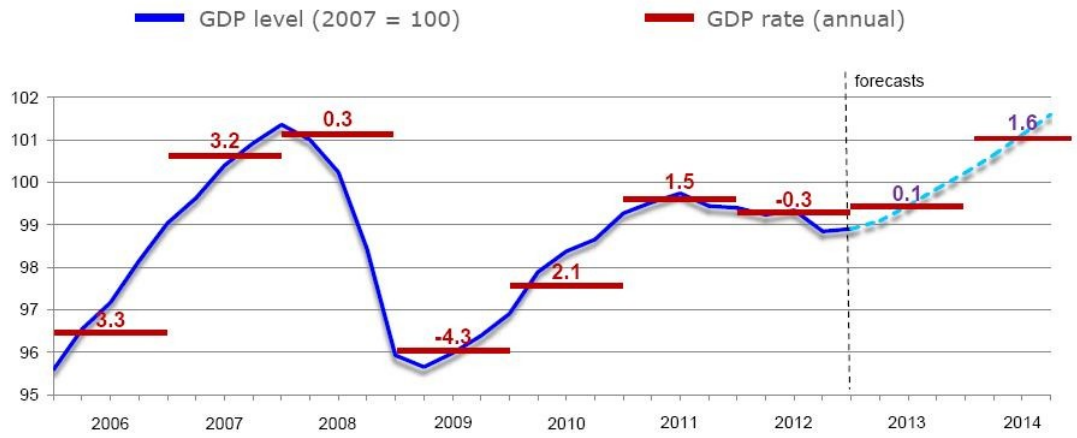

Figure 1. GDP Trends in the EU: Levels and Rates

Source: Growth, competitiveness and jobs priorities for the European Semester 2013. Presentation of J.M. Barroso, President of the European Commission to the European Council of 14-15 March 2013, http://europa. eu/news/pdf/sg. 2013-00286-01-04-eu. tra-00. pdf. Access, 24.01.2014.

(Figure 1, Figure 2). The Annual Growth Survey for 2013 launches the 2013 European semester for economic European semester for economic policy coordination, which ensures Member States align their budgetary and economic policies with the Stability and Growth Pact and the Europe 2020 strategy. It is the basis for building a common understanding about the priorities for action at the national and EU level as the EU seeks to return to a path of sustainable growth and job creation.

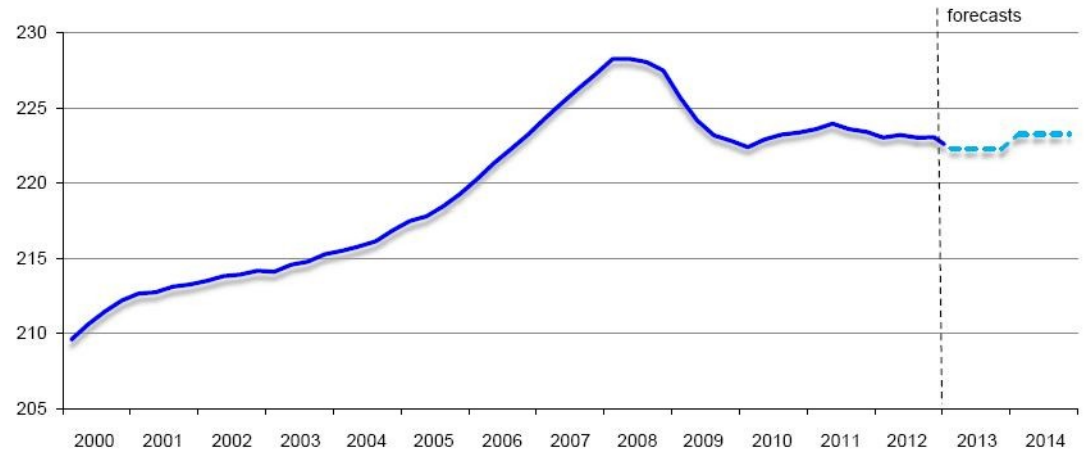

Figure 2. Number of People Employed in the EU (in Million)

Source: Growth, competitiveness and jobs priorities for the European Semester 2013. Presentation of J.M. Barroso, President of the European Commission to the European Council of 14-15 March 2013, http://europa. eu/news/pdf/sg. 2013-00286-01-04-eu. tra-00. pdf. Access, 24.01.2014.

The Annual Growth Survey should feed into national economic and budgetary decisions, which Member States will set out in Stability and Convergence Programmes (under the Stability and Growth Pact) and National Reform Programmes (under the Europe 2020 strategy) in April 2013. These programmes will form the basis for the European Commission's proposals for country-specific recommendations in May 2013.

It must be emphasized that the EU economy is slowly starting to emerge from the deepest financial and economic crisis in decades. However, although important action has already bee.

Taken and positive trends are beginning to emerge, to remain some distance from a recovery. To restore confidence and return to growth, it is essential that Member States maintain the reform.

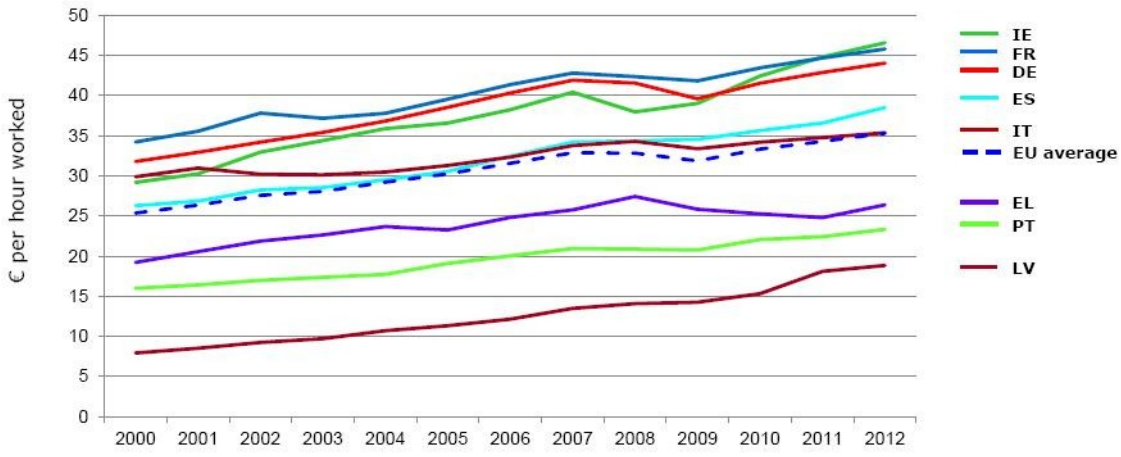

Figure 3. Productivity Levels and Trends 2000-2012 (Hourly Productivity Levels in Euro Per Hour Worked)

Source: Growth, competitiveness and jobs priorities for the European Semester 2013. Presentation of J.M. Barroso, President of the European Commission to the European Council of 14-15 March 2013, http://europa. eu/news/pdf/sg. 2013-00286-01-04-eu. tra-00. pdf.

Access, 24.01.2014.

Momentum, and for this reason the Commission recommends focusing on the same five priorities that were identified in last year's Survey (Figure 3):

-Pursuing differentiated, growth-friendly fiscal consolidation,

-Restoring normal lending to the economy,

-Promoting growth and competitiveness for today and tomorrow (Figure 3),

-Tackling unemployment and the social consequences of the crisis,

-Modernizing public administration.

The deleveraging and adjustment process is inevitable and the main task of policy makers is to manage it and alleviate the associated economic and social consequences. Fiscal adjustment has to continue along the path of a differentiated growth-friendly consolidation strategy in view of the high debt levels and long-term challenges to public finances.

The Digital Single Market holds one of the main keys to a new dynamic across the European economy as a whole, fostering jobs, growth, innovation and social progress. All areas of the economy and society are becoming digital. Europe needs to be at the forefront of this digital revolution for its citizens and its businesses. Barriers to digital are barriers to jobs, prosperity and progress. The European Union is preparing a Strategy which will identify the major challenges to complete a secure, trustworthy and dynamic Digital Single Market. The Strategy will focus on six strands: building trust and confidence, removing restrictions, ensuring access and connectivity, building the Digital economy, promoting e-society and investing in world- class ICT research and innovation.

In 2015, as part of the Digital Single Market Strategy, the EU will aim to conclude ongoing inter-institutional negotiations on proposals such as the common European data protection reform and the Regulation on a Connected Continent. It will also propose new initiatives, legislative and non-legislative, to bring the Digital Single Market to the level of ambition needed to respond to the existing challenges. In this context, the EU will notably complement the regulatory telecommunications environment, modernise legislation on copyright and on audiovisual media services, simplify the rules for consumers making online and digital purchases, facilitate e-commerce, enhance cyber-security and mainstream digitisation across policy areas.

Reliable and affordable energy is a top priority for all. The EU will adopt a Strategic Framework for the Energy Union setting out the key actions to be taken in order to ensure energy supply security, reduce dependence on imports from third countries, further integrate national energy markets and improve participation of consumers, enhance energy efficiency decarbonise the energy mix and promote research and innovation in the energy field.

The EU is also at the forefront of the global efforts to fight global warming. The EU will set out the vision and expectations in the run-up to the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties in Paris at the end of 2015 and will begin to table the legislative proposals to implement the 2030 Climate and Energy package. Efforts will continue to improve the regulatory framework for interconnected, safe and secure transport services with reduced greenhouse gas emissions.

The single market is one of Europe's best assets–its potential must be further exploited to improve Europe's competitiveness in the global marketplace and create jobs. The EU will present an Internal Market Strategy to set out new approaches for capturing that potential. The internal market is also the foundation for Europe's industrial strength and productive capacity that must be enhanced further. Boosting investment in infrastructure and in SMEs and mid cap companies,

improving the regulatory environment and helping companies to innovate, for example with the support of the Horizon 2020 programme, will be important areas of work. Aviation is facing major challenges. The EU will examine ways to improve the conditions of the sector by bolstering its competitiveness. The EU is keen to help Member States reduce unemployment through structural reforms and support for job creation and employability measures. It is identifying ways to invest in knowledge and skills with particular attention being paid to the most vulnerable groups such as young unemployed people and the long term unemployed. It will be important to support labour mobility, especially in cases of persistent vacancies and skills mismatches, including across borders, while supporting the role of national authorities in fighting abuse or fraudulent claims.

The completion and implementation of the significant overhaul of the financial regulatory framework in response to the financial crisis, including the implementation of the new banking supervisory and resolution rules, remains a major area of the EU work. The regulatory framework will be further strengthened by a proposal on crisis management and resolution of systemic non-banking entities. The EU will begin preparatory work on how the single market for retail financial services can deliver more benefits to consumers.

The EU is reviewing the Energy Labelling Directive (2010/30/EU) and will examine whether the current modalities need to be adapted to deliver its objectives in a less intrusive way. The EU will set out an action plan to build a Capital Markets Union, exploring ways of reducing fragmentation in financial markets, diversifying financing sources for the whole of the economy, improving access to finance for SMEs and strengthening cross border capital flows in the single market to enable capital to be used in the most productive way. In the short-term, it will propose a framework for high-quality securitisation in Europe, improving standardised credit information for SMEs, and will consider how to extend successful private placement schemes across the EU and review the Prospectus Directive to reduce administrative burdens on SMEs (COM 910 final 2014).

4.7 Financial Instrument Horizon 2020

Horizon 2020 is the financial instrument implementing the Innovation Union a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. Running from 2014 to 2020 with a budget of just over €70 billion, the EU's new programme for research and innovation is part of the drive to create new growth and jobs in Europe Horizon 2020 provides major simplification through a single set of rules. It will combine all research and innovation funding currently provided through the Framework Programmes for Research and Technical Development (Figure 4), the innovation related activities of the Competitiveness and Innovation Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT).

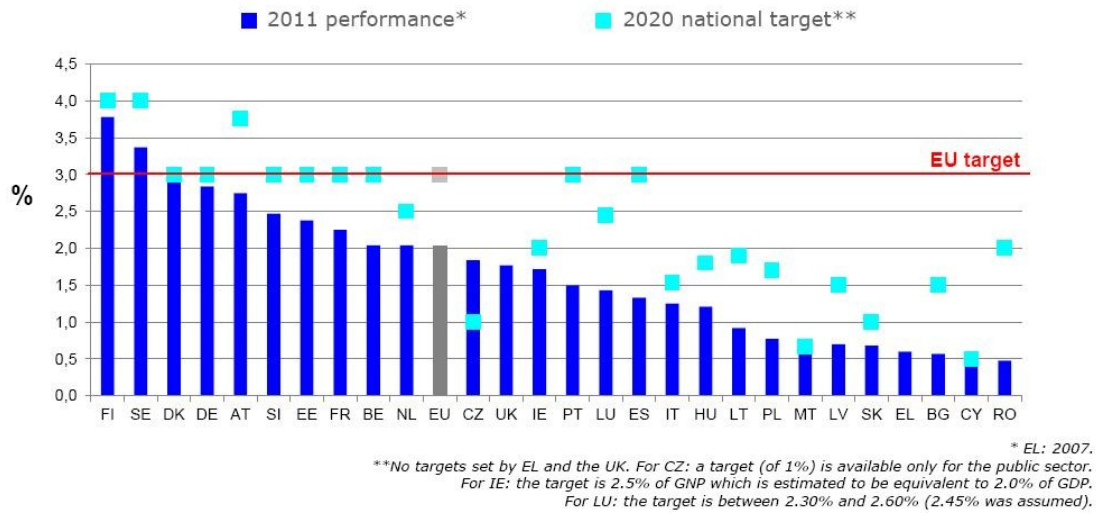

Figure 4. R&D Investments in the EU as a % of GDP

Source: Growth, competitiveness and jobs priorities for the European Semester 2013. Presentation of J.M. Barroso, President of the European Commission to the European Council of 14-15 March 2013, http://europa. eu/news/pdf/sg. 2013-00286-01-04-eu. tra-00. pdf. Access, 24.01.2014.

The proposed support for research and innovation under Horizon 2020 will:

-Strengthen the EU's position in science with a dedicated budget of € 24 341 million. This will provide a boost to top-level research in Europe, including the very successful European Research Council (ERC).

-Strengthen industrial leadership in innovation € 17 015 million. This includes major investment in key technologies, greater access to capital and support for SMEs.

Provide € 30 956 million to help address major concerns shared by all Europeans such as climate change, developing sustainable transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population.

It must be emphasized that Horizon 2020 will tackle societal challenges by helping to bridge the gap between research and the market by, for example, helping innovative enterprise to develop their technological breakthroughs into viable products with real commercial potential. This market-driven approach will include creating partnerships with the private sector and Member States to bring together the resources needed.

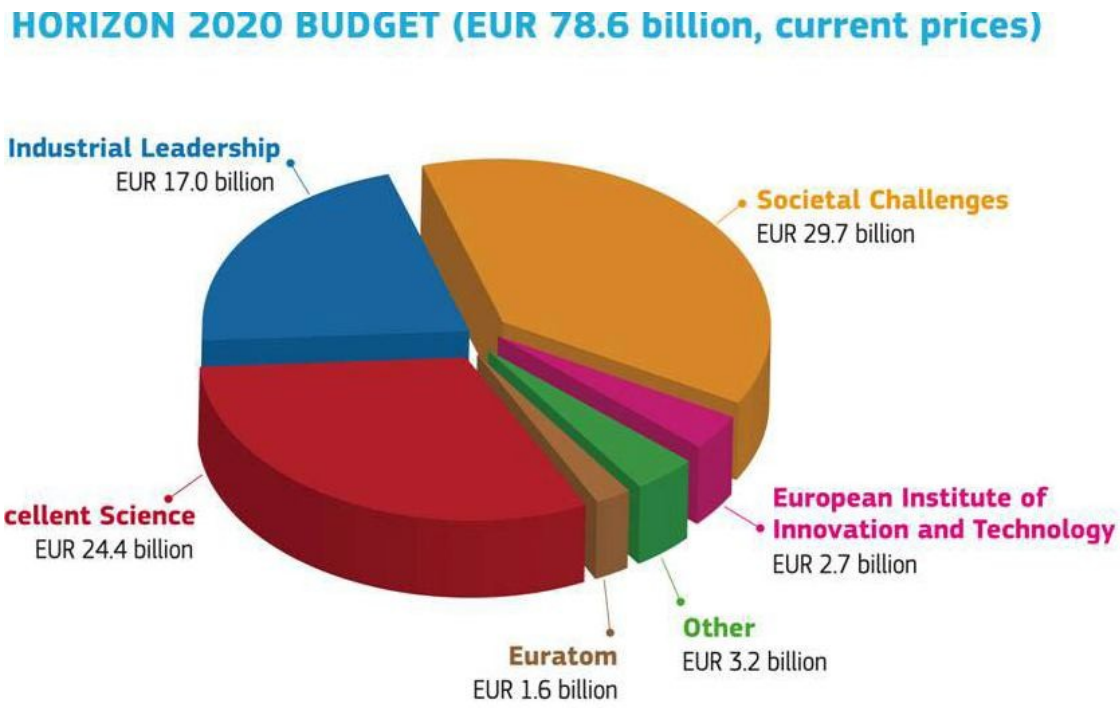

Figure 5. Horizon 2020 Budget (Eur 78.6 Billion, Current Prices)

Source: Factsheet: Horizon 2020 budget-European Commission, 25November 2013, http//. www.ec.europa.eu/2020/files/Factsheet budget_H2020 Pdf.

International cooperation (Fukuda-Parr, 2011), (Wibbels & Ahlquist, 2011) will be an important cross-cutting priority of Horizon 2020. In addition to Horizon 2020 being fully open to international participation, targeted actions with key partner countries and regions will focus on the EU's strategic priorities. Through anew strategy, a strategic and coherent approach to international cooperation will be ensured across Horizon 2020. Horizon 2020 will be complemented by further measures to complete and further develop the European Research Area by 2014. These measures will aim at breaking down barriers to create a genuine single market for knowledge, research and innovation.

It must be emphasized that new browth strategy of the EU need for public intervention, subsidiarity and European Added Value. There is a clear case for public intervention to tackle the problems above. Markets alone will not deliver European leadership. Large-scale public intervention through both supply and demand measures will be needed to overcome the market failures associated with systemic shifts in basic technologies. However, Member States acting alone will not be able to make the required public intervention. Their investment in research and innovation is comparatively low, is fragmented and suffers from inefficiencies-a crucial obstacle when it comes to technological paradigm shifts. It is difficult for Member States on their own to accelerate technology development over a sufficiently broad portfolio of technologies, or to tackle the lack of transnational coordination.

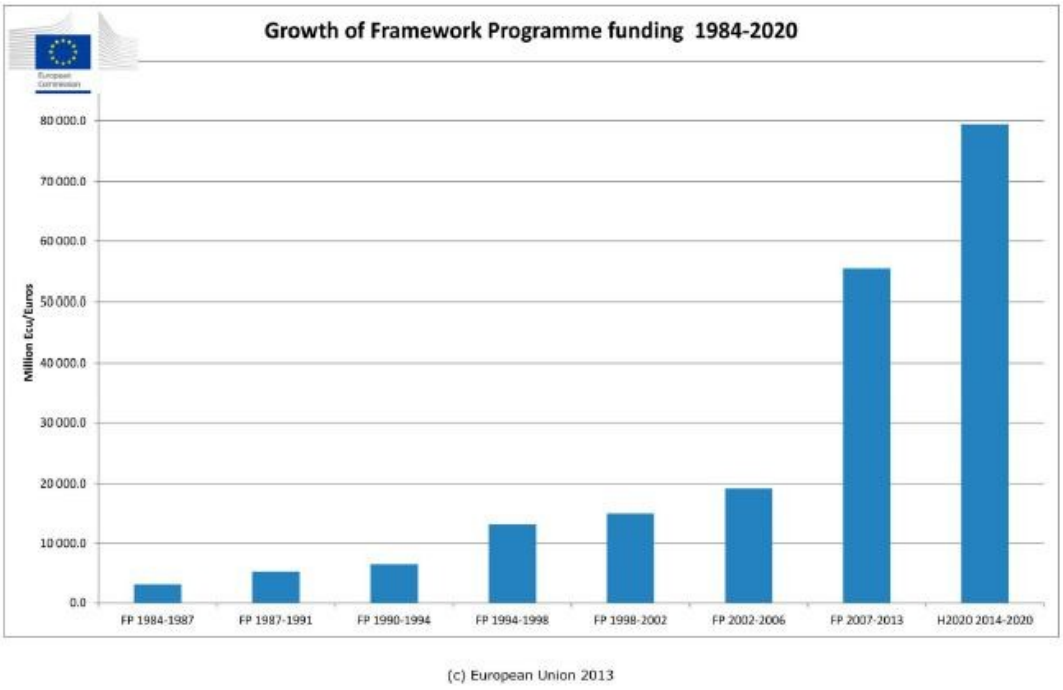

Figure 6. Growth of Framework Programme Funding 1984-2020

Source: Factsheet: Horizon 2020 Budget-European Commission, 25 November 2013, http//. www.ec.europa.eu/2020/files/Factsheet budget_H2020 Pdf.

As highlighted in the proposal for the next Multi-annual Financial Framework, the EU is well positioned to provide added value, through measures to coordinate national funding, which restructure more efficiently the European research and innovation landscape, and through implementing collaborative research and mobility actions, which generated critical mass (SEC 1428 final 2011).

A next generation programme should build on the experience from past Framework Programmes for Research and Technological Demonstration (FP), the Competitiveness and Innovation Programme (CIP), and the European Institute of Technology and Innovation (EIT) It is important to underline that over several decades, EU programmes have funded Europe's best researchers and institutes, and produced large-scale structuring effects, scientific, technological and innovation impacts, micro-economic benefits, and downstream macro-economic, social and environmental impacts for all EU Member States. However, important lessons can be learned from the past, including academic insights and stakeholder feedback. Research, innovation and education (Figure 4) should be addressed in a more coordinated manner and research results better.

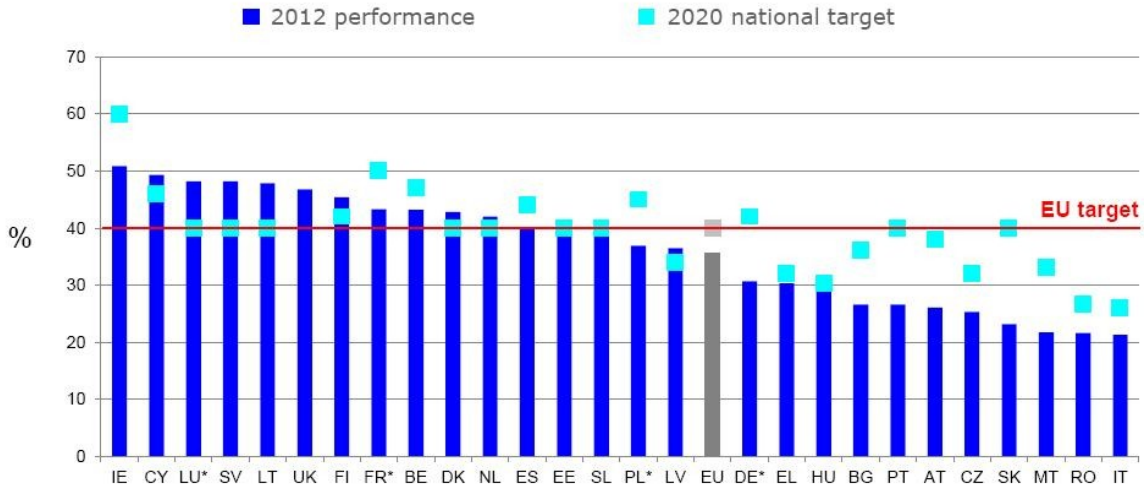

Figure 7. Share of Young People (Age 30-34) with Tertiary Attainment

Source: Growth, competitiveness and jobs priorities for the European Semester 2013. Presentation of J.M. Barroso, President of the European Commission to the European Council of 14-15 March 2013, (2013) http://ec europa. eu/news/pdf/sg. 2013-00286-01-04-eu. tra-00. pdf. Access, 24.01.2014.

Disseminated and valorised into new products, processes and services. Especially education and skills are key for increasing of innovation levels (Figure 4, Figure 7) and creat new job (Figure 8). The intervention logic should be more focused.

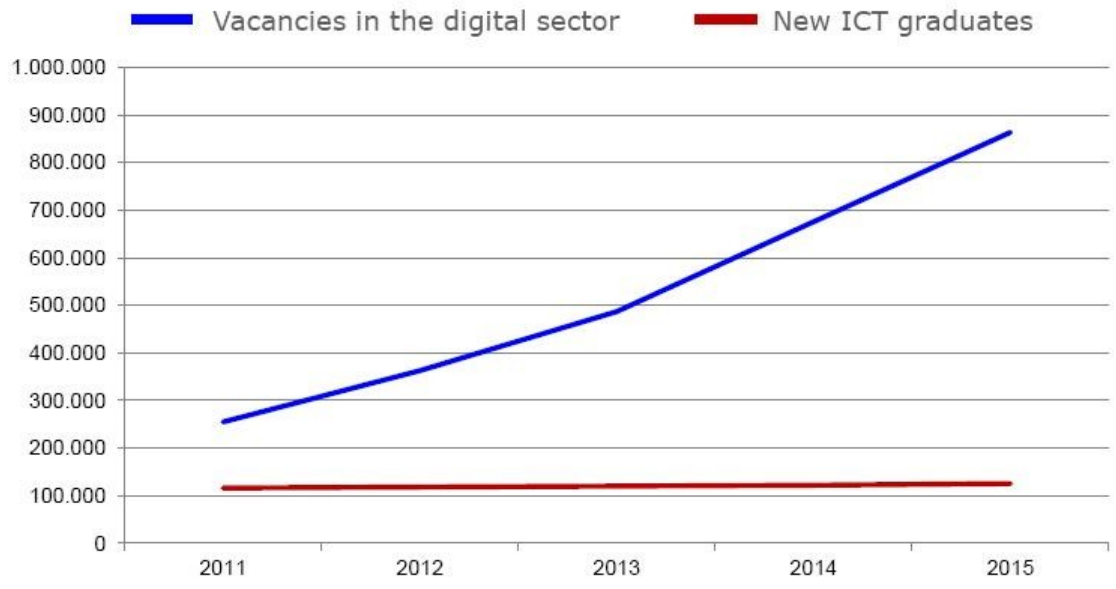

Figure 8. Digital Jobs: Vacancies and Graduates (Numbers)

Source: Growth, competitiveness and jobs priorities for the European Semester 2013. Presentation of J.M. Barroso, President of the European Commission to the European Council of 14-15 March 2013,(2013), http://ec europa. eu/news/pdf/sg. 2013-00286-01-04-eu. tra-00. pdf. Access, 24.01.2014.

Concrete, detailed and transparent. Programme access should be improved and participation increased from start-ups, SMEs, industry, less performing Member States and extra-EU countries (SEC 1428 final 2011).

Monitoring and evaluation need to be strengthened. In order to tackle the problems identified above, the following objectives have been set. The general objective of the next EU spending programme for research and innovation will be to contribute to the objectives of the Europe 2020 strategy and to the completion of the European Research Area.

In order to achieve this general objective, there are five specific objectives:

-Strengthen Europe's science base by improving its performance in frontier research, stimulating future and emerging technologies, encouraging cross-border training, and career development, and supporting research infrastructures,

-Boost Europe's industrial leadership and competitiveness through stimulating leadership in enabling and industrial technologies, improving access to risk finance, and stimulating innovation in SMEs,

-Increase the contribution of research and innovation to the resolution of key societal challenges,

-Provide customer-driven scientific and technical support to Union policies,

-Help to better integrate the knowledge triangle - research, researcher training and innovation.

The options considered were designed and evaluated in relation to stakeholders' views, the problems and the objectives above. They take into account some key parameters set out in the EU budget review: the need to focus on instruments with proven European added value, to develop a more results-driven approach, to leverage other public and private funding, and to design EU instruments that work together in a single strategic framework.

This Impact Assessment considers four policy options:

Business-as-usual (BAU): maintaining the current plurality of programmes for R&D and innovation (Figure 4): In this scenario, the three main existing EU sources of funding for research and innovation-FP7, the innovation-related part of the CIP, and the EIT-are simply carried forward into the next multiannual financial framework as separate instruments, and in their current formats.

Improved business-as-usual: loose integration and stand-alone simplification (BAU+): In this scenario, FP7, the innovation-related part of the CIP, and the EIT remain separate instruments and retain their current formats but are put together under a "common roof"; loose coordination mechanisms are established between them. The implementing modalities of each programme are simplified separately, but no single set of simplified rules, funding schemes, support services etc. applies across the three programmes.

Horizon 2020-Establishing a single strategic framework for Research and Innovation: in this scenario, FP7, the innovation-related part of the CIP, and the EIT are fully integrated into a single unitary framework: Horizon 2020, The Framework Programme for Research and Innovation. The current separation between research and innovation activities is eliminated. Horizon 2020 sets out three strategic policy objectives: raising and spreading the levels of excellence in the research base; tackling major societal challenges; and maximising competitiveness impacts of research and innovation. Horizon 2020 is structured around three priorities which link directly to these aims. The selection of actions and instruments is driven by policy objectives and not by instruments. Horizon 2020 also integrates a major simplification and standardisation of funding schemes and implementing modalities across all areas.

Bring to an end EU level R&D financing and re-nationalise R&D and innovation policies: The renationalisation option consists of discontinuing EU research and innovation programmes and of spending those funds at Member State level. A discontinuation option, which is assessed to a lesser extent, consists of discontinuing EU research and innovation programmes and not spending those funds at Member State level (SEC 1428 final 2011).

Interseting is to indicated how the options were compared. The four policy options were compared along a range of key parameters relevant to assessing public intervention in research and innovation:

-clarity of focus of the intervention,
-quality of the intervention logic,
-extent to which the intervention achieves critical mass at both programme and project level,
-extent of flexibility associated with the intervention,
-extent to which it promotes excellence,
-accessibility and reach,
-degree of stakeholder support,
-impact on SMEs,
-extent to which the intervention promotes knowledge triangle and broader horizontal policy coordination,
-impacts of the intervention–structuring, leverage, innovation, economic and competitiveness, social, environmental, and EU policy impacts,
-cost-effectiveness.

The comparison along these parameters was done using a range of evidence including: expost evaluations; foresight studies; analyses of FP and Community Innovation Survey data; science, technology and innovation indicators; econometric modelling; reviews of academic literature; competitiveness studies; expert hearings etc.

Horizon 2020 also maximises cost-effectiveness. On the cost side, its farreaching integration, simplification and harmonisation will reduce costs for the Commission and for applicants. At the same time, the Horizon 2020 option maximises the benefits through a close integration of research, innovation and training. This will provide the best approach for ensuring that investments made at EU level in research projects are fully valorised into patents and new products, processes and services.

Box 1. Quantifying Economic, Competitiveness and Social Impacts

Quantifying economic, competitiveness and social impacts

The enhanced scientific, technological and innovation impacts produced by Horizon 2020 should translate into larger downstream economic and competitiveness impacts. It is estimated that by 2030 it could generate the following impacts over and above the BAU option:

- Horizon 2020 will stimulate Europe's economic growth, generating 0.53 percent of extra GDP.
- It will also enhance Europe's competitiveness, increasing its exports by 0.79 percent, and reducing its imports by 0.1 percent.
- It will create jobs for Europe's citizens, increasing employment by 0.21 percent.

Under the renationalisation and discontinuation options, the effects would be weaker compared with the BAU option by 2030:

- Renationalisation would reduce GDP by 0.04 percent, cut 0.06 percent off exports, have no effect for imports, but would lead to a job loss of 0.01 percent.
- Discontinuation would shave 0.39 percent off GDP, decrease exports by 0.58 percent, and raise imports by 0.05 percent, while producing job losses of 0.19 percent.

Comparing the positive effects of the Horizon 2020 option with the negative effects of the discontinuation option demonstrates its true added value:

- By 2030, it is expected to generate an extra 0.92 percent (0.53+0.39) of GDP, 1.37 percent (0.79+0.58) of exports, -0.15 percent (0.10+0.05) of imports, and 0.40 (0.21+0.19) percent of employment.

The BAU+option would allow for some alignment of objectives and achieve a certain degree of simplification producing positive effects on administrative burden, accessibility, reach, structuring effects, leverage effects, innovation impacts and downstream economic, social, environmental and EU policy impacts. In the case of the renationalisation option, it would be more difficult to orient Europe’s research and innovation programmes on commonly agreed objectives while critical mass and excellence would be compromised. The quality of the intervention logic, the level of flexibility, accessibility and reach, and the extent of knowledge triangle and broader horizontal policy coordination could in theory be enhanced more easily at national or regional level (Acharya, 2011) though this is not the case now and would involve important trade-offs (Wibbels & Ahlquist, 2011). This would compromise the return on investment in research as scientific, technological and innovation impacts would be reduced, which would translate into smaller economic and competitiveness, social, environmental and EU policy impacts.

Under Horizon 2020, only those kinds of activities will be supported that have passed the European added value test. Under the proposal on the next MFF, the funding for Horizon 2020 amounts to €80 billion (constant 2011 prices), which represents a 46 percent increase with respect to comparable funding under the MFF 2007-2013 (constant 2011 prices). The new system for the evaluation and monitoring of Horizon 2020 will be based on a comprehensive, well-timed and harmonised strategy, with a strong focus on through put, output, results and impacts (SEC 1428 final 2011).

While recognising the competence of Member States for their taxation systems, the European Union will step up efforts to combat tax evasion and tax fraud and respond to EU societies call for

fairness and tax transparency. Starting from the work done on base erosion and profit shifting at OECD and G20 levels, the EU will set out an Action Plan including measures at EU level in order to move to a system on the basis of which the country where profits are generated is also the country of taxation, including in the digital economy, which also requires agreement on a Common Consolidated Corporate Tax Base. In this context, the EU will also make very swiftly a proposal on the automatic exchange of information between tax authorities on cross-border tax rulings. In addition, the European Commission of the EU will work closely with the other institutions to encourage the adoption of a Financial Transaction Tax and reinforced rules against money laundering. Work also continues in the area of VAT, including measures to close the tax gap.

Recent events have brought geopolitical challenges to the forefront, not least on the EU's eastern and southern borders. The EU needs an effective common foreign policy with better mechanisms to anticipate events and to swiftly identify common responses to common challenges, and common actions to seize opportunities from which it can only fully benefit together. Europe needs to work together on security and defence matters and to develop its strategic partnerships. The coherent and joined-up use of all instruments available to the Union, including its Common Foreign and Security Policy (CFSP) and the systematic external projection of internal policies will be indispensable to further the EU's policy objectives on the global scene.

The EU will make it a priority to promote stability at Europe's borders. Key to achieving this goal is to support neighbouring countries in implementing democratic and economic reforms, uphold the rule of law, strengthen economic governance and competitiveness, develop institutional capacities and a well-functioning public administration and to become more prosperous. The EU will review the European Neighbourhood policy and make proposals for the future. As stated in the Political Guidelines, ongoing enlargement negotiations will continue, and notably the Western Balkans will need to keep a European perspective, but no further enlargement will take place in the next five years.

The EU has a strong record of international co-operation and of providing development support and assistance to many parts of the world. This includes promotion of human rights in all external actions, addressing inequalities and advocating gender equality. However, development policy must also be continuously adapted to the evolving needs of partner countries to best deliver on EU commitments. With 2015 being the European Year for Development, the EU will continue its work on the post 2015 Sustainable Development Goals and will launch reflections on its future relations with developing countries (post-Cotonou) (COM 910 final 2014).

5. Conclusion

It must be emphasized that structural reforms are necessary to facilitate adjustment and improve the framework conditions for European Union growth. Reforms promoting job creation, investment in innovation, skills and inclusive growth are necessary to tackle the risk of hysteresis and alleviate the negative impact of the crisis on social conditions. A fair distribution of the adjustment burden across society is important for sustained growth. Ultimately, however, a coherent policy mix encompassing both macro- financial and structural policies is indispensable for growth to resume. Hence a determined policy action on all these fronts is necessary to counter the negative dynamics and improve the economic situation in a sustainable manner.

EU legislation and its effective implementation can have a major impact on jobs, growth and

innovation. Eco-industries and eco-innovation currently supply a third of the global market for green technologies, worth a trillion Euros and expected to double by 2020. The revised proposal for the circular economy will reinforce this trend thus contributing to green growth. In this area it is important that EU agree common objectives for what EU want to achieve, with the right level of ambition, whilst being less prescriptive about the means Member States can use to deliver these results, which will make it easier to turn proposals into concrete action on the ground.

The EU has a well-developed regulatory system. A renewed focus on implementation and exploring synergies between existing legislation could provide quick dividends, creating new opportunities for jobs and growth. In addition to overhauling existing legislation to make sure it is fit for purpose, the EU will also work with Member States to ensure that the maximum growth potential is extracted from the existing body of EU laws. This will be the top priority in many areas of EU work–agriculture, fisheries, customs, financial services and the Single Market to name but a few.

The important of the research is the conclusion that in the innovation process also in the European Union very important are the connection between science (universities), market (industry) and government. There is positive dependence between innovation activity in innovation system and effectiveness of the innovation process. The more interaction and cooperation it can observe on the regional level than on the state. The new programme of the scientific and innovation research Europe 2020 and Innovation Union are very important factors of the European Union's enterpreunership and global competitiveness especially against USA and Japan and also BRICSAM countries. Growing international trade integration and improving comunication technologies will spread the benefits of public R&D further generating larger positive global spillovers. Through encouraging the accumulation of KBG, more effective competition and innovation policies can help generate additional investments, for example in skills, capital or organisational change.

The European Commission of the EU will review the EU's trade and investment policy strategy with a particular focus on its contribution to jobs and growth. The consolidation of EU trade and investment links to new centres of growth in the world is not only vital for jobs, growth and enhanced productivity in the EU, but has important impacts on EU neighbourhood and development policy as well as on EU participation in international financial institutions. Trade makes an important contribution to jobs and growth. In addition to the Transatlantic Trade and Investment Partnership Agreement (TTIP) with the United States, the EU is actively engaged in a number of bilateral negotiations coupled with a strong multilateral commitment to the WTO. The EU has already taken steps to increase transparency in the TTIP negotiations and continues to work towards a reasonable and balanced agreement, while safeguarding Europe's health, social, environmental and data protection standards and its cultural diversity.

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