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INNOVATION POLICY OF THE EUROPEAN UNION – OVERVIEW OF THEORETICAL FOUNDATIONS AND EMPIRICAL ASPECTS

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Abstract. The aim of this article is to analyse the directions and instruments of the innovation policy of the European Union, showing how its theoretical and structural underpinnings influence innovation, which is considered one of the main factors in enhancing the competitiveness of both enterprises and countries on the international market. The article also analyses how technology transfers and knowledge exchanges (*spillovers*) influence changes in international competiveness at both the micro- and macro-economic levels, as well as the significance of the internationalization of enterprises resulting from Foreign Direct Investment (FDI) in terms of the diffusion of innovative processes at both the European and international levels. In this regard special attention is given to the financing of R&D in the successive Framework Programmes of the European Union aimed at supporting innovation.

Keywords: innovation, competitiveness, EU Framework programmes, support for R+D.

1. INTRODUCTION

Innovation is the understood as both the implementation of new or significantly enhanced products or processes (concerning both goods and serves), new methods of marketing, and new methods of business organization in economic practice, the organization of the labour market or relations with the business environment [1, p. 49]. "Innovative firms" are deemed to be those firms that implemented innovation(s) within the given time period under research. This does not require that the innovations introduced resulted in commercial success, as the nature of innovation is such that many innovations are not commercially successful. Innovative firms may be divided into those which elaborate innovations, either independently or in cooperation with other firms and/or public research institutions, as well as those which implement innovations primarily by incorporating existing innovations (for example new equipment) elaborated by other firms. Innovative firms may also be classified according to the type of innovations implemented – i.e. they may implement new products, new processes, new marketing methods, organizational changes, etc. A significant influence on innovation theory was exercised by the Joseph Schumpeter's classical theory of innovation. He confirmed that economic development is stimulated by innovation as a dynamic process whereby new technologies replace old ones, a process he called "creative destruction". In Schumpeteres opinion, a

"radical" innovation leads to destructive changes on a massive scale, whereas "natural" innovations constantly push the process of change forward. Schumper (1934) distinguished five types of innovation:

i. Introduction of New products;
ii. Introduction of new methods of production;
iii. Accessing new markets;
iv. Development of new sources of supply of resources or other necessary materials;
v. Development of new market structures within a given sphere of activities.

Elaborated based on [2].

The effects of innovation on a firm's activity can vary widely, from influencing sales to influencing market shares on a given market, or may effect a firm's output capacity and work efficiency. Depending on the type of innovative activity and the country, important effects almost always encompass changes in a firm's competitiveness on the international market, growth in total factor productivity, and knowledge spillovers resulting from innovation at the firm level, as well as an increase in the amount of knowledge transferred through network contacts.

The effects of product innovation are usually measured in terms of percentage of sales of the new or improved products resulting from innovation [1, p. 23; 3; 4]. Innovation is thus the main factor in improving the competitiveness of both individual firms as well as an economy as a whole [10, p.38].

J. H. Dunning, in accordance with the theory of M. Porter, introduced a new classification of the sources of the competitive advantages of firms on the international market. In addition to technological advantages, he included four other groups of factors:

1. Access to raw materials, resources, and capital – including natural resources, the requisite low-skilled and highly-skilled workers, the ability to innovate, good work organization, experienced management, and appropriately qualified workers in cooperating firms and cooperative activities;

2. Consumer demand, which is associated with the increased quality of products and increased innovation;

3. Competition between firms;

4. A good network of connections with international and domestic firms and institutions located in a given agglomerate or region, as well as universities and research and development institutions [5, p. 9–13; 6].

G. N. Yannopoulos additionally distinguishes two types of direct investment: rationalized direct investment, and reorganization investment. Investments of the first type are based on the international differences in costs of production and positively influence the development of inter-branch trade [7, p. 65]. N. Acocella additionally distinguishes among the following types of investments undertaken within the framework of rationalization of production: resource-oriented foreign direct investment; technology-oriented foreign direct investment; and investment into processing partial and finished products. Investments of the second type create impulses to increase inter-branch exchanges, leading to the reorganization of the existing trade characteristics [8].

Recent decades have also witnessed the increasing role of standards related to both the technology and innovative technology markets, as well as an increase in the number of supra-national standardizing institutions formulating norms and standards in the spheres of industries active in information and communication technologies (ICT). By meeting these standards, firms are able to increase their ability to compete on the global market, which is a basic condition for attaining permanent competitiveness.

With respect to creative technologies, there is strong demand for innovation and R&D, above all in the following technological sectors: genetics, energy, materials, information, and so-called *"intelligent technology"*. The new technologies can be segregated into five basic "bundles": information technology (including electronics and ICT), biotechnology, and new materials, cosmic, and energy technologies [9, p. 7–14; 11].

Knowledge and insight into the shape of innovative activities in these various sectors are critically important in the formulation of appropriate innovation policies and strategies. It is important to understand the role of R&D activities, not only with respect to R&D's input into innovation, but also

with respect to the mutual interactions between R&D and other critical innovation inputs. Better access to information about the distribution of other activities, unrelated to R&D but used in innovation processes, is especially important with respect to a wide variety of services, which more rarely make use of R&D developments and activities in their strategies.

Identification of the main forces driving the innovative activities of a firm can lead to making essential corrections to existing innovation policies. These forces may be connected with the market and concern both quality and production efficiency, but they may also be related to organizational changes within a firm aimed at better adaptation to the needs of the market.

Identification of the obstacles to innovation is not only of importance to firms, but also to public policy makers, as many of the steps taken by public authorities are directed toward the removal of such obstacles. Of particular importance in this regard are issues such as workers' lack of the requisite qualifications and competences, financing, and obtaining the appropriate rights and protections under intellectual property law for innovations and innovative projects.

Trust, values, and norms have a critical influence on the functioning of external relations, e.g. exchanges of knowledge with external firms within a given firm. In this regard a key element in the innovative strategy of a firm is network capital. This means linking statistical research with R&D activities as well as carrying out and monitoring the innovative activities in "related areas" [1, p. 82, p. 130].

2. Changes in Innovative Capacity in the Process of Technology Transfers Resulting from Capital Inflows within the Framework of Foreign Direct Investments

Technology is the most frequent basis for product or process innovations and plays a particularly critical role in the production output of firms actively participating in the internationalization process. This process encompasses capital goods exported to foreign subsidiaries and in this sphere is measure by the value of such exports to the exporting subsidiary (within the context of so-called "externalization" – the export and sale of products containing a high input of both technology and human capital obtained through arrangements such as licensing, franchising, sub-contracting, or minority shares in a joint venture agreement). The technology is supplied via contractual agreements or contracts for the manufacture of original equipment and is measured by the value of incoming payments and revenue. Technology transfers which take place via training and know-how transfers are measured by the costs of the resources used in their implementation. Payments for technology are received in the form of honorariums (for example for the sale of a copyright) as well as licensing fees. These kinds of payments have systematically increased since the 1980s, as intra-firm trade between a parent company and its foreign subsidiary has also systematically increased.

These changes reflect the fact that foreign investment has constantly and increasingly been associated with spheres related to intensive technology (parallel to a similar steep increase in investments in the service sector), and that the technological assets of a company are becoming ever more important for transnational corporations and increase their competitiveness [10, p. 57].

3. European Policy in Support of Research and Development (R&D)

The innovation policy of the European Union includes support for technological research and development as one of the fundamental factors in improving the competitiveness of the EU on international markets. EU activities within the scope of R&D are based on the solidarity principle. Research programmes undertaken at the community level include those which, owing to their range, scope, and multidisciplinary nature, require an international approach. At the national level individual member states undertake their own policies with respect to R&D. The technological policies of the EU

encompass support for basic research and the diffusion of technology as well as supporting the development of technological cooperation between various organizations and institutions, aimed at widening the scientific and research base of European industry as well as assisting small and medium-sized enterprises (SMEs).

Policies in the area of R&D are realized mainly through three types of activities:

1. So-called "own research", encompassing work undertaken in Joint Research Centres created and financed mainly through EU funding;

2. Research contracts, carried out by research consortiums which include enterprises (including SMEs), R&D centres, as well as higher education institutions, based on the principle that the EU finances up to a maximum of one-half of the costs of such research projects;

3. Coordination, which means that the EU determines the scope of research projects and assures a forum for coordinating the research conducted and participates in its organizational framework.

In accordance with the provisions of Article 130 f-g of the Single European Act, which supplemented the Rome treaty with respect to EU policy in the sphere of R&D, the activities of the European Community include:

– introducing into practice research results, new technologies, and empirical findings and programs by supporting cooperation between enterprises, research centres, and institutions of higher education;

– supporting cooperation between the Community and third states as well as international organizations in the field of R&D;

– distribution and diffusion of information about the results of Community research projects;

– providing support for the development of training programmes and activities aimed at increasing the mobility of the scientific cadre within the Community.

The European Community has also taken an active part in Pan-European research ventures, such as EUREKA, COST, ESA, and CERN.

The Maastricht Treaty was the first EC treaty to devote an entire chapter (XV) to deal comprehensively with technological research and development, aimed at increasing its scientific level and at the same time supporting the international competitiveness of the Community industry (Article 130 f-p).

In May of 1998, following the commencement of negotiations over the EU's upcoming new enlargement, the European Commission (EC) issued a document entitled "Reinforcing Cohesion and Competiveness through R&D and Innovation Policies." This document took the form of an EC Communication to the European Parliament, Council, Committee of Regions, and Economic and Social Committee. Its aim was to accentuate the necessity to strengthen the poorer and weaker regions of Europe by integrating industry with the R&D sector as well as with EU innovation policy.

Based on the conclusions of the Lisbon Summit of 2000, the EU created a new strategy for the development of science and technology, elaborating the concept of a European Research Area for a Knowledge-Based Economy. The aim of this strategy was to raise the level of competitiveness and development of the European economy, with the aim of promoting sustainable economic growth, creating new jobs, and bringing the EU closer to its citizens by implementing new methods of governance and offering citizens broad access to knowledge (based on the concept of a "Learning Europe"). The EU summit in Barcelona in March of 2002 confirmed the necessity for further integration and for restructuring the system of scientific research and technological progress in the EU, including raising national expenditures on R&D and technological progress to 3% of GNP by the year 2010.

Besides the establishment of the European Research Area, "Learning Europe" was supposed to encompass:

– The establishment of permanent programmes of education and development with elements of mobility and educational cooperation;

– The establishment of training programmes and other programmes aimed at encouraging contacts between European youth and youth organizations;

– Supporting the creation of an information society and the requisite infrastructure and communication culture.

These activities are aimed at increasing the innovativeness of the European economy at, as a result, improving its competitiveness and achieving a sustainable socio-economic development. This aim is also to be achieved by activities based on support for cooperation between firms, and the creation of cooperation links and networks, i.e. clusters, between higher institutions of education and firms, at both the European and global levels.

4. FRAMEWORK PROGRAMMES IN THE EUROPEAN UNION

The overall structure of the EU's activities in the R&D sphere has so far been incorporated into six multi-year Framework Research Programmes created at the Community level, establishing both scientific and technical aims as well as priorities and directions for planned activities, an also the required costs and cost allocations.

The first Framework Research Programme was elaborated between 1984-1987'. The **second Community Framework R&D programme** came into being in accordance with the provisions of the Single European Act and mainly addressed the following issues:

- improving the quality of life;
- building an information and communication society (ICT);
- the modernization of industry;
- improving international scientific and technological cooperation.

The **Third Framework Research Programme** additionally emphasized the necessity of effective distribution and diffusion of the research results as well as their efficient implementation. The **Fourth Framework Programme for Research and Development** was implemented in the years 1994–1998 and focused on the need to coordinate research policies, the concentration of research on the so-called "industrial technological base", and the need to increase the effectiveness of implementing research results in industry. The aim of securing the active participation of SMEs in the programmes was to be achieved by the establishment of a technology integration fund, the task of which was to offer credit guarantees as well as technical support services to SMEs.

The structure of the Fourth Framework Research programme (1995–1997) consisted of four main categories: research programmes, cooperation with third countries, distribution and diffusion of the research results, and training programmes and mobility of the scientific cadre.

The tasks of the following **Fifth Framework Programme for Research, Technological Development and Presentation of the European Union** was of a socio-economic character It may be divided into three main aims:

- having a social impact, focused on employment;
- having a developmental impact, focused on scientific, technological, and economic development;
- stimulating increased competitiveness in the European Union.

The programme was aimed at meeting the expectations of EU citizens with respect to guaranteeing employment, improving the quality of life and health care, and in particular ensuring the safety and quality of food products, a clean natural environment, and solving pressing problems of an ethical and social nature by raising the level of citizens' knowledge. The programme assumed the globalization of economic activities, trade, markets and knowledge as well as an exponential acceleration in scientific and technological developments and processes, accompanied by increasing research costs. It also drew attention to the growing importance of two other members of the "Triad", i.e. the new economic and industrial strength of the Asian and Latin American regions, which in the near future could become scientific and technological powers.

Within the structure the Fifth Framework Research Programme one can also distinguish the following thematic areas:

– Improving the quality of life and the management of living resources. Priority areas which need to be developed in this sphere include: molecular biology and biochemistry, medical and pharmaceutical research, as well as research into agriculture and the natural environment and their relationship to industry. In this context one can distinguish seven key actions: food products, health and nutrition, elimination of contagious diseases, "biological factories", health and the environment, the sustainable development of agriculture, and ageing and the problems associated with invalids;

– Building a user-friendly information society and creating an environment favourable for new types of activities and jobs, particularly in the production of telecommunication equipment and information services. Key actions with the framework of this thematic area include: new work methods, trade in electronics, multimedia, and basic technology and infrastructure, and systems and services for citizens;

– Promotion of competiveness and sustainable growth – strengthening the competiveness of firms and directing production into "clean" and "intelligent" technologies. Key actions with respect to this thematic area include: innovative products, processes, and methods of organization; integration and collaboration in systems for transporting people and goods; technologies for clean and safe land and sea transport; new perspectives on aviation;

– Energy, the environment, and sustainable development. Key actions in the context of this thematic area include: water management and improving the quality of water; global environmental changes, including climate change and the preservation of bio-diversity and sea and ocean eco-systems; creating cities of the future and protecting cultural heritage; clean energy sources, including renewable energy; developing economically competitive sources of energy.

The Sixth Framework Research Programme for Technological Progress and Presentation (with a budget of 17.5 million euro), was envisioned for the years 2003–2006. It concentrated on the following priorities:

Establishing an integrated and strengthened European Research Area within the Framework of seven thematic areas:

- Genetics and biotechnology in human health services;
- Technology for the information society;
- Nano-technology and creating a science based on nano-technology, multifunctional materials, new production processes and equipment;
- Aeronautics and research into outer space;
- The quality and safety of food products;
- Sustainable development, global climate change, and eco-sytems;
- Citizens and governing in a knowledge-based society.

The following specific actions were also undertaken within the context of a broadened scope of scientific research:

- Support for a policy establishing scientific and technological needs;
- Horizontal research activities with the participation of SMEs;
- Specific activities aimed at supporting international cooperation.

Also envisioned is support for research – except for nuclear – carried out by a:

- *Common Research Centre* in the fields of food products, chemical products, health and environmental protection, and sustainable development;
- Structuring the *European Research Area* (ERA).

Activities intended to achieve this goal are focused on the following areas:

- Research and innovation (stimulating technological innovation, making use of the results of scientific research, facilitating the transfer of knowledge, and establishing strong technological businesses in all of the EU's regions);
- Support for the development of human resources and researchers' mobility within the EU;
- Building a research infrastructure;
- Establishing linkages between science and society;

- Strengthening the foundations of the European Research Area. Here the coordination and support for the coherent development of research and research policies in Europe is envisaged.

The Sixth Framework Programme was aimed at the creation of a coherent research and innovation policy consistent with the tasks of the Framework Programme, as well as an integrated research and education strategy, modernizing the principle of public intervention in order to support the interactive processes of technological innovation, to promote the penetration of research results into the market economy, as well as to promote a more organic system of interaction between the business and scientific communities. In addition this Framework Programme was directed toward the strengthening of partnerships between the public and private sectors as well as the creation of a transparent system of services in support of innovation.

The **Seventh Framework Research Progamme (**7th FRP), established for the years 2007–2013 with a budget allocation of 50.5 million euro, is the most concrete example of EU activities in the field of scientific research and innovation, The 7th FRP is focused on four thematic areas:

- *Cooperation:* establishing common scientific research in the fields of health, food products, agriculture, the fishing industry, biotechnology, information and communication technology, energy, the environment (including climate change), transportation (including aeronautics), the social and economic sciences, the humanities, outer space, and security. This area also includes nano-science, nanotechnology, materials and new technologies of production;
- *Ideas:* The most important element of this division is the establishment of the European Research Centre, which supports pioneering scientific research;
- *People:* this concerns human resources and encompasses stipends for young scientists within the framework of the life-long learning program, aimed at career development, partnerships between businesses and the academic communities, and offering awards and recognitions of distinction;
- *Possibilities:* investments into research infrastructure, building up the potential of SMEs with respect to scientific research, the creation of scientific clusters in specific European regions as well as the promotion of science in society.

The Joint Research Centre (JRC) was created within the framework of the 7th FRP. It is a network consisting of scientific research units situated in various parts of the EU. The JRC carries out research on nuclear energy and nuclear security, and has also elaborated a tele-detection technology enabling early discovery of crises related to food products in developing countries as well as a structure for determining where EU assistance relating to food products should be directed.

The International Thermonuclear Experimental Reactor (ITER), built in Cadarache in France, is considered to be an important step on the path toward the development of prototype reactors for electricity plants, using a process of nuclear synthesis to produce forms of nuclear energy which are safe, environmentally friendly, and in accordance with the principles underlying sustainable development. In addition to the EU, China, India, Japan, Canada, South Korea, the USA and Russia also participate in this project.

Also within the framework of the 7th FRP for the first time separate centres were established for research into outer space, which can be seen as a confirmation of the fact that the EU is attempting to play an ever greater role in activities relating to exploration of the cosmos. The GMES project (Global Monitoring of the Environment and Security), has also been designed to alleviated envisaged future crises relating to the environment and security as well as a serving as a vehicle for taking appropriate actions.

The EU is also implementing the Galileo Project, which is aimed at the creation of a new generation Global Satellite Positioning System (GPS) which will have a large number of new applications for drivers using GPS, beginning with the creation of better road management systems and including the elaboration of rapid and effective search and rescue operations.

The main research priorities of the 7th FRP include:

- Health;

- Food products, agriculture, fishing, and bio-technology;
- Information and communication technologies (ICT);
- Nanotechnology and new materials for production;
- Energy;
- The environment, including climate change;
- Transportation (including aeronautics);
- The social and economic sciences and the humanities;
- Space;
- Security.

The above priorities are also reflected in the document issued by the European Commission entitled: *Priority initiatives for the European markets*, which identified six leading markets, i.e. those which had the highest gross value added in the EU. These included:

- The e-health services market, which provides health services and products for health protection via electronic communications;
- Sustainable construction (which accounts for 10% of GDP in the EU and 7% of the employment in the EU) – a market making use of new solutions in the construction and construction services sectors;
- Textile technology (mainly consisting of technical fabrics). This encompasses so-called "intelligent textiles" and in particular protective clothes and equipment for emergency services such as fire companies and emergency health services;
- Innovation in the renewable energy sector, including bio-resources and bio-fuels;
- Recycling, offering preferential treatment for income attained and for efficient waste management systems;
- Renewable energy: sources of renewable energy neutral with respect to CO2 emissions [12].

5. A European Strategy for Scientific Research and Innovation in the Sphere of Information and Communication Technologies until 2020

Information and communication technologies (ICT) are a driving force for innovation and development in the global economy. Hence it is no surprise that the EU is interested in attracting investments into scientific research and the development of ICT, including attracting the best scientists and ideas. Europe is faced with a number of challenges in, e.g. the fields of energy, health, and aging populations, which can only be dealt with appropriately using the optimal solutions available in ICT. The commencement of the consultation process is the first step toward the elaboration of an integrated strategy with respect to scientific research and innovation in the ICT sector. To date Europe's weakest point in this regard relates precisely to the too-low level and intensity of investments in R&D and innovation with respect to the ICT sector. In the developed economies of the world, 33% of R&D and innovation investment goes into the ICT sector, while in Europe the comparable percentage is just under 25%, mainly because the investments are too fragmented. In addition, the EU constitutes 32% of the global ICT market, while EU entrepreneurs have captured only 22% of the same market. Hence increased investments into ICT research are of prime for increasing the innovativeness of EU firms, increasing the EU's economic growth, and increasing the EU's competiveness on the global market. At the same time, it is necessary to cut administrative formalities and red tape and create new jobs.

In some fields, and in particular in those in which ICT innovation greatly contributes to social welfare, structural barriers can make it impossible to implement advantageous or even revolutionary solutions on the global market. Within the EU, these barriers need to be eliminated at the regional, national, and EU levels. Thus the EC is implementing programmes aimed at supporting both SMEs and large European firms to enable them to take advantage of innovative achievements in ICT.

The ICT PSP programme (2007–2013, with a budget allocation of 728 million euro) is aimed at supporting innovation and competitiveness by the wide distribution of practices enabling citizens, governmental administration, and firms to make the most effective use of ICT. This is part of a wider

Framework Programme implemented by the European Commission known as the CIP (Competitiveness and Innovation Framework Programme (2007–2013).

The ICT PSP is based on the experience of the earlier e-TEN programme, which ended in 2006. The e-TEN was a programme designed to support, in the public interest, the development of a trans-European system of electronic services. The objective of the programme was to accelerate the adoption of e-services aimed at implementation of the European social model in order to attain greater socio-economic cohesion. The programme was based on six themes: e-Government, e-Health, e-Inclusion, e-Education, and e-services for SMEs as well as for public trust and security.

The programme e-Contentplus (2005–2008, with a budget allocation of 149 million euro) was aimed at eliminating organizational barriers and promoting the use of innovative technological solutions in order to raise the level of accessibility to digital content in the multi-lingual environment. The e-Contentplus was a continuation of the e-Content programme and concerns above all specific market segments which are making slow technological progress: the public sector (including its geographical configurations), and the education sector. With respect to the latter one objective was to create electronic libraries with a cultural, scientific, and academic component.

Taking into consideration that innovation was a top priority with respect to the socio-economic development of the EU, the European Commission has encouraged the member state governments to invest 3% of their national GDP into R&D (with 1% coming from government subsidies and 2% from the private sector) by the year 2020. It is estimated that this will create 3.7 million new jobs and increase the annual GDP by about 800 million euro.

The EU is also working on the creation of a "Common European Space", within which scientists will be able to work anywhere in the EU, which should lead to closer international cooperation.

In January of 2014 the EU inaugurated its newest seven year program – Horizon 2020, to which it has allocated nearly 80 million euro until 2020. The allocated EU funds are designed to attract even more investments, both private and public, at the national level. Thus the total financial contributions allocated to R&D and innovation will be used as part of a single integrated programme. The aims of the programme include:

– strengthening the position of the EU in the field of science (24.4 million euro are allocated for this purpose, including 13 million for the European Research Centre);
– supporting industrial innovation (17 million euro), including investment into key technologies, better access to capital, and support for small firms;
– searching for solutions to the most critical problems facing society, such as climate change, environmentally-friendly transportation, use of renewable energy, securing the production and supply of safe food products, as well as the implementation of innovative solutions to deal with the problems of aging societies (24.4 million).

Other EU institutions will also engage in R&D and innovation:

– *The Joint Research Centre* will be responsible for supplying independent analyses and opinions based on empirical scientific and technological findings in order to assist the EU in developing its strategies and policies with respect to R&D and innovation;
– The activities of the *European Research Centre* will be aimed at supporting exceptionally ambitious and pioneering research projects and programs.
– *The European Research Agency* will manage about one-half of the EU subsidies for scientific research;
– *The European Agency for SMEs* will manage the many EU programmes aimed at supporting the activities of these enterprises;
– *The INEA (Innovation Network European Agency)* will manage the implementation of trans-European transportation networks;
– *The aim of the European Institute for Innovation and Technology* is to facilitate the establishment of partnerships between higher education institutions and other centres or units engaged in R&D and innovation within the framework of the programme "Community knowledge and innovation" [15].

Besides the **Horizon 2020** programme, one of the leading projects realized within the framework of the Europe 2020 Strategy is an *Innovation Union.* This project consists of support provided by the EC for innovation in the broadest sense of the term (improvements of a technical nature, improved processes, and improved marketing or business organization), as well as for R&D activities which are relevant to the actual challenges faced by the European Union.

Activities undertaken under the auspices of the *Innovation Union*, which includes cooperation projects undertaken with third countries, will concentrate on the most important challenges facing the world, such as: energy, safe and healthy food products, climate change, and dealing with aging populations. It is envisioned that this initiative will make it possible to use the public sector as a booster for involvement of the private sector. It will also help eliminate the obstacles to the implementation of innovative ideas on the market, such as lack of funds, the fragmented state of both the R&D network and the R&D market, the all-too-infrequent use of public contracts for the implementation of innovations, and the labyrinth of standardization procedures.

Equally important are **social innovations**, which can be, *inter alia*, new ideas for the alleviation of social ills and the fulfilment of social needs, the strengthening of social relations, and the creation of new models of cooperation. In this regard it is critically important in introduce innovative solutions into the labour market and stimulate employment growth.

Social innovations form the foundation for intelligent and sustainable economic development based on social inclusion, employment growth, increasing professional qualifications, and combating poverty. The concept of an Innovation Union complements the other leading projects of the European Strategy 2020, which include: youth mobility, the European digital agenda, a Europe effectively using resources, an industrial policy for the era of globalization, a program for new skills, qualifications and employment, and a European programme to combat poverty [14].

Modern design is also included the EU's innovation policy as a key pillar for the development of innovation in industrial activities, such as for example changes in the shape of products with the aim of better satisfying clients' needs and demands and improving how they function [16].

The development plans until 2020 also include increased investment into R&D until it reaches 3% of the EU's GDP. In the EC's opinion this will create 3.7 million jobs and increase annual GDP by 800 million euro by 2025, as well as systematically support innovative projects and ideas, and would create an integrated single European Research Space by 2020.

The figure below summarizes the results of the innovative activities of the EU's 27 member states (excluding Croatia) for the year 2016 [13].

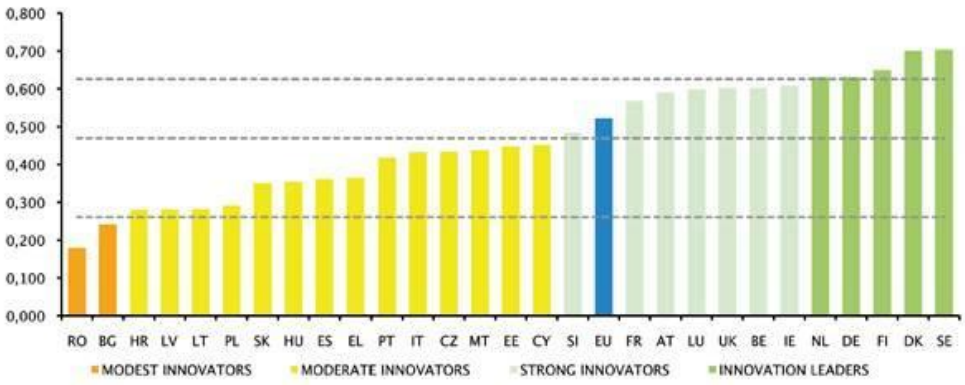

Fig. 1. The European Innovation Scoreboard for 2016 – ranking of states (axis Y – innovation indicator; axis X – EU member states).

It can be seen from the chart that Sweden ranked first and continues to be the EU's innovation leader, ahead of Denmark, Finland, Germany and Holland.

In selected sectors, the EU innovation leaders were: Sweden – human resources and quality of academic scientific research; Finland – framework financing conditions; Germany – private investment in innovation; Belgium – innovation networks and cooperation in innovation projects; and Ireland –

innovation in SMEs. The member states most rapidly improving their level of innovation were Latvia, Malta, Lithuania, Holland and Great Britain.

In the countries in the "moderate innovators" category one can find regional centres of innovation. In Italy these include the regions of Piedmont and Friuli-Venezia Guilia; in Spain the Basque Country; and in Slovakia the Bratislavsky country.

Overall the key factor in obtaining a rank as an innovation leader is the adoption of a sustainable system of innovation, which links together an appropriate balance of public and private investment, efficient innovation partnerships between enterprises (as well as academic centres), and a strong and stable system of education and high level of scientific research. The influence of innovation on the economy should appear in the form of increased sales and exports of innovative products, as well as in increased employment.

Specialization in the key pro-development technologies also leads to improved regional innovation results, particularly in the sectors of advanced materials, industrial biotechnology, photonics, and advanced technologies of production.

It is envisioned that within the next two years the level of innovation in the EU will grow. In the next year the majority of firms will either maintain or increase the level of their investments in innovation. In particular enterprises in Romania, Malta, and Ireland plan to significantly increase their investments in innovation in the following years [13].

6. CONCLUSIONS

– Innovation has been placed at the heart of the EU's strategy to create growth and jobs.

– EU countries are encouraged to invest 3% of their GDP in R&D by 2020 (1% public funding, 2% private-sector investment.

– The most important Strategy in the EU within the general Strategy Europe 2020 plays the Innovation Union.

– The objective of the Innovation Union is to create an innovation-friendly environment that makes it easier for great ideas to be turned into products and services that will bring our economy growth and jobs. It focuses Europe's efforts – and its cooperation with non EU countries – on the big challenges of our time: energy, food security, climate change and our ageing population. It uses public sector intervention to stimulate the private sector and remove bottlenecks which prevent ideas from reaching the market – including lack of finance, fragmented research systems and markets, under-use of public procurement for innovation and slow standard-setting.

– The crucial role within the innovation policy played during the recent 25 years seven Framework Programmes, supporting R+D. Within the recent Strategy Europe 2020 has been established the biggest Programme HORIZON 2020, oriented on the financial support for investment in key technologies, greater access to capital and support for small businesses and for solving major social problems such as mitigation of the negative climate change, support for sustainable transport, renewable energy, food safety and security, ageing populations.

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У статті проведено аналіз напрямків та інструментів інноваційної політики Європейського Союзу в розрізі теоретичних та емпіричних підвалин, які впливають на інновації, що вважається одним з основних чинників підвищення конкурентоспроможності як підприємств, так і країн на міжнародному ринку. У статті також аналізується, як передача технологій та обмін знаннями (поглинаннями) впливають на зміну міжнародної конкурентоспроможності як на мікро-, так і на макроекономічному рівні, а також на значущість інтернаціоналізації підприємств в результаті прямих іноземних інвестицій з точки зору поширення інноваційних процесів як на європейському, так і на міжнародному рівнях.

Ключові слова: інновації, конкурентоспроможність, Рамкові програми ЄС, підтримка R + D.