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“THE IMPACT OF INNOVATION INTO THE ECONOMIC GROWTH“

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Abstract

Competition between companies differentiates a lot nowadays compared to many years before. They compete in "nicety" that are so small but so important. Companies are trying to achieve competitive advantage in order to help them obtain a better and a stable position in the marketplace. The best way for companies to achieve a competitive advantage is through innovation. This paper addresses the meaning of innovation what does innovation present, types of innovation specifically discussing the right way of usage. In order for companies to get the as more innovations as possible it is necessary for them to be familiar with the process of innovation and its principles which innovation was found on. There are several types of innovation or ways in which companies can achieve innovation in a level of whole organization. This paper discusses the ways how that can be achieved, starting from their products and services, ways of selling, supply ect.

Innovation is essential for sustainable growth and economic development. Several core conditions enable innovation and encourage economic growth. In the modern economy, innovation is crucial for value creation, growth and employment and innovation processes take place at the enterprise, regional and national level. Innovation will lead to new businesses as well as to the increased competitiveness of existing enterprises.

In this paper are not covered all the characteristics of innovation but it presents a very good basis for a proper usage of innovation and ways of transforming it in competitive advantage for companies. Also this paper identifies the impact that innovation has on economic growth.

Key words: innovation, competition, economic growth

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1. Definition of Innovation

Enterprises today act under a big pressure by other enterprises, which offer the same or similar production or service, or they are under the pressure of the customers who expect more and more from the product they consume. In order to face with the new conditions and situations, enterprises are made to continuously search for new ways of production, namely offering new products or enhancing existing ones. In other words, they should continuously introduce innovations. But, what in fact do innovations represent?

Innovation is a process of transforming the new ideas, new knowledge into new products and services. Joseph Schumpeter defines innovation as an activity which leads to new producing function, new product. He divides this activity in several steps, as follows:²

- **Introducing a new product:** the entrepreneur should produce, namely introduce a new product which can be easily sold and which is not offered in the market
- **Introducing a new method of production:** innovation should offer a new scheme of production which through existing inputs can lead to an increased output, decrease of costs per unit product, introduction of new inputs and change of existing ones.
- **Opening new markets:** innovations can increase the sell in new regions, and also increase the number of customers.
- **Finding of appropriate sources of raw materials:** The raw material supplier can often lower raw materials' quality or increase their price and this directly influences over the quality and the selling price of the new product. Therefore, the entrepreneur should find an appropriate source of inputs, which are needed for production of new products.
- **Establishing a new organization in the industry:** Schumpeter describes this step as an entrance of the entrepreneur in the monopoly market, where there has been no competition previously; or creating conditions through which the entrepreneur would take the monopoly position in the market.

² Schumpeter, J., in McDaniel A., B, 2002, p.57-58

Pierre Lionnet³ defines innovation as a process by which a novel idea is brought to the stage where it eventually produces money...It is a dynamic technical, economic and social process involving the interaction of people coming from different horizons, with different perspectives and different motivations.

Innovations represent a process, namely an activity of creating a new product or service, new technologic process, new organization, or enhancement of existing product or service, existing technologic process and existing organization.

According to the given definition, if we analyze its separate elements, we can say that we classify: innovations in production – development or enhancement of a specific product; innovations in services – offering new or enhancing of existing services; innovations in process – finding of new ways of organizing and combining inputs in the process of production of specific products or services; and innovations in management – creating new ways of organizing business resources.

The importance and definition of innovations can be explained from several aspects. From the aspect of **customers**, innovation means products with better quality and better services, which together mean a better way of life. From the aspect of **businesses**, innovation means sustainable growth and development, realization of great profit. For the **employees**, innovation means new and more interesting job, which requires more mental faculty, which results in higher salaries. From the aspect of **whole economy**, innovation represents a bigger productivity and prosperity for all.

In daily conversation, terms like **innovation**, **invention**, **creativity** and **science** are often used interchangeably. But, for academics, researchers and policymakers there are important distinctions between these terms and these distinctions give each term a unique, specific meaning. Invention is the first occurrence of an idea for a new product or process, while innovation is the first attempt to carry it out into practice.⁴ Creativity is thinking about new things, while innovation is making new things. Creativity is an ability to develop new ideas and ways of facing problems and possibilities, while innovation is an ability to perform creative solutions in order to enhance people's life. Hence, enterprises can be successful only if they invent and make new things, or if they make the old ones in a new way (See table 1).⁵

³ Lionnet, P., 2003, p. 6

⁴ Fagerberg, J., et al, 2004, p.4

⁵ Zimmerer W., T., and Scarborough M., N., 2002, p. 37.

According to Tom Cannon⁶, the distinction between these terms is as below:

- **Creativity** represents an opportunity to create new appearance, content or process by combining existing inputs or factors of production.
- **Inventiveness** is a process of creating something new, which assigns a contribution to the level of overall mankind knowledge.
- **Innovation** is linked to the definitive marketing of the new product, service or technologic process, which is a result of the inventiveness.

Table 1 – Innovation, creativity, invention and science

INNOVATION vs INVENTION
<i>Invention</i> is the creation of a new concept. <i>Innovation</i> is reducing that concept to practice, and making it a commercial success.
INNOVATION vs CREATIVITY
<i>Creativity</i> is coming up with ideas. <i>Innovation</i> is bringing ideas to life.
INNOVATION vs SCIENCE
<i>Science</i> is the conversion of money into knowledge. <i>Innovation</i> is the conversion of knowledge into money.
Source: Composed according to Feldman, M., <i>The Significance of Innovation</i>, Rotman School of Management University of Toronto, 2004, p. 3-5

Innovation represents one of the essential characteristics of small businesses. According to some statistical data, in all countries, small businesses constitute the majority of enterprises, and as a result of this, they face the most severe competition. In order so survive in this competition, they are made to be innovative. Small businesses are centres of initiatives for innovative attempts. Innovations that are ascribed to small businesses are air-conditions, zippers, helicopters, computers, video recorders, cameras, optical scanners, contact lenses, etc.

⁶ Cannon T., 1991, p.17

2. Sources of innovation

IBM made a study about the potential sources of innovations, which was based on phone interviews with over 750 CEOs and business leaders. This study found “*that 76% of CEOs ranked business partner and customer collaboration as top sources for new ideas. This greatly contrasts with internal R&D, which ranked eighth as a source for new ideas – cited by only 14% of CEOs*”. The top sources can be considered sources outside of the company.⁷ There are the IBM’s top sources of innovation: Employees, Business partners, Customers directly, Consultants, Competitors, Associations, Internal Sales & Service Unites, Internal R&D, Academia, Think-tanks and Labs or other institutions.

An analysis of innovation sources (sources of innovation-related information) revealed that they were of relatively similar importance (within the company (28.4%), suppliers (26.4 %), customers (25.8 %), competitors (24.9 %), and exhibitions (24.6 %)). Such innovation sources as universities and other non-profit R&D institutions scored just 3.7 % and 2.9 %, respectively.⁸

According to another research, we met these sources of innovations:⁹

1. The market-Watch it carefully. Unexpected market or industry structure changes can provide potential innovative opportunities. In addition, changes in demographics, social moods, values, norms, even in lifestyle, may require innovative solutions to emerging needs. For instance, Johnson and Johnson responded to declining birth rates in Western markets by encouraging adults to use their baby products.

2. Existing customers are often a valuable source of innovation. Consider immersing yourself and/or a team of market facing and delivery people in your customer's business to gain greater insight. Observing “*a day in the life of.....*” your client may provide valuable data on unmet needs and point to innovative solutions to existing problems. In addition, disruptions in you customer's industry may also yield circumstances where innovative product or services may be just the answer to new or emerging needs. Working cooperatively with leading or innovative customers may also help foster innovation.

⁷ De Ridder, Ph., 2008.

⁸ Ukrainski, K., and Varblane, U., 2005, p. 20-21

⁹ <http://www.ceoforum.com.au/article-detail.cfm?cid=6153>

3. Suppliers can also provide valuable input. Your suppliers have a vested interest in working with their market leading customers. The development of strong partnerships with key suppliers will facilitate open discussions addressed at identifying your emerging business needs and identifying possible innovative solutions that integrate the best of both businesses.

4. Learn from experience. Unexpected success and failures can provide new and potentially valuable information. Don't sweep failures under the table but instead use them to explore what learnings may create innovation in current or new markets.

3. Principles and strategies of innovation

The great researcher and professor in the field of management and entrepreneurship, Peter F. Drucker, in his book *Innovation and Entrepreneurship*¹⁰ lists several principles which should be respected by innovators. He has grouped these principles in “Do’s” and “Don’t’s” in the process of innovation.

“Do’s” are listed below:

- ***Innovation starts with analysis of opportunities.*** It starts with the seven opportunities for innovation. They are: unexpected events, disagreements in the process, requirements of the process (the need for a new process), and unexpected changes in industry or market structure, demographic changes, changes in perception, importance and new knowledge.

- ***Innovation is a conceptual and perceptual activity.*** The second imperative of the innovation is to go out and see, ask and hear. Successful innovators work analytically on the question what should the innovation be like in order to satisfy an opportunity. Afterwards, they go out and see the customers/users and they find out what are their expectations, their values and their needs.

- ***Innovation, in order to be successful, should be simple and focused.*** If the innovation is not simple, it will not succeed. Everything new gets into trouble: if it’s complicated, it cannot be corrected or solved. All the successful innovations are surprisingly simple. In fact, the greatest acknowledgment for an innovation is when people say: This is so obvious. Why didn’t I think of this?”

¹⁰ Drucker, F. P., 1993, p.134-138.

- ***Innovation should start as “small”.*** Innovation should not be grandiose. It should hold up to something specific, concrete. In the beginning, it requires a little money, some people and a small limited market.

- ***A successful innovation aims towards leadership.*** If an innovation at the very beginning does not aim towards leadership, its highly probable that it will not be “innovative” enough.

“Don’t’s” are listed as follow:

- ***Innovations should not be very “smart”.*** Innovations should be led by simple people. Everything that is done in a very “smart” way, either for the designing or the completion, is set to failure by high probability.

- ***Many things should not be done at a time.*** Innovations have a need for concentrated energy and common effort. It also requires that people who effectuate the innovation should have mutual understanding.

- ***Don’t innovate for the future, but for the present.*** One innovation can have a long-term impact, but it demands a longer time to reach its maturity. It should be a solution for the problems in the present.

Also we can count and these principles that give life to the process of innovation:¹¹

1. Innovation starts when people convert problems to ideas. New ideas are born through questions, problems and obstacles. The process of innovation is indebted to the trouble that comes about when we are surrounded by that which is not solved, not smooth and not simple. Therefore, in order for the innovation process to flourish, it needs a climate that encourages inquiry and welcomes problems.

2. Innovation needs a system. All organizations have innovation systems. Some are formal, designed by the leadership, and some are informal, taking place outside established channels. Informal channels are untidy and inefficient, yet innovation is always associated with them.

3. Passion is the fuel and pain is the hidden ingredient. Ideas do not propel themselves; passion makes them go. Passion, in addition to talent and skill, is a valuable company asset. Passion is what transforms other resources into profits, but it never shows up on a balance sheet. Unfortunately, there seems to be some universal law that says when pursuing a passion or following a dream, pain is part of the process.

¹¹ <http://www.thepracticeofleadership.net/2007/01/28/5-principles-of-innovation/>

Innovation leaders need to take the pain with the passion and learn to manage both effectively.

4. Co-locating drives effective exchange. Co-location refers to physical proximity between people. It is a key for building the trust that is essential to the innovation process. It also increases the possibility for greater exchange of information, cross-fertilization of ideas, and stimulation of creative thinking in one another and critique of ideas during their formative stage.

5. Differences should be leveraged. The differences that normally divide people – such as language, culture, race, gender and thinking and problem solving styles – can be a boon to innovation. When differences are used constructively and people move beyond fear, suspicion, mistrust and prejudice, differences can be leveraged to enhance and sustain the innovation process.

The 2007 Booz Allen Hamilton report on Global Innovation 1000 argues that statistical analysis of a representative sample of global innovation 1000 companies divided them into three distinct categories of innovation strategy: *Need Seekers, Market Readers, and Technology Drivers*.¹²

1. Need Seekers companies focus on being first to bring new products to markets and base their R&D efforts on getting direct, proactive input from customers. They engage actively current and potential customers to shape new products, services, and processes.

2. Market Readers distinguished themselves through their preferences for incremental change and being fast followers into markets. They watch markets carefully and maintain a more cautious approach focusing on creating values through incremental change.

3. Technology Drivers focus on a technology forward approach to innovation, while remaining less concerned with direct customer input into the process. They follow the direction suggested by their technological capabilities, leveraging their investment in research and technology to drive breakthrough innovation or incremental change.

There were significant performance differences between the three categories: R&D spending was 40% greater in the Need Seekers group. Each group showed a similar mean values for return on assets, but the standard deviation for Technology Drivers was

¹² Komminos, N., 2008, www.urenio.org/.../Intelligent%20Innovation.jpg

40% higher, indicating that this group pursue a riskier innovation strategy than the two other categories.

4. Macedonia and the Competitiveness and Innovation Program (CIP) of EU

Republic of Macedonia is a full-fledged partner in *the Programme for Competition and Innovations of the European Union (CIP)*.¹³ Starting from **January 1st 2008**, Republic of Macedonia officially started with the implementation of this programme for the **2007-2013** period, and in this way, it became the second country after Croatia which is not a member of EU, but has joined this Programme. Through this programme, the European Commission gives an impulse to the entrepreneurship, innovations and the development of small and medium sized enterprises, which in EU are considered a backbone for the national economies. The aim is to encourage the competition and innovations in the European Union, bearing in mind that this could lead to an increase in the economic growth in the member-countries and candidate-countries for membership in EU.

The Programme for Competition and Innovation is especially important for the small and medium sized enterprises in our country, because it will provide them with internationalization, as well as an easier access to the financial assets, more appropriate use of information and communication technologies, development of the IT society and promotion of the importance of new renewable resources of energy and energy efficiency.

The Programme for Competition and Innovation of the European Commission is planned for the 2007-2013 period and it has a **budget of 3.6 million Euros**, and it is divided into **three basic programmes**:

1. Entrepreneurship and Innovation Framework Programme - EIP;
2. Information and Communication Technologies Policy Support Programme - ICTPSP;
3. Intelligent Energy-Europe Programme – IEE.

Entrepreneurship and Innovation Framework Programme - EIP has several defined goals:

¹³For more information, visit: www.mchamber.org.mk

- Providing more efficient access to financial resources for the small and medium sized enterprises (SMEs) by co-guarantees and co-investments of the local banks and funds for the capital venture
- Ensuring business and innovation services through a developed network of regional centres;
- Supporting and promoting entrepreneurship and innovation;
- Supporting ECO – Innovations

The Programme for Competition and Innovation of the European Commission foresees cooperation among owners of the small and medium sized enterprises, state institutions and organizations, organizations of the civil society. It is specific that co-financing of the projects is conditioned with cooperation through the consortium or network of co-operators.

In regards to the innovations in the Republic of Macedonia, the Bureau for protection of the intellectual property conveyed a **research** in order to find out the reasons of undertaking innovative activities by the enterprises. Examinees have answered that they have undertaken innovative activities because of the following reasons: **improvement of the quality of their products (15.67% of examinees), reaching access to new markets (13.07%), preservation of existing markets (12.77%), reducing of the production costs (12.57%), improvement of ways of working (9.68%), etc.**

In many cases, innovations are understood only as technical-technological term, which is wrong. They appear to be a market and social phenomenon. Many people have developed their businesses without using ways of elaborating any specific technological procedures. As examples for this we can mention the occurrence of newspapers, insurance certificates, fast food, and etc.¹⁴

5. Innovation and Economic growth

Innovation is not a new phenomenon. Arguably, it is old as mankind itself. There seems to be something inherently “human” about the tendency to think about new and

¹⁴ See more: Drucker, F., P., 1993, p. 30-33.

better ways of doing things and to try them out in practice. Innovation is a major factor of economic growth and performance in the globalised economy. ***The relationship between innovation and economic growth has been well studied. However, that is not to say that it is well understood.*** Innovation brings new technologies and new products that help address global challenges, new ways of producing goods and delivering services boost productivity, create jobs and can help improve citizens' quality of life.

Innovation is the throbbing heart of the twenty-first century economy, consistently pumping new revitalizing activity through the system. The opposing force is commoditization—probably the single most powerful force in business today—which rapidly takes what was distinctive and profitable and rapidly makes it commonplace and marginal, sucking out the vitality and profitability.

Economic growth is most commonly measured using changes in the total value of goods and services produced by a country's economy or what is known as Gross Domestic Product (GDP). Of course, since the size of countries varies this number is adjusted for the size of the population which provides a crude measure of the average individual's well-being.¹⁵ As stated in a research paper done by Torun and Cicekci that a theoretical link between innovation and economic growth has been contemplated since at least as early as Adam Smith (1776). Not only did he articulate the productivity gains from specialization through the division of labor as well as from technological improvements to capital equipment and processes.

The capacity and the ability to create economic value is critical to competitive advantage and growth for firms, industries and countries. The question then becomes how to best organize resources to create, diffuse and sustain innovation and, moreover, how to leverage investments made in science and technology, research and development and related capabilities with the ultimate goal of reaping rewards in terms of wealth creation and increased standards of living.

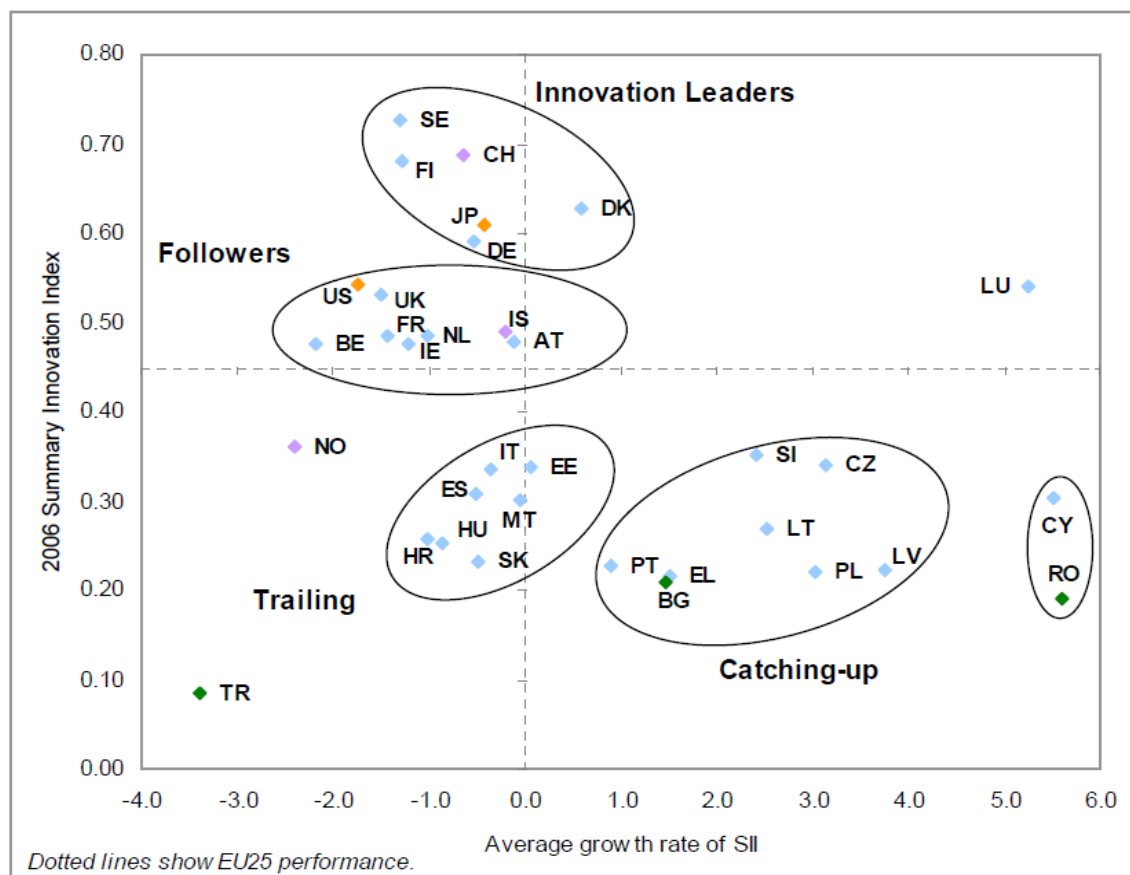
According to a report prepared by (MERIT) and the Joint Research Centre have analyzed the European Innovation Scorecard (EIS) which is an instrument to evaluate and compare the innovation performance of the EU Member States. This report includes Innovation indicator and trend analysis¹⁶ for the EU25 plus the two new Member States: Bulgaria and Romania, as well as for Croatia, Turkey, Iceland, and Norway. Taking into a

¹⁵ Torun, H., and Cicekci H. T., 2007, p. 5.

¹⁶ Maastricht Economic Research Institute on Innovation and Technology (MERIT) and the Joint Research Centre - Institute for the Protection and Security of the Citizen of the European Commission, 2006, p. 3-7.

consideration the situation in Europe, significant national differences are still observed. Figure 3 show the **Summary Innovation Index (SII)**¹⁷ on the vertical axis and the average growth rate of the SII on the horizontal axis. From the figure below we can see that countries above the horizontal dotted line currently have an innovation performance above that of the EU25. Countries to the right of the vertical dotted line had a faster average increase in the SII than the EU25.

Figure 3: The Summary Innovation Index (SII) and Trends



Source: Maastricht Economic Research Institute on Innovation and Technology (MERIT) and the Joint Research Centre - Institute for the Protection and Security of the Citizen, *European Innovation Scoreboard 2006*, InnoMetrics, 2006, p. 4.

Based on their Summary Innovation Index (SII) score and the growth rate of the SII, the countries included in the analysis can be divided into four groups or clusters:

¹⁷ The *Summary Innovation Index* (SII) gives an “at a glance” overview of aggregate national innovation performance.

- **Innovation leaders** - with SII scores well above that of the EU25 and the other countries;

- **Innovation followers**- with SII scores below those of the innovation leaders but above that of the EU25 and the other countries;

- **Catching-up countries** – such as Slovenia, Czech Republic, Lithuania, Portugal, Poland, Latvia, Greece and Bulgaria make up the group of these countries where Macedonia will belong as well, with SII scores well below that of the EU25 and the innovation leaders, but with faster than average innovation performance improvement;

- **Trailing** - with SII scores well below that of the EU25 and the innovation leaders, and innovation performance growth which is either below or only just above that of the EU25.

Growing role of innovation in economic and social development, and how governments can help ensure that innovation is translated into new products and techniques that can help society meet the global challenges of the 21st century. EU integration is among the top priorities of Macedonia. Therefore, significant efforts are invested in preparing the country for EU membership – national legislation is being adapted to EU legislation in all areas covered by EU law, EU standards are adopted in economic, political and social areas and comprehensive horizontal reforms of the public administration are conducted. Government officials and commentators have recognized this reality and have called for a variety of different substantive incentives for stimulating innovation. Several core conditions enable innovation and encourage economic growth:

- Strong standards and effective enforcement of intellectual property protection,
- Vigorous competition and contestable markets,
- A strong and sustainable fundamental research and development infrastructure,
- Encouraging Information and technology communication developments,
- A strong emphasis on education at all levels.

Every one of these conditions will be explained in the text below.

5.1. Intellectual Property Protection

Innovation and intellectual property increasingly dominate the economy. As technology advances, no firm has the resources to stand alone, and collaboration with others is becoming essential. This means that new business models are needed for developing intellectual property and sharing in its value. ***In 1421 the Government of Florence awarded the world's first patent to Filippo Brunelleschi for a means of bringing goods up the usually unnavigable river Arno to the city.*** He demanded and was duly awarded legal protection for his invention, being given the right for three years to burn any competitor's ship that incorporated his design.¹⁸

Intellectual Property Rights such as patents, trademarks copyrights, registered industrial designs, integrated circuit topographies ect, are known as key factors promoting innovation and growth in today's economy. Designing an effective and appropriate system of IPRs is complex for any country. The mechanisms by which IPRs operate vary across functional areas such as mentioned above and their importance differs across sectors. The nature and the purposes of these mechanisms are distinctive, although they share certain fundamental characteristics that bring them under the IPRs Umbrella. The strength of IPRs depends on the demand characteristics, market structure and other forms of business and competition regulation.

Intellectual property helped make possible the conditions for innovation, entrepreneurship and market-oriented economic growth that shaped the 20th Century. In the 21st Century, IPRs increasingly will define these conditions, and will dictate the pace and direction of innovation, investment and economic growth around the world.¹⁹

Since, Macedonia is preparing to become a member of the EU in the near future in some way we will be affected as far as IPR and Innovation is concerned.

Since the 1995 Green Paper on Innovation, the European Commission and the Governments of several Member States have emphasized the role of Intellectual Property Rights (IPR) as an incentive to firms to invest in innovation and as a means of appropriating their investments in innovation. If we look at one of mechanisms of IPR such as patenting, one of the main concerns over time has been a lower rate of patenting by European firms compared to American firms, as identified in several editions of the EIS²⁰. The difference in patenting rates between the US and Europe is partly due to a

¹⁸ Living Networks: Anniversary Edition - *Living Networks* is being relaunched in its Anniversary Edition five years after its original publication in November 2002, to revisit the foundations of our networked age.

¹⁹ Torun, H., and Cicekci H. T., 2007, p. 11.

²⁰ See <http://www.proinno-europe.eu/inno-metrics.html> for the 2005 edition.

difference in industrial structures. For example, compared to the US, a higher percentage of European value added and employment is from manufacturing sectors with low to moderate background patent rates²¹, such as transportation equipment. The US, conversely, has a higher concentration of firms active in high-technology sectors with high background patent rates such as pharmaceuticals, biotechnology and IT equipment.

Table 3: The equivalent subsidy rates of patents by industries

	USA	FRANCE	GERMANY
Pharmaceutical	22%	4.1%	15.2%
Industrial Chemicals	14%	7.2%	
Food, kindred and tobacco products	2%		
Semi-conductors	23%		
Electronic Components	13%		
Communication Equipment	39%		
Computer	8%		12.5%
Metals	23%		
Rubber Products	19%		
Aircraft and Missiles	4%		
Instruments	16%		
Medical Instruments	21%		

Source: Lévêque, F. and Ménière, Y., *Patents and Innovation: Friends or Foes?*, CERNA, Paris, 2006, p. 10

In the table 3 we can see different studies carried out at different periods of time in different countries and with different methodologies. In the table we can see the importance of patents to recover investments and their effects on innovation depends on industrial sectors. Unsurprisingly, for pharmaceuticals patent protection is a key mechanism (drugs can easily be imitated) whereas it is not for missiles manufacturers (purchaser of weapons do not want the invention being public). We must always keep in mind that patent stimulates innovation differently from one sector or one technology to another. There is not a universal effect of patents.

²¹ The *background patent rate* is defined as the number of patents per employee or unit of value added or sales

5.2. Vigorous competition and contestable markets

Competition is the critical driver of performance and innovation. It benefits everyone by enabling to choose from an array of excellent products at affordable prices. Competition encourages the adoption of innovation as companies evolve and offer new ideas in order to flourish in the marketplace.

Products should compete on their own merits, and consumers everywhere should have the ability to easily choose the best products available for purchase. Fair and open competition dictates that the best product wins, and market forces prevail. Competition among firms generally works best to achieve optimum prices, quantity, and quality of goods and services for consumers. Competition can stimulate innovation. Competition among firms can spur the invention of new or better products or more efficient processes. Firms may race to be the first to market an innovative technology. Companies may invent lower cost manufacturing processes, thereby increasing their profits and enhancing their ability to compete. Competition can prompt firms to identify consumers' unmet needs and develop new products or services to satisfy them.

5.3. Strong research and development infrastructure

Research and development, resulting in new goods, new processes and new knowledge, is a major source of technical change. R&D is a fundamental input into the innovation process and innovation is an important factor that influences productivity, productivity growth and competitiveness. As defined by the Frascati Manual²², ***“R&D comprises creative work under-taken on a systematic basis in order to increase the stock of knowledge and the use of this stock of knowledge to devise new applications”***. The relationship between R&D and innovation is a complex, non-linear one. However, it is recognized also that it is difficult for substantial advances in technology to occur without work undertaken on a systematic basis (even serendipity tends to develop in such a context), and R&D is a good indicator of this broader phenomenon.

²² OECD, 1993, p. 29

5.4. Encouraging information and technology communication developments

In the last two decades, the information technology sector has been responsible for more economic activity, more wealth creation, more productivity and more worldwide economic growth than any other sector in the economy. Economies, consumers, businesses and governments reap the benefits of technological innovations. R&D is not the only source of new technology: in modern, industrial economies, other activities, such as learning by doing or design are conducted in most cases on the basis of new technology coming out of R&D (*e.g.* changes in the organisation of business related to the use of information and communication technology).

Technological change is the rate at which new knowledge is put into physical forms and diffused for use in the economy. Major technological advances, such as the steam engine or microprocessors are known as **general purpose technology** as they have broad applications and productivity-enhancing effects in a number of different sectors. As a result, general purpose technologies induce dramatic economic changes by creating innovation that rejuvenates existing sectors and, in the process, create new industries and services. A historical example is the steam engine, the Internet is a more recent example. The Dot-Com bubble notwithstanding, the Internet has fundamentally changed the way business transactions take place, creating efficiencies and productivity growth for existing firms as well as new opportunities for entrepreneurs.²³

In 2006, the government of the R. of Macedonia adopted the Programme for Scientific Research, Technology and Technological Development which along with the newly developed draft Laws on Higher Education and on Scientific and Research Activity, regulate research activities and set priorities in this area²⁴. Since Macedonia signed the above mentioned programme, in the area of Information Society, the government launched several initiatives with 'e' prefix: E-Citizens, E-Education, E-Business, E-Government, and E-Infrastructure, and IT is now an integral component of every government policy.

According to a study done regarding **ICT (Information and communication technologies) Innovation and Economic Growth** in Transition Economies, suggest that ICT is already playing a significant role in the transition economies, with ensuing

²³ Feldman, M., 2004, p. 7.

²⁴ Analytica, 2007, p. 5

economic benefits. However, it is also evident that the introduction of new technologies must be accompanied by a range of complementing factors for ICT to be effectively utilized and to contribute to productivity gains and economic growth. In particular, firms must develop appropriate and new marketing strategies, invest in equipment, and undertake processes of organizational change. This raises a critical question of whether the reason for some firms having yet to experience economic benefits from ICT lie with their failure to undertake the complementary efforts, or if it is due to some limitations inherent in ICT itself.²⁵

5.5. Education and the economic growth

Education is an important determinant of economic growth (e.g., Barro, 2001). Sandberg (1982) showed for 21 European countries that there exists a relationship between the literacy rates in 1850 and per capita income in 1970, but not between literacy and income in 1850, suggesting that literacy affects economic well-being in the very long-run. This finding is further supported by Nunez (1990) for 49 Spanish provinces. Unfortunately, in most of these studies it is unclear how literacy translates into better economic outcomes.

Innovation driven economic growth is a process of continual transformation. The economy expands into new materials, new sources of energy, new processes and new products, and it contracts from old ones requires a mobile labour force. People have to be ready to move from one occupational position to another maybe several times within a generation. This is not possible without the support of a system of education and training, which provides both general purpose and learning skills and diversified specialization possibilities as the national educational systems supervised by the state, has done for years. There are some tendencies towards international integration of education, but this is mainly on the post graduate level and as a supplement to national systems.

A large number of literatures suggest that education's contribution to economic growth has been variable across countries over time, and it is proven to have made a substantial contribution to growth. For example John Pencavel (1993) has mentioned a research paper done by Denison (1979) well-known

²⁵ ECORYS Nedelands B.V. in collaboration with TNO and IDEA, 2007, p. 3-10

research, education accounts for between 15 percent and 25 percent of growth in the U.S. national income per employee. Its contribution to economic growth has tended to increase over time.²⁶ As coverage of primary education has expanded rapidly in the developing world, higher education has gained importance. Thus, countries which have invested heavily in creating a well-developed infrastructure for tertiary education have reaped enormous benefits in terms of growth. Education has been a particularly important driver in the development of the capacity for technological innovation, as the experience of Finland, Korea, Taiwan, and Israel clearly shows.²⁷

Conclusion

Innovations represent an activity of creating a new product or service, new technologic process, new organization, or enhancement of existing product or service, existing technologic process and existing organization. According to the given definition, if we analyze its separate elements, we can say that we classify: innovations in production – development or enhancement of a specific product; innovations in services – offering new or enhancing of existing services; innovations in process – finding of new ways of organizing and combining inputs in the process of production of specific products or services; and innovations in management – creating new ways of organizing business resources.

The importance and definition of innovations can be explained from several aspects. From the aspect of customers, innovation means products with better quality and better services, which together mean a better way of life. From the aspect of businesses, innovation means sustainable growth and development, realization of great profit. For the employees, innovation means new and more interesting job, which requires more mental faculty, which results in higher salaries. From the aspect of whole economy, innovation represents a bigger productivity and prosperity for all.

Growing role of innovation in economic growth, and how governments can help ensure that innovation is translated into new products and techniques that can help society meet the global challenges of the 21st century. EU integration is among the top priorities of Macedonia. Therefore, significant efforts are invested in preparing the country for EU membership – national legislation is being adapted to EU legislation in all areas covered by EU law, EU standards are adopted in economic, political and social areas and comprehensive horizontal reforms of the public administration are conducted. Government officials and commentators have recognized

²⁶ Taken from: Becker, W. E. and Lewis. D. R., 1993

²⁷ See more: Lopez-Claros, A. and Mia, I., 2006, p. 89-105.

this reality and have called for a variety of different substantive incentives for stimulating innovation. Several core conditions enable innovation and encourage economic growth: strong standards and effective enforcement of intellectual property protection, vigorous competition and contestable markets, a strong and sustainable fundamental research and development infrastructure, encouraging Information and technology communication developments, a strong emphasis on education at all levels, etc.

From January 1st 2008 Republic of Macedonia officially started the implementation of the European Union CI Programme for the period of 2007 – 2013, which became the second country after Croatia, which is not part of the EU but is part of this programme. CIP (Competitiveness and Innovation Programme - CIP) is particularly important for small and medium enterprise in Macedonia, which would make them become international, and have a better access to financial resources, better usage of information and communication technologies and development of the technological society.

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