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05. February 2010

Online at http://mpra.ub.uni-muenchen.de/32131/
MPRA Paper No. 32131, posted 10. July 2011 / 10:51

INNOVATION
STATE AND CORPORATIONS

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Abstract

This study aims to frame the innovation process between the two sectors of the economy: public and private. Innovation is recognized as the basis for long-term economic development, issues raised by Kondratiev and Schumpeter. Innovation also cause so-called long-term economic cycles. Article aims to highlight the need for cooperation between states and corporations to support and promote innovation processes. It can not belong or should not belong exclusively to only a sector or another. Each has a well defined role and a sound economic development can not be obtained only through public-private collaboration in terms of innovation.

Keywords: invention, innovation, state, corporation, R&D

Electronic copy available at: http://ssrn.com/abstract=1548526

1. From invention to innovation

We considered it necessary to delineate from the outset some terminology issues present in the title and we chose the term *innovation*. If other components of the title is quite explicit, the term *innovation* requires a separate approach to eliminate some confusion that may arise.

Under the legislation "a patent may be granted for any invention with the object of a product or process in all areas of technology, provided that it is new, involve an inventive step and are susceptible of industrial application." [18]

Thus, the invention is to create a new configuration, composition or material, device or process, while innovation involves undertaking a range of processes by which that invention is useful and reaches the market. A highly suggestive definition of what innovation is given by Michael Porter:

INNOVATION = INVENTION + MARKETING

The same relationship between invention and innovation is captured by William Baumol, that "innovation is essential connection between the knowledge embodied in an invention and successful implementation of that invention on the market" [3. p.14]

The process and sources of innovation has stopped its research and Peter Druker, identifying seven innovation-friendly aspects [6]:

- unforeseen - companies need to make any unexpected commercial success into an opportunity for innovation by developing a new product;
- disparities - differences between expected and obtained results can be turned into opportunities for innovation;
- need processes - to improve their activity can transform into innovation activities;
- structural change of industry and market;
- Demographic change - distribution by age groups, education, occupations;
- Changes in perception - the perception of customers on the company's products;
- new knowledge - inventions, patents, know-how.

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2. National System of Innovation

The interactions between state, corporate and innovation may give rise to what some economists called the National System of Innovation.

A universally accepted definition of what may constitute a National System of Innovation has not yet been done, but remember two such tests, that of Christopher Freeman being among the first. Thus, the National System of Innovation defines as "public network and private institutions whose activities and interactions initiate, import, edit and ensure diffusion of new technologies" [7]

Analyzing this definition we find gathered under one roof concepts of Research, Innovation and Enterprise State. The problem that arises for a country to enjoy a healthy innovation system is that of proportionality and the interaction of research and innovation in two sectors: public and private.

A second attempt capture National System of Innovation in the following terms "a set of distinct institutions which individually and jointly contribute to the development and diffusion of new technologies and provide the framework within which governments form and implement policies that affect the innovation process. Therefore, a system of interconnected institutions which aim to create, store and transfer knowledge, skills and means of defining new technologies. [12]

What are the limits and which should be the input for a country to not turn into an inhibitor of innovation? What is the optimal size and what should be the nature of relations between large corporations and state, because they do not room for complacency under the protection of the latter becoming lazy in terms of innovative activity? The correct answer to these questions might be the winning solution for building a national innovation system effectively.

The construction of the approach should be considered in terms of concept research involving public and private. Traditionally, research and development have been classified into: basic research, applied research and pre-competitive development. The first category was always considered for the public sector, while the latter categories were considered for the private sector. Explain this dichotomy lies in the fact that investment results in basic research appear in a long time and the level of certainty is too low to attract private sector engagement. Firms tend to invest less in basic research because they are attracted to investments that give short term results. On the other hand, applied research is considered for the private sector.

This distinction in research creates the need for the state to invest in basic research / fundamental, what should be a public good accessible to all. Simultaneously, support applied research and pre-competitive development within the jurisdiction of the private sector, are set by market forces, involving risks and uncertainties.

State interference is manifested by the policy that put emphasis on public-private complementarity in support of innovation and state involvement can have positive as long as it does not vitiate the free market mechanisms, given that private support is insufficient. National Innovation System should find and support this very fine public-private balance.

In an OECD report in 1997, measurement and evaluation of a national innovation system is centered around four types of information flows [13]:

a) interactions between businesses (technical cooperation, joint research);

b) interactions between businesses, universities and public research institutions;

c) diffusion of knowledge and technology to businesses;

d) mobility, movement within and between public and private sectors.

According to the study mentioned above, the private sector is the main supporter of research and development and the main source of innovation in OECD countries.

As for the importance of innovativeness of a country for it to maintain the global competition, Michael Porter reminds us that "the advanced nations [...] manufacture of standard products using standard production methods will not support competitive advantage . However, the benefit must come from the ability to create and market new products and processes, so rapidly changing technological barriers that rivals can not respond. [15].

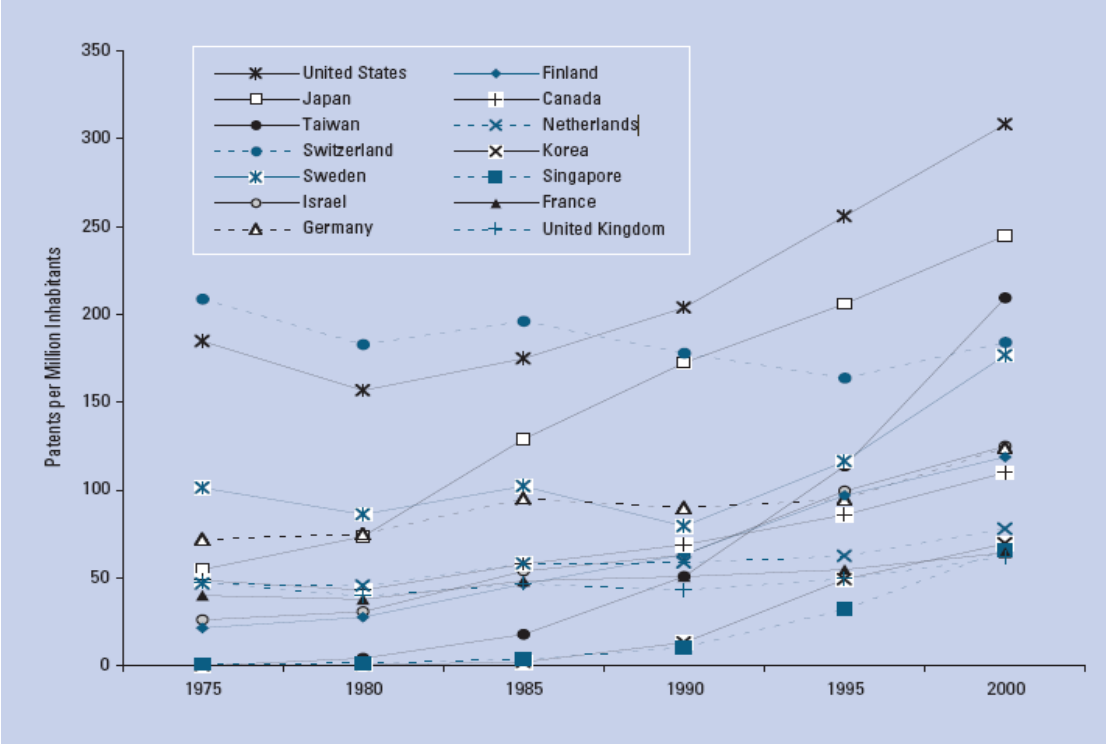
3. Innovation between public and private

Innovation activity remain focused and maintain their trend of concentration around a few nations. It is natural, under the desire to discover the key to success, to ask what these countries have specifically so that innovation activity is so prolific. It is generally recognized that the private sector is the engine of innovation, but its innovative activity is determined by the policies promoted in the public sector, course policies concerning innovation activity and related fields.

The research aims to discover new products, technologies, processes, all these take the form of innovation when it comes down to is marketed. One of the ways of measuring outcomes

in innovation is the number of patents. A classification of nations according to this criterion can be seen in the following chart:

Figure 1. International patents per million population 1975 – 2000



Source: Michael Porter, National Innovative Capacity

If we consider that the number of patents granted is the output of the innovation process, a recent ranking of nations according to this criterion will look like the following figure:

Figure2. Number of patents / one million inhabitants granted between 01.01.2008-31.12.2008

RANK	COUNTRY/ECONOMY	HARD DATA
1	Taiwan, China	279.3
2	Japan	263.3
3	United States	250.9
4	Israel	166.6
5	Korea, Rep.	156.0
6	Finland	155.5
7	Switzerland	148.3
8	Sweden	115.2
9	Germany	108.1
10	Canada	102.2

Source: Klaus Schwab, The Global Competitiveness Report 2009-2010

Linking the two graphs, we see that the strong upward trend of Taiwan materialized, they reached number one in 2008. Basically, the three classes are the same in 2000 and in 2008, with a castle between the United States and Taiwan. With reference to our first graph we see that Japan had a constant growth rate from 1990 to 2000, allowing him to maintain the second position in the rankings in 2008.

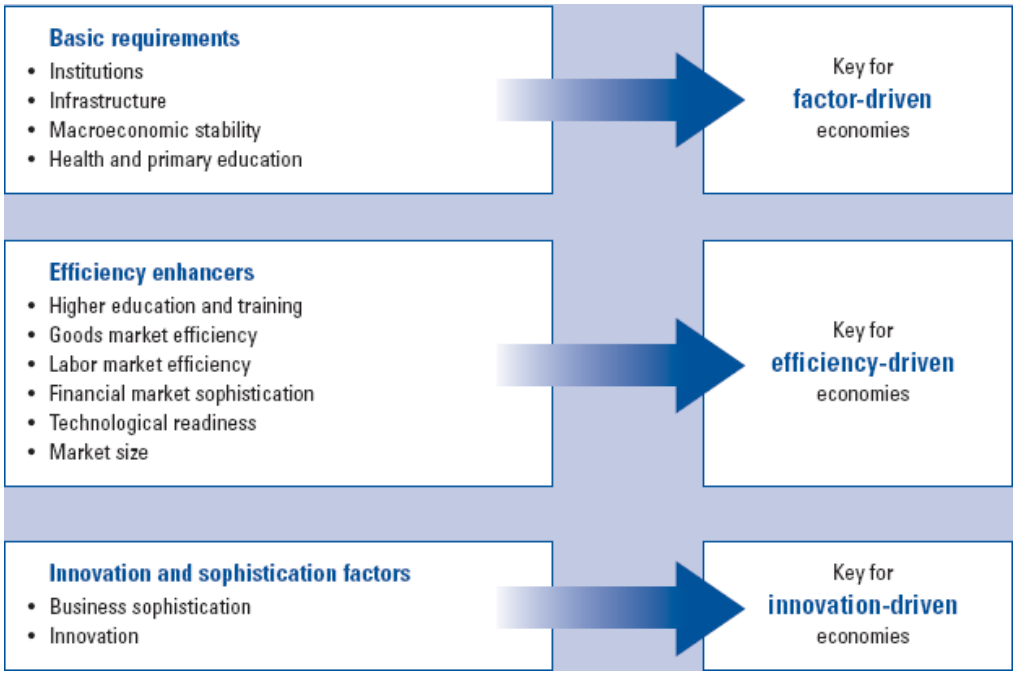
4. Economic competitiveness - ranging from production to innovation

In the year 2009 World Economic Forum held in Switzerland in Geneva, were established 12 pillars that support the competitiveness of a nation, defined competitiveness as "a set of institutions, policies and factors that determine the productivity of a country." [17]

Their order is not random but determined the existence of three different stages of economic development. The first stage, the economies based on production factors (factor-driven economies) is determined by the existence of the first 4 pillars. Achieving these conditions enable the economy to move to the next stage, based on efficiency savings (efficiency-driven economies), the feature of which is subject to the following 6 conditions. The highest stage of development is one in which economies are based on innovation (innovation-driven economies), their key factors of the last two pillars - the complexity of business and innovation.

The first pillar structure within this forum, that of the development is given the specific institutional framework of legal and administrative structure in which individuals, companies and public institutions interact to generate revenue and economic welfare. The last pillar, the defining elite economies is innovation, which is "the only responsible for ensuring the long term a high living standard" [17 p. 7]

Figure3. The 12 pillars of competitiveness



Source: Klaus Schwab, The Global Competitiveness Report 2009-2010

I made this journey to highlight the fact that institutions, such understanding by both private and state, and innovation are the benchmarks between the economies varies. In the first stage of development may occur elements that define behavior interventionist state but as we progress towards the top of the hierarchy, the pillars that characterize the following two stages of development are incompatible with expanding the role of the state of the whole economic and social life. Maybe we can tolerate a certain extent the combination of macroeconomic stability, health and basic and higher education with state interventionism, but in any case we can not accept a link between goods and labor market efficiency, complexity of financial markets and business environment and massive state intervention in the economy. Therefore we can see that the grip on the economy made by the state and capacity to innovate are two sizes interconnected.

5. Factors and indicators relevant to innovation

This interdependence State - innovation is most pronounced effects on national economic competitiveness. In a study conducted in 2009, under the Foundation for Information Technology and Innovation in the United States, Robert D. Atkinson and Scott M. Andes identify key factors affecting the innovative potential, upon which examines competitiveness based on innovation at

the level of countries in Europe and the U.S. [2]. These factors can be grouped into six categories and can build on their indicators to measure competitiveness based on innovation, as follows:

- Human capital: people with higher education, the number of researchers;
- Innovative capacity itself: private investment in research and development; investment of state in research and development; scientific and technical publications;
- Initiative entrepreneurship: investment risk; new corporations;
- IT infrastructure: e-government, Internet access, investment in IT;
- Economic policy: system of charges and taxes, regulating the business environment;
- Economic performance: balance of trade, foreign investment, labor productivity.

6. State involvement in supporting innovation

Among these indicators, business investment and state investment in research and development in relation to GDP, shows involvement of the state in support of innovation. This involvement varies from state to state, depending on the time reference and socio-economic context. For example, in the year 2006, a ranking of states according to the investment in research and development look like:

Figure 4. Investment in research and development

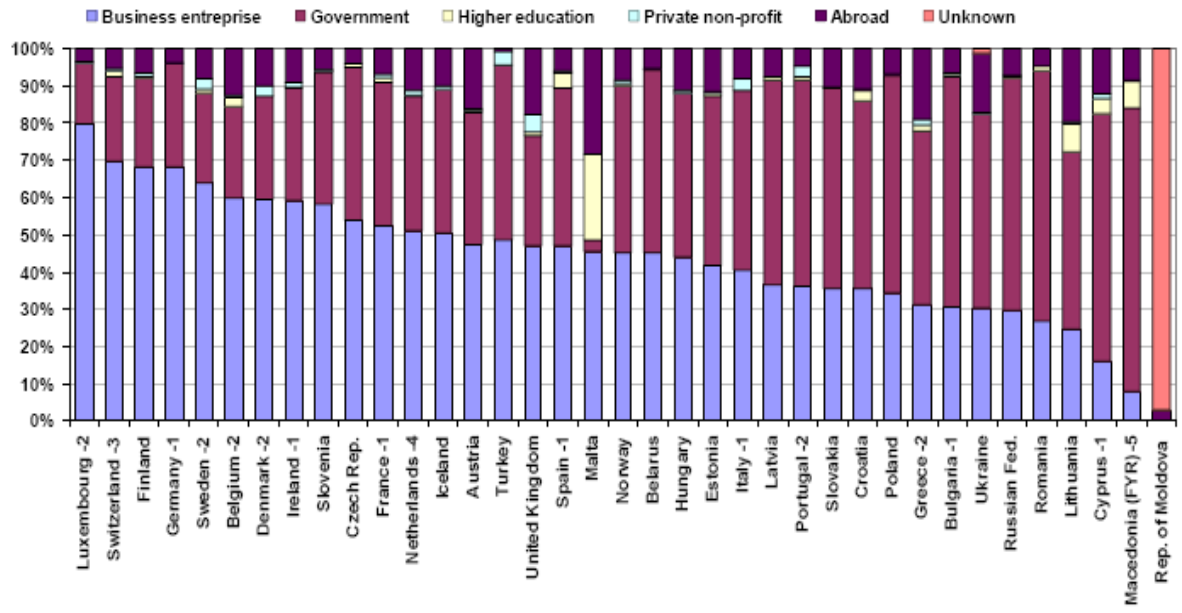
Rank	Country	Corporate investment in R&D as percentage of GDP 2006	Rank	Country	Government Investment in R&D as percentage of GDP 2006
1	Japan	2.6%	1	Sweden	0.90%
2	Sweden	2.5%	2	Singapore	0.87%
3	S.Korea	2.4%	3	France	0.81%
4	Germany	1.7%	4	U.S.	0.76%
5	U.S.	1.7%	5	S.Korea	0.75%
6	NAFTA	1.6%	6	NAFTA	0.73%
7	Singapore	1.4%	7	Australia	0.72%
8	France	1.1%	8	Germany	0.72%
9	EU-15	1.1%	9	Canada	0.66%
10	EU-25	1.1%	10	Russia	0.66%

Source: UNESCO Institute for Statistics, 2006 data

Comparing the two types of investments is higher share of the private records. In the example of Sweden private investment is almost 3 times higher than the state. In general, involvement of the state by force of example ensure that the macroeconomic framework conducive to building, to encourage companies to invest in innovation. This assumption has been made since 1983 by David Levy and Nestor E. Terleckyj, who claimed that an investment of $ 1 from the state to induce private investment in industrial research and development 27 $ [11].

In addition to these considerations, OECD correlates private R & D expenditure to GDP, considering that their development is parallel. [14] In support of this idea comes the chart below, we can see that, in 2007, the European states the highest ranked according to gross domestic product per capita (Luxembourg is ranked first according to this criterion) share of private investment in total investment in research is overwhelming.

Figure 5. Share of funding sources in research and development - Europe, 2007



Source: The EU Industrial R & D Investment Scoreboards (2004-2008), European Commission, 2009

Next we relate national innovation capacity and economic characteristics by analyzing the top ten positions in the world rankings based on global competitiveness index:

Figure 6. Global Competitiveness Index 2009-2010

	OVERALL INDEX		Basic requirements		Efficiency enhancers		Innovation factors	
Country/Economy	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Switzerland	1	5.60	3	5.98	3	5.39	3	5.68
United States	2	5.59	28	5.23	1	5.66	1	5.71
Singapore	3	5.55	2	5.99	2	5.61	10	5.15
Sweden	4	5.51	5	5.96	7	5.31	4	5.53
Denmark	5	5.46	4	5.98	6	5.36	7	5.28
Finland	6	5.43	1	6.04	12	5.17	6	5.47
Germany	7	5.37	8	5.85	14	5.12	5	5.47
Japan	8	5.37	27	5.27	11	5.21	2	5.70
Canada	9	5.33	10	5.74	4	5.39	12	4.96
Netherlands	10	5.32	12	5.71	10	5.26	9	5.17

Source: Klaus Schwab, The Global Competitiveness Report 2009-2010

Innovation factors in this table include both innovation as process and business complexity, considered part of the competitiveness pillar 11. Note that among the 10 nations ranked by this index we find 9 that are in the top 10 and in terms of innovation capacity. Certainly first conclusion that can be drawn is that innovation is a prerequisite to ensuring the competitiveness of a nation. The second one conclusion can foresee that analyze types of savings these first 10 nations.

The fact that the United States is devoted exponent of economic liberalism. The economy is generally characterized by the existence of free market, determining role in the economy being held in an optimal mix of large corporations and small entrepreneurs with approximately 90% of the employment work in the private sector. From the perspective of the innovative factor ranks 1.

In this ranking we find 3 on the European continent Nordic countries (Sweden, Denmark, Finland), countries whose administrative organization can be an example for many other developed nations, countries where the state is strong enough coexist with the private sector.

About the other countries caught in the table we can say with certainty that the fall in market economies and the state role is only to support private sector.

7. Corporations and innovation

In a 2009 top of the 500 corporations, 342 that is over 60%, come from the first 10 countries ranked by the number of patents granted per million population reported as was shown in Figure 2.

Therefore, the role of corporations is evident in the innovation process, but nevertheless, some countries have not considered a large number of corporations in the first 500 that we can correlate directly with the large number of patents reported in million residents therein. Thus arises the following question: which is due to other factors, however, the large number of inventions registered at these nations?

A relevant response and well argued is given by William Baumol, he suggests that "the most effective economic development is that of a dynamic capitalism that combine innovative entrepreneurs with the financial strength of corporations." [3]

Conceptual link between entrepreneurship and innovation dates back to 1930, when Schumpeter first tried to make a correlation between entrepreneurs and innovation, formulating entrepreneur paradigm. He argued that innovation contributes to growth as entrepreneurs producing innovation. Entrepreneurial-innovative concept underlying the paradigm mentioned, giving the developer the central place in the process of innovation. Under this paradigm, only one that established a new company based on new ideas can be considered truly entrepreneurial. Entrepreneurship is considered a creative activity that involves bringing something not previously exist. Creation brings added value and builds individual and community as an opportunity exploitation [18, p.28].

Innovation must be built on three essential components: organizational infrastructure, capital and entrepreneurial ability to ensure cooperation of the first two [9]. Synthetic modern innovation-driven corporation is built on the following format:

Figure. 7. The corporate innovation

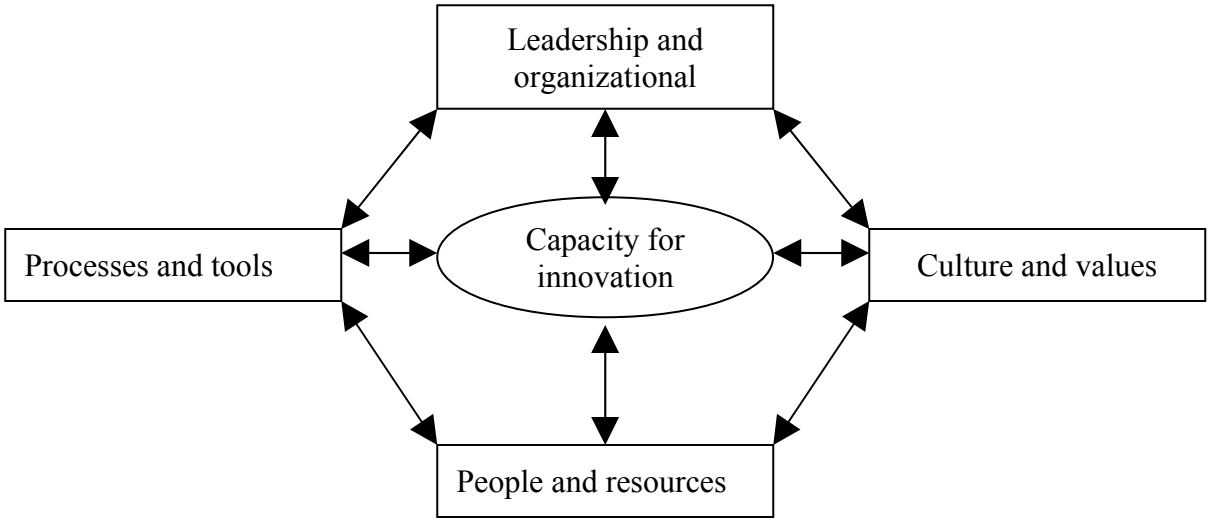
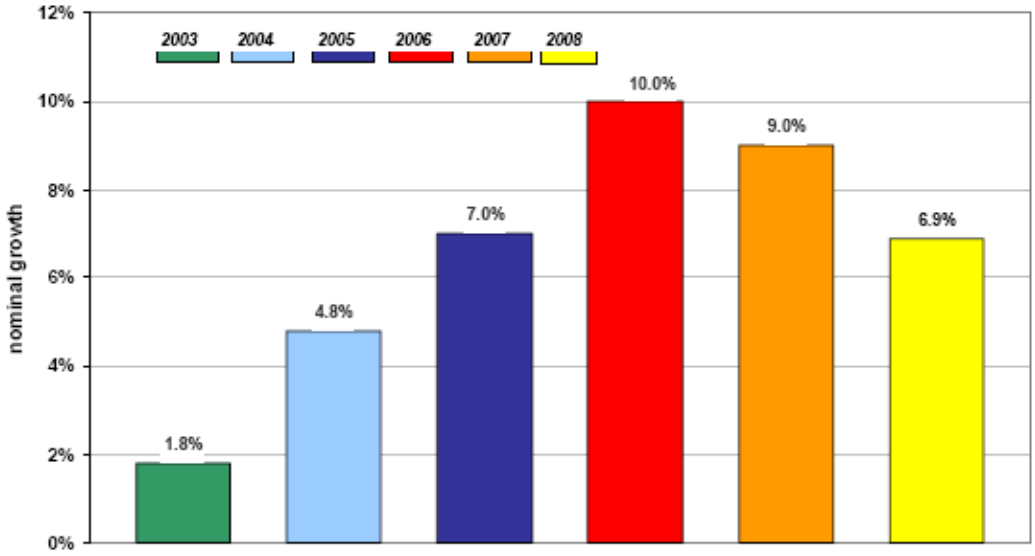


Diagram describes a system to support innovation, in which management is committed to support innovation, not just words but translated into action (real interest in new ideas, radical, linked to resource allocation, direct responsibility for the performance of departments, assuming the role of mentors innovative projects). Also is necessary organizational structure to foster and support innovation throughout the company. People need to know to whom to go with their ideas to find support and encouragement to develop business plans, to allocate financial and human resources that their idea to move to the next stage. Not least are necessary processes, mechanisms and tools to analyze ideas, to align them with strategy, allocating resources to turn the most promising opportunities in projects, then bringing them to market [8].

Innovative process that occurs within corporations have common features with that of small, young, but with the advantage of specific organizational structure, the established market position and financial resources available to support new ideas.

Corporate investment in research and development worldwide increased by 6.9% in 2008 despite the economic crisis, according to European Commission report on the 2009 "EU Industrial R&D Investment Scoreboard"

Figure 8. The evolution of corporate investment in research and development worldwide



Source: The EU Industrial R & D Investment Scoreboards (2004-2008), European Commission, 2009

Two companies in the European Union, Volkswagen and Nokia are among the ten largest investors in research and development. This includes five U.S. companies including Microsoft, General Motors and Pfizer, and one in Japan, but is in first place - Toyota. According to the same commission report, the top 50 investors include companies from 16 EU and 18 U.S. companies, two less than in 2007, in both cases and 13 companies in Japan, with four more than in 2007 .

Figure 9. Top 10 corporations - investment in research worldwide in 2008

Rank	***Company***	***Country***
1	Toyota Motor	Japan
2	Microsoft	USA
3	Volkswagen	Germany
4	Roche	Switzerland
5	General Motors (Motors Liquidation)	USA
6	Pfizer	USA
7	Johnson & Johnson	USA
8	Nokia	Finland
9	Ford Motor	USA
10	Novartis	Switzerland

Source: *The EU Industrial R&D Investment Scoreboards*, European Commission, 2009

Analyzing the economic sectors in corporate innovation, EU, U.S. and Japan, countries with the highest weight in the top 50 there is a similar structure of investments in the European Union and Japan, while U.S. medium-high intensity sectors are those for which were directed mainly private investment.

In an overview analysis of private investments aimed at innovation, the most innovative corporations, on national economies, it is obvious the impact that macroeconomic structure and the economic policies of the state has on innovative capacity, but also the importance of private initiative.

8. Conclusions

Whatever the development stage of a nation state retains its role in supporting innovation, providing the framework that corporations and new enterprises can freely express their innovative capacity.

Analyzing the two major current systems of economic organization in the world, the capitalist and the planning and linking the development stage of countries who share this ideology is evident that innovation and consequently economic development within the prerogative of the first system.

The exception that reinforces the rule is the Russia that although benefited from a strong research and development sector supported by the state and has not lacked for higher quality human capital, however, failed to go the way of economic development with existing powers. This is evidence that identifying opportunities for innovation must be achieved at the microeconomic level (corporations, businesses) on finite fields with a high degree of predictability. Depending on the utility for end users and according to national impact, such opportunities may be the benchmarks for policy formulation by governments.

Meanwhile, public investment should support basic research, the results to, public and available to all, private sector can build innovative competitive free market.

REFERENCES

1. **Arnold, E**., *Evaluating Research and Innovation Policy: A Systems World Needs System Evaluations,* Research Evaluation, Vol.3, No.1;
2. **Atkinson Robert, McKay Andrew S**., *Digital Prosperity: Understanding the Economic Benefits of the information Technology Revolution,* Washington D.C., ITIF, 2007;
3. **Baumol William, Litan Robert E., Schramm Carl**, *Capitalismul bun, Capitalismul rău şi economia dezvoltării şi a prosperităţii,* Polirom, 2009;
4. **Chandra Vandana, Erocal Deniz, Padoan Pier Carlo**, *Innovation and Growth: chasing a moving frontier*, OECD&World Bank publications, 2009;
5. **Dahman, Carl**, *Different innovation strategies, different results:Brasil, Rusia, India, China, Korea,* OECD, World Bank, 2009;
6. **Drucker Peter F.**, *Innovation and Entrepreneurship,* Elsevier Ltd., 2007;
7. **Freeman, C**., *Technology and economic performance: lessons from Japan, Pinter*, London, 1987;
8. **Gibson Rowan,** *Does your company have a process for nurturing ideas?* www.innovationtools.com/Articles/EnterpriseDetails;
9. **Herbog P., E.J. Dunphy A**., *The relationship of structure to entrepreneurial and innovative success*, Marketing Intelligence & Planning, vol. 12, nr. 9, 1994.
10. **ITIF**, *The Atlantic Century; Benchmarking EU and US Innovation and Competitiveness,* , 2009;
11. **Levy David, Terleckyj Nestor**, *Effects of Government R &D on Private R &D Investment and Productivity: A Macroeconomic Analysis*, Bell Journal of Economics, vol. 14, nr. 2, 1983.
12. **Metcalfe, J.S**., *The design of order: Notes on evolutionary principles and the dynamics of innovation,* Economic rewiev, no.6, 1995;
13. **OECD,** *National Inovation System,* 1997;
14. **OECD**, *Policy Responses to Economic Crisis: Investing in Innovation for Long-Term Growth*, 2009
15. **Porter Michael, S. Stern**, *National Inovative Capacity,* The Global Competitiveness Report, 2001;
16. **Rodriguez, A., C.J. Dahlman, J. Salmi**, *Brazil:Knowledge and Innovation for Competitiveness,* The Worl Bank, Washington D.C., 2008;
17. **Schwab Klaus**, *The Global Competitiveness Report 2009-2010,* World Economic Forum , Geneva, 2009;
18. **Zhao Fang**, *Exploring the synergy between entrepreneurship and innovation,* Journal of Entrepreneurial Behaviour&Research, vol11, Nr.1, 2005;
19. **Legea 64/1991** ;