Implications of Governments Investments in R&D on the Process of Technological Innovation in Romania

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Abstract: - This paper tries to present some findings in governments’ investments in the process of technological innovation. We start from the main premise that investing in R&D is seen as a driver for the process of technological innovation. We discuss the case of Romania by comparing its situation with other developed countries and we indicate the actual lines of acting in order to talk about technological innovation.

Key-Words: - technological innovation, Romania, government investments, R&D

1 Introduction
Governments are the second largest funders of R&D, behind private enterprise. Most government spending is in the form of contracts to private firms or to private not-for-profit institutions, such as universities, to perform specific R&D projects. One of the issues raised by government spending on R&D is how that spending can be most effective in its economic impact.

Technology can be a tool for making government better and democracy stronger, writes Beth Simone Noveck in Wiki Government [1].

Successful innovators spend a significant amount of their overall budget on information technology. Leading companies spend 2.5 percent of their budget on technology, which is higher than the average of 1.88 percent reported for state government agencies in Digital Government: Technology and Public Sector Performance [3]. In order to reap the productivity gains seen in the private sector, governments need to increase their IT spending.

The growth in R&D relative to economic output after World War II, and especially in the 1980s, can be attributed to a number of important changes. The transition to a “knowledge-based economy” [6] or to “knowledge-societies” [4] is a widely accepted phenomenon in developed countries, and has become a target for developing and transitional economies. The growth in R&D intensity is often cited as one of the indicators of the emerging knowledge economy, but additional indicators, independent of R&D, also point in the same direction. There has been an increase in the knowledge content of production, especially in the developed economies, over time, skills have become more important in production and education levels have risen. Industries with a strong science base, such as chemicals, pharmaceuticals, electronics and aerospace, have grown in relative importance while other industries, such as automobile production, have incorporated more science-based elements.

For example, computerized components have become prevalent in new automobiles. Thus, many economies have experienced a tendency for the portion of value added related to skills and knowledge applications to rise. And this implies a need for more R&D to pursue further advances in knowledge.

The justification of a significant role for government in R&D is based upon the notion that private markets are unable to generate an optimal quantity of R&D. This failure of markets is thought to arise from three phenomena, the status of R&D as a public good, the presence of significant positive externalities in the production and distribution of R&D and the inability of capital markets to appropriately value the risk and information content of new ideas.

The classic case supporting government expenditures on R&D is derived from the economic theory of public goods.

A public good – which includes both goods and services – is one that will not be supplied by private, profit seeking firms and therefore can only be supplied by a governmental entity, a private not-for-
profit institution, or a voluntary, private association. A public good has two essential properties [4]. One is that consumption of the good by a single user has no effect on the ability of any other user to simultaneously consume the good. The nonrivalrous character of a public good means that its marginal cost is zero, since no extra cost is involved in the production needed to satisfy the extra consumption. And since the well-known condition for economic efficiency is that marginal cost equals price, the most efficient price of a public good is zero. Private capital would not be attracted to a product with a zero price. Thus, the public sector or the private non-profit sector should either provide the capital, perhaps directly or via subsidies, or establish a system of incentives to stimulate private investment.

The application of the public goods concept to the production and dissemination of knowledge is also less than perfect. The ability to understand and apply advances in knowledge may require substantial prior investment in human and physical capital, as, for example, in scientific research, so that new knowledge is not available equally to all. These prior investments can be seen as a ticket of admission, permitting entrance to the arena of public goods.

2 Problem Formulation

Thus, specific knowledge advances are more of a local public good, available to some but not all members of a society. Moreover, some knowledge can be priced and yield income, either alone or in conjunction with other goods. Books can be copyrighted and sold, providing a return to authors, publishers, distributors and retailers while at the same time the ideas contained in the books can be widely disseminated via libraries, classrooms, photocopied excerpts, the internet, etc. Advances in knowledge can be embedded in saleable products and thereby transformed into a private good. Thus, knowledge combines public goods and private goods properties. Knowledge should be thought of more generally as a class of activities in which the benefits tend to be greater than the costs since not all of the benefits can be appropriated by private firms. Thus, private firms will not produce knowledge up to the point where the marginal benefits equal the marginal costs, but will produce knowledge in a lesser amount. The tendency to underinvest in the production of knowledge can be attributed to the more general phenomena of externalities, of which public goods can be seen as a special case [2].

Romania is the second smallest among the member countries of the European Union regarding research and development spending in 2006, show, Monday, the European statistics office, Eurostat. Romania worse than just sitting Cyprus, which has invested in this area 0.42% of GDP, up from 0.46% for Romania. Bulgaria and Slovakia are also caudal to the investment in research by 0.48% of GDP, 0.49% respectively.

R & D investments in Romania were 444 million euros in 2006. Compared with 2000, when the Romanian state money spent on research and development accounted for 0.37% of GDP, or 2005 when it invested 0.41% of the data published by Eurostat showed a slight increase.

Instead scientists and engineers represent 4% of all Romanian citizens employed, which ranks Romania ahead of countries such as Italy, Malta, Austria and Portugal. European country with the largest number of citizens employed as scientists or engineers is Belgium, with 7.9%, while EU countries with the lowest number of scientists and engineers is Portugal, with 2.7%.

The 27-nation European Union research and development spending in 2006, equivalent to 1.84% of gross domestic product, as in 2005 and down from the 1.86% of GDP recorded in 2000. Thus, EU Member States have invested at least 210 billion euros in research and development in 2006.

European countries have invested the most money in this area in 2006 were Sweden, Finland and 3.82% of GDP, with 3.45%, followed by Germany with 2.51%, Austria 2.45% and Denmark with 2.43%. The target of EU Member States in relation to funds for research and development, set by the Lisbon strategy is that by 2010, they reach at least 3% of GDP.

Research projects developed in rural areas receive non-reimbursable European funds worth over 383 million euros. They can be reached by 2013, the measure 312 - Support for the creation and development of micro enterprises included in the National Program for Rural Development.

Along with R&D investment and market support, the green growth strategy of advanced countries includes the formation of green clusters. By establishing clusters based on solar energy and wind power and creating new growth drivers for the region, they are enhancing national competitiveness and vitalizing the regional economy.
Money can be given for the construction, modernization, expansion of buildings for production, but also for their own marketing, provision of equipment, machinery, and for non-agricultural field, such as patents and software licenses.

Investments may be made in light industry, processing of wood products, fine mechanics, assembly machinery, tools and household items, packaging production and more.

At the same time, through these funds will be supported purchase of equipment for producing energy from renewable sources other than biofuels.

Volkswagen and Nokia are the only companies in the European Union last year were ranked among the top ten in the world after the investments made in research and development, first being the Japanese group Toyota Motor, according to a report released Monday by the European Commission.

Thus, Volkswagen has invested 5.9 billion last year for research and development, being ranked third in world ranking, and Nokia has used a little more than 5.5 billion euros for the same purpose, which set an eighth position.

But the company is located on first place in the ranking of R & D investments made 7.6 billion euros in 2008.

The top 10 R & D investments are also found five U.S. companies (Microsoft, General Motors, Pfizer, Johnson & Johnson and Ford Motor) and two in Switzerland (Roche and Novartis). The top 50 is found 18 companies in the U.S., EU 16, 13 from Japan, two from Switzerland and one in South Korea.

Companies headquartered in emerging markets had the most significant increase in investment in research and development, first being China, with an advance of 40%, followed by India with 27.3%, Taiwan 25.1% and Brazil, with 18.6%.

China and India, emerging economies with the largest number of people in the world, have always had a special relationship of rivalry explained by the power that each of them wants to pursue in the region.

Complicated bilateral relations between the two neighboring countries have experienced periods of both peace and war, characterized by territorial disputes and economic cooperation. India had an advantage in economic relations with the world: during the colonial legacy has left a very good knowledge of English.

But now it seems that India is rapidly losing this advantage over China, which is becoming more English speakers, and a recent British Council study shows that Indians were already overwhelmed.

The study estimates that more than 5% of India's population is fluent in English, meaning 55 million in 2010. This will make it more difficult to compete with China, which is above the infrastructure and its chapter and a more flexible labor market, writes Financial Times.

In China, British Council report shows that the number of English speakers grows by 20 million every year, new figures being attributed to the education law that requires them to teach students now.

The study actually shows the problems facing India in terms of education and training of new talent, which is said to be that species. Even with the overwhelming number of young people under 35 years, representing two thirds of the total population, India lacks competitiveness caused by differences in the needs of employers and the reality of the streets and in schools.

A survey of 150 companies participated and which was organized by the Chamber of Commerce and Industry of India with the World Bank showed that 64% of employers are not at all satisfied with the knowledge engineers fresh graduates, which are required in particular knowledge English.

The founder of Indian IT companies spoke about the huge potential it has in the economy as the information technology sector due to the large number of young people. However, the percentage of active population growth could turn into a disaster and not economic growth, if not more importance will be English.

Even if the Indian education system does not work as they should, parents have realized that
success in the IT industry is determined by knowledge of English. Thus, there is a huge migration from public to private schools. And in rural areas, 26% of children studying at private schools, their numbers increasing by 9.6% in 2005.

Investments in education, important as those in infrastructure

China's development because those who learn English now, though, is not so sure because they are attracted to all areas. For example, they are missing in peacekeeping missions, which show intent to become a great power.

China's investment in science, technology and education not only help the formation of future professionals, but also bring them the best in the country. Scientists went to prestigious universities in the West are attracted back to the new conditions of Chinese universities and laboratories.

Ten years ago only one in 100 Chinese researcher would return, but now half of them would do that, according to Business Week.

Those who are returning are not, however, ordinary scientists, but professors from Harvard, Stanford and Princeton. Even if they were given high salaries to Chinese standards, they are actually attracted by the possibility of a new scientific program and the conditions that are offered to do so.

One of these researchers, Dean Yigong Shi says that now earn less than Princeton, but has built a program with 1,500 students and hired so far 22 other scientists from American universities. Furthermore, another 15 would have received offers to join him in China.

3 Government spending in IT

The state has spent the past eight years, over one billion euros on computers, software and communications services that allow them to be more effective, but purchases made chaotic - liking of each institution - has led to the creation of thousands of systems not communicate with each other and that sometimes, instead of help, more confused administration. The state does not know at this point even for many computers and applications have spent public money in recent years and one billion euros invested in IT & C is also an estimate, because no centralized in the last 20 years these acquisitions. Oversized and uncoordinated, the state's IT system grows daily with new acquisitions, generating and maintenance costs, given that its effectiveness remains to be proven.

The Romanian state has never led to a lack of ICT strategies, issues and targets for the state's computer system was correctly identified since the time Vacaroiu cabinets and broths.

A document drawn up in the 90s include, for example, the need for data from the Finance, Trade Statistics and register to be connected to the end of 1998.

There was one idea resulting from "working conference," which was held at the request of President Ion Iliescu on 28 December 1995, showing that Romania has a potential of 6 trillion dollars in IT in the period 1996-1999 and 14 billion dollars in 2000-2004. Government of Romania at that time put together a thorough plan, the objectives, institutions responsible for covering costs and Romania to the level of computerization policy, scheduled to take place in late 2005.

The strategy document remains a study in 2000 so the first signs of problems which are now generalized to the acquisitions made by the public administration: incoordination and inefficiency.

"I've never been called upon to endorse expenditure ICT other ministries and then each did what he wanted. It's hard to have an exact image of the applications and computers used in administration, because although the data transmission is required, if the information is not are sent, then there is no sanction. " The above quote does not belong to Gabriel Sandu - current Minister of Communications, but now stands, although it is an extract from an interview ten years ago with Sergiu Iliescu, former head of National Agency for Communications and Information Technology (institution that turned into the Ministry of Communications).

As a show data on electronic public procurement, public money is spent almost every day to buy a computer, a software or a printer. Also, many public institutions have invested considerable human and material resources to create websites or portals that simplify interaction with citizens. But this solution is to streamline the state?

State should invest primarily in its IT systems to increase efficiency and to have an impact on all citizens to allocate funds in place mainly to solutions that reduce time spent at the desk only citizens, but causes no substantive changes in administration, says Valentin Tomsa, director of the local branch of international company SAP, which specializes in providing software specifically to help manage resources of a company or an institution.
When you have little money, it's less important that we stand in line for three-hour instead of half an hour. Now it's important that he has little money to the state to spend them effectively. Reducing the time the officer is an important but for a small number of people with low efficiency. In contrast, if I do not know how to manage a national budget, share it, to plan it and execute it, failure is much greater impact for us everybody. "Our problem is that state spending in times of crisis. Our problem is that overseas with 400,000 euros are things that we do not have to do with 1.2 million euros."

The problem is not that the Romans would not understand the software and communications - a show thousands of Romanian employees of companies like HP, IBM and Oracle to fix the phone problems ICT firms Western, but the absence of a manager who can beat his fist including the mass in front of Prime Minister or President, to order the state purchases of private firms by the rules.

"The most important thing is that the central government to have a government executives and managers - IT Director to be the equivalent of private companies," said, for example, Mindrutescu Sorin, CEO of Oracle Romania.

Purchase without a specific rule.

Ministries and other public institutions in Romania meet various economic and technical standards of transparency and procurement of IT & C products, but they do not comply and a unified vision of the administration. Authorities have talked a lot about an acquisition strategy unit, but ultimately there is no rule to stop a ministry to buy the coolest laptops on the market for secretarial activities. The absence of rules combined with a lack of knowledge stimulates inefficient spending of public money. There was, for example, sets of recommendations to the administration unit of the parameters to be followed when they buy software, for example.

Two databases are not interconnected.

Many ministries in Romania - as of Administration and Interior - holding not one but several different databases with information about citizens. Besides the fact that there are problems in accessing data within ministries, state-run databases are not interconnected, so that administration can not have an overview of a taxpayer. Government representatives agree that the aggregation of data could help authorities make better decisions in less time, but concrete efforts towards achieving this objective have been minimal in relation to discussions on this topic.

3 The same products, bought at different prices.

Almost all ICT procurement target state communications services, software and computers. Lack of coordination at the national level, which would bring huge savings State acquisition allows the same product with different prices same technical parameters. Each institution makes its own bid for computers, mobile phones or antivirus software, so that prices can vary dramatically. But the state has no capacity for coordination and data management to negotiate a single national contract for communications services or otherwise, proceed as private companies. According to estimates of the Special Telecommunications Service, the 150 million annual spend on mobile services.

4 Dozens of papers and files.

The absence of interconnected databases and an electronic document management system that each interaction with a state institution in a voluminous file of papers. Many times each time the file contains, for each institution, copies of documents that already exist in the archive. The absence of a document management system and slows the system of civil activity and stimulates the appearance of errors.

5 How many PCs and the software does the state?

The absence of strict rules on state purchases of products and services IT & C Romanian government put in a position of not knowing exactly how many computers and what programs exist in the administration. In addition, any statistics would become obsolete in a few days for government procurement is not notified that they are authorizing officer.

Million and go strategy, analysis, advice and reports

Ministry of Communications has paid 3.38 million lei (0.8 million) CP Consultants for consulting company in preparing documentation to support financing through structural funds. The company is owned 95% by Corina Petrescu, director of cabinet in the Ministry of Communications Adrian Nastase when the IT & C Minister Dan Nica was.

MCSI has paid 2.94 million lei (0.7 million) to develop the 10 strategies by the National Institute for Research and Development in Informatics. CP Consultants Company was the subcontractor under this contract. In 2008 the best year of CP
Consultants, the company had four employees, turnover of 230,000 euros and a net profit of 51,000 euros, according to the website of the Ministry of Finance.

Trends in IT & C market is interesting and the National Bank of Romania. The central bank purchased without tender, to 41,650 euros, "the information and consultancy services on IT market trends and communications" made by industry analyst company Gartner (by Czech company KPC-Group Ltd).

4 Conclusion
In order for Romania to talk about R&D and to have pretention that government investments be a driver in this direction we must expect some years, some phases that have to be naturally passed.

The necessity of international cooperation in ICT and in ICT R&D in particular is wide accepted and it is one of basic activities in EU.

Less understood and less practiced is the regional cooperation in ICT R&D. The countries of a region experience the same problems; the transfer of experience is more natural.

FP7 can become a starting point to approach regional cooperation in a more enhanced way, more practical and with less costly western consultancy.

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References: