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Abstract: this paper analyzes the recent literature on innovation and its determinants from an institutional point of view. Innovation is a concept that has been defined by several authors as implementing new ideas, processes, mechanisms and methods that allow the generation and development of new ideas, products, services and organization architectures. However, it is shown that the government, the universities and the private sector must converge in order to encourage the coevolution process of innovation. This is analyzed theoretically.

Keywords: clusters, development, economic growth, innovation, panel data, research and development.

Resumen: este artículo analiza la literatura reciente sobre innovación haciendo énfasis en sus determinantes desde el punto de vista institucional. La innovación es un concepto que ha sido definido por varios autores como la implementación de nuevas ideas, procesos, mecanismos y métodos que permitan la generación y desarrollo de nuevas ideas, productos, servicios y estructuras organizacionales. Sin embargo, se muestra que el gobierno, las universidades y el sector privado deben converger para incentivar el proceso de co-evolución que domina la innovación. Este fenómeno es analizado teóricamente.

Palabras clave: enclaves productivos, desarrollo, crecimiento económico, innovación, datos de panel, investigación y desarrollo.

Jel Classification: M13, O31, O32, O34.

Innovation and Growth: A Survey of the Literature and a Case Study for Latin America

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Introduction

For economics, innovation should be one of the most studied topics since its influence to development is inherent. Furthermore, Adam Smith in his *Inquiry about the Wealth of Nations* tried to explain development and highlighted it as the main concern in economics; reason why he devotes his book to its analysis. Additionally, authors like Joseph Schumpeter (1934) have also devoted entire books to the study of development and have stressed the importance of innovation and entrepreneurship in the process. Innovation is outlined as a dynamic process which is key for fostering economic growth, social welfare and therefore development.

In order to try to contribute to the understanding of this topic, this paper intends to analyze and summarize some of the most recent literature in innovation and point out some relevant aspects in the Latin American case. For that purpose, several working papers and articles from journals will be constantly cited and linked. However, for methodological reasons, this paper will have eight sections that will contain some of the most important topics that emerge when studying the field of innovation. Thus, the reader will find that the topics are interrelated; one section depends on the other and complements each other, bringing to mind that innovation is a dynamic process that is consequence and cause at the same time; it is a constant coevolution of

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factors, institutions, environments and agents. Nonetheless, the paper's structure will clarify some of the topics and their influence, consequence or cause in the process.

Consequently, this paper is divided into eight sections where I first give a brief definition of innovation, later I speak about the determinants that theoretical and applied papers have found, and then I mention some of the institutions that foster this process by outlining the importance of the government in such dynamics. Then I illustrate the role of patents and their influence in innovation. Later I analyze some literature about clusters as a case of study that is highly related with innovation. Finally I speak about the specific case of Latin American and sketch some conclusions.

I. What is Innovation?

Innovation is more than the act of introducing something new, at least from the economical point of view. In that respect, Schumpeter (1934) defined it as the engine of development or as creative destruction. Peter F. Drucker would later define it as the change that creates a new dimension of performance.

Wan *et. al.* (2005) define innovation as a process that is composed by the generation, adoption and implementation of new ideas or actions within the organization. Similarly, Katsirikou and Sefertzi (2000), explain that it is a social procedure related with creativity, desires, fantasy and the capacity to change and take risks.

Duggan (1996) uses a more simple definition: innovation is the successful exploitation of new ideas. Or a more complex definition given by Nauwelaers and Wintjes (2002, cited by Etzkowitz, 2003, 334): "as to a behavior of enterprises, planning and implementing changes in their practice in order to come up with new products, services or organization".

II. Determinants of Innovation

As Schneider (2005) shows, one of the explanations for higher innovation are technology imports and intellectual property rights,

both contributing to elevate the GDP per capita growth rate in an economy. But the propagation of information among firms is also a way of generating innovation (Andergassen and Nardini, 2005), since they can learn from each other and therefore take advantage of the positive externalities generated by their competitors or partners. Indeed, Ornaghi (2005) finds that technological externalities, that can arise from research and development or innovation and at the same time generate them, have positive contributions to productivity consequently generating economic growth, as shown theoretically by Zeng (2003).

Moreover, Jorgenson and Nomura (2005), by adding detailed information for individual industries, exemplify how innovation in the Japanese case, triggers economic growth during the 1960-2000 period. This cannot be ignored and neither can the mechanism that can stimulate innovation or actions that appear around it like rent seeking, since some like Boldrin and Levine (2004), affirm that it is the key to economic development.

Nonetheless, the spillovers accounted from innovation and technology could be constrained if capital market imperfections that do not allow innovators to make use of the flows that they require exist (Hyytinene and Toivanen, 2005). Also, the lack of technical capabilities and the initial level of technical skills have incidence in the size and possibility of innovation, and therefore in the country's possibility of exporting more or less of the resulting "innovative" product (Montobbio and Rampa, 2005).

Moreover, Wan *et. al.* (2005), show empirically how in the case of Singapore there are additional determinants that facilitate innovation. They find that a decentralized structure, willingness to take risks and the exchange of ideas contribute to organizational innovation. Learning by doing and using can interact with research and development generating innovation in a dynamic way (Nelson *et. al.*, 2004, 696). Knowledge is never in equilibrium and in such sense it is dynamic (Metalfe, 2004), like innovation itself.

III. The Triple Helix: The Role of Alliances and Cooperation

Alliances can always be profitable but they are more so in some cases than in others. Nevertheless, joint ventures give the possibility of doing research and development that could have not been done separately. Sampson (2003) argues that the benefits from these partnerships will bring more or less benefits for the firms depending on the technological diversity or differences in technological capabilities between the partners, and the gains from this process will be higher for them if they have a moderate technological diversity.

But innovators and innovations must be supported by Universities, the Government and the Private sector—Triple Helix—. This is accomplished through programs like Technet North-West in England. A program created to encourage and support businessmen and inventors so that they can execute their projects and "physically" build their ideas. Additionally, this institution brings businessmen and inventors together so that apparent unachievable schemes can become technically and economically feasible. Also, the program provides its participants with contacts and investors interested in aiding their ideas in accordance with their stage of development (Brown, 2005). In other words, companies or persons with products in their terminal stage of development would be put in contact with marketing agencies, for example, whereas the ones in their initial stage of research and development would be directed to universities and research centers. All this creates synergies that boast ideas, products, knowledge and resources that make innovation an attainable consequence.

In that same line of thought, alliances among institutions that might seem opposed to one another also generate new ideas. Customers, suppliers and even competitors cannot be disregarded as possible and important sources of innovative ideas and processes. For instance, when marketing brings together consumers and producers through surveys and polls, a flow of information of new products that can satisfy both ends can be developed. In this context, Belderbos *et. al.* (2004) show that this is particularly true for the Dutch case, especially when partnerships and cooperation can be established. Additionally, statistical information, market research and publications cannot be

ruled out as an important mechanism for accelerating technological innovation (Sorenson and Fleming, 2004). New information can generate new products.

Expanding those waves of innovation that take advantage of cooperation, new information and alliances through government policy is possible in practice. For example, Auerswald and Branscomb (2003) analyze the case of the Advanced Technology Program (ATP) of the Department of Commerce in the United States. This program makes public-private partnerships that allow shared investment in risk innovation programs, allowing the creation of products and ideas that would not be pursued if not accompanied, at least in the early stage of development, by public authorities.

Also, it cannot be ignored that the success or failure in the development of innovation is fundamentally attached to actions of government, university and industry. Together, they form the Triple Helix that can sustain productive research and the creation of more innovation based on innovation (Etzkowitz, 2003). And the ignition for making these processes plausible and successful can come from any of the institutions in the helix, but there is no doubt that academic entrepreneurial activities can be the triggered, like in the case of biotechnology in Boston or Silicon Valley.

As shown by Freeman (2002), public investment in technological infrastructure is fundamental for economic development. This remarks the need for the government to generate the means that can allow the Triple Helix to work properly and to guide entrepreneurs and researcher towards productive innovation. Nonetheless, as Freeman (2002) also points out, investment in intellectual capital is crucial and the channels to make it available to the Helix's three main actors are fundamental for success.

The public sector cannot bring development and innovation by itself since it is not its main purpose. Universities or firms cannot do it by themselves since the former are basically academics lacking, in some cases, marketing knowledge and the latter cannot assume the risk alone nor have the sufficient basic science to be successful with their idea.

Sometimes it might be possible for an individual institution to foster innovation and have a successful outcome, but this is rare. Each of them needs mutual support and incentives. But should it be encouraged in a centralized or decentralized way? Strumpf (1999) argues that we should take the former road if local governments are homogenous or large in number, because in the latter learning externalities are not internalized.

We agree that the public sector is important in encouraging innovation, but we also have to notice that human capital and demand-pulls are also important factors (Crespi, 2004). Also, research and development plays a key role, as shown by Thornhill (2005) for the Canadian case. Nonetheless the process is dynamic, so skilled workforce and investments in training push innovation. Therefore, it is a combination of supply, demand factors and policies that generate plausible environments for innovation.

IV. The importance for Firms of Innovation

Innovation, at the firm level, becomes even more important when companies realize that they depend on it to survive, especially in the high tech sector. Not only can it contribute to survival but it can also guarantee higher revenue in the future. This is concluded by Suzuki and Kodoma (2004) in their analysis of two Japanese companies and Reichstein (2004), who shows that firms with higher growth rates are more likely to have been innovating. Nonetheless, innovation also generates innovation and with it higher growth. A classical example is Microsoft, a company that grows due to innovation. And because it grows it innovates, creating a virtuous cycle of innovation that fosters more innovation.

Certainly, innovation increases the value of a firm. Hall (1998) points out this positive and strong relation. This induces firms to initiate or continue with research and development projects, training programs or policies that favor hiring qualified workers in order to foster the most adequate environment for the materialization of new ideas. This knowledge capital will revert in more value or gains for the company, guaranteeing more financial support and resources. This would

generate a cycle of expansion and development for the company and, at the same time, would expand the firm's innovation wave.

So, if innovation is so beneficial, should companies pursue it? The answer is yes. Baldwin (1995 and 1999) concludes that the most successful small firms are those that introduce mechanisms that propend for developing innovation. Nonetheless, that a company creates an innovative product does not imply that it will succeed. It is more likely but not a sufficient condition because it could suffer the curse of innovation. That is, consumers have the tendency of undervaluing an innovation in comparison to the current option while developers overvalue it, situations that could bring failure (Gourville, 2005). Timing is a key factor for an innovation. If the market and society is not prepared for it, no matter how good the idea, process or product is, it might not be successful, leaving behind a patent perhaps, which would allow for actions such as reverse engineering appearing with a new product in the right time.

V. Do patents foster innovation?

Normally, it is believed that patents give positive incentives to innovation and that eliminating them would harm and reduce it. This is especially controversial in the drugs sector where world efforts have to be made to take cheaper medicines to poorer countries. In this context, Chien (2003) proves empirically that allowing compulsory licensing of pharmaceuticals would not discourage innovation nor research and development. However, Opderbeck (2003) adds on this issue, that when looked from an international trade perspective, licensing or reducing patent protection in developing countries will have no effect on innovation if demand is inelastic in the developed country where the product comes from.

Perhaps patents are not such a good idea, especially if the case that Opderbeck (2003) mentions is met. Additionally, there seems to be evidence supporting the idea that the software and computer sector would have not had such development if patents would have been enforced in a strong manner, in fact, patent protection would have reduced overall innovation and social welfare (Bessen and Maskin, 1999).

Moreover, O'Brien (1974) concludes that one of the reasons for having patents, that is an incentive to an inventive industry, is that they stimulate technological innovation and investment. But the disclosure of technical information from such ideas to society by the patent owner is dubious, in other words, they may contribute to a new innovative process of externalities that are not easily foresighted.

Now, there are others like Outterson (2005) that defend the idea that we should privilege access to possible innovation through patents, therefore, leaving as a second hand debate the impact of patents on research and development. He claims that access can be improved without generating great harm to innovation, which is compatible with Chien's (2003) findings for the pharmaceutical sector.

But, what would happen if we had monopolies and patents? Would it undermine innovation? It seems unlikely. At least in the software sector, not even Microsoft with its market power could have done that (Lerner, 2001). In contrast, Fisher (2000) argues that being a monopoly would give more incentives to innovate but, like in the Microsoft case, the problem is that the clear signal that organizations with market power send is that they will not tolerate innovations from others to their products. And maybe markets where monopolies are not present and that are innovative might have an advantage: they have a higher speed of technological diffusion. This is particularly true for the mobile communications sector in Central and Eastern Europe (Gruber, 2000).

In this same debate about, monopolies, competitive markets and innovation, Ahn (2002, 14) shows in his survey that bigger companies or with more market power are not more active in innovation. In other words, bigger companies or monopolies do not develop more innovation than small firms. Uncertainty can play a big role here. If the market leader is aware that there is no latent competition or that the existing one does not have the sufficient capital or venture possibilities to develop an innovation, it will have no reason to pursue innovation since it will still be in the market tomorrow (in the future). Also if the market has reached its peak level of innovation and new ones are costly and could take too much time, stimulus for innovation might be hampered.

But according to Cohen and Lemley (2001), we should focus on a more important debate: how to refine existing copyright laws to encourage innovation. They argue that more attention should be put on reverse engineering possibilities and on more reliable methods of determining the difference of two software products. And what happens with those that violate copyrights? Should copyright owners sue facilitators or direct infringers? This type of legal policy is discussed by Lemly and Reese (2004), complementing the basic idea that the previous cited paper has: legal policy debates on copyrights that foster innovation are still to be met.

VI. Clusters: A Case of Study

In general, it seems to be accepted that inventions are more probable to arrive in clusters, playing then a two sided role in moving forward the technological frontier (Iyigun, 2005). But cluster specificities influence the real possibility of their contribution to the value chain, what has been studied for the Latin American case by Guiliani *et. al.* (2005). Furthermore, a cluster will have a higher contribution the higher the spillovers that are gained by its members and society.

But, when will a cluster appear? Firms have more incentives to cluster when an industry shows a high potential of growth, the competition in the market of the product is not harsh and the possibility that an individual firm develops an innovation is neither very high nor very low (Fosfuri and Ronde, 2004). Consequently, they will also have higher gains from cooperating than solely competing and the probability of joint ventures will increase. This will generate positive external effects that would encourage other companies to join horizontally or vertically to the new founded or existing cluster.

In other cases, the shifting ecology of firms can generate a cluster, like in the Silicon Valley case, where technological and entrepreneurial groups such as radio amateurs, microwave engineers and silicon technologists allowed the San Francisco Peninsula to have 58,000 workers around the technological industry in the 1970's (Lecuyer, 2001, 666 and 668).

But Silicon Valley can also be understood as the emergence of a new organizational architecture with a complementary institutional arrangement (Aoki, 2004). That is, a T-Form architecture with venture capital that is done, not only by capitalists that do not know the production sector, but by those that have benefited from it and that are willing to have failure in their research and development and innovation process in order to introduce new technologies and products. They understand the curse of innovation (Gourville, 2005) and the benefits derived from failure.

Another example of a high tech cluster is the one in Cambridge (England), that did not show the same globalization extent as its counter part in Silicon Valley, because the firms located there could not compete with U.S. based firms that had the upper hand in the biggest and most dynamical market for their products—United States, and the lack of good marketing and management skills (Athreye, 2001). Nonetheless, their agglomeration has allowed them to grow more than if they would have stayed in distant regions where they could have not benefited from the spillover effects and positive externalities that their reunion fosters. This is especially true in the biotechnology sector that has experienced a high and sustained growth in the region (Barrel, 2004).

Notice that clusters do not have frontiers. In the European Union case, several of this type can be identified in the information and communications technology activity: from the greater London area to Germany's industrial heart land, northern Italy and the Scandinavian bloc conformed from Stockholm to Helsinki (Koski *et. al.*, 2004). And they do not have specific sectors. For example in Italy we can find the Treviso textile cluster, and the automotive cluster in Baden Württemberg (Germany) and the West Midlands (United Kingdom). Examples and cases of clusters vary and are present in diverse environments and sectors but always generating relations among the companies, location, universities and or governments that facilitate the coevolution of the new innovations with the ones made in the past.

Finally, it should be taken into account that from successful cluster experiences, policymakers should abstain to replicate them exactly in different cultural or economic contexts since they cannot be taken as a

recipe for development (Hospers and Beugelsdijk, 2002). Each cluster is different and has characteristics that are given by its location, sector and entrepreneurial relations. Even the spillovers and externalities that each cluster generates are different, therefore fostering different innovative processes and evolving differently trough time.

VII. Innovation and Research: The Latin American Case

Innovation is an important topic for Latin America since this factor is seen as a door for development, especially when the biggest economies in the region, Brazil and Mexico, have adopted a model that allows them to export 85% of all the region's advanced industrial products (Eclac, 2003). Additionally, these economies perceived, in 2005, 52% of the total foreign direct investment in this region of the world according to the United Nations Conference on Trade and Development—Unctad—(2005).

Latin America is a complexity of heterogeneous economic blocks. The small size economies and countries of Central America and the Caribbean depend basically on the export of primary products. The Andean Economic Community of Nations, integrated by Bolivia, Colombia, Ecuador, Peru and Venezuela export mainly agricultural products and natural resources (oil, gold, natural gas, coal, emeralds) with the exception of Colombia that accounts in its exports for at least a one third component of manufactured and industrialized goods. Countries like Argentina, Chile and Uruguay are similar but with somewhat more manufactured exports. However, Brazil and Mexico export nearly half and three quarters of manufactured goods of their total exports, respectively (Eclac, 2003).

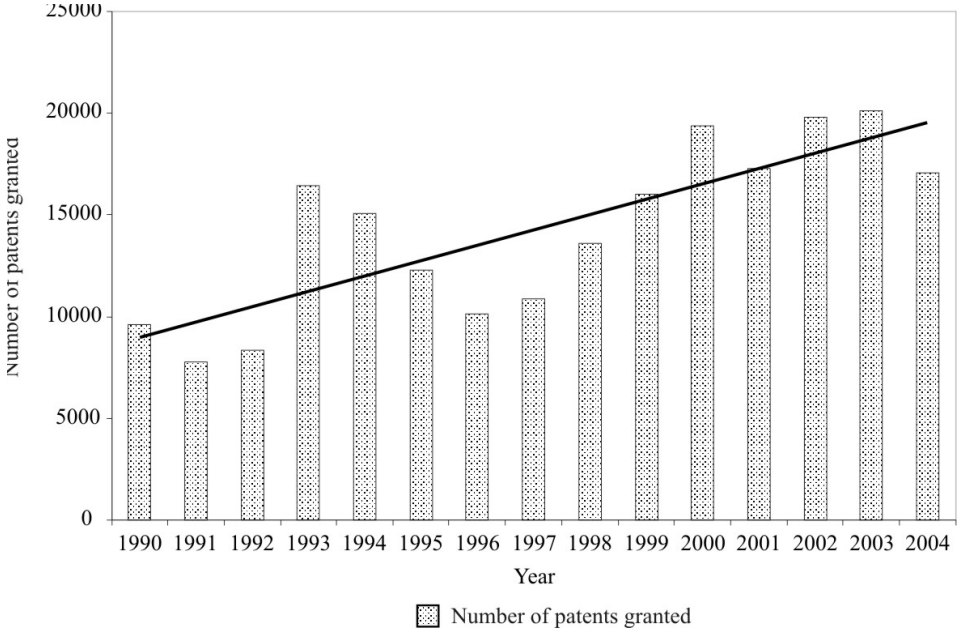
Additionally, the region with the highest inequality in income and wealth distribution in the World is Latin America (Eclac, 2003). For this reason, policies to reduce levels of poverty, income and wealth disparity, increase education, improve health systems and generate innovation in the region are given priority. Three basic policies have been promoted in the region: giving incentives to private firms to make research and development, improving and making stronger the ties between public and private institutions interested in innovation and

research, and developing and strengthening the infrastructure related with innovation and scientific information. These actions constitute the live presence of the Triple Helix idea that we have discussed in previous sections.

Thus, it is not strange to find, as shown in Figure 1, an increasing trend for the number of patents that Latin American Countries have obtained in the United States. And this tendency will continue thanks to the efforts and policies like the ones mentioned in the previous paragraph that constitute basic incentives that foster innovation.

Figure 1.

Latin America: Number of patents granted, 1990 – 2004

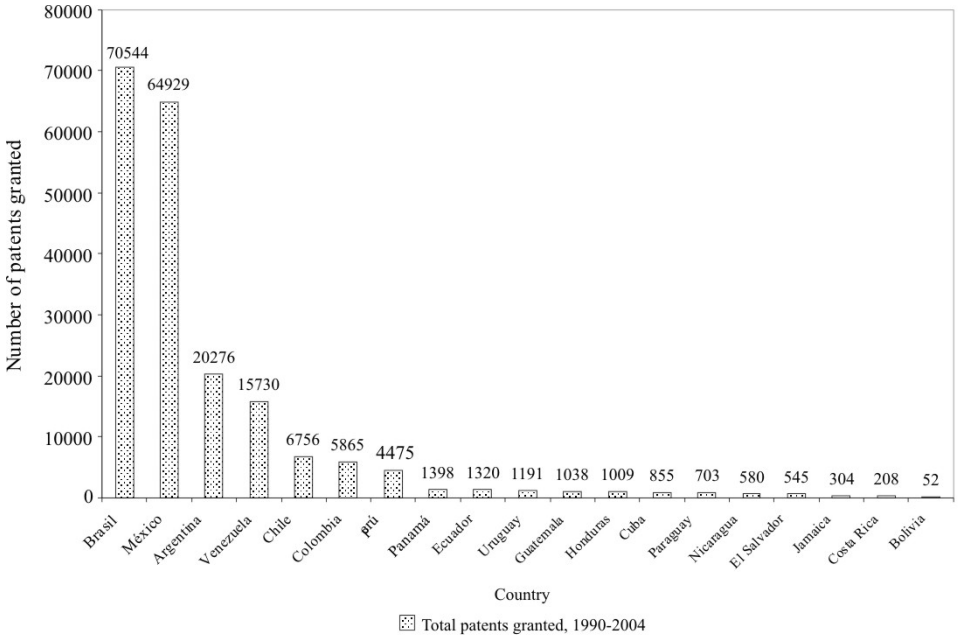


Source: Red de Indicadores de Ciencia y Tecnología (Iberoamericana e Interamericana), 2007, http://www.ricyt.edu.ar/indicadores/comparativos/22.xls.

It is not surprising also that among the leading countries in patents in Latin America are Mexico and Brazil. As discussed earlier, they have the highest exports of manufactured goods as percentage of total goods

in the region, and in the last positions are basically Central American countries (Figure 2). Thus, there is no doubt that the more a country innovates the more it can export of those goods that are a direct consequence of research and development, since they have a smaller number of competitors in the world market in comparison with primary goods and agricultural goods that cannot even be differentiated.

Figure 2.
Patents Granted to Selected Latin American Countries,
1990 - 2004



Source: Red de Indicadores de Ciencia y Tecnología (Iberoamericana e Interamericana), 2007, http://www.ricyt.edu.ar/indicadores/comparativos/22.xls.

Nevertheless, the region seems to be far from acquiring the optimal level of innovation that could generate sustainable and long term growth. Latin America only accounted for 0.2% of the total number of patents in the United States in 1995, a number equal to the ones obtained by one country in the same year, China, and way behind other regions like East Asia that registered a 27.6%. Similarly, in European Patents,

the region is well behind; for the same year it only represented a 0.1% and Central and Eastern Asia a 0.4% and Oceania a 1.3% (Table 1). It is not a coincidence; these more developed economies and with higher growth rates have a bigger number of patents.

Table 1.
Innovation Output Measured in Patents

	European Patents		United States Patents	
Region or Country	1995 (%)	1995 (base: 1990 =100)	1995 (%)	1995 (base: 1990 =100)
Western Europe	47.4	91	19.9	78
Central and Eastern Europe	0.4	101	0.1	43
Commonwealth of Independent States	0.4	113	0.1	59
North America	33.4	125	51.5	108
Latin America	0.2	204	0.2	122
Arab States	0.0	101	0.0	135
Sub-Saharan Africa	0.2	96	0.1	78
East Asia	16.6	87	27.3	108
China	0.1	152	0.2	118
India and Central Asia	0.0	103	0.0	160
Southeast Asia	0.0	165	0.0	126
Oceania	1.3	163	0.6	84
World Total	100	--	100	--

Source: Barré (1998, p. 26).

Also, when comparing countries a similar pattern arises. In 2001, for example, the United States and Canada invested 2.71% and 2.09% of their GDP in research and development whereas Chile, Colombia and Mexico only spent for 0.53%, 0.17% and 0.39%, respectively. Undoubtedly we are far from countries like Spain that dedicate, on average, a 0.9% of their GDP on R&D (Table 2). Maloney (2002) offers three explanations that could explain these substantial differences in R&D as percentage of GDP among these countries. First, the degree of protection of certain sectors and industries did not generate a sufficient

level of innovation to make them competitive in international markets. Second, the deficient learning capacity that fostered technological dependence from abroad. And last but not least, lack of innovation in economic knowledge. All these factors induce low economic growth and stagnant levels of innovation.

Table 2.
Expenditure on Research and Development as a Percentage of GDP

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Argentina	--	--	0.42	0.42	0.41	0.45	0.44	0.42	0.39	0.41	0.44
Bolivia	0.4	0.36	0.33	0.32	0.29	0.29	0.28	0.27	0.26	--	--
Brasil	0.92	0.87	0.77	--	--	--	0.99	1.02	0.98	0.95	0.91
Colombia	--	0.29	0.34	0.3	0.21	0.2	0.18	0.17	--	--	--
Costa Rica	--	--	0.3	0.29	0.26	0.33	0.39	--	--	--	0.38
Cuba	0.55	0.47	0.38	0.43	0.54	0.5	0.52	0.61	0.62	0.65	0.49
Chile	0.62	0.62	0.53	0.49	0.5	0.51	0.53	0.53	0.7	0.6	0.68
Ecuador	--	0.08	0.1	0.09	0.09	--	--	0.06	0.06	0.07	--
Salvador	--	--	--	--	0.08	--	--	--	--	--	--
México	0.29	0.31	0.31	0.34	0.38	0.43	0.37	0.39	0.4	--	0.41
Nicaragua	--	--	--	0.14	--	--	--	--	0.07	--	--
Panamá	0.37	0.38	0.38	0.37	0.34	0.35	0.4	0.4	0.36	0.34	0.24
Perú	--	--	--	--	--	--	--	0.08	0.1	--	0.16
Uruguay	0.14	0.28	0.28	0.42	0.23	0.26	0.24	--	0.22	--	--
Venezuela (1)	0.58	0.61	0.45	0.42	0.37	0.37	0.36	0.48	0.39	0.28	0.25
Spain (2)	0.85	0.81	0.83	0.82	0.89	0.88	0.94	0.95	1.03	1.10	1.07
Canada (2)	1.73	1.70	1.65	1.66	1.76	1.80	1.92	2.09	2.03	1.97	1.96
United States (2)	2.39	2.48	2.52	2.55	2.59	2.63	2.70	2.71	2.64	2.59	2.66
Media de Amércia Latina y el Caribe (3)	0.56	0.59	0.54	0.52	0.52	0.62	0.56	0.55	0.53	0.57	0.53

Notes: (1) Refers to science and technology in general. (2) Source: World Development Indicators 2005 and RICYT. (3) Estimated.

Source: *El Estado de la Ciencia. Principales Indicadores de Ciencia y Tecnología Iberoamericanos/Interamericanos 2004*, Red de Indicadores de Ciencia y Tecnología.

However, Cole et. al. (2004) offer a somewhat different view. They describe a low economic growth—and therefore a lack of growth investment in R&D—in Latin America as a consequence of deficient productivity, caused mainly by competitive barriers (tariffs, quotas, multiple exchange, barriers to entry into an industry, inefficient financial systems) and not a human capital slowdown. Nonetheless, the 1990 reforms that stimulated the elimination of competitive barriers—in the Cole et. al. sense—had positive impacts on some countries but negative on others (Panovic, 2000). Yet these reforms seem to have an adverse impact on innovation (Cassiolato and Lastres, 2000). Anyways, this is a debate that goes beyond the scope of this paper and should constitute a further research topic. In spite of the disagreement, the consensus seems to favor the idea that in order to increase research and development the role of the government and its alliance with other institutions, sectors and groups is a necessary even though a not sufficient condition.

Conclusions

Innovation is much more than the act of just doing something new. As expressed by Schumpeter (1934) it is creative destruction., Modern definitions outline that it is implementing new ideas, processes, mechanisms and methods that allow the generation and development of new, products, services and organization architectures. Not only is it dynamic but it also coevolves with other old and current innovations; it can be its cause and consequence. Nonetheless, factors like capital market imperfections and inexistent or incomplete information may reduce incentives to innovate.

However, institutions like the government, universities and entrepreneurs have a major role in encouraging innovation. The Triple Helix can generate mechanisms such as joint public, private and academic ventures that would allow private agents and society to take advantage of research and development processes that would have not been done without this association. Furthermore, stable environments with government incentives and clear information tend to promote more innovation.

There is no doubt that innovation gives positive returns for the companies that encourage it. Not only will they be more likely to succeed and keep on surviving in the market but also it will give higher value to their firm, allowing the possibility of acquiring more financial support that could permit expansion and more innovation. This in turn will take the firms to a virtuous cycle that coevolves with the market, the organization and the environment.

However, whether the most adequate mechanism to stimulate innovation is through patents, is still a matter of discussion. In fact, some recent empirical findings suggest that patents are not the best way and that they can even hold innovative process since society cannot enjoy all the benefits that we could have derived from it if it not would have been legally protected even though reverse engineering allows to benefit from patents and produce new innovations. Therefore, clusters or agglomerations of firms that complement each other through joint ventures and benchmarking are not necessarily encouraged through patents, but through government and private incentives that converge to a same place and sector. Some important cases, in this sense, are Silicon Valley, Cambridge and European Clusters.

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