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Comparative analysis of technological innovation policies between Chile and Venezuela (1999-2009)

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Summary

The work that follows is a qualitative research that attempts to understand the behavior of some Latin American governments over the issue of technological innovation as a development strategy. This approach adds to the modern technology proposal as a promoter of development. In this paper, an analysis of technological innovation policies emanating from the government through the plans of the nation and political speeches or patterns that have been called development models, to check what type of policies arise, if they are opening or statist in nature, concepts that are defined in the course of this work.

Key words: Development, Technological Innovation, Development Strategy, Policies, Chile, Venezuela.

1. Introduction

The present research analyzes government policies for technological innovation as a development strategy in Chile and Venezuela in a 10 years period (1999-2009) to determine their orientations. It covers the administration of President Hugo Chavez from Venezuela 1999-2010, presidents of Chile Ricardo Lagos between 2000 and 2006 and Michelle Bachelet between 2006 and 2010. This work is the most comprehensive update of one that investigates the same question between 1979 and 2000 in the online issue of public policy research and technological innovation. Therefore consisted of placing the proposed policies in both countries on a continuum whose extremes are represented by the categories "statist" and "openness" and whose indicators show the political, social, economic and technological dimension. The term "statist" orientation which allocates the largest portion of development effort to the state and "openness" that favors the action of the private sector and minimizes the role of government in achieving development indicators. The Venezuelan and Chilean cases are specifically treated given that they present great differences in their economic and competitively indexes. This approach is in addition to the modern proposal of technology as a development promoter.

The analysis concludes that political instability in Venezuela has acted contrary to clarify the appropriate model for their own promotion, while in Chile the indicators reported consistency in regard to technology policy and it's link with the concept of development. However in this regard and in relation to the issues raised, it is because they emphasize the content of the above results. Institutional policies were selected in relation to technological innovation in the last 10 years and they were analyzed and related to the study variables. The research used qualitative variables and hermeneutics as a technique of analysis and triangulation to validate the same results.

According to the theorists the successful experience of developed countries could be replicated Albornoz (2001) It started from the premise that the technical processes which humanity is viewed from the origin of man himself and relate to the accumulation of human knowledge that they intend to solve a problem or doing something tangible or intangible, while technology of the modern discourse emerges as a contribution to European expansion, and its use has a background of capitalist development. The Study Commission for the Development of Latin America (ECLA) offers reflections that help to seek outlets to the problem of underdevelopment. One suggestion that emerges is the substitution of imports, inward-oriented development (endogenous) and the use of the technological innovation to support the development effort.

The research was structured from the proposals of the hypothetical deductive model in which the assumptions and objectives supplant its purpose is to confirm or verify in reality a particular social phenomenon. Similarly, it's a descriptive-analytic non experimental design.

2. General Purpose

Comparative analysis of the concept of technological innovation as a development strategy in the governments of Chile and Venezuela in the period 1979-2009 to determine whether the guidelines statist or openings have consistently been linked to a particular development model.

Specifics:

1. Identify technology policies contained in development plans, by the governments of Chile and Venezuela during the studied period.

2. To analyze the orientation of technological innovation strategies implemented by the governments of Chile and Venezuela in the process of promoting their development.

3. Compare the conceptualizations of policies and strategies on technological innovation undertaken by the governments of Chile and Venezuela to promote their development.

4. Determine the similarities and differences that exhibit policies and strategies implemented by the governments of Chile and Venezuela in terms of guidance and openings associated with statist development models made for its promotion.

3. Theoretical Bases

3.1. Modern Speech and Technology

Today, to discuss technology in the setting of a modern discourse, it follows that has its own life cycle and this cycle determines the strategic use that may be assigned within the company, but also one that is assigned from instances most crucial and important as are the plans of the framed in different development models. Puerta(1998).

When a technology is born only available for a group of companies (usually the most innovative in the sector, better informed or creators of technology companies) and is used to mark distances from the other competitors. This means that competitiveness is related to it; therefore the process is individual and unconnected to the policies that emerge from the State (Nezeys, 2008).

After a while, depending on factors such as patents, licenses, trade secrets, kind of innovation, industry, etc., Technology becomes available to all companies and lost their competitive and strategic strength. Usually the company that owns a key technology developed internally (all or most of it) or acquired from a third party who is not part of their market. However, the most important element is that in order to have a key technology, the company must develop an organizational culture that encourages and supports creativity in all areas of the company and it is often necessary to have an R & D department well established technology development with great management support. Gutierrez (2008).

One of the most common mistakes companies make in underdeveloped countries is the excessive investment in key technologies on the grounds that if that is the technology that has served them in the past, also will serve the present and the future. After several years these companies are faced with a large inventory of old technologies and no key technology that enables them to survive against competition from foreign products and industries. The domain of a technology is a slow and arduous process and the acquisition of technology and its implementation requires, in many cases, years of work. (Betancourt, 2000).

But from the perspective of the state, the most important part of this process is that to be strong and lead to the expected results, it should be linked structurally to a vision of the country in a development model that finally addresses the problem efficiently. The state should formulate policies that could permit the technological processes in particular in support at all stages of the process leading to efficient corporate commitment in building a more just society. Benavides (2008).

To link and coordinate all actions with the plans and political discourse is a pending task in poor countries. Strengthen social capital, human capital and in that sense to build consistency between what you want and what is done.

3.2. Contributions of ECLAC

To neutralize the asymmetry between the countries of Latin America and the North, there is the Economic Commission for Latin America and the Caribbean (ECLAC) whose purpose, among others, was to develop methodologies for scientific policy planning and technological development under the general and local. In view of this, there were four overall strategies for the technological development of Latin American countries, being among them:

1. International science policy. Based on the supply of knowledge to the policy of allocating resources to strengthen basic research and quality.

2. Systemic innovation policy. Grounded in stimulating the innovation of small, medium and large companies and independent entrepreneurs supported by a social and economic policy established by the State.

3. Policy for the Information Society. Information technology and communication are very important for development. Today globalization of science, education, economy and social programs conducts to the progress of nations.

4. Policy capacity building in science and technology. Focusing on local production of knowledge and its general level validation tailored to the sustainability of the environment. (Bielschowsky, 1988).

To consolidate these strategies, there arises the United Nations Organization (UNESCO), the body responsible for promoting economic and social development of member countries. Their activities are concentrated in the field of economic research, scientific and cultural. The Economic and Social Council (ECOSOC) established in 1948, five regional economic commissions in order to assist and cooperate with governments in the area of research and analysis of regional and national economic issues. The work areas are Europe, Africa, Asia-Pacific, Middle East and Latin America, the latest one in being recognized.

In 1984, its scope was extended to the Caribbean. The headquarters of the Commission for Latin America is the city of Santiago de Chile, which coordinates two sub regional offices: one for Central America, based in Mexico City (established 1951) and the other for the Caribbean countries, located in Port Spain (Trinidad and Tobago) (1966).

4. Materials and Methods / Methodology

The research is part of the case studies, characteristic of a hypothetical deductive methodology (positivist) that seeks to describe and analyze the behavior of the variables in a given context. Tamayo (2002) First, we needed to develop a theoretical perspective for research that actually assist the systemization and understanding of the findings, which led to review the current status of studies on the matter and therefore generate a proper scheme in which analytically decompose the study variables, which are presented in Table 1.

Table 1. Operationalization of variables.

VARIABLES	NOMINAL DEFINITION	DIMENTIONS	INDICATORS	INSTRUMENTS
Independent variable: Modern speech: Openess speech.	Also called neoliberal, which dates from the eighties (80s) Prevalence of private management in production and service sectors (Puerta, 1998)	Politics	Centralization	Documental guide to analyze political speeches and nation plans Interview guide of key informants
			Descentralización	
		Economics	Market	
			State interventionism	
Independent variable: Modern speech: Statist speech.	Also called nationalist. Articulate the concept of national sovereignty. State is the sole owner of wealth, including the underground (Puerta, 1998)	Social	Mechanism for citizen participation	
			State control over all decisions in public and private sectors	
		Institutional	Bureaucratic Clientelism	
			Professionalism, meritocracy and technocracy of government	
Dependent variable: Technological innovation policies in Venezuela and Chile	Strategies used by the models of governmnent development	Public	Invesment	
		Private	Productive sector initiatives Competitivity	

The study variable "Policies of technological innovation" is defined as a set of actions and strategies with a particular socio-political orientation in order to facilitate the development process. The socio-political orientation is located within a continuum where at one end are represented cutting policies of openness and the other houses the

statist orientation. The variables are analyzed through the political, economic, social, and institutional represent the operations carried out by the government in the area of technological innovation.

Note the behavior of the variables in Venezuela in the period between 1979 and 2009 divided in presidential periods of five years each. For Chile, the periods were less because of the years between 1973 -1990 remained as President General Augusto Pinochet.

The lifting of the information was made analyzing political speeches, the Plans of the Nation and the Law on Science and Technology, The outlines of the plan for economic and social development of the nation 2007-2013 and by conducting interviews with informants Key, guided by an interview guide. This allowed the reception of information from experts without inducing the response leading to obtain reliable data. The instruments of data collection were two guides, a guide for the selection of documentary and other open-ended interview guide for key informants (experts). Validity was established through expert opinion as it was open with qualitative tools was not applied any statistics to measure reliability.

Finally, the methodological steps were:

1. - Preparation of the framework and theoretical framework.
2. - Development of tools.
3. - Applying tools for data collection and analysis.
4. - Organization of data for interpretation using the technique of triangulation ie comparing data and interviews with the theory and the opinion of the investigator.
5. - Elaboration of conclusions from the findings.

5. RESULTS

The results presented below are partials as noted in the summary, therefore, and considering the above it makes an inventory of the most important ideas and efficiently linking the study variables in order to present this opportunity only the last ten years in a synthetic way.

Venezuela:

Hugo Chavez Frías (1999-2009)

With the arrival of the government of Hugo Chavez in 1999, establishing the Ministry of Science and Technology (MCT) becoming the CONICIT now FONACIT (National Endowment for Science, Technology and Innovation) of the institutions attached to this release and other organizations such as the IVIC, CIEP, FII, CIDA, FUNVISES, Institute of Advanced Studies (IDEA) and the National Agricultural Research Fund (FONAIAP), now the Centre for Agricultural Research (CIA).

The Ministry gave importance to the search for financial resources as well as the enactment of several legal instruments, among which include the Law on Science, Technology and Innovation (2000), which allowed honor to Article 110 of the Constitution approved in the 1999, which established that the state would recognize "the public interest in science, technology, knowledge, innovation and information services

necessary", considering them as essential tools for economic development of the country, "as well as enact security and national defense. " Similarly, the State indicated that earmark the necessary funds and would create "the national science and technology were according to law." (Gutierrez, 2004).

The new legal instrument was part of a set of laws enacted by the Executive empowerment granted by the National Assembly in 2001. The Ministry of Science and Technology (MCT) claimed urgency to pass the bill, which caused friction with the scientific community, which thought that the text of the new instrument should be the subject of extensive consultation, which meant having it in discussions a time longer than that established by the Ministry.

The Law of Science, Technology and Innovation approved in August 2001, is an attempt to summon those sectors linked directly or potentially for science and technology, both public and private, in order to integrate into a system. This should follow a plan for science and technology prepared by the Ministry (Article 11). This point was controversial, members of the scientific community through their associations, the Council of Scientific and Humanistic Development, for example, insisted that there was an instance where all stakeholders (researchers, public and private employers, foundations of the state, between other system) could be represented and participate in the drafting of the plan. But this was not accepted in the law enacted. The law also gave authority to the Ministry to guide the science and technology projects and municipalities that desired to take (Articles 36, 37, 38 and 39). Finally, the Ministry became the coordinating body for public and private efforts to finance the activities of the Plan (Article 26).
Another instrument that was modified was the investigator's Promotion System (SPI), which sought, first to be more flexible in terms of people who could be incorporated, by failing to emphasize the commitment to research. And on the other, looked at first, forcing researchers to publish their research results in national media to give higher scores to the magazines of the country on the outside. Both issues generated controversy and while the first of which has not changed, the second if it was to eliminate the privilege to national publications.

The statute creating the IVIC (1959) was replaced by a law (2000) which allowed the TCM choose members of the Board of same, except for worker representatives. Priorities within the Plan to enact the MCT, made without consultation of the actors in science and technology sector, stresses the idea of the need to democratize science, which in practice was to finance research projects submitted by individuals not are scientists, but the Ministry has identified as persons who seek to resolve their problems through science. This fact violates the spirit of a national science, technology and innovation in that populism goes to distort its essence.

The TCM also launched the idea of creating a network of computer centers so that the population had Internet access, which calls Infocentros. This drive for computers is part of wider action, which is that the State automates a variety of tasks. In this perspective is the electronic signature law adopted to facilitate the compilation of official documents and electronic disclosure, has intensified the existence of websites of ministries and other State agencies, joining the Executive to existing efforts the academic, social media and other nongovernmental organizations (Mendoza, C. 2004) However, periods of government have been highlighted mainly by internationalist policies of Latin American unity, to the design of trade and negotiation policies to import and export products and services. Likewise, the Venezuelan government has been discussed in the continuum openness-statist especially in the oil issue by creating the trend of fluctuation depending

on governments rather than of a particular development scheme. It encouraged the oil opening in terms of exploration, exploitation and export with a view to social support to needy countries, which lack strong economies. But also nationalized the same purpose. (Benavides, 2008)

Says Avalos (2008) "In the case of countries like Venezuela should be added the lack of "technological culture" as a reason for the state to take matters into, but I think it should do so by changing the center of gravity of politics you had during the last twenty years and, in essence, still holds despite the economic changes already underway. Such a change implies a shift in technology policy from the so-called "scientific and technological sector" towards the productive sector and from the concept of "proprietary technology" to the technological domain. A logical consequence must be the change in the forms of organization of public sector and its modes of participation, as part of institutional reform must touch, of course, the productive sector.

The policy developed by the CONICIT continues to be understood primarily from the perspective of the "science and technology sector, which in practice, boils down to the cluster of research centers, both located in the public sector and in universities. And the most important item on the agenda of work is, as before, how to link laboratories with industry. The company still remains outside the "national scientific and technological" policy, but for its eventual role of recipient of the knowledge generated by research centers. There remains, also, the conviction about the need for proprietary technology 'and there are no measures in support of technological learning strategy within the productive sector.

Proof of what is said can be found, clearly, in the Second National Plan for Science and Technology. Without going into detail, sure to be important in other types of analysis, it seems that it is reissuing, otherwise, as circumstances differ, the similarity observed during the period of import substitution.

In short, this is a policy that, despite the renewed language documents that support has changed little and does not match with what is intended through the Great Shift, not only because it is disproportionate to the transformation required our production, but because it appeals to ideas and approaches that have little to do with the modes of operation of the market economy can be constructed. (Avalos 2008)

Chile:

Ricardo Lagos 2000-2006

His term was marked by his attempt to make Chile a country, even more democratic, for which implemented a series of programs such as: the modernization of the judicial system, programs for the equal right to health, forwarded the education reform, improved transport system through the Transantiago plan. The policies were all type of openness and therefore neoliberals. Designed a new constitution that reflects the current international standards of democracy. This period was also characterized by supporting the network of Innovation through Technology Innovation Program (1996-2000). (Vio, 2008)

Michelle Bachelet 2006-2010

This government was characterized by being a mixed cut but with a strong liberal social burden. What that translates into health and education programs with strong participation of the poorer classes. And in relation to the innovation system, it is important to stress, expressed by Vio 2006. In relation to the support of this government to Chile Innova system which is the continuation of two programs that prompted the Government of Chile during the 90s: the Program on Science and Technology (1992-1995) and the Technology Innovation Program (1996-2000), who represent a wide range of policy instruments, experiences and lessons that helped to achieve remarkable progress in the development of innovation in the productive sector. Chile is one of the Latin American countries that invest more in innovation as a result of the policies emanating from the state in connection therewith (ECLAC, 2009)

In the years (2001-2005) funded programs were developed with input from the Inter-American Development Bank (IDB) and the State itself. The total investment amounts to U.S. $ 200 million (Central Bank of Chile). The aim of Chile Innova is helping to increase competitiveness by supporting innovation and technological development in strategic areas of the national economy, especially among small and medium enterprises (SMEs) that produce goods or services. In this way, is one of the axes of technology policy that encourages the Government of Chile.

The Chilean government has formulated policies for technological innovation combined with the major institutional innovations developed economic planning, technology transfer and management of high impact to the country. This has allowed it to develop the technological innovation system while it becomes more competitive.

6. Final Thoughts

Finally, and with a more illustrative than conclusive intention, Table 1 shows the indices of competitiveness. This information can tell the difference between the competitiveness of Chile and Venezuela in the years to express the series. It is important to note that the research is not saying that there is a direct relationship between technological innovation policies and competitiveness but it is shown that after analysis it may be cause for reflection and further study. This rate of growth of competitiveness (ICC) is composed of some sub-indices are: macroeconomic environment, public institutions (legal apparatus and corruption) and innovation, and information technology. The result of this research gives the following scores of Latin American ICC in 2003.

Chilean-Venezuelan competitiveness indexes evolution					
Global competitiveness Index. Ranking from 1 to 133	**GCI 2009-10 Rank**	**GCI 2008-09 Rank**	**GCI 2007-08 Rank**	**GCI 2006-07 Rank**	**GCI 2005-06 Rank**
Chile (Best position in Latin-American)	**30**	**28**	**26**	**27**	**27**
Venezuela	**113**	**105**	**98**	**88**	**84**

Source: World Economic Forum. The global Competitiveness Report, 2009-10, 2008-09, 2007-08. Compilation Pietrosemoli, 2010

Tabla.2 Chilean-Venezuelan competitiveness indexes evolution

7. References

Albornoz, M (2001) "Science and technology policy. A view from Latin America. " Iberoamerican Journal of Science, Technology and Innovation Society. No. 1 from September to December. Available at:

http:/www.campusoei/revistacsi/numero1/albornoz.htm date accessed: 06/02/1928

Benavides, L (2008) Comparative analysis of the concept of technological innovation and strategy development undertaken in Chile and Venezuela. 1980-2000. Thesis submitted to obtain the DEA. Universidad Politécnica de Madrid. Not published.

Benavides, L (2008) The technological innovation policies in Venezuela in 1980-2000. If oil sector article published by the Second International Conference on Industrial Engineering and Industrial Management Sep. 3-5, 2008, Burgos, Spain.

Bielschowsky, R. (1988). Evolution of the ideas of CEPAL. CEPAL special issue. October.

ECLAC-SEGIB (2009) the economy of conocimiento. Chile
Freitas (2002) Study of Science Department, IVIC, Caracas Thematic Encyclopedia, 3 vols., Editorial Planeta Venezuela, SA, Caracas, pp. 217-239.

Genatios , La fuente (2005) Ciencia y tecnología en Venezuela. Editorial Opsu. Caracas.

Gutierrez (2008). Depth interview (Dea) Universidad del Zulia Maracaibo, Universidad Politécnica de Madrid in June 2008.

Mendoza, c. (2004). La Integración Regional En La Planificación Del Desarrollo En Venezuela. Período 1963-2001. en: COMPENDIUM, Julio. Disponible en: http://www.ucla.edu.ve/dac/compendium/Revista12/Carolina.pdf fecha de consulta: 05-04-08.

Nezeys, B (1998) International Trade. Eafit University Magazine. January-February-March. Spain.

Puerta, J. (1998) "Venezuela. Discourses of Oil. " RELEA. Latin American Journal of Advanced Study. No. 4. January to April. Caracas.

Tamayo y Tamayo, M. (2002) The process of scientific research. Editorial Limusa-Noriega. Mexico.