



Paper to be presented at the DRUID Academy 2012

on

January 19-21

at

University of Cambridge /The Moeller Centre

**Institutional framework for fostering innovation capabilities and collective
action: The case of Nuevo León, Mexico**

Danilo Chavez

EGAP Government and Public Policy

Public Policy Doctorate

tredicinov@gmail.com

Abstract

This paper focuses on how the institutional framework strengthens innovation capabilities and promotes collective action in high-tech clusters. Current implementation of innovation policy in developing countries faces the challenge of how institutional capabilities may enhance or inhibit the innovation capabilities. This is to be analyzed in particular for the state of Nuevo Leon, located in Northeastern Mexico, through documental research and the application of semi-structured interviews. The theoretical approach is institutional analysis, where formal institutions such as laws and policies attempt to foster informal institutions such as cooperation and collaboration to promote innovation. This paper is the first overview to the PhD dissertation of how to design an institutional framework that may foster and promote more efficient innovation policies.

Key words: innovation policy, institutional capabilities, innovation capabilities, collective action, regional policy, Mexico.

Institutional framework for fostering innovation capabilities and collective action: The case of Nuevo León, Mexico

Danilo Chavez¹
Ph.D. Program in Public Policy
EGAP Government and Public Policy
tredicinov@gmail.com

Abstract

This paper focuses on how the institutional framework strengthens innovation capabilities and promotes collective action in high-tech clusters. Current implementation of innovation policy in developing countries faces the challenge of how institutional capabilities may enhance or inhibit the innovation capabilities. This is to be analyzed in particular for the state of Nuevo Leon, located in Northeastern Mexico, through documental research and the application of semi-structured interviews. The theoretical approach is institutional analysis, where formal institutions such as laws and policies attempt to foster informal institutions such as cooperation and collaboration to promote innovation. This paper is the first overview to the PhD dissertation of how to design an institutional framework that may foster and promote more efficient innovation policies.

Key words: innovation policy, institutional capabilities, innovation capabilities, collective action, regional policy, Mexico.

Introduction

Science, technology and innovation are decisive factors for the economic growth and welfare of contemporary societies. These societies are characterized by how knowledge is distributed through formal and informal exchanges of information; by the intensity of its use; and by the maximization of technological elements in favor of production; as well as a science system integrated by institutions that produce, diffuse, and transfer that knowledge (Bazdresch y Meza, 2010). The complex dynamics of fostering innovation aimed at economic growth involves the joint participation, coordination, and articulation of policies that incentivize actors into developing a favorable environment which involves economic stability, respect for intellectual property, public-private partnerships, trade regulations, among others (Romo and Hill, 2010).

¹ Address: Edificio EGAP 5to Piso, Av. Fundadores y Rufino Tamayo s/n, Col. Valle Oriente, San Pedro Garza García, C.P. 66269, Nuevo León, México tel. 81.8625 8360, email: tredicinov@gmail.com

Knowledge has become an economic factor for development. It is also considered an economic factor, which sometimes can be measured, exchanged, transferred, and built. In a global economy where competition is a common element, the use of knowledge through innovative capabilities of individual, groups, firms, regions and states are crucial to be competitive.

Knowledge as well can be seen as a public and private good. Public in the sense that is available to anyone and its use by one person does not limit use by anyone else, there is non-rivalry in its consumption. And private because when a piece of knowledge is patented, it can become excludable, this is, the owner can exercise private property rights preventing those who have not paid for it (Ostrom and Ostrom, 1997). Also knowledge can be seen as a club good, patents put knowledge in the public sphere, but they also protect the inventor by giving them a temporary monopoly on the invention. The public benefits by having access to the invention itself, and by having access to the details of the invention so that someone else might build upon that intellectual property (IP).

For some developing economies, especially in Latin America, the 1960s was the decade during which the bases were established for the design of policies aimed at the creation of institutions for science and technology (S&T), which broadly defined the roles and functions of such institutions (Bell, 1995). Such policies mainly concentrated on strengthening national research capacities that would allow the scientific community to fulfill its social functions (Wionczek, 1980). During that time, most decision makers belonged to the public sphere, and the institutional framework at its first stage was mainly aimed at increasing skilled human resources through the support of universities and research centers mostly supported by public funds.

By the end of the eighties these strategies helped develop some industries such as mining, oil, energy, agriculture, and manufacturing. Most of the technology was imported from developed countries. The challenge during this decade was to interact technology policy and economic policy in order to stimulate technological change (Bell, 1995) and build more competitive sectors. Firms had also the responsibility to increase their human capital resources. By the end of the nineties most developing countries started to sign free trade agreements at the regional and international level. At the institutional level, commercial policies and intellectual property laws became part of the science and technology formal framework.

Current science, technology and innovation policy in developing countries face the challenge of how to promote and enhance innovation in processes and products, and to fully acknowledge the relevance of having strong institutions that foster institutional capabilities and collective action in regional and national level to promote innovation.

Within this context, my study addresses how institutions at the national level impact the design of regional science, technology and innovation (STI) policy, and how collective action meets a formal and informal set of rules. The paper is divided into four sections. The first section presents the theoretical framework discussing the concept of institutional capabilities, collective action, and their relevance for promoting innovation capabilities in a region. The second section presents the institutional framework for Nuevo León, located in northeastern Mexico, in terms of institutional capabilities to implement regional STI policy aimed at developing high-technology clusters. Nuevo León was chosen as the location where to undertake this study due to its economic weight in the Mexican economy. The third section discusses the methodology to be applied to answer the research questions set forth by my study. The fourth and last section presents the conclusions and final remarks.

1. Defining Institutional Framework, Institutional Capabilities, Collective Action, and Innovative Capabilities: An Overview of the Literature

1.1. Institutional Framework

The institutional framework holds the formal and informal rules, the organizational set where a certain actors interrelate in order to achieve specific goals, establish policies and procedures, among others (UNEP, 2006). My study puts under discussion how the institutional framework can foster institutional capabilities. These capabilities in a collective action environment promote innovation both at the regional and national level. Under an institutional perspective, I first discuss the conceptual evolution of institutions and the impact of those in the economic performance. Then I focus on how institutional capabilities strengthen the performance of the actor involved. Third, I introduce the collective action principles for a science and technology context. Fourth and last, I focus on how innovative capabilities emerge within these two contexts of institutional capabilities and collective action.

1.2. Institutions

Institutions are the structures and mechanisms of social order, and the cooperative behavior of individual in a community. Institutions are identified with their social purpose and permanence that transcends the intentions and the lives of humans and the application of rules that governs cooperative human behavior (Miller, 2011). For Knight (1992:171-208) institutions are the main base of society, because they provide information about the behavior of the players, setting expectations and structuring them. Institutions identify with their social purpose and permanence, and transcend the intentions and lives of humans (Miller, 2011).

For Douglas North (2008:3-6) institutions are the rules of the game in a society, or more formally, they are the humanly devised constraints that shape human interaction. This constraints can be formal such as rules that human beings devise or informal such as convention and codes of behavior. Consequently, continues North, they are the incentive structures in human exchange, whether political, social, or economic. In this sense, the major role of institutions in a society is to reduce uncertainty by establishing a stable structure to human interaction.

Institutions may be created or evolve over time. The set of institutions provides the institutional framework. Just like institutions, organizations provide a structure to human interactions. But rules and actors need to be differentiated. Organizations are the actors within the institutional framework. Organizations² model the strategies and the skills to operate in a institutional framework. This process is different from modeling the creations, evolution and consequences of the rules (North, 2008:5).

The institutional framework fundamentally influences which organizations come into existence and how they evolve; at the same time, they influence the institutional framework from which they evolve.

The approach from institutionalism focuses on societies' institutions, actors, regimes, norms, and resources. The complexity of a society increases according to the characteristics of their components. At the same time, institutionalism focuses on the interaction between individuals and institutions, through the coercive capacity and influence of the latter on the conduct and behavior of the first, but also through the way they may alter their institutional settings. The structure of incentives, rules, norms, behaviors that remain over time, gives certainty are relevancy to the relationship between actors. Which is the main role of institutions.

Since institutions are those factors that provide incentives and constraints to individuals, the capacity of those individuals has to be in accordance to the enforcement of their established rules.

1.3. Institutional Capabilities

The concept of institutional capabilities becomes the main issue for several years for International Organization such as United Nation Program for Development (UNPD). Capabilities, according to the UNPD, have to do with the ability of its individuals,

² “Organizations include political bodies (political parties, the senate, a city council, a regulatory agency), economic bodies (Firms, trade unions, family farms, cooperatives), social bodies (Churches, clubs) and educational bodies (schools, universities, vocational training centers). They are group of individual bound by some common purpose to achieve objectives” (North, 2008:5)

organizations, organizational units and institutions to perform their functions effectively, efficiently and sustainably. This concept involves active use and a continuous process, where individuals are the central resource for capacity building in all settings. Also capabilities are defined as a context where a set of entities operates under a common purpose according to certain rules and processes (UNDP, 1997:121).

Of concern in my study, institutions are legal norms governing relationships, among economic agents, state organizations, and firms, among others. Then, institutional capabilities are the ability of the state to enforce the board sets of rules that govern economic and political interactions (Grindle, 1999:9).

The concept of institutional capabilities (IC) has expanded. Some authors understand it as an input, a process; some others as a result (Morgan, 2006); an institutional quality (Fukuyama, 2004; Irael, 1987); as an attribute of governance (Grindle, 1997); as an organizational characteristic (Tolobem, 1992; Morgan, 1997), or as a factor enabling the individual (Sen, 1999). Also, it has been used as a synonym for quality management, organizational performance, efficiency, management or training (UNDP, 2009:49).

The issue of IC becomes relevant in the nineties due to the adoption of second-generation State reforms in developing countries. These reforms promoted a set of administrative measures within itself to achieve efficiency in service deliver and strengthening the conditions for the development of the private and public sector (Nickson, 2002 in Orchard, 2008).

The need for better management and performance of the state through the use of their capabilities and reforms raises its immersion "inside". This capacity-building concern has to do with: a) improving function and solve public problems, b) moving or adapting institutions to address public problems and c) developing, implementing, coordinating, monitoring, evaluating and reporting accounts under a system of governance (Huerta, 2008:121).

1.4. Collective Action

The study of collective action becomes the focus for various disciplines that try to understand how to solve problems that affect a particular context, population, and institutions, through collective action. Social dilemmas have to do with the nature of individuals, their behavior, their expectations, their particular way of viewing a given context and the tools they have. Within this context, from various perspectives such as philosophy, anthropology, political, economic and psychological studies have addressed that these factors favor the solution of social dilemmas.

Hardin (1968) in the "tragedy of the commons" made explicit that the need to solve a problem requires the application of mutual coercion. Those involved adopt rules and make

explicit sanctions and incentives. This framework sets them apart from individual actions seeking personal gain at the expense of others.

One of the factors favoring cooperation is the establishment of social arrangements, where freedom is translated as recognition to solve a need. A second factor is that human beings are taken into account as rational individuals that always seek first to fulfill their needs. This approach is more rational economic. A third factor is the notion that human beings are like a "blank slate" (Pinker, 2002), it refers that we can adapt through experience: socialization, culture, family, and according to these situations are subject to be cooperative or not. A fourth aspect, is about bounded rationality, and has to do with the transaction costs, in which individual make decisions based on information that is available. A fifth factor is the ideology, that brings together under a framework of beliefs and ways of being to individuals and this becomes a facilitator for cooperation in those circles. A sixth aspect has to do with adapting to situations where the individual requires a systematic intuition and make it available to the group, the collective mechanisms that can explain such patterns is neuroscience and studies that allow empirical work with a better explanation of collective agents. Among others, sense of solidarity, altruism, reciprocity, trust, are the issues that revolve around the above factors that favor the solution of social dilemmas in collective action.

Collective action holds trust-based relationships. These, among other factors, promote collaborative, cooperative and coordinated relationships. The collective action literature explores the fundamental aspects related to action arguing that society requires coordination and cooperation. Achieving common goals take us to understand why individual members or groups decide to cooperate. What are their incentives? What is the government's role in these interactions? What kind of effects do public policies have?

For Mancur Olson (1965) the importance of understanding the logic of collective action is to identify its inhibitors and drivers. Olson argues that individual rationality provides incentives to "free ride", but individual rationality into group boundaries with common interest provides a collective rationality where active participants receive incentives to keep cooperating.

The presence of private groups, and organizations is a clear demonstration of the human tendency to form associations. Olson (1965) identifies small and large groups, which act according to their principles and respond to different benefits. Thus the solution of the free-rider dilemma can only be prevented by selective incentives, allowing treating separately those who cooperate and those who do not.

Selective incentives are those elements that place individuals in a collaborative context. A rational decision to achieve their interests is the same as the group, which protects and helps to get them. There are two types of selective incentives: first, negative

which acts under the high cost of not participating; and, second, positive incentives that brings the benefit of participating. For those reason, it can be said that the intent of the actors to reach consensus, agreements and collective action is in its rationality.

For Olson (1965) collective behavior can be explained in rational terms. It's a paradox to the free-rider dilemma because there is a strong temptation to expect others to make the necessary effort to achieve results that benefit everyone, as you know is under what conditions can be collective action. A significant number of people who share interests, act according to them. The attempt is to explain how rational individuals can have rational collective actions. Individual interests, individual action guide to collective action by or through the participation in these groups, and organizations.

There are several types of collective action models, but according to Oliver (1993) there are four main types of them. First, single-actor models which treat the “group” behavior as given; second, models of interdependent aggregation of individual choices into collective action; third, models of collective decisions of individuals with different interests; and, fourth, models of the dynamics interactions among collective actors and their opponents.

The importance to take account collective action is to understand how new forms of coordination, cooperation, collaboration and communication might foster innovation.

1.5. Systems of Innovation and Institutions: towards innovation capabilities

Already back in the 1950s Joseph Schumpeter had argued that innovation was a key ingredient for economic growth through the generation of higher quality products at lower unit costs (Feldman and Florida, 1994), what became known as neo-Schumpeterian economics and represented a gateway for evolutionary economics, organization theory, and entrepreneurship (Augier and Teece, 2004). During the 1980s these Shumpeterean ideas constituted part of the backbone for the study of innovation from a systems perspective, which emphasizes and analyzes the role of institutions and provide a framework for understanding the impact of innovation where non-market synergies are present (Carlsson, 2007). Following on the notion that the pattern of innovative activity may differ between nations due to their “specific institutional factors related to national systems of innovation or of the presence of a firm or an industry with a peculiar history” (Malerba, 2007),

Through collective action and the institutional framework how can individuals, groups, organizations, and networks, innovate? Innovation studies appear in different literature such as institutionalism, sociology, education, management, science and technology, public policy, etc. In the institutional literature, innovation is a field related on how to shape innovation systems through the role of supporting the structural changes, legal reforms, and capacity building of the actors involved (Oyelaran-Oyeyinka, 2005).

The innovation capabilities of firms and other types of organizations include a stock of resources that permit them to undertake production and differing degrees of innovation activity. Such capabilities are both in the nature of ‘human capital’ (i.e. specialist professionals, knowledge bases and skills/talents that are formally and informally allocated within specific organizational units, projects and teams) and ‘organizational’ (the firm’s internal and external organizational arrangements such as their routines and procedures, linkages, managerial systems, including the firm’s values, norms and beliefs that are reflected in its management style and behavior) (Figueiredo, 2010).

In most of the studies the process of building innovation capability has been studied by assuming the existence of a long-term continuity. Most studies address the accumulation of a firm’s capability by considering (successful) technology-following trajectories (Figueiredo, 2010). Innovation capabilities related to a science and technology framework also take us to see the relationship between innovation systems and the creation and evolving of institutions.

Systems of innovation is an approach for understanding innovations occurring in an economy, and points the fact that innovation processes are evolutionary. Also, that firms do not normally innovate in isolation but in interaction with other organizations within a framework of specific institutional rules. The system approach to innovation is essentially an attempt to think through and analyze the nature and implication of the collective character of innovation (Edquist, 1999).

Nelson (1993) on his empirical work of systems of innovation showed that countries have developed different knowledge bases in both R&D and the capacity for innovation. He notes some principal differences, such as political circumstances and priorities, while size and degree of influence matter a lot (Nelson, 1993:507). This acknowledges the role of forces outside the domain of R&D and the institutions associated with it (Oyelaran-Oyeyinka, 2005).

The lack of innovation capabilities in developing countries has been explained by factors under the systems of innovation approach and lack of enforcement of the institutions. In the innovation system at least four conditions are mentioned to understand the innovation capability level in developing countries. First, the amount of R&D carried out in universities and firms is significantly lower than is found in advanced industrial countries. Second, the competence-building capacity of organizations such as universities and training centers, is still in transition compared to developed countries. Third, the function of information exchange is usually very weakly coordinated, exists a lack of databases in high technologies. And fourth, the regulatory functions like intellectual property still is an issue in developing countries (Oyelaran-Oyeyinka, 2005:17-18).

In terms of the institutional perspective, Oyelaran-Oyeyinka (2005) mentions five

factors where institutional analysis takes innovation capabilities into account. First, institutional change constitutes a strong selection mechanism for innovation. This has both market and non-market origins, with the latter providing the leverage for policy intervention at different levels of the economy (Metcalf, 1997). Second, learning processes are key determinants of innovative activities and institutions are the carriers of knowledge, representing the cumulative learning of groups and societies (North, 1996). This is particularly so for tacit, non-codified knowledge. The speed of economic change is a function of the rate of learning, but the direction of that change is a function of the expected payoffs to the acquisition of different kinds of knowledge (North, 1996: 346). Third, path-dependence is a central concept of institutional change and it too underpins learning and innovating activities that are essentially heuristic and possess strong feedback loops (Edquist, 1997). Fourth, the observation of technological innovation relies strongly on institutional innovation (Sampat and Nelson, 2002). Fifth, considerable diversity is generated through learning, in much the same way economic change is brought about by market and non-market selection mechanisms that create diversity (Edquist, 1997:7).

Some of the functions of an innovation system are: first, reduction of uncertainty among institutions; second, the management of conflicts and engendering of cooperation among actors; third, the provision of incentives to engage in learning and participate in innovation; and, fourth, the channeling of resources to innovative activities (Edquist and Johnson, 1997). Also we can add some more: fifth, knowledge generation, including R&D; sixth, competence building, supply of inputs (finance, foreign direct investment, venture capital, loans); seventh, provision of regulatory frameworks and measure, standards and quality functions; eighth, facilitation and exchange of information, stimulation of demand and creation of markets; and, ninth, reduction of uncertainties and resolution of conflicts through appropriate institutions (Fagerberg et al., 2004).

These refers that system functions are not only technical but also institutional and organizational. In a given institutional context, functions are related with a recognizable system.

In summary, the literature reviewed which integrates the theoretical framework for my study notes is that in the dynamics of economic development, institutions that foster not only innovation but also cooperation and coordination among relevant actors of an innovation system are key. There is a need for more empirical studies in developing countries such as Mexico, which address the issue of how to better, design such institutions.

2. The case of Nuevo Leon, Mexico: Developing an institutional framework and strengthening institutional capabilities

Mexico has become in the past decades one of the twenty larger economies in the world. Mexico made huge gains in export manufacturing in the seventeen years since the

North America Free Trade Agreement was signed with the U.S. and Canada. But it has been a challenge to keep up with Asian countries like China, South Korea, among others. As science, technology and innovation are decisive factors for economic growth, and a fundamental factor for the wellbeing of contemporary societies (Bazdresch and Meza, 2010), stimulating such factors is part of a complex process which involves the participation, coordination, and joint articulation of policies that incentivize key actors to build a favorable environment for economic stability, respect for intellectual property rights, trade regulations, among others (Bazdresch and Meza, 2010).

For Mexico in particular, evidence has shown that science, technology, and innovation (STI) policies are weak in creating linkages between the coordinating STI organizations, mechanisms and the final users (Cabrero, Valadés, y López-Ayllón, 2006). Within this context, my study centers its attention on those factors that may be accountable for the weakness in the implementation of STI policy in Mexico, considering its institutions and their capacity to bridge the existing gap between design and implementation.

Encourage innovation in science, technological progress and the techniques and production processes are important factors in economic growth dynamics of capitalist societies (Romo and Hill, 2010:73). This complex process involves the participation, coordination and joint articulation policies that encourage actors in the creation of an enabling environment and economic stability, respect of property rights, support programs and linking businesses, public-private financing, regulation of trade, foreign investment and permeate into the national economy (Romo and Hill, 2010).

The evidence regarding the effectiveness of the STI Policies in Mexico shows that there is not connection between bodies and coordination mechanisms (inter-and intra-governmental) and binded to the target (Cabrero, et. al., 2006) . In this context, the gap between a design that significant progress has to have new actors in their formulation, however dissonances and dislocations generated in the institutional framework that should support (Cabrero, et. al.,2006).

In this context, the research interest focuses on the explanatory factors that may account for this lacking STI implementation of policies in Mexico. For this purpose we take into account their institutions and their capacity to effectuate the gap between design and implementation.

2.1. The Case of Nuevo León, Mexico

The State of Nuevo León (NL), and its capital city, Monterrey, is located at the North-eastern region of México (see figure 1); Monterrey is considered the most important financial and industrial center, as well as the must port of entry for the commercial exchange between the Northeastern Region of México and the United States (OECD,

2005). Also, it has been characterized for its industrial wealth and progress and as a competitive economic region (see chart 1).

Since the beginning of the twentieth century NL become a leader in national and international activities such as, steel, beer, glass, cement, ceramic products, chemical and metalworking and other manufacturing (IDB, 2009).

Figure 1: State of Nuevo León: location remarks



Source: Parada (2009)

In the last decade the State of Nuevo León, has set strategies and policies to put the city and their region in the international spotlight not only in terms of commerce and industry.

One of its main pillars for economic development is the strategic project “Monterrey International City of Knowledge”, which is based on an alliance between government, higher education institutions (HEIs), and industry, also known as the Triple Helix, to promote growth through innovation (OECD, 2009:192).

In the beginning, the project followed some basic strategies which included revising educational contents and methods, the incorporation of technology specialists for industry, increasing the number of researchers and public research centers (PRCs), promoting business incubators, and strengthening the city’s infrastructure. To make the alliance stronger, several clusters were initiated in sectors including auto, IT, medical services, life

sciences, agro, nanotech and biotech, accompanied by Centers for Innovation and Intellectual Capital by sector (OECD, 2009).

Chart 1: Monterrey features

Capital: Monterrey

* Population: 4.3 Million (4% of the total population of the country)

Producer of 11% of Mexico's manufactured goods (\$16.4 Billion USD)

GDP: \$69.2 Billion USD (7.6% of the country's GDP)

Exports 2007: \$17 Billion USD

GDP per capita: \$16,000 USD (\$8,000 USD above national average)

* 2nd most important state to attract FDI (\$1.5 Billion USD avg./year)

* 145,000 jobs created between 2006 and 2007

* 2,000 foreign companies established in the Metropolitan area

Source: Parada (2009)

For the creation of new enterprises, the government launched the several programs like INVITE in 2005, or FONLIN in 2009, helping researchers and local entrepreneurs license and register their knowledge while promoting the creation of new knowledge-based firms. Additionally the I2T2 started two funds with seed money and resources from private investors to help firm start-ups as well as high-growth small and medium enterprises (SMEs) (OECD, 2009)

2.1.1. The Institutional Framework of Nuevo León

Monterrey has maintained in recent years the top competitiveness in Mexico (OECD, 2009). However, the vision for the coming years Monterrey is to position the city within the twenty-fifth cities most competitive in the world.³ The competitiveness of the city is based on the ability to attract, retain and develop human talent and investment to produce goods and services of high value added to generate gainful employment and quality of life for its inhabitants.

The Institutional framework that the NL government has established includes policies oriented towards better and effective interactions between de triple helix components.

The STI public policy issue is set in a fast technological development environment, and the composition of various actors taking part of it. There is an evolution in the STI

³ According to America Económica (2009, 2011) Monterrey was the twelve most competitive city in Latin America in 2009. By 2010 had the same Rank but in 2011 went down to the thirteen position. See more details for the methodology they used <http://rankings.americaeconomia.com/2011/ciudades/index.php>

policies in legislation in Mexico and in the State of NL, taking the development of scientific knowledge as an engine of development.

2.1.1.1. Planning

The actions of a government are provided within a planning framework. This process is important because it is represented by a plan that includes explicit and consistent decisions to allocate resources to predetermined purposes. Thus it is important to know the regulatory framework and the establishment of rules.

Under the Constitution, the law empowers the executive with the administration and coordination of planning in Mexico, these powers are outlined in Articles 25 and 26 of the Mexican Constitution as regards Article 25, the "guidance of the National Development to ensure that it is comprehensive and sustainable" and in the 2nd paragraph, "The state will plan, conduct, coordinate and guide national economic activity, and carry out the regulation and promotion of activity that requires the public interest under this Constitution grants freedoms "and Article 26:" The State shall organize a system of democratic planning of national development ".

Under the Law of Planning (LP), Article 3 and 4 explained that by National Development Plan (PND) is a rational and systematic actions of the Federal Government are aimed at transforming the country's reality and fix the responsibility for the Executive to lead the planning of the country with the democratic participation of social groups, respectively.

The planning process is integrated into the National System of Development Plan (SNPD), which takes into account the participation of various social actors. For the federal government, the Plan will be the current operational framework, with the Ministry of Finance and Public Credit (SHCP), whom is the in charge of the task to develop, to coordinate, to monitor and evaluate the progress of the process (Article 34 LP).

In Chapters 5 and 6 of the LP are the mechanisms for coordination and consultation and induction, respectively. As for coordinating the Federal Executive may make agreements with the States (Article 34 LP) to participate in the National Development Plan (NDP) and contribute in the field of its competence in achieving the objectives of national planning. The Federal Executive through its agencies and companies working in direct partnership with the State, but as independent entities, will arrange to carry out the actions envisaged in the Plan and the programs, with representations of social groups or individuals concerned (Article 37 LP).

2.1.1.2. Science, Technology and Innovation Regulatory framework

The legal regulation of science and technology is constitutional, statutory laws, organic, regulations, decrees, and administrative tools. At the constitutional level the Article 3, Sections II, V, VII indicate that the results of scientific knowledge are the criteria to guide public education also reflects the National State's obligation to support scientific and technological research, which is the backbone of the S & T policy, this rises to a constitutional point of authority and responsibility for research on autonomous university.

For the analysis of legal and regulatory framework in science and technology serves three items proposed by Cabrero, Valadés, Ayllon-Lopez (2006:40): a) research, b) the actual development and c) industrial plant processes .

Under the Constitution the Federation reserves only scientific research and technological innovation related to national development (as provided for in Article 124 of the MC).

Based on this premise, there is a clear centralization by the Federation about the guidelines to regulate CTI in the country. Yet you opt for an administrative decentralization where the states have the power to create S&T State Councils to coordinate under a National S&T Conference. The conference is a permanent body of coordination between the National Council for Science ,and Technology (CONACYT) and entities.

In the NL case, the efforts of the government has able to regionalize and create from bottom-up a set of policies and take into account the Law from National Level to State level. Which was reflected in the NL 2004-2009 State Development Plan (Plan Estatal de Desarrollo 2004-2009). This Plan established the relevance of the interaction among government, industry and academia for economic development through initiatives that involve this actors.

In this period of government there was an strategic way of thing that need it to deep in the administration the long term concept where a “Knowledge city” can mean for the State of NL (Ciencia, Conocimiento y Tecnología, 2010). These initiatives seek to stimulate these interactions primarily through: 1) establishing the institutional settings for knowledge transfer, 2) creating the environment for attracting industry, and 3) strengthening and developing clusters in the state.

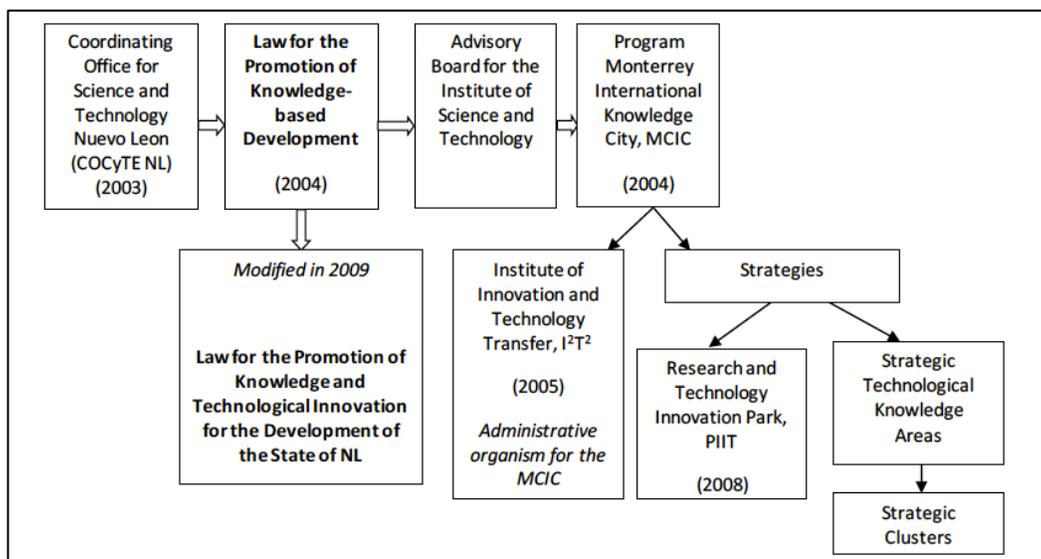
In 2003 the Law for the Promotion of Knowledge-based Development was approved by the State Congress. This led to the creation of the Coordinating Office for Science and Technology in 2004 with the purpose of bringing together all actors of S&T in NL (Coordinacion de Ciencia y Tecnologia de Nuevo Leon, 2010).

One of the key initiatives for 2004 was the creation of the Institute for Innovation and Technological Transfer (I2T2). The I2T2 is an agency of the State Government of Nuevo Leon, established in 2005, with the authority to sign agreements and allocate financial resources to programs and projects of innovation, science, and technology. The Institute administers the program MCIC-Monterrey International city of knowledge (I2T2, 2005).

MCIC revolves around seven basic strategies: 1) redesigning the agenda for the education system; 2) attracting new research centers and technology-based firms; 3) promoting innovation in firms, universities, and research institutions; 4) creating new innovation firms; 5) widening urban and cultural infrastructure; 6) diffusing a new entrepreneurial culture; and 7) improving instruments that support innovation (MTYCIC, n.d.).

The promotion of knowledge-based activities is also anchored in the national STI instruments such as the Mixed Fund CONACYT-Nuevo Leon, in addition to other programs designed by the NL government aimed at promoting the creation of new firms. The number of approved projects through the mixed funds as well as the amounts has been quite varied, and they include industrial development and the creation of a scientific and technological infrastructure (FCCyT, 2009).

According to Villasana (2011) the Institutional Framework for promoting a regional innovation system in NL (see figure 2) has the COCyTE NL as the coordinator and responsible to watchout the Law for promotion of knowledge and technological innovation, also link with the Advisory board for the Institute of Science and Technology the Program MICK.



Source: Villasana (2011:32)

The I2T2 are in charged to monitor and evaluate the evolution of i) the develop of a mayor cluster of researchers in the state, ii) build of technological infrastructure, iii) foster graduated programs in insert into international networks, iv) promotion and attraction of Foreign Direct Investment (FDI), v) impulse to Nuevo Leon's exports, vi) accelerated education of human capital (Specialists and Technologists), vii) linkage and alliances between companies and academic institutions, viii) incorporation of Science & Technology to basic education, ix) patents for technology developments and transfers, x) incorporation of R & D in the companies, xi) business incubators and venture capital (Parada, 2009), (Ciencia, Conocimiento y Tecnología, 2010).

3. Methodology

In this context the purpose of the study will be to evaluate through an institutional perspective, the case of the State of Nuevo Leon as a region that has been developing strategies and policies in order to increase their economic growth through the implementation of policies that foster innovation in new high-tech sectors such as biotechnology, nanotechnology and impulse a society and economy based on the intensive use of knowledge.

There are three specific objectives of the empirical study: first, to study from an institutional approach STI policy and the role of institutional capabilities with respect to its implementation; second, the identification and analysis of actor's capabilities that conform up the organizational structure of the sector and relevant institutions in the region; and, third, to evaluate the empirical evidence based on the impact of institutional capabilities in the implementation of regional policies CTI.

Therefore, this study will empirically address the question of how the relationship between the impact of institutional capacities and the implementation of policies for science, technology and innovation?

The following sub-questions complement this research:

- What is the structure of the institutional framework of STI policies in Nuevo León?
- What are the institutional capacities and the importance of the actors in this network?
- Under what constraints incentive scheme does the current institutional framework works in the STI policy Nuevo Leon?

To answer this questions and after the review of literature the purpose of the study is through a case study, first to make and diagnostic on how is the current implementation of the Program Monterrey International City of Knowledge in order to compare with the

formulation of the policies and evaluate how the institutional framework has impact on institutional and innovative capabilities.

Therefore through semi structure interviews and documental research seek quantitative and qualitative attributes. In that context, and with respect to the benefits it creates, seek factors like increasing/decreasing wealth and income levels, job creation or employment level, the availability of good and services, and improving financial security. As well consideration as generating creative capital, creating greater social and financial equity, achieving sustainable development, creating a spread in the range of employment, and gaining improvements in the quality of life (Stough, et. al. 2011).

The temporal time that has been assigned to do this research is two years, where first 6 months will be used in the writing of theoretical chapter that involves the institutional perspective, institutional and innovative capabilities, and collective action. Also the elaboration of the institutional framework of science, technology and innovation in NL.

The following sixth months will be used to field research through semi structured interviews and documental research and design a diagnostic of the current implementation of the MICK in NL.

The following six months have to do with the revision of the findings in the field research work and been able to construct and explain how institutional framework has impact in the institutional and innovative capacities.

The last six months will be used to write the final draft and to put in consideration to the director and professors the conclusions of the field research work and provide some policies implications.

4. Concluding remarks

The objective of this paper was to present and empirical study that will be undertaken in the Mexican state of Nuevo Leon during the year 2012-2013 aiming the evaluation through a case study about the impact that institutional framework has in the institutional capabilities of the main actors in the science, technology and innovation sectors in the current implementation of the STI policies.

Through the review of literature taking the institutional perspective, was address how institutions plays a critical role in the developing of a region and a national State. The establishment of rules provides an environment and specific constraints that alter human behavior. The institutional perspective also allows taking into account collective action characteristics, specially in science and technology matter where innovation and use of knowledge requires the collaboration of many resources (financial, geographic, human resources, ideas, etc.)

Institutional approach also let us to evaluate the institutional and innovation capacities within the actors involve. This outcome also provides a better way of seeing institutional framework enforcement. Several methodologies has developed to measure institutional capabilities and the result has take to an evolution of the concept. Nowadays not only the external financial efforts provides good implementation of policies, also innovation capabilities can turn bottom-up and strength the rules.

Current science, technology, and innovation public policies in developing countries faces several challenges. Even the effort to built a sustainable institutional framework providing technological infrastructure, incentives for all the actors, is not enough. The lack of skilled human resources, or the lack of enough financial resources to STI affairs, a low integration between industrial, commercial and STI policies, or the not coordinated speed in the triple helix are some factors that might decrease levels of innovation.

Regional Innovation Systems still are theoretical and empirical cases that need more research and studies. Each geographical condition, type of government, level of competitiveness, level of innovation, and long term policies might be some factors where can create an environment to foster collective action, institutional and innovative capabilities in order to innovate process and products.

The State of Nuevo Leon is a interesting case to take into account in regional innovation policies. The I2T2 has been challenge and take a long term goals trying to pull up socioeconomic factors to increase growth and development in the region. It's also a critical opportunity at national level to set a path where other capabilities might joint these efforts.

Feedback and comments on the theoretical approach and suggested methodology will be greatly appreciated by the author.

References.

America Economía (2009) Ranking Latin America's Most Competitive Cities available in <http://www.worldcrunch.com/ranking-latin-america-s-most-competitive-cities/4141>

America Economía (2011) Especial ciudades available in <http://rankings.americaeconomia.com/2011/ciudades/index.php>

Augier, M., & Teece, D. (2004). Competences, capabilities, and the Schumpeterian tradition. (K. Tryggestad, & S. Christensen, Eds.) New Social Science Monographs (No. 52).

Arundel, A., Lorenz, E., Lundvall, B.-A., & Valeyre, A. (2007). How Europe's economies learn: a comparison of work organization and innovation mode for the EU-15. *Industrial and Corporate Change* , 16 (6), 1175-1210.

- Bazdresch Parada, Carlos; Meza González, Liliana;. (2010). *La tecnología y la innovación como motores del crecimiento de México*. México D.F.: FCE.
- Bell, M. (1995). Enfoques sobre política de ciencia y tecnología en los años noventa: viejos modelos y nuevas experiencias. *Redes* , 2 (5), 7-34.
- Cabrero, E., Valadés, D., & López-Ayllón (Eds.). (2006). El diseño insitucional de la Política de Ciencia y Tecnología en México. 2006: UNAM - CIDE Instituto de Investigaciones Jurídicas , Serie Doctrinas Jurídicas , Núm. 317.
- Carlsson, B. (2007). Innovation systems: a survey of the literature from a Schumpeterian perspective. In H. Hanusch, & A. Pyka (Eds.), *Elgar Companion to Neo-Schumpeterian Economics* (pp. 857-881). Northampton, Massachusetts, USA: Edward Elgar Publishing Limited.
- Ciencia, Conocimiento y Tecnología (2010) “El parque de Investigación e Innovación Tecnológica: un ejemplo”. *Revista Ciencia, Conocimiento y Tecnología* número 104, 30 de abril. Monterrey.
- Cimoli, M., Dosi, G., & Stiglitz, J. Institutions and policies in developing economies. In B.-A. Lundvall, K. J. Joseph, C. Chaminade, & J. Vang, *Handbook of innovation systems and developing countries* (pp. 337-359). Cheltenham: Edwar Elgar Publishing Limited.
- Cohen, J. (1993). *Building Sustainable Public Sector Managerial, Professional and Technical Capacity: A Framework for Analysis and Intervention*. (Vols. Development Discussion Paper 473,). Harvard Institute for International Development.
- Coordinacion de Ciencia y Tecnologia de Nuevo Leon. (2010). Portal del gobierno del estado de Nuevo Leon. Retrieved January 2010, from http://www.nl.gob.mx/?P=atrib_ciencia_tecnologia
- Cooke, P., & Morgan, K. (1998). *The Associational Economy: Firms, Regions, and Innovation*. Oxford: Oxford University Press.
- Edquist, C. (1997). Systems of Innovation Approaches: Their emergence and characteristics. In C. Edquist (Ed.), *Systems of Innovation: technologies, institutions and organizations*. Oxford: Routledge.
- _____ (1999) *Innovation Policy – a systemic approach*. Departament of technology and Social Sciences, Linkoping University.
- Edquist, C. and Johnson, B. (1997) "Institutions and Organizations in Systems of Innovation," in: Edquist, C. (ed) *Systems of Innovation Technologies, Institutions and Organizations*. London: Pinter Publishers, pp. 41–63. Fagerberg, J., Mowery, D. and Nelson, R.R. 2004. *The Oxford Handbook of Innovation*. Oxford: Oxford University Press. FCCyT, 2009)

- Feldman, M., & Florida, R. (1994). The geographic sources of innovation: Technological infrastructure and product innovation in the United States. *Annals of the Association of American Geographers*, 210-229.
- Figueiredo, Paulo N. (2009) Discontinuous Innovation Capability Accumulation in Latecomer Natural Resource-processing Firms: Evidence from Brazil. DRUID Working Paper No. 10-11
- Fukuyama, Francis (2004) *State-building: Governance and World Order in the 21st Century*. New York: Cornell University Press
- Grindle, Merilee ed. (1999) *Getting Good Government. Capacity Building in the Public Sectors of Developing Countries*. Harvard Institute for International Development. Harvard University Press, 1997
- Hardin (1968) The tragedy of the Commons. *Science* Vol. 162. December 13th. Available at www.sciencemag.org
- IDB (2009) *Monterrey International City of Knowledge*. International Development Bank, The State of Nuevo Leon. Monterrey.
- IITT (2011) “Un proyecto que estamos construyendo”. Instituto de Innovación y Transferencia Tecnológica. disponible en: http://www.mtycic.com.mx/mtycic/avances_quesehahecho.html consultado agosto 15, 2011
- Informe General del Estado de la Ciencia y la Tecnología en México 2010. Dirección Adjunta de Planeación y Cooperación Internacional del Conacyt.
- Israel, Arturo. 1987. *Institutional Development: Incentives to Performance*. Baltimore: Johns Hopkins University Press
- Juma, C., & Yee-Cheong, L. (2005). *Innovation: Applying knowledge in development*. London, UK: Earthscan.
- Knight, J. (1992). *Institutions and Social Conflict*. (P. E. Decisions, Ed.) Cambridge University Press.
- Lieberwitz, R. (3-5 de November de 2006). Expanding global access to knowledge: The role of the university. Knowledge, Economy and Management Congress . Kocaeli, Turkey.
- Ley para el Fomento del Desarrollo Basado en el Conocimiento (Publicada en el Periódico Oficial del Estado No. 40 de fecha 19 de Marzo de 2004)
- Constitución Política de los Estados Unidos Mexicanos
- Ley de Planeación (Publicada en el Periódico Oficial)
- Malerba, F. (2007). Schumpeterian patterns of innovation and technological regimes. In *Elgar Companion to Neo-Schumpeterian Economics* (pp. 344-359).

- Mizrahi, Y. (2004). Capacity Enhancement Indicators: Review of the literature. World Bank Institute.
- _____ (2006); The Concept of Capacity. Study on Capacity, Change and Performance, versión preeliminar European Centre for Development Policy Management
- MTYCIC. (n.d.). *Definicion*. Retrieved March 11, 2009, from <http://www.mtycic.org/?p=acercade>
- Metcalf, Stan (1997) "The economic foundations of technology policy: equilibrium and evolutionary perspective" in Stoneman P.O. (Ed.) (1995) *Handbook of the Economics of innovation and Technical change*, Blackwell Handbooks in Economics, UK, pp. 409-512.
- Morgan, Peter (1997) "The Design and Use of Capacity Development Indicators." Paper prepared for the Policy Branch of CIDA. December.
- Nelson, R.R. and Rosenberg, N. 1993. "Technical Innovation and National Systems," in: Nelson, R.R. (ed), *National Systems of Innovation. A Comparative Analysis*. Oxford: Oxford University Press, pp. 3–21. Oyelaran-Oyeyinka, 2005
- North, D. C. (1990). *Institutions, Institutional Change and Economic Performance*. New York: Cambridge University Press.
- _____ (ed). 1996. *Economic Performance through Time*. Cambridge: Cambridge University Press..
- OECD (2005) Regional Integration Program of Northeastern Mexican States and linkage with the State of Texas, USA (INVITE Program). Paris: OECD.
- OECD. (2009c). Review of Regional Innovation 15 Mexican States. Paris: OECD.
- Oliver, Pamela (1993) "Formal Models of Collective Action." *Annual Review of Sociology* 19: 271-300.
- Olson, Mancur (1965) *The Logic of Collective Action: Public Goods and the Theory of Groups*. Harvard University Press. Cambridge
- Ostrom, Elinor and Vincent Ostrom (1977) "Public Goods and Public Choices" (with Vincent Ostrom). In E. S. Savas, ed. *Alternatives for Delivering Public Services: Toward Improved Performance*. Boulder, CO: Westview Press, 1977, pp. 7-49
- Oyelaran-Oyeyinka, Banji (2005) *Systems of Innovation and Underdevelopment An Institutional Perspective*. Discussion Paper Series. United Nations university foro New Technologies, Maastricht
- Parada, Jaime (2009) Monterrey: International City of Knowledge". IC4 The World Conference on Intellectual Capital for Communities Fourth Edition

- Pinker, Steven (2002) *The Blank Slate: The Modern Denial of Human Nature*. New York: Penguin Books
- Romo, D. y Hill, P. (2010). Los determinantes de la innovación tecnológica en la industria manufacturera mexicana en *La Tecnología y la Innovación como Motores del Crecimiento de México*, Carlos Badrezch y Liliana Meza (Eds). PP. 73-170. México, D.F.: Fondo de Cultura Económica..
- Sen, Amartya (2009), *Development as Freedom*, Oxford, Oxford University Press, 1999Tolobem, 1992;
- Storper, Michael (1997) *The Regional World. Territorial development in a global economy*. The Guilford Press, London.
- Stough, Roger R. , Robert J. Stimson, and Peter Nijkamp (2011) “An Endogenous Perspective on Regional Development and Growth” in Kourtit, K, Peter Nijkamp and Roger Stough (2011) *Drivers of Innovation, Entrepreneurship and Regional Dynamics*. Springer Heidelberg Dordrecht London New York
- Tobelem, Alain (1992) “Institutional Capacity Analysis and Development System (ICADS). Operation Manual.” World Bank. Public Sector Management Division. Technical Department. Latin American and the Caribbean Region. November 9-July.
- UNEP (2006) *Manual on Compliance with and Enforcement of Multilateral Environmental Agreements*. United Nation Environmental Program.
- UNDP (2009) *Informe sobre Desarrollo Humano México 2008-2009*. En proceso de publicación.
- Villasana, Marcia (2011) *Technology Policy And Drivers For University- Industry Interactions: A Grounded Theory Approach To Biotechnology In Nuevo Leon, Mexico*. Thesis Is Presented As Part Of The Requirements For The Award Of The Degree Of Doctor Of Public Policy.
- Wionczek, M. (1980). ¿Es viable una política de Ciencia y Tecnología para México? *Foro Internacional* , 81.