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POLICY ENVIRONMENTS AND INSTITUTIONAL FACTORS THAT SHAPE THE ROLE OF TECHNOLOGY IN ENTREPRENEURIAL CULTURE: AN EXPLORATORY STUDY IN MEXICO AND CANADA

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Entrepreneurship is, by necessity, a function of opportunities and constraints that a given environment presents, together with the vision and project of a new enterprise that the entrepreneur conceives of. His background, skills and motivation shape his ability to convert those opportunities into a new organization that creates value and captures a significant portion of it.

Naturally, the first options that the entrepreneur will consider for the design of the new firm will be those successful enterprises and role models that he has had the opportunity to see around him. As a nation and its regions and sub-regions develop technological and innovation capabilities, and as successful technology-based firms proliferate in them, new entrepreneurs will attempt to imitate those successful firms that he may see operating in his environment.

But many other elements from the environment can be taken advantage of by the entrepreneur, whether he realizes it or not. Social capital in many forms will represent opportunities for support and guidance for her project. Explicit economic policies can certainly influence her decisions, to the extent that those policies are implemented through effective and locally available programs. Venture capital networks as well as the proximity to university or public research labs will represent resources that will be readily available. More intangible factors, such as the presence of a mature intellectual property culture, or the overall disposition for joint learning among competing firms will also play a role.

Even as the "business model" concept has been relatively little studied for firms in general, there is still even less attention given so far to technology-based firms (TBF's). But important differences arise from the fact that TBF's represent a significantly new way of wealth creation, with a specific set of decisions that need to be made from their very inception (Hindle and Yencken 2004, Chesbrough and Rosenbloom 2002), decisions that

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strongly determine their subsequent development paths and growth trajectories, which are different from those in traditional or non-innovative firms (Aspelund et al. 2005, Almus and Nerlinger 1999, Autio 1997, Bower 2003, Colombo and Grilli 2005). Their main asset is not capital or labour, for example, but knowledge and intellectual property. Their competitive advantage arises from the fact that they develop unprecedented innovations, and that they move quickly to carve out new market opportunities based on that advantage.

As the entrepreneur comes to identify a knowledge-based opportunity and to conceive the project of a new firm, he will readily seek to take advantage of those resources and opportunities he finds in the environment (Crick and Spence 2005) by assigning them a role in the business model he is using to build his new firm. Whether explicitly sought after, or taken as granted, available resources and opportunities are likely to become building blocks for the new firm, assembled by the entrepreneur's talent into a business model that seeks to create wealth and to capture a significant portion of that value.

Thus, the role of technological innovation in entrepreneurial activity is shaped not only by the entrepreneur's business and innovation talent, but by environmental factors, such as: a) the presence, abundance and relative success of technology-based business models; b) programs that implement industrial, and innovation policy; c) the presence and development level of innovation networks; d) the types and strength of social capital; e) the relative visibility of endogenously developed technology; f) experience in, and knowledge of international markets, for example.

How do entrepreneurs perceive and incorporate environmental and policy signals in their business models? Can we identify specific factors that can be actively changed by industrial and technology policy, in order to increase the generation of technology-based startups, and to improve the innovative capacity of firms in traditional industries?

In this paper we present a comparative study of entrepreneurship in Mexico and Canada, based on the study of the role of technology and innovation in entrepreneurial activity. The aim of the paper is to highlight similarities and differences in the perceptions of entrepreneurs about environmental and policy factors that affect their business opportunities, in order to better understand their role, and to derive policy implications that may be useful in advancing technological innovation in Mexico. With this aim, we structure and analyze the differences found in the two contexts in terms of the "business model" concept, as applied to TBF's.

Comparing Policy Environments

Canada's experience in fostering innovation has accumulated successful experiences in the last decade. Among them, technological initiatives that are designed to mobilize human capital and business resources in the development of social and economic wealth can be cited. The success of these experiences can be assessed through the examination of the performance of innovation clusters across the country (Wolfe and Lucas 2005).

Canadian Policy and Institutions

Federal Policies

Canada (like Mexico) is a federation. In Canada technology policy is seen as an extension of economic policy, which falls firmly within federal jurisdiction. Thus the federal

government has created a number of policies over the years which have remained remarkable consistent, and which provide a general framework against which entrepreneurs can base their investment decisions. There have been, periodically, written policy statements (see the federal Science and technology Strategy, 2007), yet, at the same time, an unwritten S&T policy has come into being, and has been remarkably consistent. This policy has the following elements:

- Direct support of basic and early stage applied research in the university sector;
- Creation of specialized, decentralized, stakeholder operated granting agencies for university-based research (e.g. Networks of Centres of Excellence, Genome Canada);
- Shift from direct support for industrial S&T and innovation to indirect methods (the NRC Industrial Research Assistance Program is a very successful exception to this rule – see below);
- Redirection of direct R&D spending in government labs to mission-oriented S&T;
- Active recruitment of S&T HQP through repatriation of Canadian emigrants and encouragement of immigrants;
- Participation in international consortia for big science projects such as space programs;
- Federal support for major technology-based projects (the most recent being the Information Highway).

For the most part these policies have been successful, and they have served Canada well. Canada has global expertise and a competitive advantage in a number of technology-based industries and social programs.

Table 1. Canadian STI policy will focus on Canada's competitive advantages: Some examples:

Climate and Environment:	global warming and its consequences
	sustainable resource production
	conservation and reuse of water resources
	energy efficient building design
Energy Production	hydro-electricity and electrical energy transmission
	sustainable oil-sands exploitation
	hydrogen production and storage, and fuel cells
	environment-based energy production (wind, tidal, and biomass)
Manufacturing Techniques	Logistics
	remote manipulator devices
Communications and IT	enhanced Internet access and computing for SMEs and households
	IT for health care systems

Transportation	energy-efficient vehicles
	bulk transportation systems
	high-speed domestic passenger transportation

Federal Institutions

Federal Laboratories

The federal government supports a number of laboratories whose purpose is to maintain a public competency in areas where either there is only room for a single national facility (such as the National research Council's wind tunnel) or to maintain an arm's length research capability for regulation and safety in the public interest (such as drug testing at Health Canada or explosives research at Natural Resources Canada)

The Industrial Research Assistance Program (IRAP)

As noted above, IRAP is an interesting exception to rule that the federal government is trying to divest itself of programs that directly support Canadian industrial innovation. It is one of the oldest innovation support programs in the country – it was established in the 1950s. It provides both technical assistance and small scale financial support to small and medium-sized enterprises across the country, with a focus on providing support in smaller communities, where there may be no larger university of other public sector laboratories. In a number of federal S&T policy reviews it has always emerged unscathed due to the strong support it receives from the private sector.

R&D tax credits

The Canadian tax system provides generous tax credits to those firms that carry out R&D. The definition of R&D is essentially that used by the OECD (in the natural sciences and engineering, social sciences are excluded). This tax support provides a significant advantage to Canadian firms and Canadian branches of multinational firms. Indeed, it has attracted significant inward foreign investment in R&D by multinationals, with consequent spill-over effects to the Canadian economy.

Provincial Policies and Institutions

Canada is a patchwork of provincial jurisdictions whose innovation policies range from the highly sophisticated and *dirigiste* policies of Quebec to a virtual indifference or ignorance in the smaller provinces.

Post-secondary education, and thus all universities, fall within provincial jurisdiction. Virtually all Canadian universities are publicly-funded, and all research universities (i.e. universities with research-based post-graduate programs) are public institutions. Provinces provide funding for the basic infrastructure, while the federal government provides support for specific research initiatives through various granting agencies (as noted above). In general universities carry out basic and pre-competitive research, while applied and mission-oriented research is carried out elsewhere. There are only a few mission-oriented provincial research laboratories (many are in Quebec).

The government of Quebec has made heavy investments in the aerospace sector to support the aerospace industry in Montreal. This includes heavy investment in educational

facilities, to ensure an adequate supply of skilled labour as well as support facilities for the industry itself.

Many of the provinces see education itself as a saleable product and have invested in educational programs that attract foreign students. These are not just university-level programs but include some skilled trades such as aircraft mechanics (in both BC and Quebec). These programs also support local entrepreneurs: for example there is now a significant cluster of firms in BC that repair and rebuild old aircraft, often aircraft that are no longer supported by the original manufacturer.

Canadian industrial innovation and entrepreneurship

Canadian industry has been the beneficiary of both the IRAP and research tax credit programs. Frequently these programs provide the incentive for investment by Canadian industry in research and innovation. While investment in research by Canadian industry is below the OECD average, much of the difference can be attributed to the fact that Canadian industry is heavily resource oriented, and resource industries in general do little research themselves (usually relying on their equipment suppliers to carry out the research and innovation necessary to increase productivity. Canada also has a sizeable services sector, a sector which does not support many formal research or innovation programs.

Canadian industries which do carry out research tend to concentrate on specific niches where Canada has a competitive advantage. Thus ICTs are a major area for innovation, since the geography of the nation demands efficient telecommunications and digital access.

Mexican Policies and Institutions

Latin America has been lagging behind in the development of technological innovation (Sutz 2000, Etzkowitz and Brisolla 1999, World Bank 2008). Too large a share of its business firms are mostly “survival” firms (Altenburg and Meyer-Stamer 1999), with a defensive position in international markets. However, firms that invest in knowledge and innovation tend to have a better performance than the rest (Maranto y Gómez 2005).

Even though Mexico is usually seen as one of the most advanced economies in Latin Amercia, its tradition, policies and institutions for the development of technology and innovation are still to prove their impact in the economy and in its international competitiveness.

Federal policies

Among the OECD countries, Mexico ranks at the bottom in terms of investment in S&T as a percentage of gross domestic product. In spite of government commitments to the contrary, its gross expenditure on R&D (GERD) is below 0.4%, instead of rising to 1%, as established in the Special Science and Technology Program (PECyT 2001) issued by President Vicente Fox. Along with Greece and the Slovak Republic, Mexico is one of the OECD countries with the weakest R&D intensity and the lowest business R&D intensity (0.3% of industry value added) (OECD 2007).

The country has recently made attempts to increase government funding for business R&D and to expand business investment in it (OECD 2007). However, programs such as AVANCE, and tax incentives for R&D still are in the initial phase of their learning curves, and they still have to prove their ability to reach a significant portion of their potential

users. It was only in 2007 that a fund to promote technological innovation by subsidizing up to 50% of the projects was created, so it is still too early to assess its impact.

Federal institutions and programs

The National Council for Science and Technology was created in 1970, depending from the Ministry of Education, with the responsibility for developing science and technology policy in Mexico. Its mission is to promote and strengthen scientific development and technology modernization in the country, through the training of high-level personnel, in order to bring the country to have a greater participation in the generation, acquisition and diffusion of knowledge, and to significantly increase society's scientific and technological culture, enjoying the benefits that derive from it. Under this mandate, it has developed and proposed several initiatives to Congress, for the support and development of S&T in the country (CONACYT 2008).

However, CONACYT's history has been marked by a strong institutional ambiguity, since its budget has been allocated and its performance evaluated by other ministries, such as the Ministry of Programming and Budget. To this date, its decisions and initiatives are subject to approval by the Ministry of the Treasury, mostly for economic and budgetary reasons. The National Science Advisory Council was created in 1989, with a mandate for supporting decision-making and policy making in this area at the highest level Even though the president nominally presides this Council, this council has never been convened by him.

These problems not withstanding, the federal government, through CONACYT itself, and through the Ministry of Economy, has launched programs to support the development of TBF's. Among them, the following can be counted:

AVANCE – A program that runs four instruments, dedicated to support the development of innovations and new technology ventures as spin-offs from scientific and technological developments.

TechBA – Tecnology Business Accelerator, run by the Mexico – US Foundation for Science and Technology, which provides guidance and support for technology-based entrepreneurs, in order to target international markets.

High- and Intermediate- Technology Incubation Program – Designed to build incubation capabilities in higher education institutions, and to multiply successful incubation models.

State policies and programs

Several states have advanced aggressive and visionary programs that in some cases take advantage and, at the same time, overtake federal efforts. Among them the States of Nuevo Leon and Jalisco have initiated aggressive efforts to develop their science, technology and innovation capabilities.

The state of Jalisco, together with the states of Nuevo Leon, Guanajuato, Puebla and Morelos, has been one of the most successful in leveraging federal funds for specific technology and innovation programs, such as the Software Industry Development Fund (PROSOFT). These funds have enabled the development of technology parks and incubation facilities for software companies that have already shown a significant impact in the states' economies and their levels of entrepreneurial activity.

What has proven to be more effective at the regional and state level, than at the federal level is the identification of sectors and industries that will be considered strategic, and the

development of instruments and programs to address key needs in those sectors. Some programs, such as the regional funds for science and technology (FOMIX) have begun to address needs identified and defined at the state and regional level, with the participation of local industry.

State-level science and technology agencies such as COECYTJAL (Jalisco), CONCYTEG (Guanajuato) have also promoted the creation of new public R&D centers that look at the development of science and technology capabilities. An example is the National Plant and Microbial Genomics Laboratory (LANGEBIO) in Guanajuato, while Jalisco is attempting to develop industry-led R&D laboratories. The state of Nuevo León has launched also an ambitious initiative that aims to build a scientific and technological park with the collaboration of public research centers, universities and industry.

But federal or state (or provincial) policies and programs to promote innovation can only be effective to the extent that they influence decisions made by different actors in the system. Universities and researchers must recognize and use different criteria for their decisions and resource allocation, businessmen and entrepreneurs must incorporate the impact of public policies and programs in the design and construction of their new firms. To the degree that this process is aided by support organizations (whether public or non-governmental), a sense of common purpose will give rise to collective action and to the emergence of systemic properties in the network.

The "Business Model" Concept: Does it Make a Difference?

In order to create a new firm, whether in traditional or in high-technology environments, conceptions are necessary to bring together information from the environment and technological capabilities into significant agendas and action plans that take advantage of recognized opportunities (Witt 1998). The evolutionary theory of the firm (Nelson and Winter 1982) seeks to explain new firm organizational forms as means of acquiring, combining, utilizing and maintaining technological and commercial knowledge and skills (Witt 1998). Firm-specific competencies for generating, acquiring and using productive knowledge profitably become the source of business models in technology-based firms.

The concept of a business model being a construct devised by researchers in order to account for differences in design and strategy that are seen among firms, does not have a fixed or observable structure, and no general and commonly accepted definition of the term has emerged so far (Shafer et al. 2005, Morris et al. 2005). Different authors and theoretical approaches will identify diverse attributes of the firms as relevant to account for their business models. However, in a review of the relevant literature, Morris and his group (Morris et al. 2005) have synthesized a useful framework for understanding common and differing firm organizational and operating structures. They group decisions made by entrepreneurs in three levels: the economic one, that expresses the logic of value creation and profit generation, the operational level, where the concern is the structure and interaction of the firm's subsystems in order to create that value, and the strategic level, where concern is the sustainability of a competitive advantage and the positioning of the firm among the relevant actors in the system where it operates.

Even though these authors do not apply directly to TBF's, the business model concept provides useful framework to examine how they significantly differ from other firms, and

to study how an entrepreneur comes to incorporate specific environmental resources and constraints in the design of the new firm (Crick and Spence 2005).

The nature of a TBF's assets and products, its potential markets and competition, its infrastructure and operating rules, and the very goals that the founding team my have for the firm, differ from traditional firms. An entrepreneur may build a new firm with only patents or knowledge as its main asset, for example, with the aim to sell it to a bigger company within five years. Or he may strive to continue to develop the technology into marketable products, where he will have the option of manufacturing directly or to outsource that function to other firms, whether nationally or internationally. In most cases, because of the cost of developing the technology, and because of the specific interests of investors, a TBF is a born global firm: it is oriented from its inception towards international markets, since domestic markets are seldom enough to recover the investment. In the case of disruptive technologies, the ability to create new markets, or change the rules of competition in them naturally positions the new firm to attack reach for global markets. If these components of a TBF's are well understood, the appropriate policy measures and programs may be devised for them and, maybe more importantly, participating organizations in the innovation network will be better prepared to interact in a fruitful way.

Method

Research reported here has been done as part of a nation wide project carried out by the Innovation Systems Research Network[4] with the aim of identifying important characteristics and dynamics of city-regions across Canada. The current project is the second phase of a previous one, which studied the structure and dynamics of regional innovation systems across the country. Interviews referred to here were conducted mainly in the Greater Vancouver Regional District, but occasional references are made to interviews from other parts of the country.

In the Mexican case, interviews were conducted in the Central and Western part of the country, among firms and public research institutes, under a project funded by the National Council for Science and Technology, and the collaboration of the Jalisco State Council for Science and Technology.

Fieldwork comprises: a) interviews with entrepreneurs, businessmen and trade association representatives; b) officers in charge of government economic development programs; c) public research and development organizations; d) comparative analysis of policy documents. The qualitative analysis of these data is structured in order to elucidate the ways in which entrepreneurs interpret environmental signals as they build their business models (Morris et al. 2005). Rather than establishing a statistical generalization, the aim is to understand the ways in which entrepreneurs incorporate environmental signals and available resources in their business models, and the role that support and service organizations play in the instrumentation of technology and innovation policies and programs.

[4] www.**utoronto**.ca/**isrn**/

The role of policy environments in technology-based business models

Interviews with entrepreneurs and with representatives of the organizations they interact with clearly show differences in what entrepreneurs perceive as opportunities derived from public policies and from the environments that they foster. In Canada, deliberate efforts by government agencies seek out areas of opportunity for innovation-based economic development. The executive director of an organization funded by the provincial government, and dedicated to promote the interaction among university researchers, businessmen and venture capitalists describes the origin of that organization:

> "(…) and then there are a number of companies in BC that have identified themselves as either being nanotech company or … in which their work they use the products applied nanotechnology. And then thirdly, we want to bring together folks who have an interest mostly, I would say, as investors, and also the general public. (…) I was contracted or chartered in 2002 by the National Research Council to do an economic impact study of a couple of emerging sectors, and nanotechnology being the first one I concentrated on (…) Nanotech BC was formed in 2006 to do exactly to what we had suggested. The whole idea of having that catalyzing effect, so we are here to try and stimulate the whole sector, advocate on behalf of it where we possibly can, and then a large component of our effort is education, so whether it is helping investors understand what the academic folks are doing, or answering questions that the general public may have about nanotechnology and nano materials, that sort of stuff is what we are trying to do."

Public research institutions have been for a long time given the mandate to have a tangible impact in economic development. This mandate translates into collaboration with trade associations and with firms, which in turn represents opportunities and resources for entrepreneurs. Provincial and federal level private and public organizations deliver resources and support for startup TBF's.

In British Columbia public agencies have a strong mandate to help new TBF's get started. A significant amount of tacit knowledge flows in the system by means of personnel mobility.

> "I am a scientist, a geologist by training, and so I worked as an expert in geology for ten years, and then I worked with the precursor to the BC Innovation Council, I worked with an organization called the Science Council of BC from 1992 to 1998. And my role was to help to provide government financing for applied research and development projects. Most of them would be coming from, at the time, the three universities: UBC, Simon Fraser and UVic, and my main role, other than writing a check to these folks was helping these different, basically researchers, take their idea and turn it into a business. And it was difficult to do that."

Professional service firms are also well equipped to help startup firms take advantage of fiscal incentives:

> [So, is it that most of the services your firm provides are linked to the specificities in the industry? For example, taxes, are they linked to the dynamics of the sector itself?]
>
> "Yeah. Most of the tax work we do involves making sure that a company maximizes its claims for scientific research and experimental development credits. For two reasons. When you are a Canadian privately controlled corporation you get refundable tax credits, up to seven hundred thousand [700,000] dollars a year. And if you are not a Canadian controlled private corporation you can't get the refundable credits, but still designate those expenditures as scientific research and experimental development, and the trick there is that the deductions are available in perpetuity, not just for a limited period of time, so if you [...]"
>
> [So, then you have to understand the technology itself, and the level of development it has at a certain point...]
>
> "Yeah. People in our SRED practice which is [...] practice are very knowledgeable in the fuel cells space, yeah."

In the Mexican case, startup firms in sectors such as information and communication technologies (ICTs) have experienced some relationship with state government support programs. There are still doubts, however, about the value of those programs for the startup firms, since all parties are still in a learning phase on how to build collaboration among the organizations involved, and that makes it difficult for entrepreneurs to take advantage of them in building up their firms:

> "We have had contact with government programs that have helped us build collaboration links with academia, but we have had some trouble with the bureaucracy involved. Whenever we want to share an MOU with universities and need support from the government, there is a lot of red tape and paperwork. There is a lot of paper work that is not proportional to the resources you will get, such as a student internship […] Maybe if resources were more significant, if they represented a greater incentive for the student to remain in the company, or even to go and work at a research establishment, then it would be worthwhile…"

Some networking organizations and industry associations are being created, or have recently been created, with mandates similar to those in Canada, but they are currently learning to interact with the federal and the state government, as well as with the entrepreneurs themselves, in order to fulfill them:

> "Our goals include triggering and promoting growth in the [IT] sector, with an impact in the sector itself, but also on other sectors that are important in the state such as the shoe and food manufacturing industries, so that these technologies are used to improve the competitiveness of firms in the state. (…) We have been able to set up the [software technology park] and important alliances with universities and with private enterprises for development of new

> products locally… in under a year. (…) We have become part of the ecosystem, and that makes us strong (…) Restrictions? Support from the federal government is very small, there is not enough investment on science and technology, and without research there won't be any significant growth in technology."

It is also clear that the ability to take advantage of public programs and initiatives depends to a large extent on the business model that the entrepreneurs are trying to work with. Many firms attempt to join collective efforts for the wrong reasons:

> "They joined the network because they thought that there would be public funds and commercialization opportunities readily available for their firms, and not because they were intent on building stronger capabilities in them, when in fact that is the main issue for those companies that remain in [the network]. It was only after a lot of struggle that only those firms with long-range and international market business goals remained in [the network]."

But policies and programs need to directly impact the entrepreneur's business model in order to have any efficacy. For startup TBF's, these resources and programs form a key factor in the difficult path towards commercial viability:

> "The government of Canada has been fantastic as a supporter for [our company], the reason is that the amounts of money available through government programs has been well tuned to our capital needs. The government of Canada has contributed to Angstrom through four programs. First of all, the Scientific Research and Experimental Development Program, which is a tax credit program. It's automatic, if you are doing research and development, and you document your work. It pays us one third of our R&D which is not being funded by other activities. We get the cash back, not a credit, cash from the government. So, every year we do a tax return and the government pays us. It's unique in the world. Second, NRC-IRAP has been very supportive. They have supported us now through two major projects. IRAP's support is approaching (X) dollars. They helped us make the transition from our first generation to our second generation technology. We viewed that our first generation technology would fail, we didn't think it had mass market potential. We had some ideas. We went to IRAP and said: 'We need a year. The other stuff is doing fine, we can keep the investors going... they won't realize for a year that this was a bad idea. Would you help us work out the new idea? So when they figure it out, we've got something better to show our investors'. And they did. They helped us, and that's [how we developed the new technology] a really good technology."

> "Some government policies help, but others hinder our progress. Yes, it is through federal government support, through the ministry of Economy, that we have been able to obtain the certifications we need to export our software (…) but the financial part is not well designed. We have been approached by a state

> funding agency, but unfortunately their operating rules are not adequate for our needs"

This impact is again possible as different actors learn to adjust their operating rules to each other, both at the individual and at the collective level:

> "There are good policies in place, I am happy to be working in this sector, we are all trying to join our strengths, we are all in line, but we need more support from the government and the private sector, from both. The government is doing its share, but more financing for the firms is needed. They ask them for collateral, but they have nothing, they are just beginning. In startup technology-based firms it is so little what they have in terms of traditional assets… a financial system needs to adequate its policies in order to support small and medium software firms. (…) we have hosted several meetings with (banking institutions), but we are only just beginning, we do not have solid foundations yet."

Although some programs to support private R&D are in place, they are still not adequate to fit the needs of a TBF's business model:

> "There are some funds available from CONACYT, but we have not applied for them because they are mostly for infrastructure and equipment. They cannot cover salaries to the extent we need (…) and it is research talent what represents our biggest expense. So therefore, we are progressing very, very slowly, working only with those researchers who are partners and who are willing to wait for payment."

Availability of angel and venture capital is very scarce, and to a large extent, mostly unknown for the majority of entrepreneurs. There are not enough sources of capital for new technology-based ventures:

> "There is very little financing available in Mexico for sharing technological risks. You can usually get loans for small *tortillerías* and grocery stores, but there is no funding for technology."

Discussion and conclusions

The study of entrepreneurs' perceptions of policy environments in both countries underscores the differences in the role that technology plays in their business models. The role and visibility of federal and local programs and policies in this domain, however, is not only a function of individual entrepreneur's ability to monitor his environment. In innovation networks, multiple players perform complementary functions in delivering technology and innovation programs to traditional as well as to high-technology businesses. This research echoes findings in other contexts (Casper and Kettler 2001, Benz and Furst 2002), namely that it is not only personal talent or specific policies as such what are behind

the success of effective innovation policies and of high-technology entrepreneurship. The development of an effective innovation network is also a function of the institutional arrangements or interaction rules that the new firm must establish with those organizations with which it interacts, and of the collective learning process that must ensue. It is only when these interactions are clear and predictable enough that entrepreneurs may incorporate them into their business plans that they begin to have a significant impact on their success rates, and on a regional or national economy.

In the Canadian case, programs oriented to foster innovation have a long history at the federal and provincial level. The role of local and federal policies is clear and visible for the entrepreneur. It is frequently described by businessmen in terms of available funding for R&D activities, and fiscal credits, for example. These programs are also actively lobbied for by trade associations, and managed by service organizations and consulting firms.

Mexico has quickly transitioned between an import substitution industrial policy to a very open economy. However, businessmen have had relatively little capacity to adapt their business models, and they have tended to seek the extension of protectionist measures as their domestic markets are challenged by aggressive foreign competition.

Mexico has a series of handicaps in terms of the environmental components that can foster the development of technology and innovation capabilities in enterprises: the knowledge base at universities is still underdeveloped, and links to industry are only beginning to emerge; venture capital is practically absent, except for certain elite economic groups. Few businessmen are able to identify useful industrial policy programs that may help improve their viability and competitiveness. Those that are more visible are financial in nature, and usually their requirements are beyond the ability of small businesses to fulfill them. The public sector is usually distrusted or considered irrelevant.

Still, in Canada as well as in Mexico, the role and importance of diverse actors in innovation networks under development can be identified. Both in Canada and Mexico support and networking organizations have a strong role to play but, more important than that, they must gradually learn how to interact with other actors in the system, and how to adjust their role to changing conditions.

These results suggest it is important that policy design and instrumentation be strengthened at the local or regional level, but that the support of federal policies cannot be underestimated. Knowledge of local conditions, needs and opportunities occurs at the local and regional level, but local resources must be backed strongly by those available at the federal level.

Even though every entrepreneur, by necessity must allocate his attention and resources to many different areas, a very important learning process about opportunities in his environment and about how to take advantage of them is necessary. It is only when entrepreneurs and business managers are able to design and adapt their business model and strategy to opportunities available in their environment (Crick and Spence 2005) that the viability of their firms grows.

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