Víctor Garrido of **Dumont Bergman Bider** discusses the efforts to apply a national innovation system in Mexico

The Mexican innovation system

The System Theory has been applied to several aspects of modern life since its publication by Bertalanffy in 1968. Scientists, technicians, enterprises, governments and international organisations have taken into account the system theory principles to try to better understand natural and social environments, with a view to influence and even to drive them.

Within the context of the System Theory, the concept of a National Innovation System (NIS) – as discussed by Freeman (1987) – has become paramount around the world. Freeman proposed the NIS concept from an analysis of the economies of developed countries such as US, Japan and Germany and concluded that innovation is a determinant key to explain the growth and success of those economies. The NIS concept is in continuing construction, as shown by further works dealing with the topic: R Nelson and N Rosenberg (1993), P Patel and K Pavitt (1994), G Dossi (1999), Narayanan (2001) and Mira Godinho (2006).

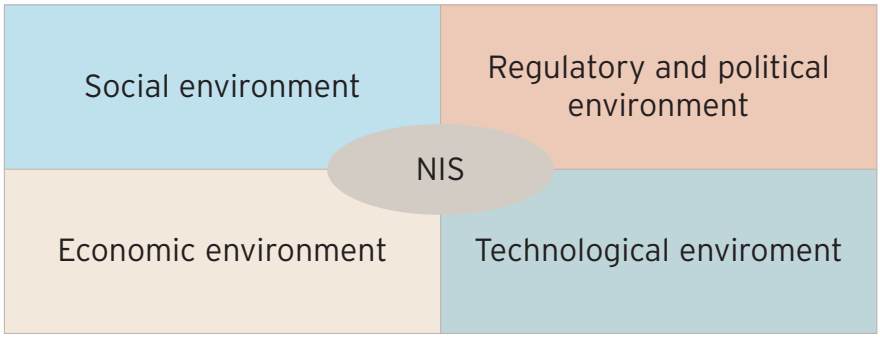
Narayanan puts the NIS within the context of a macro environment comprising four environments that directly influence the NIS of a country (See below).

As inferred from the below chart, the degree of development of an NIS defines, from a broad perspective, the level of integration of an economy in the global market. Accordingly, the NIS should take into account as many aspects of the international economic policies of a country as possible, as well as international agreements and treaties the country is taking part in.

Moreover, it is important to note that the legal and innovation frameworks are simply dimensions of the regulatory environment and the technological environment, respectively. Laws directed to promote innovation and intellectual property laws are not more than part of the legal framework and patents are not more than an indicator of a part of the technological environment, since innovation when talking about NISs is defined in its broadest scope – it comprises both patentable and non-patentable inventions and other innovations which even include trademarks, software, managerial improvements, new business methods etc.

Neither do IP laws define the regulatory environment nor patents explain more than patentable innovations. Further, the number of patent applications or number of granted patents are not even indicators of the inventiveness of a country unless we separate resident patents and applications from non-resident ones.

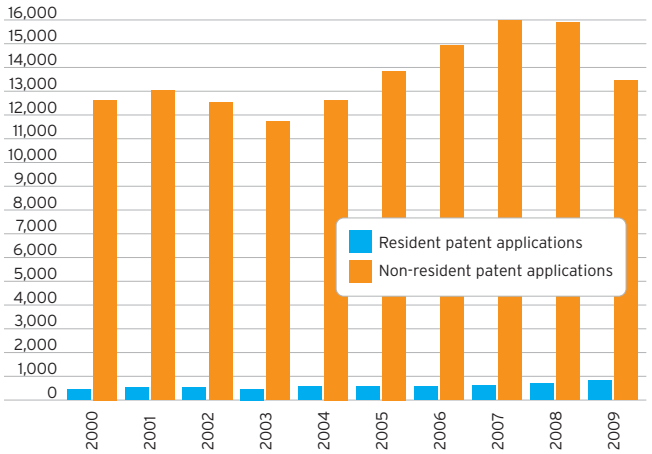
Building a functional NIS is not an easy task to do at all. It requires long term strategic vision and planning, as well as continuing efforts which require expenditure of very large amounts of both human and material resources, as well as empathetic, synergetic relationships between members of all four environments mentioned above. Therefore, institutions from both public and private sectors play a role with their interactions defining to a large degree the NIS profile.



Víctor Garrido

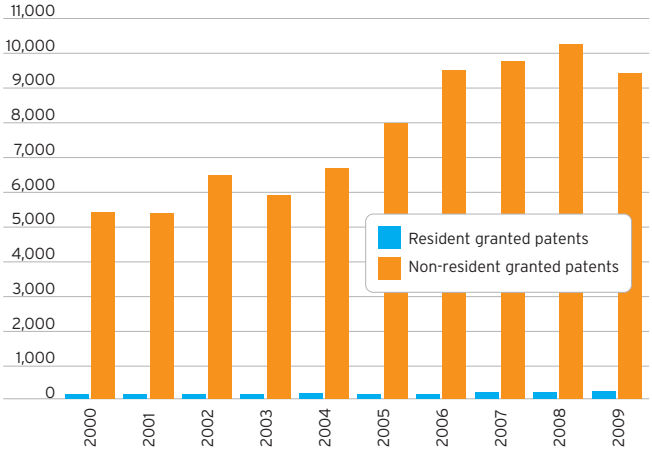
Víctor Garrido is Manager of the Technical Department with Dumont, Bergman, Bider & Co SC and has wide ranging experience in analysis of patentability and official letters on the merits of inventions issued by the Mexican Patent Office. He qualified as an industrial chemical engineer from Instituto Politécnico Nacional (IPN) in 2000, and studied intellectual property at Instituto Tecnológico Autónomo the México (2007). Garrido has been working in industrial property matters since 2001. His experience encompasses technical opinions on patentability, clearance analysis, and handling of all aspects related to drafting, filing and prosecution of patents and utility model and industrial design registrations before the Mexican Patent Office. He is member of the Mexican Association for the Protection of Intellectual Property and has finished the credits of a Master of Business Administration Degree at IPN. Garrido speaks Spanish and is fluent in English.

Graph 1: Resident and non-resident patent applications filed in Mexico (2000-2009)



Source: Mexican Institute of Industrial Property

Graph 2: Resident and non-resident patents granted in Mexico (2000-2009)



Source: Mexican Institute of Industrial Property

Mexico initiated efforts to have an NIS in 2001 with the Special Programme of Science and Technology 2001-2006 (EPST) driven by the National Council of Science and Technology (NCST), a public organisation created in 1970. The EPST 2001-2006 was born within the context of the Science and Technology Law issued on June 5 2002, which abrogated the former Law for Promotion of Scientific and Technological Research of May 21 1999. Surprisingly, none of said laws as originally published made reference to an NIS, so the EPST was an attempt by the NCST to bring Mexico up-to-date, 15 years after the NIS concept came out.

A National Science and Technology System (NSTS) was defined by the EPST 2001-2006 with special focus on enhancement of the business profile of Research & Development (R&D) activities in Mexico (Menéndez et al). Unfortunately, it met with little success for the reason that the NSTS did not really seem to take the macro environment into account as it should have done – for example, by considering indicators as proposed by Narayanan. The Organisation for Economic Co-operation and Development (OECD) concluded in 2005 that the inefficacy of the system was primarily explained by a lack of linkage between the private enterprises and universities, mainly the public ones. A quick review of indicators, such as resident and non-resident patents and patent applications, clearly shows the failure, especially if we take into account the fact that at the end of the 1970s, the share of non-resident patents was 87.1% (Sagasti and Cook).

There was not a sustained increase in the number of resident patents or patent applications during the period 2001-2006. Distribution of patent filing by residents and non-residents in Mexico maintains no similarity at all with the world tendency shown next page as informed by the World Intellectual Property Organisation (WIPO), which indicates that from 2001 the share of non-resident patent filings has been more or less stable at around 42 to 43%, while the share of non-resident patent filings in Mexico is around 98%.

On the other hand, even if ineffective linkage between the academics and industry is surely the most important systemic issue explaining failure of the NSCT, it is also true that no significant improvements can be expected without an increase in R&D expenditure from government; expenditure was not more than 0.5% of the gross domestic product GDP during the period 2001-2006, a relatively low percentage if we take into account the OECD recommendation of R&D expenditure of at least 2% of GDP, expended in 2006 by countries such as France (2.4%), Denmark (2.4%), Germany (2.5%), the US (2.6%), Japan (3.2%), Finland (3.4%) and Sweden (3.7%) (Eurostat, 2008). All this, despite the OECD note that the Mexican government funding for business R&D had increased in such a way that the share of business R&D financed by government had more than doubled from 2.8% in 1995 to 5.7% in 2005.

Mexico continued its efforts to build a functional NIS, with the EPST 2007-2012, which tried to take into account OECD notes. However, to date, the results achieved have not been encouraging and the conclusions from OECD in 2008 provide a disappointing outlook:

Mexico's reforms have not led to the productivity growth necessary to catch up with other OECD countries. Continued structural reforms will be needed to put the country on a firm basis to boost innovation, productivity and growth.

Mexico's level of development affects its innovation system... various structural weaknesses inhibit innovation, including gaps in physical infrastructure, restrictive regulations, and, most importantly, a low level of human capital

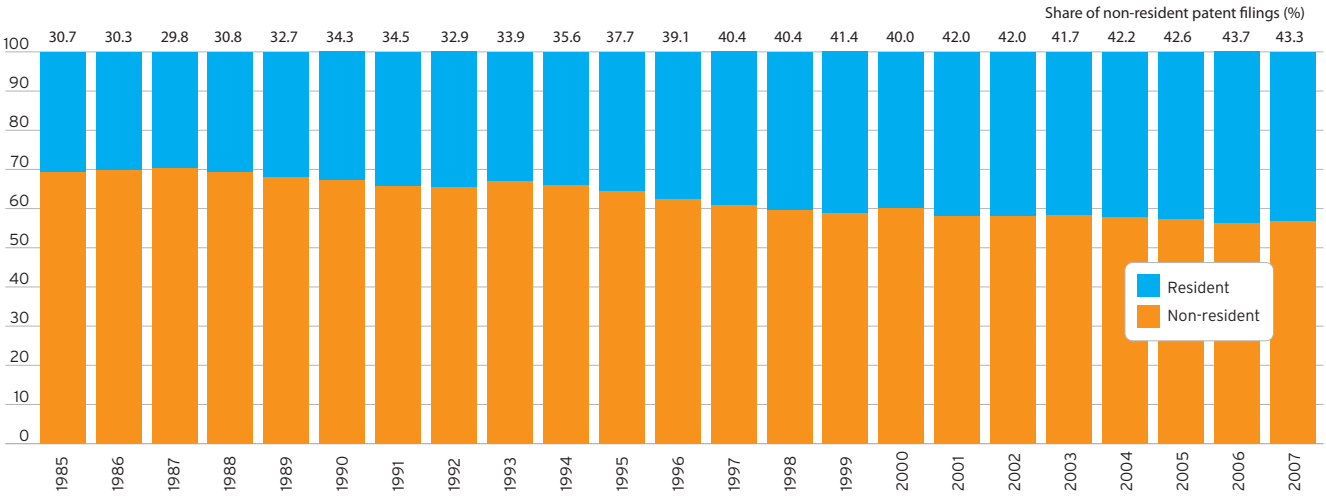
Mexico's R&D intensity is one of the lowest in the OECD area; gross domestic expenditure on R&D (GERD) is 0.5% of GDP. However, this ratio is not out of line with Mexico's income level.

Mexico's technological and scientific performance, as measured by patents and publications, is low...

Public institutions and universities continue to play an important role in R&D, while the business sector finances 47% of R&D and performs just under 50% (which is below the OECD average).

Perhaps the OECD note that the key challenge at this stage in Mexico is to establish supportive underlying conditions for innovation, particularly with respect to education levels and the competitive and regulatory environment, prompted the Mexican government to substantially amend the Science and Technology Law, which had been in force since June 5 2002. On June 12 2009, the amended Science and Technology Law came out. Article 2 of this amended law sets the basis for integrating what is now called the National Science, Technology and Innovation System (NSTIS).

Percentage distribution of total patent filings by residents and non-residents



Note: PCT national pahse entry data is incomplete prior to 1995. The world total is based on WIPO estimate. *Source: WIPO Statistics Database*

This is the first time a Mexican federal law explicitly addresses an NIS (the 2002 Law did not, so the attempt to create it easily failed). With this new law, the Mexican Government is obligated to drive, enhance, develop and consolidate the scientific research, the technological development and innovation in the country. Special focus is put on linkage between the academic and the productive sector. Technology transfer will play a relevant role if such linkage is achieved. Perhaps forecasting success on this issue, the law creates and regulates linkage and transfer of knowledge units (which will basically be technology transfer offices (TTO)). Article 4 of the Law undoubtedly integrates the System Theory and a broad concept of innovation to the Mexican science and technology public policy by defining innovation as the creation of a new product, design, process, service, method or organisation, or the addition of value to those already existing and by defining technological development as the "systemic use" of knowledge and research directed to the production of materials, devices, systems or methods.

22 years after Freeman proposed the NIS concept, Mexico is on the way to build its own NSI with a fresh amended law, an academic-private sector linkage approach and a plan to manage TTOs. Hopefully this time, if efforts are duly directed, Mexico will succeed.