Science & Technology in Mexico

Background

With a population of just under 100 million and a GDP approaching US$ 500 billion [1], Mexico's economy is largely based on services (66.4%) and manufacturing (31%), with agriculture represented only by 4.8% in 1999. The share of exports of goods and services is 31% of GDP, probably dominated by trade with NAFTA partners, with imports accounting for 32.3%.

Six years after a major macroeconomic crisis, Mexico is one of the fastest growing economies in Latin America, having succeeded in maintaining high economic performance throughout the recent years of international financial volatility. It is addressing poverty reduction on a wide front, through fiscal, financial and administrative reforms, targeting societal issues in sectors such as health, rural development and employment generation.

Mexico's future development will have to be progressively more based on the effective generation and utilization of knowledge, in order to meet economic, social and environmental challenges. The role of the scientific & technological communities in knowledge supply and in its effective integration in innovation systems cannot be overemphasized. If it wants to invest coherently in its own S&T assets, and assert its own intelectual and scientific capacities in the global knowledge society, Mexico must strive to go beyond the level of being an "economic province" of the much larger and US-dominated NAFTA. This calls for the **reinforcement of scientific & technological interfaces primarily with Europe but also with the Latin American & Caribbean countries**.

At the last meeting of the EU-Mexico Joint Committee, Cooperation in Science & Technology was specifically designated as the 4th pillar for bilateral cooperation, highlighting the considerable importance attached by the Mexicans to the reinforcement of their S&T capacity and to the performance of their knowledge and learning systems. Mexico's interest in the S&T Agreement was formally reiterated.

Clearly, the Mexican Government has decided to pursue a strategy of internationalisation of its knowledge & learning system, possibly by reducing its presently excessive dependence on the USA. Enhanced S&T Cooperation with the European Union has therefore potential geopolitical and geoeconomic consequences, both for Mexico and for the Union.

Overview of Mexico's S&T

[1] World Bank, http://devdata.worldbank.org/data-query/

Overall investment levels in S&T remains low, although substantial investment in local human resources and infrastructure is required to ensure the absorption, adaptation and application of world-class technology. For instances, Mexico's investment on RTD is the lowest of the OECD [2] (0.31% of GDP), compares unfavourably with 0.38% for Turkey and represents only one-seventh of the OECD average. This figure can also be compared with those of China (0.7%), India (0.8%) or Brazil (at least 0.8%).

Fluctuations in research funding over the past 25 years are very visible, often increasing or decreasing by 50% on an annual basis, reflecting economic cycles. These fluctuations have necessarily a negative impact on the continuity and the stability of research activities, driving down researcher productivity indicators.

In what concerns human scientific capital, Mexico has the lowest concentration of researchers in OECD countries, with only 6 researchers per 10,000 inhabitants, compared to 48 in Korea and 29 in Poland. Mexican levels are not very different from those of India, with 4.8 researchers per 10,000 inhabitants.

Human resource formation, a critical output of research projects, also remains disappointigly low. Mexico trains fewer Ph.D.s per year than comparable countries, with 3 Ph.D.s per million inhabitants, compared to 5 in India, 6 in Brazil and 19 in South Korea. Moreover, there is a significant regional disparity in the allocation of scientific resources, with 75% of all doctoral degrees being awarded by institutions in the Mexico City area.

Productivity of research, expressed in terms of peer-reviewed international journals per researcher, *per annum*, has increased at a fast pace between 1990 and 1995 (9.6%). Despite this impressive growth, productivity remains low at 0.42 publications per researcher, *per annum*.[3]

Societal Relevance of the Mexican S&T System

The scientific quality of Mexico's output is beyond doubt, as is the excellence of a number of its contributions to world science. However, the contribution of Mexico's S&T system to societal development has been hampered by two main factors, namely :

- Lack of demand-driven technological support institutions, with the associated centralized control by federal agencies and an over-emphasis on the supply of S&T services versus incentives for articulation of demand; and,
- Relatively narrow definition of individual research programme objectives, possibly reflecting shorter term policy scenarios, sectoral research approaches and low levels of international S&T Cooperation.

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[2] OECD MSTI Database, November 1997 (data from 1995)
[3] Indicadores de Actividades Científicas y Tecnológicas, CONACYT, Mexico, 1997

The Government of Mexico is endeavouring to rescue these shortcomings by improving the performance of the knowledge & innovation system, promoting demand of technology by SMEs, increasing the effectiveness of investment in research and related human capital formation, providing stability to and consolidating research centres and implementing reform in the higher education system. To this extent, Mexico has decided to reinforce its S&T investment (US $ 1,685 million for the period 1998-2000) by requesting a loan from the World Bank for a "Knowledge and Innovation Project". This 5-year project, with a total cost of US$ 663 million, benefits from a US$ 300 million loan from the WB.

Opportunities for S&T Cooperation with the Union

Mexico is clearly "demandeur" in this cooperation. A successfully negotiated S&T Agreement with the Union would open the door to **Mexico's unrestricted participation in the entire RTD Framework Programme**. Its past successful and sizeable presence in the *Research for Development* (INCO) programme (30 joint-research projects in FP4 and 20 in FP5, involving 33 Mexican research groups), could be extended to all the RTD thematic programmes, conceived and designed to enhance European competitiveness. An S&T Agreement with the Union would therefore be a catalytic factor in promoting broader participation in the RTD Framework Programme. It would also promote the participation of European scientists in Mexico's national RTD activities.

An Agreement with Mexico should serve other strategic dimensions of the Union's relationship with this important Latin American country, and specifically : **a)** it should provide entry points for European knowledge in economic cooperation involving high-tech industries & services, as well as enhance European RTD capacities in the exploitation & sustainable management of Mexican natural resources; and, **b)** it would reinforce considerably the ties between the scientific communities on both sides through the implementation of joint-research projects and cooperation in higher education.

Altogether, a proactively managed future S&T Agreement with Mexico would necessarily constitute an alternative to an excessive dependence on NAFTA by this country, as well as a source of much needed cultural diversity, to be found in Europe. Conversely, the Union would be able to join another emerging "pole" of activities in the knowledge society, in addition to the Southern Cone countries, with possible regional spin-offs in Central America & Caribbean countries. This is why the Union should react positively to a Mexican request for an S&T Agreement, along the lines of the one signed with Argentina and of those we are negotiating with Brazil and Chile.

The thematic focus of such an Agreement would target scientific and technological domains of interest to Mexico, such as:

- The environment and climate, including Earth observation;
- Biomedical research and health;

- Agriculture, forestry and fisheries;
- Industrial and manufacturing technologies;
- Electronics, materials and metrology;
- Non-nuclear energy;
- Transport;
- Information Society technologies;
- Economic and social development;
- Biotechnologies;
- Aeronautics and space research and applications; and,
- Science and technology policies.

Several of these domains are directly related with the seven thematic priories of the 6th RTD Framework Programme (2002-2006), providing concrete opportunities for S&T Cooperation in the short and medium term future. Furthermore, two-way mobility of scientists will be reinforced under FP6; and additional opportunities for academic cooperation and post-graduate training will be made available under the ALFA and the newly approved ALBAN programme.

The Madrid Summit of 17.05.02 has endorsed the conclusions of the EU-LA&C S&T dialogue (ALCUE), which has culminated with the S&T Ministerial Meeting at Brasilia in mid-March, 2002. This endorsement paves the way to much reinforced bi-regional S&T Cooperation on specific thematic domains of direct relevance to sustainable development. Mexico has been an important partner in the ALCUE process, a role that will undoubtedly be reinforced through the mechanisms of a future S&T Agreement.

The Science & Technology Agreement

A formal request for an S&T Agreement was received from the Government of Mexico, earlier this year. Based on this request, the Commission has asked Council for a negotiation mandate, which was granted on 12 July 2002. Formal negotiations should be opened soon, possibly in Brussels. Informally and in order to expedite eventual negotiations, meetings have been held involving the Commission and Mexican officials in charge of S&T. A draft text exists but has not yet been agreed upon.

In summary

In what concerns the Union's direct interests, three main domains of action are envisaged, namely:

- Participation of Mexico's scientists in the "seven" main priorities of FP6; and the reciprocal participation by European scientists in Mexico's own RTD programmes, directly or indirectly through researcher mobility;
- Active involvement of Mexico in the ongoing bi-regional S&T dialogue between the Union and Latin American & Caribbean countries, along

the lines defined by the S&T Ministerial Meeting in Brazil (March 2002) and endorsed at the Madrid Summit (May 2002); and,

- Mexico's proactive stance in the *Plan Puebla-Panama*, a regionally oriented development initiative aimed at reducing poverty in Mexico and Central America, and in which Mexico expects to see the Union's involvement - the critical role of research in support of specific poverty eradication issues in this region cannot be overemphasized.

These three domains of action fully justify the reinforcement of the Union's S&T Cooperation with Mexico. All three would benefit from the establishment and successful implementation of an S&T Cooperation Agreement. Such an Agreement would be consistent with the Union's overall strategy for cooperation with Mexico, Central and Latin America, as defined by DG RELEX.

FURTHER INFORMATION:

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