

OECD SCIENCE, TECHNOLOGY AND INDUSTRY SCOREBOARD 2007

BRIEFING NOTE ON MEXICO

Innovation and performance in the global economy

Throughout the world, innovation and globalisation are the two major sources of economic performance. They directly affect productivity, job creation and citizens' well-being, and they help make it possible to address global challenges such as health and the environment. As their role has taken on greater prominence, their characteristics have evolved and policies have had to adapt.

This eighth edition of the *OECD Science, Technology and Industry Scoreboard* explores recent developments in matters relating to science, technology, globalisation and industrial performance. It points to an increasing globalisation of science and technology activities encompassed by more stable trends in investment in knowledge. The pace of diffusion of information and communication technologies has become steadier than in the heady days of the late 1990s, notably in terms of broadband Internet access among households and adoption by businesses for e-commerce. Public policies that seek to foster innovation are being progressively reoriented, from subsidies and procurement to alternative instruments such as R&D tax relief and reinforcement of industry-science linkages.

Mexico is moving along these lines but still suffers from low levels of investment in knowledge (notably R&D), weak linkages between sectors for innovation, and poor scientific and technological performance. Whereas trade remains on a modest rise (notably with the United States), productivity has slowed down, hampering Mexico's global competitiveness. Such weakness is in part explained by the fact that Mexico still lags behind the rest of the OECD countries in the uptake of ICT technologies and absorption of human resources in S&T by industry.

Mexico invests more intensively in R&D but the intensity of this spending remains weak ...

In 2005, Mexico (along with Greece and the Slovak Republic) is one of the OECD countries with the weakest R&D intensity (0.5%, measured by gross domestic expenditure on R&D as a percentage of GDP), and Mexico is among the bottom five with the lowest business R&D intensity in OECD (0.3% of industry value added). However, Mexico's efforts to increase business investment in R&D are noticeable as this has expanded by 17% with respect to 2004, the second highest expansion (after China) in reporting countries.

The role of public institutions and universities in R&D remains important as the share of R&D expenditure performed by the business sector is far below the OECD average: only 46% of total national R&D (in 2005) is performed by business enterprises, while around 20% is conducted by the higher education sector. As venture capital is still at an embryonic stage, there is no statistical information available about the weight of such finance in the economy and its use in firm creation.

... despite human resources available for S&T

In contrast to the situation regarding R&D investment, Mexico has outstanding capabilities for S&T. Mexico holds the 11th place in the share of S&T degrees in total new degrees: 25% of new university degrees awarded in 2004 were in science and engineering (although this share is almost the same as that reported in 1998). This ratio is well beyond the OECD average, and similar to countries such as

Austria, Japan or Switzerland. However, although the employment of tertiary level graduates represents only 17.5% of total employment, it is expanding by 5% every year (average annual growth rate over the period 1998-2004).

At the same time, the rates of R&D personnel and researchers (in per thousand employment) are among the lowest in the OECD: fewer than 2 researchers per thousand in industry. This is mainly due to national characteristics; the business sector plays a much smaller role in the national innovation system than the higher education and government sectors. There is also evidence that an important part of professional and technical staff emigrate to other OECD countries: 7% of total employed professionals and technical employees emigrated to other OECD countries in 2001 (notably to United States). This ranks Mexico in 8th place for the highest rates of migration of highly skilled human resources.

Tax incentives for R&D and direct funding of business R&D

Mexico is increasing government funding for business R&D and is strongly promoting innovation through tax incentives. The share of business R&D financed by government more than doubled in a decade (from 2.8% in 1995 to 5.7% in 2005). Since 2006, with China and Spain, Mexico provides the most favourable tax treatment for R&D. One unit of R&D expenditure by firms (with no size distinction) results in 0.37 unit of tax relief. Further, Mexico reports the highest increase (34%) in the level of tax subsidies for R&D between 1999 and 2007.

The links between industry and universities in R&D activities are weak. Jointly with Italy and Japan, Mexico has the smallest share of business-funded R&D performed in the higher education and government sectors. University patenting in combination with patents filed by government represent in total over 8% of total patent filings (owned by Mexican residents), well above the OECD average. It is important to mention however that the total number of patent applications filed by Mexican residents remains very small (fewer than 200 PCT patent applications filed in 2002-04). Overall, Mexico's position in terms of technological and scientific performance as reflected in patents and publications remains very modest.

The information economy is expanding but Mexico is still among the less advanced countries in ICT

Despite significant advances, Mexico remains among the few OECD countries to have invested relatively little in ICT. Communications in terms of cellular mobile subscribers and fixed communications has risen overall by 21% over the period 2000-2005 (the highest annual growth rate in OECD countries). Likewise, Internet hosts (.mx) in Mexico have grown more than in any other OECD country: 67% over the period 1998-2006. Nevertheless, the number of Internet subscribers per 100 inhabitants (in 2003) is among the lowest (3.8 subscribers per 100 inhabitants), just before Turkey (3.1 per 100).

Mexico is in the group of countries (Turkey, Greece, Hungary and the Czech Republic) with the most expensive entry level charges per Mbit/s and highest monthly subscription rates (2006 and 2007). Mexico has the third highest cost per MBit/s at USD 34.01 (PPP adjusted), just before Greece and Turkey, while the monthly subscription rate of USD 52.36 (PPP adjusted) is the most expensive in the group of OECD reporting countries.

As regards trade (goods), ICT plays a particularly important role in Mexico, where it constitutes 20% of total goods trade, close to the figures of the Netherlands (21%) and Finland (19%). Patenting in ICT, according to the country of origin of inventor, is amongst the lowest in OECD countries.

Science and research are still weak but highly internationalised

Mexico is a quite open economy, notably in terms of penetration of foreign activity (in total domestic activity), either in terms of research or production, and these trends continue to increase. 61% of domestic inventions belong to foreign residents, and 48% inventions involve at least one inventor located in a foreign country.

Mexico is the second top country in terms of intensity of international co-inventions (patents with foreign co-inventions in total inventions made). This reflects Mexico's need to overcome the lack of the infrastructure needed to develop technology. Not surprisingly, over 29% of co-inventions have a US inventor as a partner.

In terms of outward foreign direct investment (FDI), Mexico invests 0.4% of GDP in non-resident enterprises. This is a striking contrast to the share of FDI inflows to Mexico: during the period 2000-05 investment by foreign companies constituted 3.8% of GDP, just behind the United Kingdom, Sweden and Canada (4.3%, 4.3% and 4.1% respectively).

There has been a slowdown in productivity but steady expansion of exports

In 2005, Mexico reports the second widest percentage gap (after Turkey) with respect to United States GDP per capita (74 percentage points) with the main gaps coming from differences with respect to US GDP per hour worked (-70 percentage points), and minor differences (4 percentage points) in terms of labour utilisation (gap in hours worked per capita). Furthermore, compared with the period 1995-2000, the economy has slowed down, as seen in the significant decrease in the annual rate of labour productivity growth in recent years (2000-2005). As seen in the contribution of sectors to the growth of value added per person employed, the slowdown is mainly explained by the contractions (in percentage points) in the business sector services and the manufacturing sector.

The capabilities of Mexican manufacturers in technology creation are reflected in the importance of high and medium-high technology manufacturing: in 2004, these industries constituted 6% of total gross value added. In contrast, knowledge-intensive market services (post and telecommunications, finance and insurance and business services) represented less than 13%, putting Mexico one place before the bottom of the OECD reporting countries.

Exports in high technology industries continued to rise significantly by 11% over the period 1996-2005, well beyond the average of the Mexico's manufacturing industry (9%), and the OECD average (6%). Yet this expansion is half the growth rate reported in Turkey, Greece or the Czech Republic, and less than half the growth experienced in Hungary or China.