Implications of Knowledge Transfer and ICT on the Level of Labor Productivity in Mexico: An International Comparative Analysis

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The leading role information and communications technologies (ICTs) and knowledge dissemination plays in labor productivity has been the object of attention of many authors (1a). However, few empirical studies exist that support the proposed elements in the Mexican context. This study, one in a series of four, presents a general overview of the level of labor productivity in Mexico in the international context and its relationship with the ICTs and knowledge dissemination, which will serve as a foundation for a later empirical analysis of the services sector. (Paper 2: Causal Relationship: Knowledge Dissemination – Labor productivity; Paper 3: Causal Relationship: ICTs – Labor Productivity; Paper 4: Model for Measurement of Increase of Labor Productivity as a Function of ICTs and Knowledge Dissemination.) (1a) Bailey (2003), Bailey & Gordon (1988), Colechia & Schreyer (2001), Gordon (1999), Jorgenson & Stiroh (2000), Oliver &Sichel (2000), O'Mahony & Van Ark (2003), Pilat (2003), Stiroh (2002), Van Ark & Timmer (2004).

1. Introduction

In recent years, productivity and economic growth have been a major focus in the global arena (Pilat and Schreyer, 2004). Endogenous growth theory, based on neoclassical theory, states that in the long run, the main underlying determinant of economic growth is the total factor productivity (TFP), an element that depends largely on the rate of technological progress in the form of knowledge accumulation as intellectual capital (Howitt, 2004).

Direct and indirect effects on labor productivity embodied knowledge transfer, as well as technological progress. Total factor productivity (TFP) has been claimed as the fundamental mechanism of transmission of knowledge and ICT productivity impulses (Mas & Quesada, 2005).

This working paper describes the drivers of productivity performance (Knowledge and ICTs) and compares the estimates of labor productivity, measured in GDP per hour worked, in some of the OECD countries[1], with special attention on Mexico.

2. Data

This section presents a brief explanation of the data used (OECD Productivity Databases) as a framework to measure the productivity performance and its relation with knowledge transfer and ICT advances and investment.

The first step is to understand how the data of productivity labor level is obtained and how the consistency of this measure is obtained[2].

For the scope of this explanatory paper, we based on OECD statistics to have a standard of comparability of estimates of hours worked and GDP per hour worked of various countries.

2.1 OECD Productivity Database:

2.1.1 Gross Domestic Product:

> The estimates for GDP are derived from the OECD Annual National Accounts (ANA), which are based on the OECD´s annual national accounts questionnaire to OECD member countries (Pilat & Shreyer, 2004).

2.1.2 Labor input:

> The estimates of labor productivity included in the database refer to GDP per hour worked. GDP per hour worked requires estimates of total hours that are consistent across countries (Pilat & Shreyer, 2004).
>
> The consistency is achieved by matching the hours worked that are collected by the OECD for its annual OECD Employment

[1] OECD member countries: Australia, Belgium, Canada, the Czech Republic, Denmark, Finland, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

[2] Problems in comparing productivity growth due to statistical investigation have been noted in OECD work (Ahmed et al. 2003).

Outlook with the conceptually appropriate measure of employment for each individual country (Pilat & Shreyer, 2004).

2.2 Productivity measures:

For a better understanding of the data used for the purpose of this paper, it is important to emphasize the differences between the OECD Productivity Database and the OECD Economic Outlook.

The OECD publishes different productivity measures for two purposes (Pilat & Shreyer, 2004):

> *The measures for labor productivity in the* ***OECD Productivity Database*** *refer to the total economy. They are based on a detailed assessment of labor, which incorporates adjustments for average hours worked per person employed. These economy-wide productivity measures provide a close link to changes in GDP per capita.*
>
> *The measure of labor productivity in the* ***OECD Economic Outlook*** *covers only the business sector and does not adjust for average hours worked. The main advantage is that it excludes a large part of the economy (the public sector, in which productivity is typically poorly measured).*

2.3 Knowledge and Labor Productivity:

It is important to explain the approach-to-knowledge concept used for this study as a coherent framework and unified methodology that can vary considerably according to different views (Mingers, 2007; Zhichang Zhu, 2004).

The investment in knowledge is the basis for innovation and technological progress (OECD, 2007), and the main impact on labor productivity arise from these factors (Mas & Quesada, 2005). But what is Knowledge? What does this concept mean? For the purpose of this work and in an attempt to conceptualize the subjectivity of knowledge, which is highly debatable and full of ambiguity and considered an unspecific and dynamic phenomenon (Mingers, 2007), it is necessary to distinguish it from the different existing metaphors and approaches. Considering the context of this research, the study of knowledge will be within the scope of the "Western" approach that defines it as an asset (Andriessen, 2007).

Andriessen (2007) inspired by the work of Lakoff and Johnson (1999) defined "*knowledge as an asset in the context of an accounting discourse about organizations*".

This approach highlights:

- Knowledge can be controlled by enterprise
- It generates economic benefits that flow to enterprise
- It is identifiable and its cost can be measured
- It is used in production
- It has a place in the reporting system

With this approach, it becomes possible to cover the knowledge dimensions used by the OECD to measure the levels of knowledge as a component of the labor productivity level.

2.3.1 Investment in Knowledge

According to the OECD (2007) investment in knowledge is defined and calculated "*as the sum of expenditure on R&D, on total higher education from both public and private sources and on software*".

A more complete statistic of investment in knowledge would also include expenditure on innovations (expenditure on the design of new goods), expenditure by enterprises on job-related training programs, investment in organization (spending on organizational change), among others. However, the lack of available data did not allow for the above elements be included (OECD science, technology and industry scoreboard 2007).

2.3.2 Knowledge Transfer

The sources of knowledge that could trigger its transfer for the labor productivity are according to Roberta Capello (2001):

- external suppliers and scientific research centers;
- internal information;
- the scientific environment in which firms operate plays a key role in their labor activity. One of the main sources of knowledge are R&D centers;

- the presence of highly qualified public services, such as schools and public facilities (considered as one of the main reasons for a metropolitan location of multinationals).

The consequence of the above factors is the possibility of gaining knowledge from co-operation with scientific research centers, and co-operation with suppliers and customers to stimulate the labor productivity. Under this scope any firm could highly appreciate the existence of socialized knowledge mechanisms which feed their labor capacity and stimulate its efficiency.

Then, a system of knowledge transfer can be thought of as a consisting of a set of actors that interact in the generation, use and diffusion of knowledge. Within this approach to knowledge transfer, a technological system, based on the concept of technological regime, have a specific technology as its point of departure for the purpose of transfer of knowledge combining it into the production of final outputs with a great impact in the labor productivity.

2.4 ICT and Labor Productivity:

The 1990s saw a strong acceleration of labor and total factor productivity growth (TFP) notably in the United States, where the major investments in ICT were made due to the technological progress and falling prices in the semi-conductor technology (computers, software and communications equipment). These advances contributed to U.S. labor productivity growth and the potential for a higher long-term GDP (Notaro, 2004).

Within this scope it is possible to say that labor productivity and economic growth were stimulated by investment in information technology, also shown in various studies (Bosworth and Triplett, 2000; Jorgenson and Stiroh, 2000; Oliner and Sichel, 2000).

ICT has been the most dynamic component of investment in recent years, especially in software. By 2005, software accounted for 50% or more of total ICT investment in France (64%), the Netherlands (58%), Sweden (57%), Denmark (55%) and the United States (52%) (OECD, 2007).

As Mexico is not an ICT producing country, data on this sector are not available, hence this work is limited to analyzing the impact of new technologies investment on the ICT using sectors (specifically the service sector).

Data availability and measurement of ICT investment based on national accounts (SNA 93) vary considerably from country to country[3] (OECD Science, Technology and Industry Scoreboard, 2007).

3. Mexico's performance

Direct and indirect effects on labor productivity embodied a variety of knowledge and technological changes that are determinant factors for economic development. There is a general agreement that both are central to regional change, either positive or negative, in terms of job-creation, job-destruction, labor productivity and labor qualification (Fischer & Frölich, 2001).

Investment in Knowledge:

Investment in knowledge directly to science and technology outputs facilitates the creation of new products and services and new modes of organizing business, with a strong impact on labor productivity level. However, in the case of México, as Table 1 shows, this investment is just 0.5% of the GDP in 2005 compared with 1.1% of Spain, 1.3 of Ireland and 2.0% of Canada. The use of more efficient capital is an important determinant of productivity.

Human Resource in Science and Technology

Research and development personnel include all persons employed directly in R&D activities, covering technicians and support staff, in addition to researchers. The average ratio of R&D personnel of OECD countries is 14 / 1000 persons. In Mexico, this ratio is less than 5 R&D personnel for every 1000 employees that contribute to R&D activities.

This rate clearly indicates the importance of improving the quotient of more qualified human capital in the labor

[3] In the national accounts, expenditure on ICT products is considered investment only if the products can be physically isolated (ICT embodied in equipment is considered not as investment but as intermediate consumption). As a result, ICT investment may be underestimated and the order of magnitude of the underestimation may differ depending on how intermediate consumption and investment are treated in each country's accounts (OECD, 2007). The difficulties for measuring software investment are also linked to the ways in which software can be acquired (via rental and licenses or embedded in hardware).

arena. Figure 1 shows the R&D personnel in 2005. (Per thousand employees).

Mexico's current situation in investment for research and development and human resources in sciences and technology and the trends toward new technology fields (biotechnology, nanotechnology and environmental technologies) has not shown the same level of growth as in other countries, where investment in R&D is growing at the same pace as GDP.

The intensity of Finland Sweden, Japan, and United States, in terms of expenditure for researchers and R&D is above the OECD average in the business sector as can be seen in Table 2. Researchers per thousand total employed, 2005

R&D expenditure

Table 1. Gross domestic expenditure on R&D as a percentage of GDP, 2005. (1)

	R&D intensity (1)	Share of total OECD R&D expenditure
Greece	0.5	0.2
Mexico	**0.5**	**0.7**
Slovak Republic	0.5	0.1
Poland	0.6	0.4
Turkey (2004)	0.7	0.5
Portugal	0.8	0.2
South Africa (2004)	0.9	0.6
Hungary	0.9	0.2
Russian Federation	1.1	2.2
Italy (2004)	1.1	2.6
Spain	1.1	1.6
New Zealand (2003)	1.2	0.2
Ireland	1.3	0.3
China	1.3	15.4
Czech Republic	1.4	0.4
Norway	1.5	0.4
Luxembourg	1.6	0.1
EU27	**1.7**	**29.6**
Australia (2004)	1.8	1.6
Netherlands (2004)	1.8	1.3
United Kingdom	1.8	4.4
Belgium	1.8	0.8
Canada	2.0	2.9
France	2.1	5.3
OECD	**2.3**	**100.0**
Austria	2.4	0.9
Denmark	2.5	0.6
Germany	2.5	7.8
United States	2.6	42.2
Iceland	2.8	0.0
Switzerland (2004)	2.9	1.0
Korea	3.0	4.2
Japan	3.3	16.9
Finland	3.5	0.8
Sweden	3.9	1.5

Source: OECD Science, Technology and Industry: Scoreboard 2007

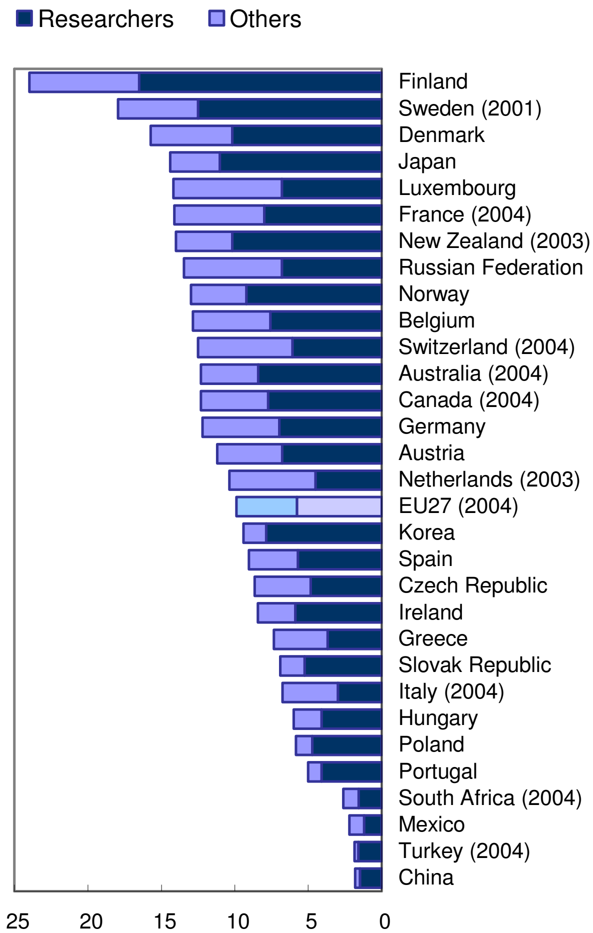

Figure 1. Source: OECD Science, Technology and Industry: Scoreboard 2007

	of which: business enterprise researchers	Others
Mexico	0.6	0.6
China	0.9	0.6
Turkey (2004)	0.2	1.3
Italy (2004)	1.1	1.8
Greece	0.9	2.7
Hungary	1.3	2.8
Portugal	0.8	3.3
Netherlands (2003)	2.3	2.2
Poland	0.7	4.0
Czech Republic	2.1	2.8
Slovak Republic	0.9	4.3
United Kingdom (1998)	3.2	2.3
Spain	1.8	3.9
EU27 (2004)	**2.8**	**3.0**
Ireland	3.5	2.4
Switzerland (2004)	3.0	3.1
Austria	4.3	2.5
Luxembourg	5.0	1.8
Russian Federation	3.5	3.3
Germany	4.3	2.7
OECD	**4.7**	**2.6**
Belgium	3.9	3.7
Canada (2004)	4.7	3.0
Korea	6.0	1.8
France (2004)	4.3	3.7
Australia (2004)	2.4	6.1
Norway	4.6	4.7
United States	7.7	2.0
New Zealand (2003)	2.6	7.6
Denmark	6.4	3.8
Japan	7.5	3.5
Sweden	8.5	4.0
Finland	9.2	7.3

Table 2. Researchers per thousand total employed, 2005 Source: OECD, MSTI database, May 2007.

Education as a factor of productivity

University graduates are considered an indicator of a country's potential for assimilating, developing and transferring advanced knowledge, in addition to supplying the labor market with highly skilled workers. For this research, the OECD statistics termed as university graduates all those who receive "tertiary degrees" (levels 5A and 6 of the International Standard Classification of Education ISCED-1997) (OECD Scoreboard, 2007).

Scientific studies are the second most popular field (social science, business and law lead); however, science and engineering graduates have been declining, as shown in the Table 3.

In 2004, OECD universities awarded 6.7 million degrees, of which 179,000 were doctorates. At the typical age, 3.5 of the population completed university degrees and 1.3% doctoral degrees.

In the particular case of Mexico, it could be perceived as unrealistic to measure graduation rates at doctoral level, as the OECD's Program for International Student

Assessment, PISA (2006) demonstrates Mexico's weaknesses in comparison to other OECD countries, pointing out that 15-year old students struggled to use scientific evidence and had difficulties analyzing data and experiments.

This important finding demonstrates that Mexican students only learn to memorize and reproduce scientific knowledge, which leaves them ill-prepared for tomorrow's job market (PISA, 2006), in which analytical and conceptualizing skills will be key factors for productivity and further technological development.

	All doctorates	Doctorates in science and engineering
India (2003)	0.1	0.0
China	0.1	0.1
Mexico	0.1	0.0
South Africa	0.1	n.a.
Turkey	0.2	0.1
Iceland	0.2	0.1
Hungary	0.6	0.1
Italy (2003)	0.7	0.4
Greece	0.8	0.5
Canada	0.8	0.3
Japan	0.8	0.3
Poland	0.9	0.3
Denmark (2003)	1.0	0.6
Slovak Republic	1.1	0.4
Ireland	1.1	0.6
Korea	1.1	0.4
New Zealand	1.1	0.5
Czech Republic	1.1	0.6
Belgium	1.1	0.6
Norway (1)	1.1	0.4
Brazil	1.1	n.a.
France (2003)	1.1	0.7
Spain	1.2	0.4
OECD	**1.3**	**0.5**
United States	1.3	0.3
Netherlands	1.4	0.5
EU19	**1.4**	**0.6**
Russian Federation	1.5	n.a.
Australia	1.7	0.6
Finland (2003)	1.8	0.7
United Kingdom	1.9	0.9
Austria	2.1	0.7
Germany	2.1	0.7
Portugal	2.5	1.0
Switzerland	2.7	1.0
Sweden	3.1	1.6

Table 3. Graduation rates at doctorate level, 2004. (As a percentage of the relevant age cohort) Source: OECD, Education at a Glance 2006.

An average 9% of 15-year old students reach Levels 5 and 6, the top level of the PISA 2006 science scale. In Mexico only 3% of the students achieved these levels and very few reached the top level, which required that they consistently identify, explain and apply scientific knowledge in a variety of complex situations PISA, 2006). Demands for skill in labor markets are increasing, unfortunately for Mexico the social cost of poor educational levels are high and increasing.

ICT and Productivity

Labor productivity could be attributed to three different sources: 1) efficient capital – investment in knowledge and information technology, 2) improvements of labor qualification through education and training in science and technology, 3) a more efficient combination of both capital and labor qualification (Mas and Quesada, 2005).

Here, it is important to focus on the analysis of investment in technologies as well as on labor qualifications to use them because, according to the OECD Information Technology Outlook (2006b), the investment in ICT could refer to various factors such as:

- Investment in ICT equipment and software
- Telecommunications networks
- Internet subscribers and hosts
- Broadband and security
- ICT access by households
- Internet use by individuals
- Internet access and use by businesses
- Internet access and use in non-OECD economies
- Volume of electronic commerce
- Internet commerce activity
- Telecommunications pricing

- Occupations and skills in the information economy

- International trade in ICT goods

- International trade in ICT goods in non-OECD economies

- R&D in selected ICT industries

- ICT-related patents

These factors, as well as the new trends in technology (biotechnology, nanotechnology and patents), will be analyzed in a more in-depth research as a follow-up to this documentary analysis. Nevertheless, in order to link ICT with labor productivity, it is important to understand the scope of ICT-related skills.

With rapidly changing technologies, workplace training, in addition to formal education and private-sector training, is increasingly important for augmenting and adapting workers' ICT skills (OECD, 2006b) This is true for many categories of workers, but is generally thought to be more important for older workers, whose skills acquired through the educational system are likely to be substantially depreciated, and for the less skilled and less educated (Bassanini et al., 2005).

ICT skills are difficult to measure; therefore, two indicators have been developed by the OECD: one for ICT specialists[4] and one for ICT users, both basic[5] and advanced[6], who rely on ICT to carrying out their work.

Mexico's disadvantaged background, coupled with fewer home computers and broadband connections, contributes to the unfortunately low possibility to accurately assess ICT-related skills (Table 4 Broadband subscribers in OECD countries per 100 inhabitants).

Additionally, the formal education system is not flexible enough to respond to the rapid changes in demand for specialized skills brought on by technological innovation. However, private-sector training and vendor certificates are generally considered a relatively flexible means of supplying ICT skills[7] (OECD Information Technology Outlook, 2006).

	Total
Mexico	3.5
Turkey	3.8
Greece	4.6
Slovak Republic	5.1
Poland	6.9
Czech Republic	10.6
Hungary	11.9
Ireland	12.5
Portugal	13.8
New Zealand	14.0
Italy	14.8
Spain	15.3
Germany	17.1
Austria	17.3
Australia	19.2
United States	19.6
Japan	20.2
France	20.3
Luxembourg	20.4
United Kingdom	21.6
Belgium	22.5
Canada	23.8
Sweden	26.0
Finland	27.2
Norway	27.7
Switzerland	28.5
Korea	29.1
Iceland	29.7
Netherlands	31.8
Denmark	31.9
OECD	**16.9**

Table 4. Broadband subscribers in OECD Countries, per 100 inhabitants, December 2006. *(Source: OECD Broadband statistics www.oecd.org/sti/ICT/Broadband)*

[4] ICT specialists with abilities to develop operate and maintain ICT systems. ICT constitutes the main part of their job (OECD, 2006b).
[5] Basic users: competent users of generic tools (Word, Excel, Outlook, and Power Point) needed for the information society, e-government and working life. Here, ICT is the tool, not the main job (OECD, 2006b).
[6] Advanced users: competent users of advanced, often sector-specific, software tools. ICT is not the main job, but a tool.(OECD, 2006b).

[7] IT certification can have a wider importance. According to independent research commissioned by Microsoft, human resource managers that consider IT certificates to be important both for IT and non-IT roles, would choose candidates with IT certification over those without, and would be willing to pay an average of 6.9% additional salary for these certified skills (Microsoft Corporation, "Delivering 21st century skills for employability").

Another critical factor to take on account as a source of productivity is the efficient combination of technology use with labor; in other words internet access and use by businesses.

In Mexico, only medium-size firms (50-249) and large businesses (250 or more employees) have access to internet through broadband connection, a lower level than other OECD countries, as shown in Table 5. Broadband penetration by business size class, 2006. As a percentage of businesses with 10 or more employees.

	[10-49]	[50-249]	250 and more
Iceland	94.8	96.0	100.0
Canada	91.1	94.9	99.6
Sweden	87.3	95.9	99.1
Spain	85.6	95.9	98.5
Korea (2005)	93.6	97.4	98.2
Norway	84.5	95.3	98.1
Portugal	61.6	89.5	98.1
Finland	87.0	97.0	97.6
Luxembourg	73.2	84.9	97.1
Austria	65.7	86.2	97.0
Denmark	80.6	91.4	96.5
New Zealand	80.1	91.4	96.5
Belgium	82.5	93.0	96.5
Germany	68.9	87.7	96.1
France	84.9	93.4	96.1
United Kingdom	74.2	89.2	95.7
EU25	**71.5**	**87.2**	**95.4**
Italy	67.4	84.8	95.1
Netherlands	79.6	90.9	95.0
Switzerland (2005)	83.0	94.0	95.0
Poland	39.1	71.1	92.5
Czech Republic	65.1	83.3	92.1
Greece	54.2	74.6	91.3
Hungary	57.8	76.5	90.8
Australia (2005)	69.5	82.0	90.5
Ireland	57.0	71.5	90.4
Slovak Republic	58.7	69.3	79.5
Mexico (2003)	..	42.2	58.6

Table 5. Source: OECD, ICT database and Eurostat, Community Survey on ICT usage in enterprises, April 2007.

The above observations related to investment in knowledge and ICT factors as determinants among others of labor productivity take into account the significance of knowledge dissemination and technology transfer in the output of productivity for economic growth and development.

Between the period of 2000-2005, the contribution of business sector services[8] to labor productivity growth decreased in the case of Mexico, as well as in Canada, Portugal, the Slovak Republic and Switzerland (OECD Science, Technology and Industry Scoreboard, 2007) (Table 6).

In Mexico's case, this is due to a negative evolution of employment of more qualified workers. Productivity can no longer be based on reducing employment. It has to be relied on knowledge and technological progress embodied in capital goods and improvements in labor qualification.

Table 6. Growth in business sector services labor productivity. Percent of average annual growth.

	2000-2005
Mexico	-1.7
Switzerland	-1.2
Spain	-0.8
Italy	-0.7
Portugal	0.2
Germany	0.7
France	0.7
Denmark	0.9
Finlandd	1.0
Slovak Republic	1.1
Austria	1.1
Canada	1.2
Belgium	1.2
New Zealand	1.4
Netherlands	1.6
Sweden	1.7
Korea	2.1
Poland	2.4
Greece	2.4
United Kingdom	2.5
Australia	2.5
United States	2.8
Norway	2.8
Japan	2.8
Czech Republic	3.3
Hungary	3.7

[8] Business sector services cover "Wholesale, retail trade, hotels and restaurants" (ISIC 50-55), "Transport, storage and communication" (ISIC 60-64), "Finance, insurance, real estate and business services" (ISIC 65-74).

Source: OECD, Annual National Accounts Database, March 2007. OECD, STAN Database. www.oecd.org/statistics/national-accounts

Labor Productivity

It is paradoxical but Mexico is the country with one of the higher average annual rate of hours worked per worker, 1883 hours in 2006, and the third country of number of persons engaged in employment after Japan and USA (Mexico 42,198,000 -USA 152,621,000 –Japan 64,179,000 employees) among other OECD countries, but with the less labor productivity level, $16 US dollars GDP per hour worked. (Table 7. Labor Productivity Growth. Data extracted on 2008/04/07 02:57 from OECD Stat).

This is part of the evidence that technological changes and knowledge transfer have not yet been assimilated by individuals and firms. Additional time and effort on education, training and R & D will be needed in Mexico to extract all the potential from the new ICT technologies.

Unfortunately the absence of statistical data limit the direct impact results of ICT in labor productivity in the case of Mexico, where its late start in the technological arena is probably one of the main reasons for not yet finding clear evidence of labor productivity growth induced by ICT technologies. However, this documented analysis will let us pursue a more in depth research into the factors affecting labor productivity in the case of Mexico.

Table 7. OECD estimates of labor productivity levels.

time	2006				
variable		Average hours worked per person	Total employment (number of persons engaged), thousand	Total Hours worked for total employment, million	GDP per hour worked, current prices, US dollar
country					
Australia		1728	10226	17675	41.6
Austria		1659	4228	7014	42.1
Belgium		1571	4278	6721	52.6
Canada		1736	16758	29094	41.2
Denmark		1584	2822	4471	42.8
Finland		1716	2441	4189	41.2
France		1555	25278	39297	49.9
Germany		1433	39088	56001	47
Hungary		1989	3905	7768	23.5
Ireland		1640	2042	3350	51.6
Japan		1784	64179	114520	35.6
Korea		2357	23131	54522	20.4
Luxembourg		1604	319	512	72.2
Mexico		1883	42198	79467	16
Netherlands		1391	8383	11661	51.2
New Zealand		1787	2126	3798	28.3
Norway		1407	2419	3403	71
Poland		1985	14594	28969	19.3
Portugal		1758	5154	9060	24.3
Slovak Republic		1749	2132	3729	25.4
Spain		1656	19848	32869	39.4
Sweden		1601	4423	7083	44.7
Switzerland		1651	4291	7084	40.3
United States		1708	152621	260631	50.4
OECD		1748	543380	949664	38

Source: OECD Stat. Data extracted on 2008/04/07 02:57 from OECD.Stat, Data Set: Labor productivity

4. Final considerations

The aim of this study was an attempt to provide data to debate on the implications of knowledge transfer and information technologies in labor productivity as a trigger for a further and deeper analysis of the phenomenon by diminishing the elements of ambiguity derived from different perceptions of knowledge transfer systems.

In order to test the implications and causal relationship of knowledge dissemination and technologies in labor productivity through an empirical analysis this study would be linked with three further papers:
1) The Causal Relationship of Knowledge Dissemination and Labor Productivity;

2) The Causal Relationship of ICTs and Labor Productivity;

3) A Model Proposal for Measurement of Increase of Labor Productivity as a Function of ICTS and Knowledge Dissemination. The Case of Mexico in the International Arena.

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