

Promoting the Economic Development Through the IT Industry in Mexico: The PROSOFT Program

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INTRODUCTION

The Information and Communication Technology (ICT) industry has been identified as a key factor for increasing national competitiveness giving the variety of applications of ICT in many economic sectors. In fact, productive and social networks are enabled by ICT to satisfy the needs for health, education, government, and economic well-being (García, 2006). Moreover, and because of synergies and spillovers of the ICT sector, policy makers around the world are devising plans to increase the investment in ICT in order to promote economic growth (Baily, Farrell & Remes, 2006). In this way, the ICT industry has become in the last years an important catalyst for national economies.

Recent changes in exportation patterns have motivated the Mexican government to create a campaign to position Mexico as an ICT provider. The campaign intends to show the advantages of outsourcing services to Mexico, focusing particularly on the United States market (Ruiz, Piore & Schrank, 2005). This campaign is a key component of the digital economy policy in Mexico, and has been called the Program for the Development of the Software Industry (PROSOFT).

Achieving PROSOFT goals will depend on several interrelated factors (Secretaría de Economía, 2006). First, it will depend on the ability of policy makers to promote investments. Second, the ICT industry in Mexico will need a transition toward a new administration and governance. Moreover, Mexican success will also depend on the speed and capability of ICT industry in adopting a collaborative approach to respond to the needs of the international market.

This paper reports the current progress of a case-based simulation project in which we analyze the PROSOFT program. Our objective is to explore the relative effectiveness of different policy mixes to achieve the PROSOFT goals. Some of the aspects of the program to be included in the model will be the workforce, human capital, financial investments, and governance and collaborative approaches being promoted by PROSOFT project leaders.

LITERATURE REVIEW

The Mexican economy has two main problems according to some analysts (Martínez, 2001): The first one is associated with the low nutrition levels suffered by many Mexicans, and the second one is related to the uneven distribution of wealth. Moreover, domestic economic growth is not having a direct impact on basic well-being of the growing population, but rather it has increased the accumulation and the concentration of income in very few people.

In order to improve the economic conditions for the general population, it is needed either to increase allowances or to reduce the population's growth. To achieve this development is necessary to elevate the investment rate substantially and to modify the distribution of income in order to reach a better level of efficiency (Baily et al., 2006).

Latin American economies have problems because of the lack of capital. Countries in this region depend on those countries that have the capital to invest and

promote economic development. The dependence resides on the importation of capital goods and capital investments. Important factors attracting such capital investments are the existence of qualified and cheaper workforce (C.I. García, personal communication, December 7, 2006).

Investing in the ICT sector to promote economic development is attractive for several reasons. ICTs are having a direct impact on many countries inflationary trends, reducing the unit capital costs, and accelerating demand for ICT products as a mayor driving force. It is amazing how the ICT prices, adjusted for quality improvements, are going down while prices in the rest of the economy have been increasing. This has been allowing a non-inflationary growth, which generates a positive effect on the economy. (Hilbert, 2001). In addition, the economy is indirectly impacted by human capital and telecommuting workforce programs, which tend to report an increase in productivity through increased morale and commitment to the company.

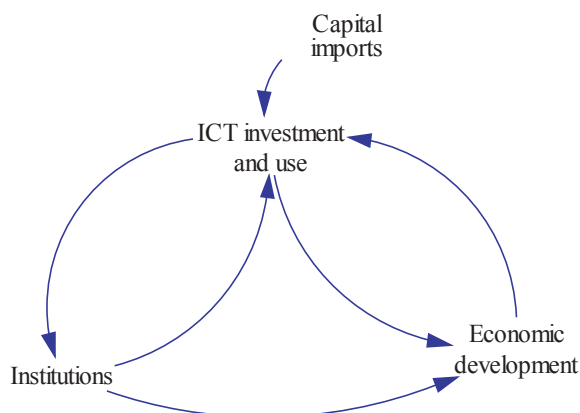
In this way, ICT should eventually lead to a permanent increase in productivity, just like every other innovation, which decreased input costs. Currently, some countries are already investing on research and the final integration of the new economic features into their societies, in order to benefit from it, while others (such as many Latin American countries) are still trying to provide the basic access to the knowledge-based economy for several sectors of their populations.

Economies are increasingly based on knowledge. The generation, processing and distribution of knowledge and information are a fundamental source for productivity, power and prosperity (Baily et al., 2006). In the past, the growth of the economy of a country depended on the optimization of the physical labor and financial capital, it's been proved that information and communication (networking in the network), are definitely the main component of growth in the new knowledge society (North, 1994).

Institutions have been identified as another important factor affecting economic development (Hassan & Gil-Garcia, 2006). Moreover, institutions have been also identified as an important constraint and enabler of ICT investments, development and use (North, 1994). Authors describing such effects do not only recognize the impact of institutions in economies or ICT applications, but also recognize ways in which individual and organizational interactions affect the institutional arrangements (Figure 1).

Most of the discussion about ICT and economic growth recognizes the effect of ICT investments on economic development. However, as shown in Figure 1, Institutions are also constraints and enablers of economic development because of its impact on transaction and transformation costs. Moreover, institutions also affect the ways in which individuals and organizations decide to invest and use ICTs, modifying the possible benefits of ICT use and explaining differences between organizations or countries (i.e. some organizations or countries obtain more benefits from ICT investments than others). However, Institutions are also modified through time by individual and organizational actors. In this way, our exploration of the impact of ICT policies such as PROSOFT will use institutional

Figure 1. Interactions among institutions, ICT investment and use, and economic development



theory as a reference to understand the complex interactions among ICT investment and use, institutions, and economic development.

METHODS

In order to understand the PROSOFT case two main data collection methods are used. First, we performed an analysis of relevant documents including articles, digital references, and books. This review will provide some background, general information, and the basic characteristics of the PROSOFT program. Information was also extracted from articles and reports in which we observed the growth of the Information Technologies, as well as the different behavior and scenarios of several countries who are investing on the implementation and development of ICT.

Second, we will conduct semi-structured interviews with people responsible for the promotion of information and communication technologies in Mexico. These interviews will provide additional information on the evolution of the PROSOFT program, and help to understand why the development of information technologies is so important to increase national competitiveness. Participants will be asked about the main rationale of the program, program development, and main achievements.

Finally, we will use System Dynamics as a method to understand all the strategic components of the PROSOFT program and their interrelationships. This method consists on identifying the behavior of several variables in the system and identifying a causal structure associated to it. The development of the model represents an iterative process of comparing system's performance over time, linking those processes into causal structures and evaluating the feedback processes (Richardson & Pugh, 1981). The main objective is to simulate the most important components of the PROSOFT program to analyze and understand their main interactions. As a result of the modeling process we will develop and evaluate hypotheses about the impact of the behavior of ICT investment and use and the simulation will help to understand and manage the different variables that appear in the program. This preliminary version of the paper reports the results of the analysis of documents and one interview with two key participants in the PROSOFT program.

PRELIMINARY RESULTS

The PROSOFT program was officially created in 2002, following a 10-year plan, PROSOFT focuses in the development of the software industry integrating public and private funding, promoting collaboration among private industries, federal and state governments, and institutions of higher education. (Colón, 2006). One of the goals of PROSOFT is to achieve by 2013 an annual production of technologi-

cal solutions for 5,000 million dollars. In this way, Mexico will reach the world average of expense in ICT, becoming the Latin American leader in software and digital contents development in Spanish. Initial results are encouraging, and the ICT sector growth has changed from a negative rate in 2002, to 10.7% in 2005. This growth represents three times the growth of the domestic economy in that same year. It is expected a 11.4% growth for 2006.

The program is organized around seven strategic lines:

1. Promotion of exports and investments in the software sector
2. Education and training of competent personnel in the development of software, as well as the required quantity and quality
3. Appropriate legal framework in place promoting this industry
4. Development of the IT domestic market
5. Strengthening of the local industry
6. Achieve international levels in process capability
7. Promote cluster development throughout Mexico

As of 2006, PROSOFT is working with approximately 26 of the 32 Mexican states, 121 universities, and 25 clusters have been developed since the beginning of the program. Overall, PROSOFT has increased growth of the Information Technology (IT) Industry (C.I. García, personal communication, December 7, 2006). It has been an engine to the IT Industry, and helped to develop and increase well-paid salaries as well as jobs for well-prepared people. PROSOFT allows to develop exportation services and technologies. This program has created a new culture that shows the commitment of the people who are involved in this environment and the best administration of human and material resources.

NEXT STEPS

The results of the program seem to be promising. However, more information is needed and we will continue looking for additional relevant documents. As mentioned before, we will also conduct semi-structure interviews with key participants in the PROSOFT program.

We will develop a model and simulate the behavior of the factors through time. As an initial phase we will generate a list of all the important factors to the problem, secondly we will analyze and describe each one of the behaviors of these factors by creating graphics over time. Once completed the initial phase we will link all the factors described in the first phase utilizing diagrams (Causal-Loop diagram) in order to visualize the feedback process and to facilitate the simulation process. During the construction of the model several tests will be applied to validate the model. Finally, extensive experimentation with the model will yield insights about problems and opportunities in the implementation of the PROSOFT program and similar policies implemented in different countries.

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