

# Information Technology Transfer and Diffusion to Mexico: A Preliminary Analysis

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*The Republic of Mexico should be targeted for Information Technology Transfer and Diffusion (ITTD) for a number of reasons. Its educational tradition, political and legal environment, and national economy are just a few of the contextual factors which become pivotal in making the decision to take part in ITTD to Mexico. The few barriers that may hamper this endeavor are more concerned with the corporate culture and the sociocultural elements. Mexico is increasingly willing to provide protection for technology transfer from outside its borders. Multinational corporations, such as IBM, who are willing to invest will be at the forefront of ITTD. Understanding of all these factors will permit companies to make this move with less risk.*

There are a number of economic, social, and political reasons that make the Republic of Mexico very attractive for information technology transfer and diffusion (ITTD). First, Mexico is one of the twenty largest computer users in the world and its information technology market is the second largest behind Brazil in Latin America (Tigre, 1991). Second, the Personal Computer (PC) market in Mexico is mostly dominated by Apple, Hewlett-Packard, and 30 other local firms which are incapable of taking advantage of economies of scale (Frazier, 1984). Third, IBM holds 45 percent of the mainframe market and 30 percent of the minicomputer market (Whiting, 1991). Fourth, Mexico is a dual member of the North American Free Trade Agreement (NAFTA) and the Latin American Integration Association (LAIA) which makes the Mexican market viable for further technology transfer into these markets (Plaff, Sordo, Schwartz, Trevino, Sepulveda, and Dominquez, 1993). Fifth, Mexico's quarterly economic

growth has become positive again (El Paso Times, March 3, 1994).

Mexico has, however, been battered by recent problems such as a devalued peso, high inflation, political scandal over high profile assassinations, and rebellion in the south. We do realize that this has put a damper on bubbling Mexican economy but we believe the situation is temporary and will be under control soon. President Ernesto Zedillo has launched a crash program of economic, political, and judicial reforms to restore investor's confidence in Mexico. Recently, the peso has gained ground against the U.S. dollar, the stock market is doing much better, and preliminary figures showed a \$380 million dollar trade surplus for Mexico in March 1995 (El Paso Times, April 22, 1995). The recession is expected to be over by the middle of the next year and the foreign investment in Mexico is expected to skyrocket if the political situation is stable. Hufbauer (a senior fellow at the Institute of International Economics in Washington) indicated that the recent peso devaluation has made the economies of foreign investment in Mexico very favorable (El Paso Times, April 8, 1995).

"Technological innovations offer much promise for widespread technology transfer on a global basis. Yet, without taking social, economic, or political considerations into account, companies cannot transfer technology as effectively" (Dean and Master, 1991, p. 35). The objective of this paper is to discuss such social, economic, and political factors that directly or indirectly create either opportunities or hindrances for ITTD to the Republic of Mexico. The importance of the manuscript stems from the fact that, with the inception of North American Free Trade Agreement (NAFTA), more and more organizations will be interested in ITTD to Mexico. This

research paper will help these organizations develop well-structured strategies for such an endeavor.

The remainder of the manuscript is organized as follows. The next section discusses contextual factors that influence or mediate acceleration of information technology transfer in the Republic of Mexico. This is followed by an elaboration of the antecedent factors that facilitate ITTD to Mexico. The manuscript concludes by emphasizing the importance of having good, sound information before making this important decision.

## Contextual Factors

In order to gain insights into what factors influence the effectiveness of information technology transfer in the Republic of Mexico, several factors such as educational tradition, national economy, legal context, political environment, technology environment, and corporate culture have been hypothesized to either influence or mediate transfer acceleration. These "foundation" determinants establish a national cornerstone on which all other factors are established. While antecedent factors take on pivotal roles to facilitate ITTD, these contextual factors create either challenges to be overcome or accelerate the transfer process.

### Mexican Educational Tradition

Several phases or steps are normally evident within the educational system of a country. Depending on several factors including cultural, economic, infrastructure, and developmental progression, the characteristics of the educational system can either seriously challenge or provide the vehicle for information technology transfer. Since the focus of change in this context is change which facilitates the acquisition and application of technology, the roots of the educational system begin at the elementary school level.

Mexican federal officials have repeatedly attempted to improve the educational system with a series of initiatives through the decades - most of which have met with limited success. The Constitution of 1917 provides the foundation on which educational initiatives have been initiated (Urquidi, 1986). It established free compulsory education at the elementary level. Public education policy in the 1920s and 30s included schooling in rural as well as urban areas, increased teachers training, and started modern secondary education (Tannenbaum, 1950). Burgeoning population forced educational expansion but quality still lagged behind other countries, even when the Ministry of Education's funding accounted for the largest share of the federal budget. By the 1960s, 90 percent of all primary education was under direct and highly centralized federal or state supervision. Luis Echeverria, incoming President in 1970, appointed a strong educational minister who emphasized technical education with accompanying effort devoted to establishing official, compulsory free texts to support instructional efforts public and private institutions. A state run system of baccalaureate schools was established, as well as a new university in Mexico

City (the Metropolitan Autonomous University) intended to match modern educational institutions in other countries. By 1980, overall expenditures on education in Mexico were below UNESCO guidelines of 3.5-3.8 percent of Gross National Product. Twelve percent of the labor force (estimated at 22 million) had no schooling and 24 percent had attained a post-primary educational level. Seventy eight percent of aggregate enrollment was in primary education and only 18 percent in secondary. Only 4 percent of enrollment was associated with higher education and teacher training (Urquidi, 1986). Current public education continues to face a prevalence of functional illiteracy; much of the effort associated with adult education is directed toward developing elementary literacy into functional literacy.

Conflicts between the Ministry of Education and teachers' unions have prevented progress toward educational innovation and application of competitive instructional techniques. Due to a 1980 amendment to the Constitution, autonomous institutions of higher education are now self-governing. The federal government thus cannot interfere directly in any aspects of university life, though it is the main source of funding. Unionization of faculty, staff, and administrative personnel combined with autonomy and the principle of the right to a free education without restriction as enunciated in the Constitution has engendered mediocrity in Mexican public colleges and universities. University student protests in the 1960s and 70s followed by demonstrations in 1987 repeatedly forced the government to abandon plans to introduce academic reforms such as instituting admission requirements and higher academic standards. The Mexican debt crisis, overcome by the mid-80s, had a particularly strong impact on the reduction of academic real wages by 1986 - as much as 50 percent. Faculty-student protests against educational change continue to perpetuate a condition of disarray in higher education. With some 750,000 new job seekers entering the market each year, 18% unemployment and 45% underemployment, new graduates from public Mexican educational programs face serious challenges to gainful employment.

### National Economy

Arguably the second most important contextual factor that creates either challenges to be overcome or accelerates the information technology (IT) process is the national economy. Numerous factors manifestly interact to facilitate or deter change. IT manifests the ability to influence both micro and macro levels of the economy. At the micro or organizational level, IT assists the firm to maintain a real-time knowledge of its vital financial, operational, and market signs. As the sophistication of IT develops, telecommunication technologies interconnect major institutions so that greater understanding of local, regional, and national conditions can be attained. Thus not only is there a transition from labor intensive to technology intensive conditions that can provide monitoring and decision support, non-productive mechanisms that reduce the ability to discern problems or opportunities begin to fade. As the level of IT evolution reaches mature levels (if possible, considering

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