

"Management Engineering: Fostering  
And Managing Technological  
Change"

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Por: Dr. Emilio Zorrilla-Vázquez.

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## **Abstract**

Globalization in the Mexican context has implied, essentially, the modernization of the industrial and management engineering professions and, on the other hand, that of a new view regarding worker training and retraining to attain the essence of globalization requirements: competitiveness.

An easy word to handle but difficult to implement by virtue of the underlying elements on which that condition obtains.

The author's comments and proposal include a review of the context in which the challenge of modernization is immersed in Mexico and presents views on the required modernity of attitudes and programs necessary, of soft and hard technology to face the increasingly complex internationalization and demands of specialized higher education directed at assuming the referred challenge; inclusive of some suggestions regarding the amplified curriculum for building-up undergraduate and specially reinforcing

postgraduate studies particularly in the industrial and management engineering disciplines.

The polemic issue of greater specialization *vis-a-vis* a broader educational base for engineers in those areas is brought up briefly, however centered on advanced higher education where the argument for a more universal concept of industrial engineering is proposed for potential leaders of the profession with a postgraduate degree in whatever activity.

## **Introduction**

The general view of this brief paper is centered on the fact that young mexican professionals face a radically changed world and indeed economic, social, and technological changes that have come about in little more or less than a generation.

Not to say the important and often grave transformations that have been induced in and come about in human and social values that heretofore had been cornerstones of sustained stability (development) in Mexico, mexican tradition and behavioural assets in social interfacing and in family, political, educational and aesthetic institutions characterized by a strong humanistic vein and evolving social organization and institutional development; albeit with significant institutional limitations as well as some identifiable and sluggish aspects of public policy.

The scenario modifications that have taken place over the last ten to fifteen years have evidently affected most aspects of mexican business, financial, and engineering activities and therefore their

very demands on the more recent and forthcoming short and medium term generations of professionals.

## **The Challenges**

The Mexican Model is today inserted in the general globalization process and its correlative inherent activities of production, marketing, finance, logistics, and quality certification: their standards, design, operation, and monitoring. The latter involving know-how in techniques, procedural elements, and norms which compose each area's modern body of knowledge.

The challenges that globalization poses for Mexico transcends the traditional technical and technique-oriented educational process insofar as the assymetry existant between developed and underdeveloped (or "in process of development") countries or, if you will, subregionalized areas, appear to demand a broader and depthened familiarization and training of the mexican student and professional ( by means of "Executive Development" Courses ) in relation to specific small business and corporate awareness, scenario building, and planning for amply designed and evaluated local and foreign insertion in the globalization process. These tasks also suggest that their support would come from a greater exposure

of student and professional to international business events and systematic up-dating on pertinent economic, legal, and policy-related events in the global scenario coupled with a reasonable knowledge of economic and political geography.

This, I propose is the leader's and manager's scenario for the beginning twenty-first century. Among other elements, worth mentioning in this paper, is the closely related subject of international management inclusive of the inter-cultural interface that will require bolstering in day to day professional practice, and basically superior education and applied research to integrate mexican young men and women's education to satisfy the many-faceted idiosyncratic needs of globalization.

Competitiveness is and will continue to be a key concern as a result of globalization. Specific education and training for the presence and entry, maneuvering, negotiation, and sheer hard work appear to be the direct reply. These actions will rely as well on various disciplines from attitudinal aspects, to knowledge about peoples, countries and indeed, economic history and geography;

however, well buttressed by worldly matters such as industrial efficiency and organized groups with a strong work ethic, down to everyday costing, quality control, and productivity. This implies acquainting leaders with "nuts-and-bolts" methods and terminology to communicate effectively with the middle echelons and "factory" floor cadres. In my view, it is important to be watchful lest competitiveness ( capacity to compete) be confused with PR (public relations) or solely maneuvering.

As a consequence a very major challenge will be to distinguish an utilitarian pragmatism solely oriented to satisfying immediate market technique-oriented education versus an universal (scholastic) and broader multidisciplinary view for young leaders of the future.

In an attempt to fathom some aspects of the context, the emerging reality to be faced can be referred to Mexico's increased reliance on foreign-based suppliers for medium and high level technology, equipment, processes, materials, marketing, and financial management know-how and particularly their

international components, as a function of the referred globalization process.

## **The Scenario**

Furthermore, sectorial activity within GNP in Mexico has strongly skewed towards the services sector, a not unusual phenomenon elsewhere, however it is considered acute in the country having increased its share from around 24% to 26% in 1960 to over 60% of GNP in 1998. Another point of contextual interest is the fact that manufacturing value added has dropped, some consider it dramatically, from about-on average – 65% to the order of 38% over the period 1975 to 1998.

The brunt of tasks and activities has acceleratedly polarized in the computing, communications, banking and correlative financial intermediary areas. These areas have weighed heavily on hard and soft technological needs and developments in the corresponding subsectors, including by definition most of the related industrial, economic, engineering and management facets.

Systematic, if sometimes fluctuating, foreign direct investment toward new factories and service facilities and most importantly to portfolio investment and buy-outs of existing plant will also put an

edge on the educational requirements of mexican professionals particularly in the medium term as rapidly increasing competition will magnify for job-positioning under foreign cadre occupation of key jobs in foreign investment-controlled companies. The exception to this general process is the case of educating scions and prospective owners of established family businesses in a wide range of economic, banking, and other service activities.

Without disregarding diverse phenomena than those alluded to, it becomes evident in any case that the factors referred to above validate the need for educational requirements to satisfy the needs of an economy, a mexican society, bracing to face competition in that globalized world, with all its consequences, major among which are modern views of, for example; product design, promotion, marketing; process up-dating and acquisition of state-of-the art soft and hard technology. Possibly more important are the behavioural attitudes which impinge on competitive and general insertion into globalization and which refer to wage-profit relationships, quality consciouness, cost sensitivity, facing profit squeezing processes, focusing the design of resource allocation, adaptation to marginal

decision-making, more realistic intertemporal discount-rate comparisons ( future vs. present value views and again corresponding decisions processes) directly related to planning, corporate saving and its sequel reinvestment, equipment replacement, and overall modern strategic management criteria and most important, teamwork.

All that this entails behaviourally and psychologically has indeed been changing in the mexican business enviroment, but, in my perception, more slowly than conditions warrant.

Another critical and demanding question is technology search and selection compatible with competitiveness and acute conditions of surplus labor. Here, the strategic demands are high.

Must a balance be struck between lean organization and employment generation; with labor saving *vis-a-vis* labor-intensive industries; with investment, capital accumulation and capital inflows? And how is modern technology to be made compatible with remunerative farm income and the sector's share of GNP: directly,

indirectly? All questions closely related to criteria and techniques related with technology management, selection, transfer, and assimilation: pertinent problems to enrich specialized higher education in mexican reality. The issue reemerges ("flashback" to the sixties), with greater weight under the pressures of globalization.

- ❖ The major problematic faced by current and medium-term mexican economic development is very briefly centered on the following points arising from the globalization requirement and its effects on domestic and foreign-oriented activities: the latter translate into assuring the increasing capacity of mexican industry, commerce, and banking to compete in the supply of products and services in the local and export markets; pertinent, I believe, to mexican professional capability achievement and the educational requirement scenarios in the country to foster specific skills and should the case be to motivate certain traits (attitudes), and

generally contribute to the enhanced quality of social, economic and human capital.

## **Curricular Needs**

Topics which may be approached by means of one, more, or other subject matter as follows:

- ❖ Project Management
- ❖ Portfolio Management
- ❖ Technology Management: search, selection, negotiation and implementation
- ❖ International Financial Flows: monitoring, harnessing, availability.
- ❖ Corporate Financial Mechanisms and Planning
- ❖ Sourcing: search, bids, quality assurance
- ❖ Investment Projects: private and social evaluation
- ❖ Capital, Money and Stock Markets: operation and tapping.
- ❖ Macroanalysis: emphasizing critical development bottlenecks.
- ❖ Microanalysis: emphasizing Managerial Economics

Within the topic of "Applied Research", we emphasize the inclusion of the important relationship between university and industry on the part of the student and faculty. A relationship that is much referred by the business environment when suggesting improvements in higher education.

Most of the topics listed may be grouped within broader existing, or other subject matter that conform to curricula needs and requirements. In certain cases it may be convenient to include them in propedeutic courses that will enhance the student's capability to better confront and assimilate his formal curricula subject matter.

## The Cultural Menu

A key means to broaden the educational and cultural menu of a so-to-speak "globalized" university will suggest specific activities, among others, such as:

- a) Periodic local and preferably international seminars and round-tables and/or shops, followed by published results parting from specific issue papers and multinational participation.
- b) Advise and consultation (interface) with educational institutions regarding undergraduate and graduate programs and curricula including university extension activities with industry.
- c) Ad-hoc short-courses imparted by selected and accredited nationals and foreign faculty on specific subject matter needed to fill the gaps and satisfy educational programs linked to the common globalized mission.

d) Promote the creation of a multi-institutional center for "development within globalization" for, among other aims: Executive Training and Updating, Specific Applied Research on for example, local problematic arising (engendered) by globalization, such as Strategies for Assymetries, Business Development, and International Business Strategy and Public Policies, and Intercultural Management, etc.

Some of the central topics observed are then as follows:

- ❖ Price Competition
- ❖ Quality Competition
- ❖ Distribution and Logistics
- ❖ Employment Generation
- ❖ Investment & Reinvestment
- ❖ Resource Allocation Criteria
- ❖ Business Ethics
- ❖ Social Ethics
- ❖ Technology Transfer

Applied Research

Business leaders of the future are ethically compelled to find a balance between the new visions of intercommunication that globalization offers in creating the oft-referred McLuhan's "global village" and, on the other hand, the observed drawbacks of that process such as inequity and polarization of well-being that it has as well nurtured (propitiated) by means of its very advances, its very technological breakthroughs. The World Bank, reflecting on its own experiences in the past two generations has, as a consequence, propounded the concept of "inclusion", i.e., bringing people into society. Hopefully a new vision of its development financing policies.

The leaders' of the future responsibility will be to make compatible development with opportunity and economic justice for the factors of production whether it be labor, intellect, or capital. The challenge is there; the challenge is real.

## BIBLIOGRAPHY

- ❖ Hicks, Philip ( 1994). Industrial Engineering and Management: a New Perspective. McGraw Hill, Inc. New York.
- ❖ Porter, Lyman and McKibbin, Lawrence.(1998). Management Education and Development. McGraw Hill, Inc. New York.
- ❖ Tunnerman, Carlos. (1998). La Educación Superior en el Umbral del Siglo XXI. Caracas, IESALC/UNESCO.
- ❖ Zuscovitch, E. (1986). The Economic Dynamics of Technologies Development. Research Policy, vol. 15, pp.175-186.
- ❖ Stoneman, P. (1983). The Analysis of Technical Change. Oxford University Press. London.
- ❖ Zorrilla-Vazquez, Emilio (1997,1999). Apuntes para el Análisis y Revisión del Modelo de Desarrollo Mexicano. Tecnoart. México, D.F.