Available online at www.sciencedirect.com
SCIENCE DIRECT®
ELSEVIER
Technovation 25 (2005) 1059–1070
technovation
www.elsevier.com/locate/technovation

Competitiveness and innovation systems: the challenges for Mexico's insertion in the global context

José Luis Solleiro[a,*], Rosario Castañón[b]

[a]Center of Applied Sciences and Technological Development, National University of Mexico; 22-510 C.P. 14091, Mexico City, Mexico
[b]Engineering Institute, National University of Mexico; 22-510 C.P. 14091, Mexico City, Mexico

Abstract

Intellectual capital and its relation to innovation capacity are a common factor observed in the different schemes for the assessment of competitiveness. It is therefore that there is a growing need to adopt a systemic approach in order to analyze and design innovation policies aimed at strengthening collective performance for generating, adopting and diffusing innovations, building an approach known as National Innovation Systems (NIS). Following the concepts of NIS and competitiveness, the case of Mexico is analyzed reviewing some factors that establish obstacles for the development of enterprises, mainly those related to the macroeconomic environment. Finally some basic elements for a science, technology and innovation policy are proposed.

Keywords: Competitiveness; National Innovation Systems; Mexico

1. Introduction

Competitiveness is a complex concept that has been studied from different approaches and disciplines; however, it has not been possible to come to one sole broadly accepted definition. Nevertheless, the study of competitiveness is necessary to determine how it can be stimulated through an understanding of the sources that feed it and, of course, how it can be translated into an increase in the standard of living of society.

Competition analysis is not only a question of performing an economic analysis exercise with no social transcendence. On the contrary, it identifies the ways to foster more competitive national enterprises which, through the generation of better remunerated, stable employment can contribute to a real increase in levels of well being.

In the light of the above, this piece of research identifies the factors determining competitiveness in order to then put forward some proposals favoring better competitive performance from both the microeconomic point of view and that of the nation. This document first analyzes the phenomenon of globalization and its links with the concept of competitiveness with the purpose of observing that there are forces in the performance of the economic agents that transcend the country's borders. Subsequently, different approaches to competitiveness are reviewed in three aggregation levels: the firm, industrial sectors and the nation; with the central idea of examining the different components that have been considered to measure competitiveness.

A common factor can be observed in the different competitiveness schemes: intellectual capital and its relation to innovation capacity. Hence, it is proposed that there is a growing need to adopt a systemic approach in order to analyze and design innovation policies known as National Innovation Systems (NIS). Given this point of view, a final aspect is approached that refers to Mexico's competitiveness and its innovation system: factors are reviewed that have put a brake on a macroeconomic environment favoring the development of enterprises and some basic elements are proposed that should include a science, technology and innovation policy.

2. Globalization and competitiveness

The globalization phenomenon, characterized by intensification of international competition derived from the view of the world as a large market, has brought along with it deep productive and socio-economic transformations that constitute a process that is taking place at different levels

* Corresponding author. Tel.: +52-55-6228602x1146; fax: +52-55-6228602x1136.
E-mail address: solleiro@servidor.unam.mx (J.L. Solleiro).

0166-4972/$ - see front matter © 2004 Elsevier Ltd. All rights reserved.
doi:10.1016/j.technovation.2004.02.005

(international regional and national) simultaneously and that imposes the need to have new methodological approaches with which to understand and stimulate competitiveness. In fact, even though the concept of competitiveness is not new, the context in which it is occurring and the sources feeding it are. The traditional model, based on comparative advantages, that supposes that countries and their economic units allocate their resources to the production of those goods and services in which they have advantage over other countries, has been strongly criticized, for it emphasizes static analysis and takes the supply of resources and natural advantages as fundamental sources of competitiveness, but they have lost their value generating capacity.

A strong contrast has now been established between the traditional model and the new approach of competitive advantages, which are dynamically created by entrepreneurs and governments through a set of entrepreneurial strategies and actions, public policies and interinstitutional relations that seek to optimize value added. Indeed, it is now recognized that the main source of the wealth of the OECD nations comes from the creation of intellectual capital, principally through education and research, and this far surpasses sources related to the natural resources of the countries and even the existence of physical capital.

Although the dynamic competitive advantage model is broadly accepted as being superior to the traditional model, no agreement has been reached as to a definition of competitiveness. There is, however, a high level of consensus as to the idea of competitiveness as a multi-dimensional concept involving exporting capabilities, the efficient use of factors of production and natural resources and an increase in productivity which guarantees an increase in the standard of living. (Haque, 1991).

From the point of view of countries, the US Competitiveness Policy Council (1992) proposed a concept of competitiveness that refers to 'the ability of a national economy to produce goods and services that pass the tests of international markets, while their citizens can enjoy a growing standard of living that is sustainable in the long term'.

Adopting a practical approach (Müller, 1992), a good starting point for defining competitiveness is the concept of *Canada's Task Force on Competitiveness in the Agri-food Sector*, which proposes that competitiveness is the 'sustained capacity to gain and maintain a profitable market share'. This definition coincides with the generalized idea associating competitiveness with participation in the market, but qualifies it from the point of view of industry, by incorporating the objective of achieving profitable operations, and this is correct. It is clear in this definition that competitiveness has then to be understood as a process of relations between entrepreneurial organizations and markets in which a decisive role is played by the different expressions of the power structures, both governments and interest groups, which determine the context in which firms compete.

The complex network of relationships between the firms, industrial groups and public institutions that act within a determined macroeconomic, political context has led to the development of different views of competitiveness, whether they are centered on the individual firm, some economic sector or the nation. However, it is now accepted that competitive advantage is generated at the level of the firm and of specific industries. Furthermore, a high level of consensus has also been generated as to the fact that the complex of public policies and relationships between the firms and institutions surrounding each industry comprise the competitive environment, which Porter (1990) calls the diamond of national advantage.

Indeed, the OECD (Bradford, 1994) has identified that, in the new competitive environment, the behavior of the firm lays the microeconomic foundations of competitiveness, which is determined by a broad spectrum of knowledge and information on topics associated with the environment, such as consumer preferences, communication systems, production relations, markets, distribution systems, advertising in different cultural environments, etc. As a consequence, the complexity of this information demands firms to define new strategies.

In fact, in the new production systems, the sources of knowledge and key information for a firm extend beyond its internal sphere and are located, with increasing intensity, outside the firm. For this reason, relations between firms have become more important for competitiveness than their own internal relations.

In order to sustain the new entrepreneurial strategy, it is then important to distinguish between the elements of competitiveness over which the firm has a certain degree of control from those over which it does not. The competitive performance of the firm depends, in the first instance, on its capacity to manage the following internal elements under its control:

- Selection of a product portfolio
- Selection of technology and equipment
- Internal organization
- Purchases
- Research and development projects
- Quality control systems
- Contracting, training and management of human resources
- Marketing and distribution
- Financing and cost administration

The adequate management of these internal elements is the function of the organization and the capacities of the personnel and the firm's systems to evaluate and improve performance in each of these areas.

Competitiveness also depends on the quality of the interactions that the firm establishes with a series of factors including: