TECHNOLOGY POLICIES FOR EDUCATION SYSTEMS

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ABSTRACT

Knowledge is the main interest in universities, enterprises and research institutes. National systems of innovation and production are also related to technology and knowledge. Unfortunately technology policies and management knowledge policies in both levels seem to be inexistent in most cases or disconnected in few cases, which are more or less defined.

National Systems of Innovation may be viewed as a way of encompassing the many relationships between technology, economic development, trade, education quality and social improvement.

Technological learning and its application across sectors of a country require of an education system strong, up dated and efficient to guarantee competitiveness in terms of production

The links between national science, technology, industry, education, economic development systems are many and each of them receives the effect of the others. So the policies on each of them need to be defined as an integral whole-. Strategic orientation, formulation and integration is the support and a good way to have good results in the market competence.

Public management In almost all countries is not enough systemic nor integral to make possible a design of a set of policies in the mentioned fields.

Particularly in emergent countries it is necessary to make an effort to assure a better congruence between policies. This paper tries to help achieve this purpose.

Keywords: Knowledge Management, Education System, Innovation.

Introduction

Mexican experience in technology development is poor. Most of the main technologies in industry are imported and there are only few examples, which prove that it is possible to develop new technology in institutes or universities.

Besides of that, the contribution of universities in the enterprise spaces is scarce and not determinant in the future of Mexican enterprises development or competitiveness.

When we analyze the reasons of this situation we find that the links between industrial sector and academic sector are only devoted to supply the human resources, mainly in technical aspects, from engineering schools to different areas of the enterprises process, by means of a classical teaching- learning process in subjects that many times are out dated forty or fifty years.

It is very difficult to up date study programs in hundreds of engineering schools of many universities. Scientific careers are also not very well connected to technical schools in corresponding fields.

If we would try to define the most important scientific and technological policy in Mexico we could remark that our rate of economic resources devoted to these activities against the PIB has been less than 0.5% for many years, with governments of different political parties- In spite of that, they always have stated that are very interested in both science and technology. .

Relationships between policies in technology management, education and industrial planning

Development and transformation of the economy in Mexico have been tried in many ways and with different strategies- At every turn the effort has involved ideas, organizations, regulatory frameworks, infrastructure and resources. From the 1950¨s to the 1980´´s the Mexican governments followed the named " Import Substitution Industrialization¨". Its effect changed a set of behaviors of enterprises, workers, financial systems and governmental institutions.

The most important characteristics in this period were the lack of assimilation of modern technologies, efficient management practices and increasing competitiveness. For many years the results were satisfactory in terms of social progress but in recent times, from the 90´s, this strategy had to be changed by the rules of free trade, open economy and globalization.

In this new order, it is necessary to establish proper relationships between policies. But before that it is necessary that those policies exist, be clear and be aligned to the same objectives. That is not the case in Mexico because each institution define its functions according to an old Public Organization

Strategic Planning and integration

In enterprises and in universities, a long term objective is formulate a strategic plan and integrate it applying Knowledge Management and Technology Management. We propose a methodological criteria and a general schema to improve the present whole system integrated by y science, technology, industry, education, economic and development systems. There are many relationships between them and each partial system receives the effect of the others. So policies need to be defined also as an integral whole. Strategic orientation, formulation and integration are the support to have good results in the market

competence. In this way, the whole system shall obtain the biggest increase in value for its community.

Role of Science and Technology institutions

Our traditional institutions of science and technology have had few results in the complex objective of improving competitiveness through technology. In developing countries like Mexico, technology development is a very low level. Most efforts are made in acquisition and improvement of existing technologies but it seems that abilities generated by this process do not change neither the efficiency of technology management nor industrial competitiveness.

Industrial strategy and planning of new industrial enterprises

The most obvious seed to grow industrial activity is to have a strategic plan in each sector and many investors interested in business. Government had the main role in industrial planning many years ago but now it abandoned the arena and nobody has the leadership in this task. So there is not a national strategy in terms of industrial planning for Mexico.

The lack of governmental industrial promotion

A long time ago there was a governmental industrial promotion based on an industrial planning promoted by the State. But with globalization changes came new ideas about the previous role and industrial promotion was abandoned by governments.

In this new phase, the lack of experience in collaboration, the lack of promotion agents have put other obstacle for industrial development. New actors have emerged to solve the problem: producers´ associations or large firms. Both have been the key to get the construction of some competitive networks but these have been not enough.

Education System based in Knowledge and Technological Management

The Education System in Mexico has had as a main goal to cover the basic education services for a great population of more than 100 million inhabitants- Quality of that process has not been the first priority. So in the next stage it is necessary to adopt additional goals to include the education quality as a new priority.

This new goal means a complete transformation of the education system. One of the main policies and tools in this task is the modernization of the educators themselves, the strengthening of a technological infrastructure in schools, creation of research and engineering institutes in academic spaces and promotion of knowledge about technology sources and technological innovation.

Modernization of education and training systems is an urgent task to improve the quality of human resources. The adoption of process of continuous learning and continuous improvement have proved to be the best way to advance in technological innovation.

Technology Policies for Education

Policies for improve competitiveness through the Education System based in Knowledge and Technological Management

First, it is necessary to define three policies for Mexico 1) Define its technological vocation 2) Invest more than 1.5% on GNP in Science an Technology 3) 0rganize Research in the country as a strategy aligned with its technological vocation.

Second, regarding to academic development, it is not possible to promote it if a tight link between science, technology and industrial sector is not achieved before. It is the only way to get an authentic academic development.

Third, design a continuous modification of the educational system based on the application of Knowledge Management and Technology Management.

Behavior and Competitiveness of the whole system

The variable which integrates the performance parameters of the whole system is competitiveness.

Knowledge Science(KS), Knowledge Management (KM) , Technology Management (TM) and Technological Innovation (TI) have became more important in the last decade to study the complexity of whole systems like the one under study here. In this specific case, the expectative is to improve the mentioned variable, ***competitiveness***.

National competitiveness depends on the selected strategic orientation and performance of the set of the firms that contribute to the Gross National Product of a country; and their capability to transform the scientific and technological knowledge into economic growth and development.

The firm's performance depends on other factors like human resource competence, technology management efficiency and other indirect variables.

After an economic comparative analysis of socio-economic parameters it is difficult to conclude which is the better combination between science / technology / engineering / industrial / educational and competence policies. The knowledge accumulation and its intelligent application on development requires of the Knowledge Science content: creativity, systematic application of knowledge and methods for knowledge transfer, knowledge utilization and knowledge creation.

With regards to strategy, different governments have applied specific set of strategies. None of them have shown excellent results in competitiveness, in spite that there were some sectors with good results, in general our competitiveness in lowing and many ups and downs are observed in several related parameters.

CONCLUSIONS

1. KM AND TM are very good disciplines to support a planning task for building a whole system made up national innovation, industrial production and education.

2. Before to define and integrate the policies, a proper diagnosis is necessary. The diagnostic covers as main points : industrial production, technology, marketing, economic performance, knowledge management, education system and competitiveness.

3. It is essential to include education quality as a new goal in the Education System.

4. Education system must be modernized to bring into the focus educators, technological infrastructure and knowledge.

5. For improving competitiveness through the macrosystem *Science / Technology / Innovation / Industry / Education* following we propose several policies:

   a. Define the country technological vocation
   b. Invest more than 1.5% on GNP in Science an Technology
   c. 0rganize Research System in the country as a strategy aligned with its technological vocation
   d. Tighten links between science, technology and industrial sector.
   e. Carry out a continuous modification of the educational system based on the application of Knowledge Management and Technology Management. .

6. Other specific policies for improving competitiveness through engineering schools are :

   a. Analyze the content of current academic programs of engineering schools from the point of view of involved technologies.
   b. Analyze Knowledge content of those programs, to adjust them in accordance with .
   c. Apply Knowledge Management and Technology Management criteria and techniques to the complete set of academics study programs at national level to give them a proper shape bringing out to date and congruence.
   d. Repeat the same reviewing process every three years as much to avoid obsolescence.

7. Solve the problem of linking policies and behaviors of the three main systems : Industrial, Technological and Educational.

8. A convenient solution for this task is to integrate a team with many representatives from the involved institutions with related functions.

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