

## **FACTORS AFFECTING THE SKILLED LABOR IN ELECTRONICS INDUSTRY AS A COMPETITIVE ADVANTAGE IN THE METROPOLITAN AREA OF GUADALAJARA**

Factores que afectan a la mano de obra calificada en la industria electrónica como una ventaja competitiva en el área metropolitana de Guadalajara

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**ABSTRACT**

The objective of this work is to know and to determine the major factors that had caused the lack of competitiveness in the electronics industry for the Metropolitan Area of Guadalajara (ZMG) from an approach of the theory based on the resources. Through an exploratory method shall be determined which are the variables that most impact on the competitiveness of the skilled labor. The factor endowments of a country are the key to the generation of competitive advantages.

Keyword: Electronics industry, skilled labor, comparative advantages, competitive advantages.

**RESUMEN**

El objetivo de este trabajo es conocer y determinar cuáles son los principales factores que originaron la falta de competitividad en la industria electrónica para la Zona Metropolitana de Guadalajara (ZMG) a partir de un enfoque desde la perspectiva de la teoría basada en los recursos. A través de un método exploratorio se determinará cuáles son las variables que más impactan en la competitividad de la mano de obra calificada. El factor de dotaciones de un país es pieza clave para la generación de ventajas competitivas.

Palabras Clave: Industria electrónica, mano de obra calificada, ventajas comparativas, ventajas competitivas.

## INTRODUCCIÓN

This research shows the skilled labor as a factor determining the comparative advantages of a country and therefore generates competitiveness against other nations. For skilled labor is understood that preparation is obtained by an individual either through education or training in the workplace. The Metropolitan Zone of Guadalajara (MZG) is a point where the electronics industry companies by geographic and resourcing issues in the region crowded. From 1960 it began to develop this industry. Skilled labor and in collaboration with the government promoted educational programs to meet the industry shift was required.

The crisis appeared since 1980 caused the loss of competitiveness because large corporations left the country with their capital, leaving a high unemployment rate that integrated labor qualified for years. In addition to this phenomenon they originated the changes presented by other countries that were more competitive than Mexico. To counter the problem, guidelines were established to attract foreign investment, not discourage it by the decrease in tariff rates, further opening of foreign direct investment and tax incentives.

Loss of competitiveness generated malaise in society. So, the government through programs in collaboration with the state of Jalisco made it a specialized place in high-tech companies that do address the major technological changes (also known as the fourth wave). Factor endowments of the country depend partly on the capital that has the nation that is a diamond element (Porter, 1991). Mexico

in recent years has lost competitiveness of its skilled labor partly because it is not prepared to address the issues that ask businesses to solve.

In order to determine those factors that reduce the competitiveness of a nation in a specific sector, the following research is conducted.

## PROBLEM

The electronics industry in Jalisco emerged since 1960, although before this date already have existed the state and federal agreements in order to industrialize the state. Companies like Siemens, Burroughs Mexican Industries, Industries International Photographic Kodak and Motorola Semiconductors were the first to settle in the ZMG (Metropolitan Area Guadalajara) (Rodriguez, 2008).

The state has advantages of location, i.e., adjacent to the port of Manzanillo, Colima, leading into the Pacific Ocean and also its location within the country is central part of the territory and access to the United States is direct. In addition to the companies that settled in Jalisco came mainly from both sides. That change brought more transnational companies seeking to reduce their production costs and maximize their profits. The industry required skilled labor to cover the requirements of enterprises. This was why workers were trained and formed generating comparative advantages with other states such as Baja California and Nuevo Leon to generate competitiveness, including with other countries.

With the help of the government and the state through fiscal stimulus, it was achieved decentralization, promoting the establishment of industrial corridors in the main towns of the MZG as El Salto, Tlaquepaque and Zapopan. For 1970-1980 it had already been established about 14 transnational corporations according to Rodriguez (2008). But since 1980 a crisis was presented in

terms of economic development that led to the devaluation of the peso against the dollar and inflation was very high. In order for companies to not leave the country by the uncertainty presented changes were made, mainly a program was created of trade liberalization, Mexico joined the GATT (General Agreement on Tariffs and Trade) and reduced its tariffs.

Despite these changes to counter the crisis the country lost competitiveness at first, but soon the strategies implemented gave confidence to the companies installed in addition to reach more. The maquiladora industry on the one hand specialized and located in the north of the country while the electronics industry in Jalisco finds the skilled labor it required. Thus the State was

positioned as the main reference to this economic sector.

In the 90s there was a restructuring of the electronics industry, giving rise to the expansion of some companies and the arrival of others such as Japanese that aimed to enter the US market. In this situation, the skilled labor was in high demand by industry. But, since 2000 the electronics industry entered a process of decline, i.e., due to the crisis that occurred mainly in the United States had to reduce production by companies causing a decrease in production which resulted in large transnational companies, which decided to leave the country. Loss of investment is estimated at 36.38% for the period 1997-2000, but there was still a much larger loss in the period 2000 to 2004 of 86.70% (Hernandez, 2006).

**Table 1. Foreign direct investment in key states**

State	FDI (2013)
<b>Jalisco</b>	162
<b>Chihuahua</b>	197
<b>Baja California</b>	152
<b>Estado de México</b>	122
<b>Tamaulipas</b>	286
<b>Distrito Federal</b>	150
<b>Sonora</b>	31
<b>Nuevo León</b>	31
<b>Coahuila</b>	37
<b>Puebla</b>	10
<b>Zacatecas</b>	7
<b>Querétaro</b>	0
<b>Aguascalientes</b>	0
<b>Other</b>	8
<b>Total</b>	1184

Source: Based on data from the Ministry of Economy (2012).

In the period 1994-2005, foreign direct investment (FDI) in Jalisco was concentrated by four countries, mainly the United States with 54% of total investment, the Netherlands and Germany with 17% and 5% respectively Singapore (Dussel, 2007). This speaks about the importance of the US electronics industry in the country. In addition to investment firms established in the ZMG they obtained greater benefits because much of their production was for domestic consumption and the rest is exported to their country of origin.

As shown in the table 1, there are thirteen states for 2013 that make foreign direct investment related to the electronics industry. Of these, Jalisco is positioned in third place below Baja California and Tamaulipas. While part of outward foreign direct investment was due to the US crisis by terrorists and economic problems also influenced greatly the emergence of countries like China where cheaper labor work was presented, lower tariff rates, location factors and infrastructure. Regarding labor there was a decrease in its cost three times, i.e. a worker in China earned three times less than a Mexican (Carrillo and Gomis, 2005: 37).

Mexico and Jalisco mainly presented serious problems for these radical changes, decreased economic activity; unemployment and obsolete infrastructure were some of the process. For years the state focused on empowering individuals through technical education programs as secondary and high schools. The more skilled labor was related to the electronics industry and became on the one that had a high unemployment rate.

## DELIMITATION OF THE PROBLEM

The skilled labor is part of the competitive advantages that encourages specialization and efficiency in a sector, as mentioned by Porter (1991). Jalisco has skilled labor in the electronics industry, but currently is not demanded by companies. In addition to this, technological changes that cause global training for labor is continuing to lose competitiveness but also increases the level of unemployment.

Alvin Toffler, American sociologist mentions the fourth wave currently is living in society. The first wave is defined as the period of the agricultural revolution (before the seventh century). The second wave refers to the industrial revolution in the nineteenth century. The third wave includes a series of events that break the structure of the second wave mainly regarding decentralization, de-massification and personalization (Toffler, 1979). Derived from the three previous waves, the fourth wave that exists at present arises. It is that major technological changes have a direct impact on the economic system, i.e., production processes change and specialization giving rise to another type of demand from companies in terms of services, labor and supply.

The map shown in figure 1 below shows the specialization of each state, i.e., the type of industry that is set there. Jalisco is composed of SMEs companies, computer components and office. Notably, these firms are in the area of technological innovation. Based on the written information labor it will be affected by these technological changes. This will lead to problems in the education system because the programs do not settle for dynamism in the labor market which it does not make the appropriate changes, it will be left behind.



Figure 1. Areas in the electronics industry in Jalisco.  
 Source: Electronic Industry, 2014, pp.17.

Under the assumption that companies stopping being competitive increase the unemployment rate and skilled labor more current qualified will be the most demanded by the labor market, despite it is small. For this reason, it is proposed to identify the factors that determine the loss of competitiveness of labor in the electronics industry in Jalisco as it is.

**JUSTIFICATION**

This research aims to know which factors influenced the skilled labor in Jalisco to become a competitive disadvantage. For the period 2001-2003 in Jalisco closed a total of 29 companies ending their operations permanently or deciding to transfer their investments to another country where could reduce their production costs (Rodriguez, 2008). According to Cadelec (2013)

Production chain of electronics (A.C.) in 2013 there were 99.518 jobs in the high tech sector, which represented an increase over 2012 of 1.03%. Based on a survey of 20 companies it found that 45% of them invested in training their workers.

**RESEARCH QUESTION**

What are the factors that determine the loss of skilled labor as a competitive advantage in the MZG?

**HYPOTHESIS**

The factors that determine the lack of competitiveness of skilled labor in the electronics industry in Jalisco are the

decreasing in preparing individuals coupled with technological changes occurring globally.

### GENERAL OBJECTIVE

Identify the factors of skilled labor resulting in the loss of competitiveness for the creation of an indicator measuring is.

### SPECIFIC OBJECTIVES

- A. Detect the current situation of skilled labor in Jalisco.
- B. Identify the relationship between government and business concerning the type of labor required.

### CONCEPTUAL FRAMEWORK

#### A. Absolute advantage

According to Adam Smith (1937) trade consisted of countries that had surpluses in their production processes, that is, each nation should specialize in what was best and whose production factors were not hard to come by, so absolute advantages were created or production of goods. By specialization of an individual in the production of goods, it generated his own welfare and this caused that the common good is outside homogenizing in society. Smith argues that if a foreign country could offer cheaper than other country could do, to benefit from trade this country should buy the good produced by the foreign country, with some part of the production of its industry, used in the form it has some advantage (Smith 1937: 45).

#### B. Comparative advantages and competitive advantages

The theory of comparative advantage proposed by David Ricardo (1951) mentions that a nation in those economic activities that can generate a comparative advantage over another and by that specialization would lead to export the surplus production and would import what was missing because it is more expensive to produce it. This is an original efficiency and productivity of the nation that would be competitive. In this way each nation specializes in what generates comparative advantages is what makes the exchange of surpluses beneficial to another country that does not have the resources or capacity to produce it. David Ricardo presented efficiency in the economy of any country that is reflected globally.

The theory of competitive advantage shows that this depends mainly on 3 factors: Geographical location, skilled labor and preferential access to major markets around the world. Porter (1991) performed a study of the top ten nations of the world, these are Germany, Korea, Denmark, USA, Italy, Japan, United Kingdom, Singapore, Sweden, Switzerland, where it is affirmed that the success of a nation is due to its competitive advantages, where these depend on the ability to have the industry to innovate and constantly improve their production processes. Under the diamond of Porter (1991) there are four factors that determine the competitive advantage of a nation, these are: factor conditions, structure, strategy and rivalry of companies, related sectors and auxiliary; and demand conditions. For research purposes conditions it, will be analyzed factors only.

### C. Determinants of national competitive advantage

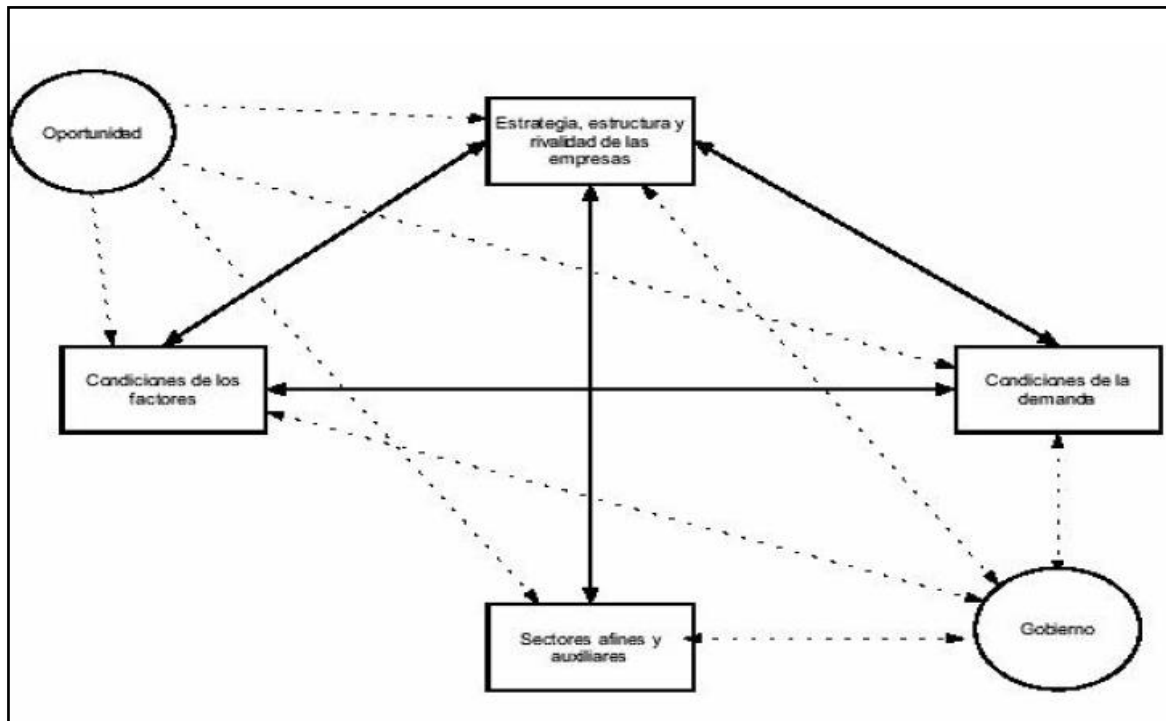


Figure 2. Competitive Advantage of Nations  
Source: The Competitive Advantage of Nations, Porter (1991).

The terms of such factors as economic theory marks are the factors of production: land, labor, capital, natural resources and infrastructure. These factors determine the competitiveness of a company through the provision with which initially counts. Porter (1991) also divided into two the production factors. On the one hand, defines the basic factors such as land, location, climate and demography. The other division is defined as specialized and integrated infrastructure and advanced research capacity.

In the second division it is labor and refers to the training and preparation with which it is counted. For Porter (1991) education without training does not work. It is necessary that education systems have specialized in the lawsuit that asks industry programs and also there is a continuous training in production processes to keep the competitiveness of this factor. Based on the conceptual

framework shown above, it is presented a number of methods which can be determined more clearly the kinds of factors that influence a nation via competitive advantages.

### D. Government as an economic agent

The government's role as a regulatory institution of the market is essential for the economy. While attracting foreign direct investment depends on the benefits of the company that arrives in the country, it is also the task of the government to allow entry through stimuli. In this way it can become an entity that promotes the competitiveness of direct or indirect way.

### E. Towards the structure of companies in the electronics industry in Jalisco



The electronics industry in Mexico can be classified into three groups of companies: Global standards, leading suppliers and secondary and design houses. Within global standards there is a subdivision that is manufacturing original equipment and manufacturers of contract equipment. Enterprise groups concerning global standards are those that are leaders in their field and can be defined as multinationals. These firms seek countries where production costs are minimal compared to their place of origin. Although its plants are established in another country, decisions come from the top management (parent plant) and only respond to external processes.

Groups leading suppliers are those companies that are aimed to provide resources to companies with global standards. In most of these firms, they come from the same place of origin and only a small part is national. It may be remarked that is part of the mistrust foreign direct investment not related to the domestic companies by the fear that is going to cause problems in production processes. The third and final group is the one concerning the design manager of global companies provide services of all kinds, this more personalized

way. This group is the only one of the three where a high percentage of companies that make up the national and foreign rest.

## F. Strategies of companies in the electronics industry

### 1) The view based on the industry and the viewpoint based on the resources and capabilities

For Peng (2012) an industry consists of a group of companies that produce goods or similar services to each other. In the case of Jalisco, specifically the ZMG, the electronics industry integrates foreign companies making goods with similar production processes. To better understand how firms compete in an industry a model called structure-conduct-performance (ECD) (Peng, 2012) was raised. The structure makes mention of the structural attributes of a company. Conduct is the company's actions and performance can be interpreted as the result of the conduct of firms in response to the structure of the company (Vargas-Hernandez, et al. 2014). Under the framework of the five forces of Porter (1991) the case is broken down for the electronics industry ZMG:

Table 2. Frame Porter's five forces in the electronics industry in Jalisco.

Five forces framework	Electronic industry
<b>Intensity in the rivalry between competitors</b>	Electronic Multinational competitors from several nations are set in Jalisco.
<b>The threat of potential entry</b>	Foreign companies with lower costs to those already installed.
<b>The bargaining power of suppliers</b>	Competition among foreign nations by the large number of suppliers in the country.
<b>The bargaining power of buyers</b>	Similar goods are exported to the same countries as the United States and the European area.
<b>threat of substitute</b>	Competition from Japanese companies.

Source: Prepared with data Peng (2015), pp, 37.

To Geert Hofstede culture is defined as the collective programming of the mind which distinguishes the members of one group or category of people from another (Hofstede, 1997). Hofstede distinguishes five key points of culture defined as dimensions. The first is the power distance is defined as the relationship between the hierarchies in a society or, where applicable within society. In the case of Mexico the difference between worker communication with the boss is remarkable, as is the misdistribution of income since a high percentage is only concentrated in a small number of Mexicans.

The second dimension defined as individualism is the participation of society in terms of cooperation. Collectivism as its counterpart is the ideal but the reality is far from the concept. As noted, the individual and especially the Mexican, is not a person working collectively, without opposite, selfishness is presented as negative in order to meet objectives, giving rise to the existence of information asymmetry.

The third dimension is gender. Globally males largely cover power in all areas of society, this due to discrimination against females. At company level, the same problem occurs. Senior management or managerial positions are in charge of men and women are limited to administrative positions without voice or vote. Globalization has made major changes to business and social level. Restructuring is presented by the genre resulting there greater participation by female gradually begin to take place in leadership and governance positions in society.

Uncertainty as the fourth dimension comes in companies when making decisions regarding the risk that this entails. Many firms prefer to stick with the processes identified by managers in order to reduce as much as possible taking other decisions, but there is the other side that takes risks having as consideration that processes are in

constant change and have to adapt to them somehow to prevent stagnate at some point.

The last dimension focuses on long-term orientation says that there are companies that spend part of their profits to save in case of financial problems in the future and others who prefer to make instant use of these financial resources with the intention of rapid growth.

The electronics industry as already discussed is constantly changing and will be decision of the companies that belong to it to define what path they want to take, but always starting and considering the constant changes that occur in society and around the world. There will always be risks and more in terms of technological innovation, but also yields will be much higher because of the importance of this in all areas of society.

## 2) Globalization

For Peng (2010), globalization is the integration of countries and people around the world. For the study of globalization there are three important points: Three perspectives on globalization, the pendulum vision on globalization and semi-globalization (Vargas-Hernandez, Guerra and Bojorquez, 2014). Concerning the first point globalization is a process in which technological changes affect all nations. In the case of the electronics industry as mentioned in previous paragraphs in Jalisco established companies with innovation technology that is constantly changing and that makes large firms installed there try to maximize their profit by exploiting the resources they have.

Under the vision of pendulum on globalization the country behaved like marks history in a protective country of its industry in order to specialize and develop approximately in the sixties. But globalization was imminent and had to move its objectives towards a model of openness to integrate

multinational nations, so was named as many other emerging economies. The effect of globalization is remarkable about countries around the world, where some resent more than others. Factors such as free trade, foreign direct investment and exploitation of natural resources affect the development of a country. The presence of positions of rejection is present but the process of continuous change is unstoppable.

### CONCLUSIONS & SUGGESTIONS

The electronics industry in Jalisco is very important because of the investment coming by companies that are installed there. From the beginning, it specialized in the creation and training of skilled manpower to cover labor demand, but with, financial crisis, government policies and the process of globalization, labor has lost competitiveness in recent years. Through state and federal programs a turn of the electronics industry was promoted to convert the entity into a central point concerning technology innovation. It is why firms are installed in those areas.

It is concluded that although there is skilled labor workers in the work ZMG this is not sufficiently prepared to meet the demands of companies which leads to increased rates of unemployment or wage cuts. This phenomenon is also part of the fourth technological wave that occurs today. Jalisco is the third state with the highest percentage of foreign direct investment in the country, which is why you should not lose their position, so the following is recommended:

Analyze and update study programs for higher labor skilled labor supply cover. A close relationship between the state and foreign companies to define the type of policies aimed at improving the services offered.

A company level, create strategic alliances between suppliers for profit maximization. Impose internal control with reference to the competition between foreign companies that produce similar goods.

Monitoring of the effects caused by production processes to reduce costs generated by the exploitation of existing resources in the region.

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