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South American Cluster: *A Practical Case Study*

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Abstract

This paper studies Guadalajara's cluster in its major aspects. It tries to pinpoint and identify the triggers that made this agglomeration a new Silicon Valley. One of the most outstanding features of this city is its vigorous export performance in the electronic industry that is why in our study, we focused on that specific industry. We found out that rules and regulations in this geographic area played a critical role when it comes to attracting foreign exportations and local investors especially in the electronic industry. Nevertheless, the study of the case of Guadalajara verifies that different clusters have their own explanations in regard to their emergence which is specific and unique to different circumstances and geographical locations. In fact results showed that Asian countries electronic cluster differs in terms of aspects from the one from Mexican city. Past researches based on Asian clusters only took into consideration the conception and the initial stage of the process. The description of other stages of growth and development in the Mexican city helped us distinguishing between anchor firms and seminal firms which help in understanding how clusters are created (general) based on the fact that seminal firms are not essentially supporting firms and supporting firms may not be described as seminal firms.

Keywords: Foreign Direct Investment, Strategic Economic Zones, Cluster

JEL Codes: F35, L10, C39

I. The Republic Context

Mexico is a country located in North America. It is surrounded on the north by the United States, south and west by Pacific Ocean, and east by Gulf of Mexico. This republic is divided into 31 states, one Federal district, and seat of Mexico City, which is the nation's capital. It is bordered on south east by Guatemala, Belize, and Caribbean Sea. Jalisco lies northwest of Mexico City (Shavinina, 2004).

Map 1
Mexico's Location in North America



Map 2 Jalisco General Information



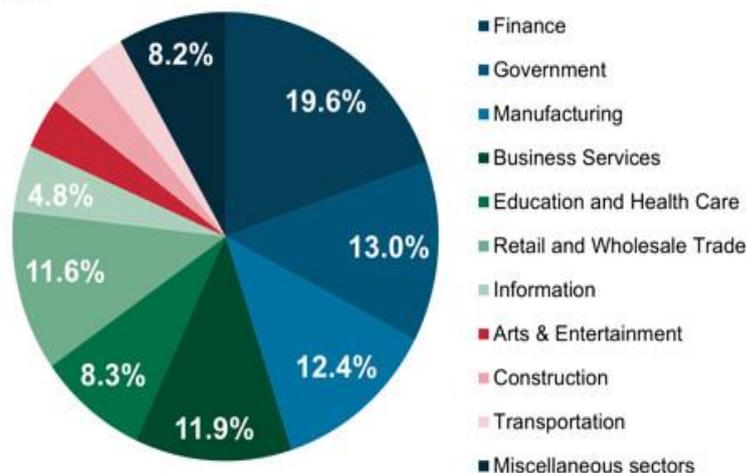
Source: Secretariat of Economics, Mexican Government

According to Potter and Miranda (2009), the Mexican economy is regarded as one of the largest in the world with a diversified structure which consists of services, manufacturing, foreign trade, commerce and tourism, and accounting. Mexico is strongly recognized as an upper middle-income country which is United States' third trading partner. Most of the exports from this republic go to the northern countries (neighbors) from which it also imports the products. Mexico is a member of North America Free trade agreement which it signed in 1993. The main trade system includes the Maquiladora industry program and the Temporal Importation for Export Program (Shavinina, 2004). The Maquiladora Industry system is very important to the U.S. subsidiaries since it allows them to import equipments, parts, and machinery for assembly in Mexico; on condition that the assembled would be exported to the United States for the final stages in the value chain (Tamasy & Taylor, 2008). Temporal Importation for export Program is free for both domestic and foreign corporations which under this system are able to import (temporarily) different components for the development or assembly of products for export, free of value added tax and general importation duties (Cook, 2002, Tamasy & Taylor, 2008; Porter, 2008).

Chart 1 GDP BY SECTOR 2013

GDP by Industry

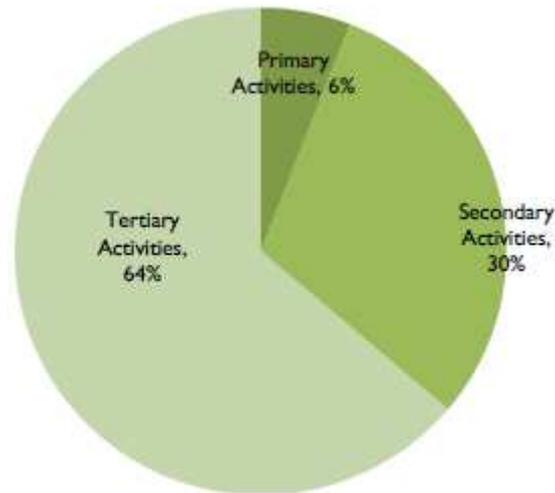
Finance remained the nation's top industry in 2013, while government was no. 2 despite efforts to roll back spending.



Source: Commerce Department | WSJ.com

Source: Commerce Department-WSJ.com

Chart 2 GDP BY Industry 2013



Source: INEGI

In 2004, Mexico Congress passed a new federal Strategic economic Zones law which led to the development of free trade zones regarded as Strategic Fiscal Enclosures (Tamasy & Taylor, 2008). This law allows the companies in these Zones to operate duty and tax free in regard to importation, compensatory changes, value added and foreign trade taxes while the imported products remain within specific locations. In 2004, the first Zones were launched in north of Mexico City and San Luis Potosi (Cook, 2002; Shavinina, 2004). The strategic economic zones allow Mexico to offer domestic and foreign corporations export free zone similar to the ones in Asia. The features are related to Maquiladora regime which allows U.S subsidiaries to operate throughout Mexico duty free (Shavinina, 2004).

Table 1 GDP by Activities Jalisco vs National

| GDP 2013 | Jalisco | National | Share (%) A/B |
|--|--------------|--------------|------------------|
| | Total (A) | Total (B) | |
| Total | 989,219 | 15,443,167 | 6.4% |
| Primary Activities | 58,568 | 506,396 | 11.6% |
| Agriculture, Forestry, Fishing and Hunting | 58,568 | 506,396 | 11.6% |
| Secondary Activities | 299,332 | 5,322,220 | 5.6% |
| Mining, Quarrying, and Oil and Gas Extraction | 3,767 | 1,176,109 | 0.3% |
| Utilities | 16,419 | 268,925 | 6.1% |
| Construction | 84,046 | 1,166,705 | 7.2% |
| Manufacturing | 195,101 | 2,710,481 | 7.2% |
| Tertiary Activities | 631,318 | 9,614,551 | 6.6% |
| Wholesale and Retail trade | 207,214 | 2,486,089 | 8.3% |
| Transportation and Warehousing | 50,719 | 1,001,760 | 5.1% |
| Information | 21,318 | 357,185 | 6.0% |
| Finance and Insurance | 29,427 | 535,440 | 5.5% |
| Real Estate and Rental and Leasing | 135,477 | 1,839,260 | 7.4% |
| Professional, Scientific, and Technical Services | 16,946 | 345,630 | 4.9% |
| Management of Companies and Enterprises | 889 | 92,078 | 0.0% |
| Admin. & Support and Waste Mgmt. & Remediat. Svcs. | 24,310 | 516,744 | 4.7% |
| Educational Services | 39,685 | 662,898 | 6.0% |
| Health Care and Social Assistance | 21,656 | 364,491 | 5.9% |
| Arts, Entertainment, and Recreation | 3,434 | 73,519 | 4.7% |
| Accommodation and Food Services | 27,098 | 340,863 | 7.9% |
| Other Services (except Public Administration) | 19,228 | 329,191 | 5.8% |
| Public Administration | 33,917 | 669,403 | 5.1% |

Source: INEGI Facts: Millions of peas

II. Guadalajara city (location advantages)

Guadalajara is the capital of the State of Jalisco. As put by Shavinina, (2004), it is located on both the NAFTA corridor and Pacific Trade Capital. This city is regarded as the main commercial center in Western Central Mexico and a major hub that promotes communication networks and continental transport. The most outstanding feature of this city is the vigorous export performance of the electronic industry (Shavinina, 2004; Tamasy & Taylor, 2008). The Location of Guadalajara in Mexico and North America helps it to have a variety of advantages which include the market proximity, export growth of electronic products, high technology production, availability of high quality human resources in engineering, and government support. In regard to market proximity, Mexico has a long border with the United States. This closeness favors the electronic industries in terms of the ready market in the USA (Shavinina, 2004). Guadalajara also has a very high technology production which leads to increase in the level of production and also high quality products. The high technology production is enhanced by availability of high quality human resources in engineering (Shavinina, 2004).

Table 2
Mexico: Free Trade Agreements Subscribed

| FTA | Partners | Date |
|---|---|-----------------------------|
| NAFTA | United States & Canada | 1 January 1994 |
| G3 FTA | Colombia & Venezuela | 1 January 1995 |
| Mexico – Costa Rica FTA | Costa Rica | 1 January 1995 |
| Mexico - Bolivia FTA | Bolivia | 1 January 1995 |
| Mexico - Nicaragua FTA | Nicaragua | 1 July 1998 |
| Mexico - Chile FTA | Chile | 1 August 1999 |
| Mexico-European Union FTA | European Union | 1 July 2000 |
| Mexico – Israel FTA | Israel | 1 de julio de 2000 |
| Mexico – Central America North Triangle FTA | El Salvador, Guatemala & Honduras | 15 March 2001 & 1 June 2001 |
| México – FTEA FTA | Island, Norway, Liechtenstein & Switzerland | 1 July 2001 |
| México - Uruguay FTA | Uruguay | 15 July 2004 |

Source: Ministry of Foreign Affairs, Mexican Government

Map 3
Mexico's Golden Triangle

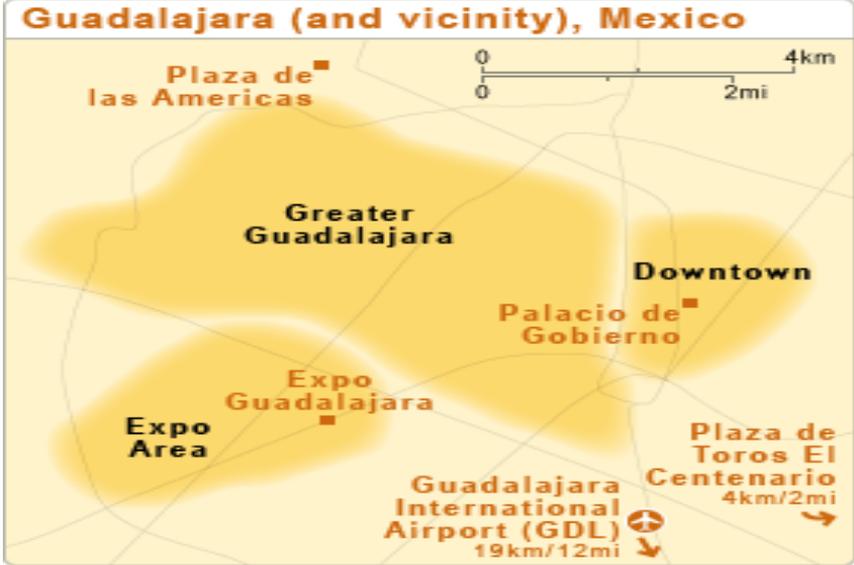


The production of high technology electronics is also enhanced by the state government through favorable tax treatment (Shavinina, 2004, Porter, 2008). The other advantages include an efficient transport system which connects Guadalajara to other cities, communication and logistics infrastructure (super highways), an international airport, optic fiber phone communication networks, and effective airfreight and courier services provided by companies such as FedEx and DHL. The city also has an efficient water supply system, an efficient industrial infrastructure (industrial zones and industrial parks), an adequate number of elementary schools and major universities with research centers and labs (SEPROE, 2004).

II.I Guadalajara city: the Silicon Valley Mexican Style

In 1980's, Guadalajara and its surroundings were give the name Mexican Silicon Valley nationally and globally due to the fact that there was a large number of high-technology manufacturing companies which were subsidiaries of the world major multinational companies in the electronics industry, that were in Mexico at that time *World Press Review* (1988) and *Businessweek* (April 3, 1989) and in Mexico's top business magazine, *Expansión* (September, 1989). In 1990's the status kept growing as Guadalajara's up-and-coming electronics cluster grew and diversified (cook, 2002, Porter, 2008). This city attracted many analysts and journalists from different geographical settings to make the case known to the world. In this regard, Guadalajara was given a new name, Silicon Valley South, with an aim of establishing it as the only region in America and south of the United States deserving the term Silicon Valley. Shavinina, (2004) argues that this was enhanced by a favorable atmosphere created by NAFTA when it signed a free trade oriented economic policies in the late 1980's. However, the nature of Guadalajara electronics complex and the factors that led to its development are totally different from the ones that originated the rise and induced the growth of original Silicon Valley in California. Guadalajara features are closer to other cases in developing countries which are regarded as the Silicon Valley of East. These include Malaysia and Penang (Shavinina, 2004; Palacios, 1995).

Map 4



Map 5



Source: Secretariat of Economics, Mexican Government

Guadalajara metropolitan region is known to stand the development of electronics industry in Jalisco with a high percentage (90%) of direct investment in the electronic industry (Table 1). Most of these investments come from abroad. Based on the fact that Guadalajara is too close to the major U.S logistics centers such as Houston, Dallas, and Atlanta, the large size of foreign direct investment was from U.S.A capitals. In the late 1990's (when there was a boom), the bulk of foreign direct investment was from the United States which accounted for ninety percent of the dollars invested in electronics enterprises (Jalisco) (Shavinina, 2004).

Table 2
Jalisco: Cumulative Investment in the
Electronics Industry by Municipality, 2001-2004

(Thousand U. S. dollars)

| Municipality | Investment | % |
|---------------------------------|----------------|--------------|
| Guadalajara metro region | | |
| Zapopan | 282,649 | 51.6 |
| El Salto | 145,870 | 26.6 |
| Tlajomulco de Zúñiga | 34,000 | 6.2 |
| Tlaquepaque | 17,733 | 3.2 |
| Guadalajara | 300 | 0.1 |
| Various municipalities | 5,176 | 1.0 |
| Sum | 485,728 | 88.7 |
| Other municipalities | 61,689 | 11.3 |
| Total | 547,417 | 100.0 |

Source: Jalisco State Information System (SEIJAL),
 Secretariat of Economic Promotion

Tamasy & Taylor (2008), reports that the other major investors were Taiwan, Singapore and Germany (Table 4). This shows that Mexico is so much dependent on foreign countries (Table 3) more so the U.S.A economy since it has a large number of subsidiaries making up the valley. This implies that the production and investment decisions are influenced by the interests of the foreign corporations.

Table 3
Jalisco: National Origin of Direct Investment in the Electronics Industry, 2001–2004
(Million dollars)

| Origin | 2001 | | 2002 | | 2003 | | 2001-2003 | |
|----------|---------|--------|---------|--------|---------|--------|-----------|--------|
| | \$ | % | \$ | % | \$ | % | \$ | % |
| Foreign | 179,720 | 99.90 | 81,330 | 51.32 | 142,076 | 67.97 | 403,126 | 73.64 |
| Domestic | 107 | 0.05 | 77,146 | 48.68 | 66,238 | 31.69 | 143,491 | 26.21 |
| Mixed | 100 | 0.05 | 0 | 0 | 700 | 0.34 | 800 | 0.15 |
| Total | 179,927 | 100.00 | 158,476 | 100.00 | 209,014 | 100.00 | 547,417 | 100.00 |

Source: SEIJAL, Jalisco Secretariat of Economic Promotion

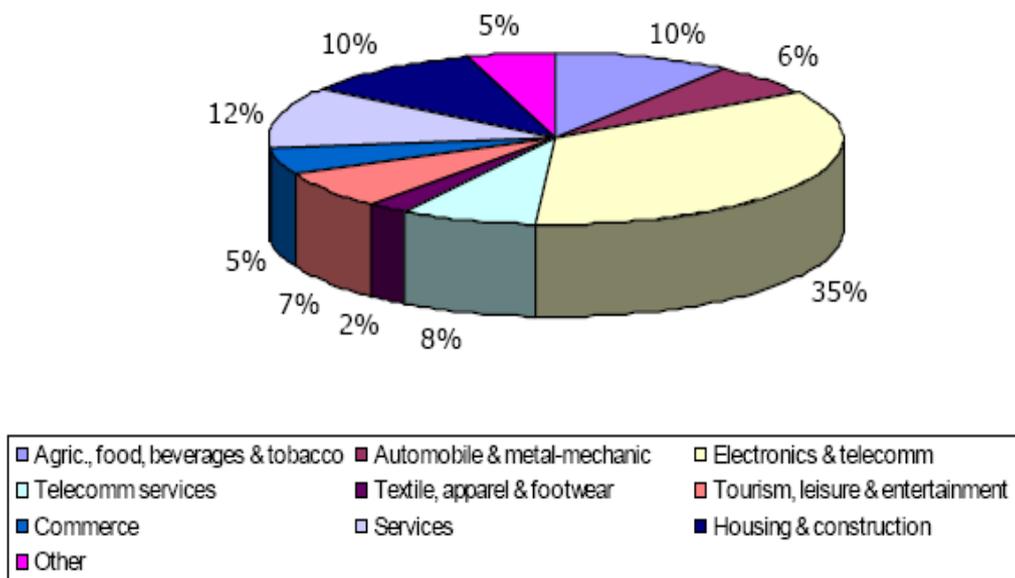
Table 4
Jalisco: National Origin of Total Direct Investment in the Electronics Industry, 1995-2003 & 2006
(Million US dollars)

| Country | 1995-2003 | | Country | 2006 | |
|---------------|-----------|---------|---------------|--------|---------|
| | \$ | % | | \$ | % |
| United States | 1,900.80 | \$89.2 | United States | 123.54 | \$68.01 |
| Singapore | 143.00 | \$6.7 | Singapore | 30.14 | \$16.59 |
| Taiwan | 31.00 | \$1.5 | Germany | 26.60 | \$14.64 |
| Japan | 15.86 | \$0.7 | Holland | 0.75 | \$0.41 |
| Hong Kong | 11.00 | \$0.5 | Venezuela | 0.34 | \$0.18 |
| Germany | 6.00 | \$0.3 | Mexico | 0.16 | \$0.09 |
| Mexico | 24.00 | \$1.1 | Mixed | 0.12 | \$0.07 |
| Total | 2,131.66 | \$100.0 | Total | 181.65 | \$100.0 |

Source: SEIJAL, Secretariat of Economic Promotion

In any case, as reported by Shavinina, (2004), the truth is that electronics industry is one of the main economic sectors in Jalisco (Chart 3) since it is the main exporter (Chart 4 and 5) and the main attractor of capital investment in the state. The sector has been performing well since the government has provided a lot of support and promotion. The cluster manufactures different types of electronic products. The main products are the personal computers, servers, storage systems, robotic tapes, digital video discs, jukeboxes, routers, firewalls, medical equipments, mobile phones, cameras, car security systems, air bags, anti-lock braking systems, and televisions (Cook, 2001; Shavinina, 2004; Porter, 2008). However, the tendency also affects imports that have shown similar dynamism in the last five years as shown in Chart 10, with imports equaling exports. This shows that electronics integrated superficially the local environment, further illustrating the condition of the branch-plant dominated industrial cluster that represents the Mexican Silicon Valley.

Chart 3
Jalisco: Cumulative Total Direct Investment by Sector, 1995-2003



Source: SEIJAL, Jalisco Secretariat of Economic Promotion

III. Policy Environment and Institutional Support

In 1995 to 2001, the state government came up with policies which were aimed at enhancing the electronics industry in Jalisco (Tamasy & Taylor, 2008). Tamasy & Taylor, (2008), adds that these policies were formulated in collaboration of industry organizations and all electronics companies operating in the state, particularly the home branches of the American Chamber of commerce, the Jalisco industrial chamber council, Electronics, Telecommunications, and Informatics Industry National chamber (Tamasy & Taylor, 2008; Shavinina, 2004). These led to the boom of the industry which was experienced in 1990. The most important members of Electronics, Telecommunications, and Informatics Industry National Chamber include the IBM, Jabil circuit, lucent technologies, MatSteel electronics, and Intel. In 1997, Lucent technologies and Nasteel electronics partnered to establish the Electronic supply chain agency, which was an important research body aimed at promoting the development of home based networks, by enhancing the link between foreign agencies and the local startups. This would play an important role of building a home based electronics supply chain connected to other sectors in the regional and national economies (Cooke, 2001; Shavinina, 2004).

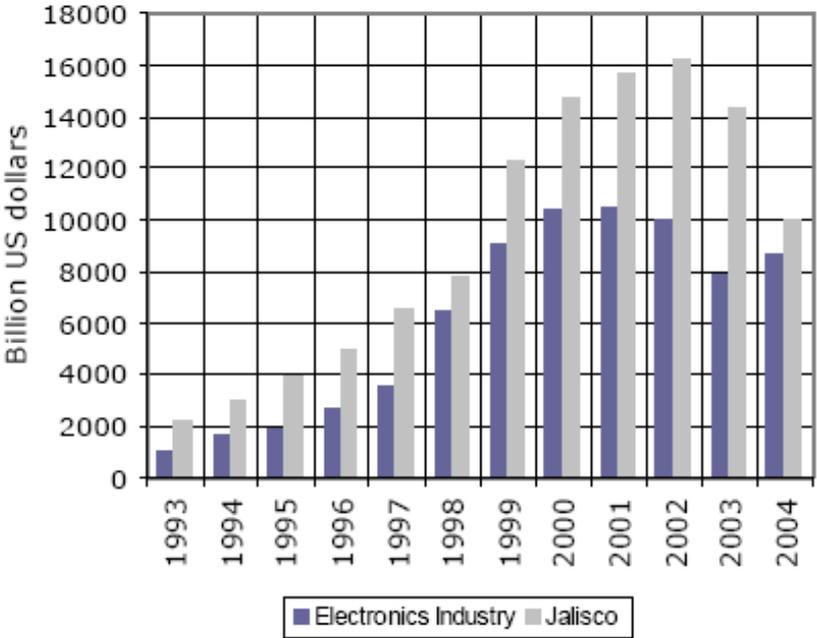
In regard to this initiative, Tamasy & Taylor (2008) tells that other institutions were created in the successive years. These include Digital Economy Promotion council, and Jalisco institute for information and technology. All these were supported by private sectors and the government. Similarly, Jalisco State Science Technology Council was launched to enhance the consolidation of the electronics industry and promote the development of the information technology sector. All these promoted the development of e-commerce and e-business in Jalisco (Cooke, 2001).

Fujita & Venables, (2002) claim that there are other different organizations that were launched as a result of these associations. These include the committee for development and Competitiveness in Jalisco which promote the development of new companies by providing support initiatives such as public services, infrastructure, and training of employees, examines the Jalisco laws of business which was changed to enhance new export promotion program, and support different companies to participate in local and international business programs (Fujita & Venables, 2002; Porter, 2008). This in turn led to the development of Jalisco business initiative for development and competitiveness in 2004, to support the development of prospective studies to promote sustainable development, reduce transaction costs, creation of high impact strategic projects for state's social and economic development, development of

industrial policy to promote integration of regional supply chains, and fostering of innovation and technological advancement (Fujita & Venables, 2000; Gordon Gordon & McCann, 2000 ; Porter, 2008).

Fujita & Venables, (2000), claim that the state government also provides support of industrial parks (by private developers), of which a good number are group in Jalisco State Industrial Association (APIEJ). Shavinina (2004) also claims that the government has played a big role in development of institutional framework which helps the investor to start new businesses in Jalisco, especially in Guadalajara and its surroundings. All these factors have contributed to locational advantages of Silicon Valley by generating a favorable environment for local and foreign companies to set up businesses. Shavinina, (2004), holds the view that the favorable environment has been enhanced by programs and regulation set up by local agencies, federal authorities, and government agencies concerning foreign trade, industrial promotions, taxation, and telecommunication leading to development of Silicon Valley.

Chart 4
Jalisco: Electronics exports, 1993-2004

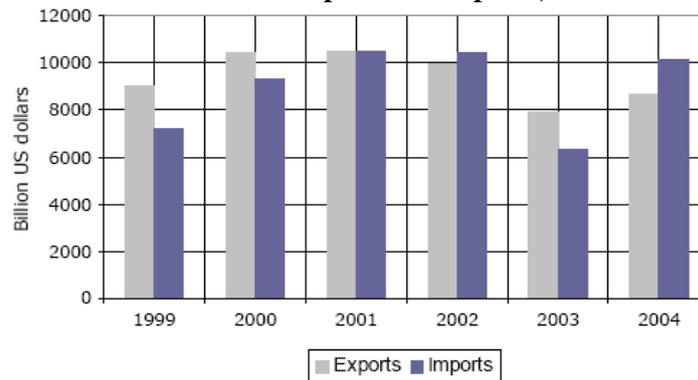


Source: SEIJAL, Secretariat of Economic Promotion

III.I Electronics industry trends

As reported by Tamasy & Taylor, (2008), since 1980’s, many brand companies in electronics industry have been making use of contract electronics manufacturers in their businesses or when coming up with manufacturing strategies. These companies outsource a variety of engineering and manufacturing services to take advantage of contract electronic manufacturers’ capital investment and expertise, thus enabling them to emphasize on their core activities or their core competencies, for example, marketing, research and development, and sales. According to Shavinina, (2004), brand companies in electronic industry make use of their competitive position by reducing production costs, accessing worldwide production capacities, improving their skills in regard to inventory management and purchasing power, reducing the fixed overhead costs and capital investment requirements, accessing high quality manufacturing and design capabilities through increase in technology, and accelerating time to volume production as well as time to market. These are some of the aspects which have led to Guadalajara area being regarded as Silicon Valley. This is based on the fact that the major brand companies are established in this area (Cooke, 2002; Shavinina, 2004).

Chart 5
Jalisco: Electronics Exports vs. Imports, 1999-2004



Source: SEIJAL, Secretariat of Economic Promotion

IV. The development and growth of Guadalajara electronics cluster

As discussed earlier, the development and growth of Guadalajara has been influenced by many factors some of which are effective government policy which supports and strengthens the scientific and technological aspects in Mexico. The institutional and government policies had a positive influence to multinational or global companies to locate their production facilities in Jalisco. For example, the government policy through Maquiladora program encouraged the US companies to invest in the Mexican territory (Gallagher & Chudnovsky, 2009). The companies would import raw materials duty free, assemble or repair products and export them. These policies led to the emergence of other firms within the region giving a clear illustration of how cluster development processes spread out in developing countries of Latin America (Shavinina, 2004).

IV.I East Asian reference and theoretical aspects

There is a big difference between Latin American clusters and the ones in the Asian republics (World Bank, 2010). This difference is as a result of branch plant deployment policies employed by Asian multinational companies which influence the formation of core-firm directed clusters in large local-plant manufacturing facilities. The other difference is that Asian countries have extensive export processing zones and special economic zones where incoming foreign direct investment tend to concentrate (Sargent & Matthews, 2003). This aspect is absent in Latin American republics. These differences imply that there are various conditions which should be met if clusters are to be formed in these continents. Kuchiki & Tsuji, (2008) argue that there are different factors that determine the formation of clusters in Asian countries. These include availability of physical infrastructure, less bureaucracy in regard to investment procedures, availability of export processing zones and special processing zones, and supporting firms. The development of clusters involves the setting up of shops in the development zones by the supporting firms and once the anchor firms have developed their shops and they are performing well (high production) other firms come together and launch their operations in those areas (become suppliers) (Kuchiki & Tsuji, 2008).

This implies that clusters form in chronological patterns where different firms come together if an industry has been established. However, these conditions or circumstances are not always relevant for the arrangement of clusters in other areas as in the case of Guadalajara where clusters form in different patterns (Sargent & Matthews, 2003). There are two ways or dimensions of analysing the formation of industrial clusters (birth, development and evolution). These involves a set of interrelating forces that push the development process and determine the different features of the industrial formation. The other dimension is the essential elements or chief players that promote the creation of the cluster (Corrochano & Eklundh, 2009). Porter (2008) suggests that the most important elements for the formation of a cluster are a group of suppliers of services, equipment, or inputs, a group of companies which produce their products jointly, customers and market channels, and coordinating or supporting institutions such as trade unions, technical institutions, universities and government agencies.

The other factors that drive the creation or coming together of different industries are presence of conducive industrial and innovative atmosphere, availability of institutional or social infrastructure, convenience in terms of the location, emergence of rivalry or active co-operation among clustered firms, the occurrence of partnerships and alliances in related firms, availability of inter-firm networks and production relations, and existence of agglomeration economies. All the industrial clusters that have these kinds of features are alleged to form lock in effects or path dependence over time which help them to continue developing and have economic sustainability (Corrochano & Eklundh, 2009).

Different clusters have different theories or explanations in regard to birth, development and evolution patterns. Many students and theorists believe that industrial clusters are born physically ignited by a market driven process based on existing industries expertise and production competencies within a Particular locality (World Bank, 2010). They are not as a result of formulated or implemented strategies. This implies that policies play an important role of supporting or strengthening the expertise or such competencies and providing favourable geographical locations for emerging or existing industrial agglomerations instead of creating new ones. The main emphasis is identification of common features or ingredients that enhance the formation of clusters so that one may understand the underlying features or patterns and get concepts which may be useful for the formulation or implementation o policies. The best way for one to come up with these concepts is to carry out a comparative analysis of various factors that drive the formation of clusters in different regions which is the main objective of this study (Porter, 2008).

IV.II Birth and initial stages

Different theorists suggest that Guadalajara electronics cluster was born unexpectedly as a result of market development factors. The formation of this cluster began in 1968 when there was setting up of two major electronics corporations based in the USA, Burroughs and Motorola, which aimed at the interior of Mexico for a location which was cheaper and had a good supply of inputs such as raw materials, labor and favorable conditions for the assembly of different products (Shavinina, 2004). The management of these companies carried out their own research and concluded that Guadalajara was a favorable location for their activities as compared to other towns and cities in the U-Mexico border. By the end of 1960's Guadalajara proved to be one of the best locations for various businesses in the sense that it was the second largest city in Mexico and the population was also high. These factors were very important for the success of Boroughs and Motorola in regard to setting up their branch plants assembly of semiconductors, microphones and radio sets, integrated circuits, minidisks, microprocessors, and power supplies (Scott & Garofoli, 2007). An important predecessor was German engineering giant and the alliance Siemens, and Productos industriales (manufacture of electrical motors) who had launched their activities in 1965. These enterprises stimulated the process of clustering in the area in regard to electronics firms (Shavinina, 2004).

The other corporations which launched their operations (setting up of assembly plants) were General instrument (1975) and IBM (1975). They operated under the same cross boarder system as the Motorola and Burroughs, which is, obtaining raw materials and other parts from U.S.A and exporting the outputs back for other operations. IBM manufactured electric typewriters while General Instrument engaged in surge suppressor assembly and relays. Basically, IBM moved its operations from Mexico City to Guadalajara plant where it launched the production of microcomputers such as AS/400 and S/36 in 1982. The Guadalajara plant was fully owned by IBM in 1985 whereby it began manufacturing PC's and disc drive products in 1986. General instrument's plant was later acquired by C.P Clare Corporation and Sumida Electric Corporation in 1999. In addition to this, Siemens acquired PINSA in 1982, Sperry merged with Burroughs in 1986 and became Unisys while On Semiconductor acquired Motorola in 1999 (Shavinina, 2004).

A unique company in the trend toward the launching of international subsidiaries in Guadalajara is Electronica Zoda which was a local start-up. This company was launched in 1970 in regard to manufacturing of portable radios and other audios. By 1973 this company was producing television sets using its own brand name (Shavinina, 2004). This innovation led to the company being regarded as the top manufacturer of radio in Mexico City. In 1980's, Zonda launched four companies one of which

(Compumex) was producing PC's in Tijuana. In 1988 it established a new company in Guadalajara which was also manufacturing PC's but importing the main components such as the motherboards from United States and Asia. By 1970's, there were many companies which were operating in Guadalajara, all of them being subsidiaries of multinational companies (apart from Zonda) (Gereffi, 2003; Shavinina, 2004). This circumstance was regarded as a feature of the process of cluster arrangement in Mexico. All these companies led to the building up of external economies of agglomeration in the 1980's.

In addition to this, there was another round in development of new electronics companies in 1990. In this case a mixture of companies were established in this area ranging from joint undertakings, local startups, fully owned foreign subsidiaries and some spin-offs. All these continued to ignite further the process of industrial clustering. In this manner, some characteristics of snowball process of firm creation as in the case of Silicon Valley were displayed in Guadalajara (Gereffi, 2003; Shavinina, 2004). These characteristics included the emergence of research and development and design operations. In the same round (1990), other main electronics original equipment manufacturers emerged. These included the Wang, Tandem, NEC, Hewlett Packard and AT&T, and the Kodak local subsidiary. After ten years, AT&T, Nec, Tandem, and Wang closed down their operations while IBM, Hewlett Packard and Kodak became one of the main anchor or supporting firms of the new electronics cluster in Guadalajara (Shavinina, 2004). Exhibit 3 lists the companies that were setup in the two initial stages in the Cluster development discussed until now. This Exhibit shows the years of founding, the nature and the main initial productions of those firms.

IV.III The attack of contract manufacturers (fourth stage)

In regard to the third stage of development of Mexican Valley (1990), many companies were well established and also performing well. In 1994, the reduction of Mexican complex policies and the signing of NAFTA also ignited the growth of the cluster and created a more favorable environment for foreign direct investment in Mexico. All these led to the emergence of Contract manufacturing activities and growth of manufacturing industries in this location. Afterwards (a few years later), something wrong happened whereby there was invasion of the world's leading contract manufacturers. The huge arrival of CMs was eventually influenced by main electronics original equipment manufacturers and by strong force created in global markets by large expansion in the United States economy in the 1990's. All these aspects led to multinational companies deploying their branch plants abroad (Gallagher & Chudnovsky, 2009; Shavinina, 2004).

The provisions and legal policies of NAFTA had made it easier for Asian and United States to launch their branches in Mexico and supplied different customers in the whole world. The devaluation and falling of Mexican peso in 1994 and 1998 respectively had an effect in the economy of United States in regard to appreciation of the dollar which in turn led to reduction of prices of input and labour (Gereffi, 2003). This favoured various companies in this area by reducing the operation costs. The other factors that favoured US and Asian companies is the geographical location. These republics are close to Guadalajara which implies that they incur less transportation costs when exporting the assembled products back home (Berg & Auer, 2006). At the same time (arrival of CMs), other main manufacturing companies launched their operations in Guadalajara, for example, assemblers of cables, connectors, and other PC makers leading to the merger between Hitachi Global Business Technologies and IBM. The resulting company was named as Hitachi Global Storage Technologies. The infrastructure was set up in El Salto Industrial Corridor (IBM campus) (Shavinina, 2004). All these branches were subsidiaries of multinational original equipment manufacturers except SERIE (local start up) and CUMEX (joint venture). During this period, there was a boom of electronics industry in Guadalajara as a result of arrival (huge) of CMs and the rush of different companies to establish their businesses in that area. This boom continued until 2000 when the economy of United States was in Recession. This led to a decrease in demand for electronics products and collapsing of electronics markets (Corrochano & Eklundh, (2009; Shavinina, 2004).

IV.IV Company exit- entry, Mergers and acquisitions

In year 2000, the Guadalajara city's cluster experienced some changes in the structure due to successive entrance and walking out of foreign branches. In 1990's, Motorola sold its subsidiary to other companies

(On-semiconductor) and left the place (Fullerton & Schauer, 2001; Shavinina, 2004). In year 2000, Lucent Technologies sold its branch in Guadalajara to V-Tech (Hong-Kong). In the same year V-tech closed down its activities and moved to china. Similarly, NEC closed its branch in El Salto Industrial Corridor. In addition to this, NatSteel branch in Guadalajara was acquired by Solectron while Sanmina merged with SCI systems forming Samina-SCI. Xerox later moved the New York and California operations to Aguascalientes which is managed by Flextronics (2001).

In 2002, the semiconductor Company stopped operating and traded everything with Frasca, and transferred all the businesses activities to other firms such as Malaysia, Seremban, and Arizona. Ultimately, Eker shifted from Saltillo and Coahuila to Yamaver (Fullerton & Schauer, 2001; Shavinina, 2004).

IV.V Supply chain management/ Anchor industries (fifth stage)

When the CMs arrived in Guadalajara, different firms from the sporting companies connected with the cluster. Most of these branches were associated with multinational corporations since most of the local entrepreneurs did not engage in electronics business (mainly operate by global corporations). Due to increase in the number of electronics firms in this area, another group of companies (concerned with supply management and logistics) launched its activities in Mexico together with support industries (Dufey & Ward, 2008). These companies specialized with vendor-managed inventory logistics services and were international. These companies included Emery logistics, Span international, Redwood systems, YCH, iLogistics, Ryder de Mexico, Roadway Express, Bax Global, Modus media International, and Sales Links.

The companies also offered other services such as cross-docking and e-warehousing. Cross-docking was mainly offered by Toyota industry in Tiajin, china (Kuchiki, 2008). Cross-docking is a delivery and shipping service that moves production systems and companies from supply chain to demand chain since the goods arriving in cross-docks in the supply chain are allocated to another point (in advance) such as an airport, or a retailer. This is part of supply chain management which helps different companies to make the best use of their efficiency as they also keep enough inventories to make sure that all unexpected changes of demand of products and services are met in advance. Cross-docking also helps many companies to make the best use of their time when they are moving to the market or reduce the shipment time at the logistics provider's facilities. The efficiency of these systems in developing countries is normally determined by storage and processing facilities and how local customs office operates (Harvie & Lee, 2007; Kuchiki, 2008).

Vendor managed inventory is regarded as a procurement method or an orderly logistics that reduces the time between the point when an order is placed and the time when is effective. This is very important for manufacturers' efficiency and productivity. Vendor managed inventory promotes outsourcing of parts and components also forces the suppliers to move close to the manufacturing premises. This system has been employed in Guadalajara by original equipment manufacturers such as IBM and other companies (Harvie & Lee, 2007; Kuchiki, 2004). There are also other services known as service management inventory which help various companies to procure and have the parts or components in the production line. These services are also known as service maquiladoras. The most common service management providers in Guadalajara are Memec insight and Arrow Dicopel (which also specialise in distribution of semiconductors for the electronics industry. The facilities of Arroe Dicopel are located in Flextronics industrial campus (Harvie & Lee, 2007).

Exhibit 3
Guadalajara Electronics Cluster Core Company Setup / Deployment
Initial Stages

| Company | Year Established | Character | Initial Product (s) |
|--------------------------------------|------------------|-------------------------|--|
| First Stage | | | |
| Siemens de Mexico | 1965 | Foreign subsidiary | Electric motors, contractors & switches |
| Motorola | 1968 | Joint venture | Cables, harnesses & power supplies |
| Burroughs | 1968 | Joint venture | Semiconductors, radio & microphones |
| Electrónica Zonda | 1970 | Local start up | Portable radios & audio system consoles |
| General Instrument | 1974 | Joint venture | Relays & surge suppressors |
| IBM | 1975 | Joint venture | Electric typewriters |
| Second Stage | | | |
| Microton/Info-Espacio | 1979 | Local start up | Personal computers & buffers |
| Wind Computers | 1981 | Local start up | Personal computers (PCs) |
| Hewlett-Packard | 1982 | Wholly owned subsidiary | Minicomputers |
| Telectra ¹ | 1982 | Joint venture | Low-tension control devices |
| Kitron | 1982 | Local start up | Digital control instruments |
| Sistemas Delphi | 1983 | Spin off | PC keyboards & Printed circuit boards (PCBs) |
| Encitel ² | 1983 | Spin off/joint venture | PCBs |
| Resser | 1983 | Local start up | Electronic alarm systems |
| Poder Digital | 1985 | Local start up | Power supplies |
| Electrónica Pantera | 1985 | Spin off | Cables and harnesses for PCs |
| Cherokee Electrónica | 1985 | Joint venture | Power supplies |
| Tulon de México | 1985 | Wholly owned subsidiary | Drills for PCB assembly |
| Shizuki Electronics | 1986 | Wholly owned subsidiary | Connectors & moulded capacitors |
| Kodak ³ | 1986 | Foreign subsidiary | Floppy disks, harnesses & PCBs |
| Wang de México | 1986 | Foreign subsidiary | PCs, minicomputers & phone sets |
| Compubur | 1986 | Spin off | PCBs |
| Tandem Computers | 1986 | Foreign subsidiary | PC assembly |
| Third Stage | | | |
| Adelantos de Tecnología ⁴ | 1987 | Induced location | PCBs |
| Logix | 1987 | Local firm spin off | Personal computers |
| Molex | 1989 | Wholly owned subsidiary | Cables & connectors |
| Mexaltec (formerly Kitron) | 1990 | Local venture | Relays & digital control instruments |
| NEC de México | 1990 | Joint venture | Microprocessor-controlled cell phones |
| ATT de México | 1990 | Wholly owned subsidiary | Phone answering machines |
| Panamericana de Tecnología | 1994 | Joint venture | n. a. |
| Circuit Assembly de México | 1994 | Wholly owned subsidiary | PCBs |
| Computadoras Electron | 1992-1994 | Local start up | PCs, printers & other peripherals |
| Scale Computers ⁵ | 1993-1994 | Local start up | Personal computers |
| Advanced Electronics | 1993-1994 | Local start up | Personal computers |

Sources: Palacios (1997) and Palacios (2004), updating by the same author up to January 2010

1. Established by Siemens building on SITESA, a company also founded by Siemens in Mexico State
2. It was established with 100 per cent local capital but as a Siemens de Mexico subsidiary
3. Up to this year the plant produced photographic film
4. It was established to supply the local IBM plant, located three kilometres away
5. 100 per cent local capital

Notes: Microton and Wind marketed their PCs with their own brand name

IV.VI Research and development companies, design and centers

Research and development plus design companies launched their operations in Guadalajara in 1980's and have developed together with multinational subsidiaries and the companies which offer procurement service. They started their operations with local companies such as Semiconductor Technology Centre, Resser and research centres, Mexico's National Polytechnic Institute in 1988. Foreign companies such as Hewlett Packard were also performing research and development activities in one of the departments whose aim was to design minicomputer components in Guadalajara. Design and research and development companies continued to expand their operations in 1990's and year 2000 both at local

companies and foreign subsidiaries (Gibson, Heitor & Yunez, 2005). In year 2004, Intel also established a design center and came up with other plans for developing a business incubator for local start-ups (technology based) in which the incubating firms were provided with capital for their project. This included a payment for advancing CIVESTAV's educational and research facilities together with Flextronics local plants in its pursuit to attract design projects and activities in its buildings (Zapopan). Saxennian (1989) claimed that other companies such as Jabil Circuit were also involved in product design and operations. These companies emerged in the 1980's with simple branches which (with technological advancement) improved to high-tech manufacturers (Gereffi, 2003).

Design and research capabilities were improved with the opening of Technopole in Zapopan municipality whose aim was to become the leading firm in Jalisco in regard to science and technology. The supporting companies were Semiconductor Technology centre, Ensenada Centre for Higher Learning and Scientific Research, and CINVESTAV, local branch (project leader). The other companies which were attracted for research were Texas Instruments and ST microelectronics as well as design areas of Siemens VDO, Hewlett Packard, IBM and Intel in 2005. The main objective was to attract main semiconductor designers in Technopole by the end of 2010 (Cattaneo, Gereffi & Staritz, 2010; Shavinina, 2004).

IV.VII The whole process

The birth of Guadalajara cluster is a complex and a long procedure which extended beyond three decades. This process was launched by two firms which were promoted by the boom of United States economy and the world at large in 1960's. These companies decided to carry out their production operations beyond their borders to locations which were cheaper (location, raw materials and labour) in order to confront the increased competition in both local and international markets. Through their assessment they decided to move to Mexico since it was the best in terms of cheap labour and convenient location (Cattaneo, Gereffi & Staritz, 2010; Shavinina, 2004).

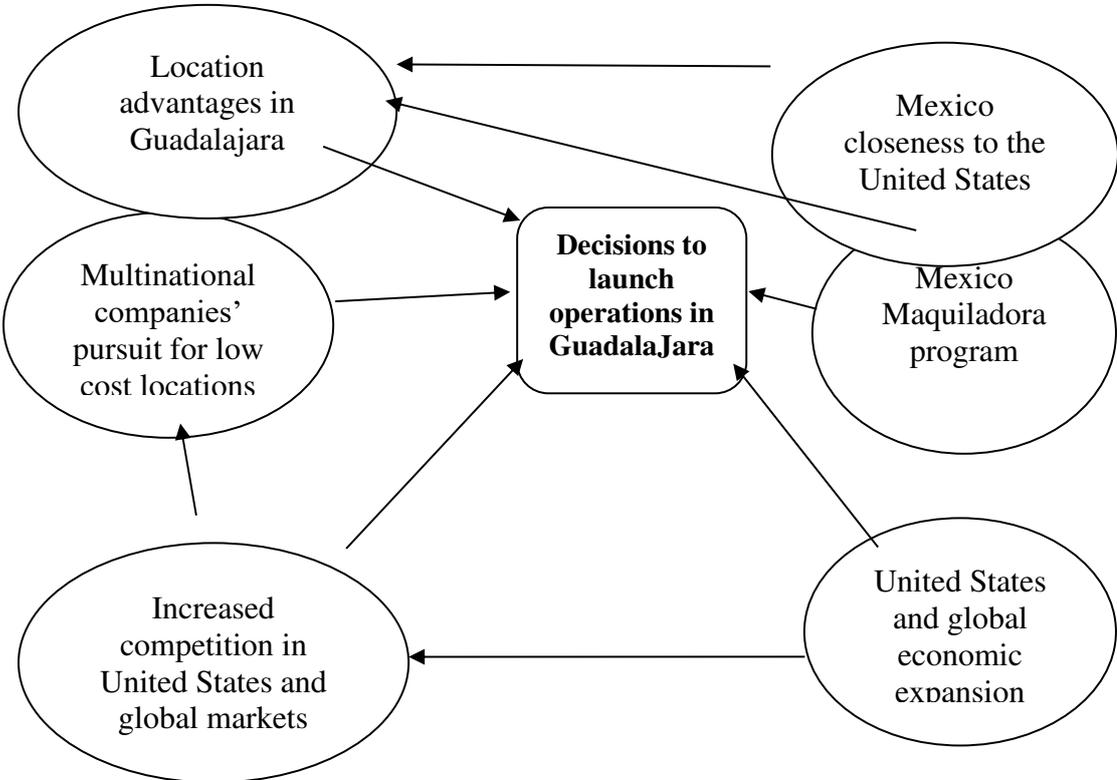


Figure 3.1: factors that led to launching of Guadalajara Electronics cluster (Gallagher & Chudnovsky, 2009; Shavinina, 2004).

Figure 3.1 displays the factors that led to the development of Guadalajara electronics cluster. These factors include Mexico closeness to United States, creation of a favourable business environment for

foreign direct investment by Maquiladora program, United States boom in the economy, increased competition in the United States and Global markets, locational advantages in Guadalajara, and multinational corporations pursuit for low cost locations (Gallagher & Chudnovsky, 2009; Shavinina, 2004).

The development of Guadalajara electronic cluster was not continuous with exception of Design and research companies which launched their operations after many companies were already established in 1980's. The same case applies to the CMs and logistics and supply chain providers which were established after the main companies were in place. These features support the claim that the developments of industrial clusters have some aspects of sequential pattern. This study (Mexican case) clearly indicates that clusters do not essentially begin from planned complexes as in the case of East Asian prototype. Industrial parks have also contributed in inducement in later stages of the process but not in the initial parts of development (Shavinina, 2004).

In regard to what most theorists suggest, Guadalajara has also been considered to emerge from the onset of coordination, co-operation and collaboration among manufacturing firms and between local and national institutions. The local American Chamber of Commerce played an important role in the beginning of this development by organizing a forum where different company managers met and discussed the common problems and projects in their companies and how to resolve them. These forums also included the industry captains, industry chamber leaders and a community of company managers. This sense of community was an important ingredient in creation of personal and social relationships and community relations which was the foundation for the emergence (Ottaviano & Thisse, 2003).

The other factor which was also important in the initial stages of development was the presence of institutions of higher learning. These included high quality universities, research centers, and technical schools in that location. These institutions provided the engineering and managerial skills which were important for the development of the staff in local companies. The ministry of economy and local managers from CANIETI and CADELEC has been claiming that the higher institutions of learning and research centers have played an important role of supporting and attracting foreign direct investment and supply of adequate talent to foreign and local electronics companies that is crucial for the operations of the branches and offices. In this regard, local universities such as the University of the Valley of Mexico (UVM), National Polytechnic Institute and the Technologic University of Mexico (UNITEC) have launched local branches in different parts of Guadalajara due to high demand of their students in electronics companies (Gereffi, 2003). In addition to this, other local universities have launched new academic programs and research centres to cater for the growing needs in electronics firms. These include the University of Guadalajara, the Guadalajara Campus of the Monetary Institute of Technology and Higher learning, and western institute of technology and higher learning. In this regard, we may claim that the institutions have created a conducive atmosphere for technological advancement for an electronic cluster to grow in this geographical setting (Buitelaar & Padilla, 2000).

Since 1970's the development of the industrial cluster has led to the flow of external economies due to increase in the number of companies investing in that area. This increase continued in 1990's, where different production links were established giving birth to production and business networks among the clusters. Palacios (2001) claims that, this happened mainly between CMs and other larger original equipment manufacturing companies operating in the area and also between the CMs and their suppliers. In this manner, there was an increase in concentration of interrelated and linked firms in the area and also network externalities, agglomeration and confinement of economies as a result of lock-in effects and path dependence (Corrochano & Eklundh, 2009).

The process has also been activated by foreign infrastructure and acquaintance which has led to Mexico being regarded as the local-plant dominated cluster. This is based on the fact that it lacks important components of a self-sustained cluster as suggested by Miller and Cote (1987). These include an adequate local capacity, a market driven research and development and an entrepreneurial capacity required for sustaining home based companies through start-ups or spin-offs. Some characteristics and elements have nonetheless been created in the area for a self-sustaining cluster. For example, a strong

business culture and strong management acquaintance of the local engineers and managers acquired when working in various subsidiaries of the various multinational companies which operated in Guadalajara. In addition to this there are physical or industrial infrastructures which were created as a result of these activities plus the social and production networks established among the companies, and the sense of community developed around the electronics cluster (Corrochano & Eklundh, 2009).

V. Rising of professional managers in Guadalajara

Many firms in Guadalajara electronics cluster are associates of multinational companies, but in most cases, they hire local people to fill the managerial positions of various subsidiaries. This implies that these professionals or managers are not the owners of these company as it the case of many local companies or family businesses in developing countries. As in the case of many emerging or developing economies, Mexico used to have three enterprises in the whole economy comprising multinational enterprises, private enterprises, and public enterprises. In (1980-1990), the government reduced the number of public enterprises through privatization and remained with few such as petroleum and electricity (Gereffi, Spener & Bair, 2002). This led to emergence of many private companies which were managed by their owners (including electronics firms) despite the skills or professionalism in different sectors.

As the electronics sectors continued to be high-tech, there was need for the hiring of professional managers for the success of their operations. This was a big obstruction for unprofessional family members to run their companies. Gereffi, Spener and Bair, 2002 add that many companies hired professional local managers since they were able to adapt to changes in the electronics sector (environment). Based on the fact that many local professionals or managers had a lot of expertise in electronics, many multinational corporations hired them whenever new engineering skills or expertise in manufacturing of new products was needed. Currently, the Guadalajara electronics sector has continued to nurture or retain local professional managers who are very experienced in engineering, flexible to production of new products and well trained to cope with local employees.

V.I Business association and local professional managers

Many professional managers (local) in Guadalajara cluster use their expertise and business networks to run, direct and promote industrial development. They run the electronics company together as clubs in coordination with top leaders in the government if they would want some favours. These companies tend to network with business associations due to the political structure of the republic. These associations are very important in the sense that they help the companies to register with Mexican Enterprise Information System which is a must and should be through business association defacto. This leads to business associations being regarded as interest groups (Gereffi, Spener & Bair, 2002). The same case applies to electronics firms in Guadalajara cluster which associate with Delegation of the Occidental Region of the National Chamber of Electronics or Canieti-Occidente as interest groups. They also coordinate the firms within the sector. One of the main elements of these sectors is that managers are the main members of business associations. Since many multinational companies in electronics also use the local managers for these associations. The local professional mangers help the companies in investment of their assets in different industries. Sometimes the local managers may have their own interest of receiving benefits from coordinating actions but they end up promoting their own clusters or efficiency of subsidiaries. If there are multilayered clusters, there is increase in efficiency of management (inventory) due to external economies. This is the reason why the international trends of electronics favour multilayered clusters or sectors. This applies to Guadalajara electronics sector where local professionals relate or co-operate with each other to promote the cluster. For example, they jointly invite suppliers to Guadalajara from other countries and promote joint sub-industries such as design centres and software's through business associations (Gereffi, Spener & Bair, 2002; Therin, 2007).

Other business associations as help in promotion of parallel incorporation with government institutions. The National association of electronics also helps different regional delegations to carry out their own independent mission and function. Each delegation helps its own members in coordination efforts in different geographical settings (Gereffi, Spener & Bair, 2002).

V.II Spin-offs of different organizations (specialized ones)

When there is a swift growth in electronics cluster in Guadalajara, local managers recognize that there is need for an increase in local supplies to meet the needs of the businesses and reduce manufacturing costs. This objective is in conformity with the interests of the managers as both the leaders of their organizations and as members of business associations. Given that, local suppliers are given contracts for their operations, they do not supply on one company. Based on this factor, it is the responsibility of local professional managers in organizing the local supplier market (Gereffi, 2003). In 1990, the vice president of CANIETI had an interest of restructuring the local supplier development. In his pursuit for this initiative, he was faced with increased demand of supplying different products. What he did is that he decided to spin-off these activities into a separate or a different entity (Dufey, Gran & Ward, 2008).

Sergeant and Matthews (2003) claim that this is how Electronics Productive Chain (civil association) or CADELEC emerged in 1998 with assistance of the United Nations development program, the state government, and a technology-transfer oriented foundation. Through close relation with CADELEC, Canieti-Occidente is able to maintain a good coordination (sector wide) while still delegating some activities and maintaining good relations. CADELEC plays an important role of attracting local suppliers to various companies. It makes analysis in regard to the various supply needs of the host companies and maintains a data base of this information for future use. CADELEC also carry out research and sells this data to local suppliers. In other instances, it conducts a survey of the required products and distributes them to certain companies.

In regard to the market research and surveys, CADELEC prepares a report on a particular product market. This report is used in analysing the overall demand of the Guadalajara cluster for the possible suppliers (supply side) or possible demands (BCs and CEMs). In 2002, various professional managers realized that the reports prepared by CADELEC were not enough for their operations and that manufacturing was not enough to bring together the electronics business. Therefore, they decided to participate in a research tour organized in Ireland, India, and Canada. Once they were though with this tour, they decided to promote local research and development such as development or design of software and hardware. This led to the birth of Jalisco Information Technology Institute with the support of the state government (Dufey, Gran & Ward, 2008; Gereffi, 2003).

V.III Cluster development after 2000): Crisis of Mexican valley

Since the year 2000, Guadalajara cluster has been faced with numerous challenges. These includes the termination of exchange rate appreciation due to the recovery of Mexican republic, the end of information technology bubble in the United States, the termination of Maquiladora arrangement (2000) and emergence of china as the main competitor (Hufbauer & Schott, 2005).

The termination of the Maquiladora arrangement imposed on producing companies in Mexico's standard tariff system in 2001, where the companies were required to pay tariffs on non-Nafta Input imports on Mexican Value added, this was very important for Guadalajara electronics industry in the sense that 90 percent of the total parts were imported from outside (non-NAFTA) countries. There important aspect was that the cost of human resources in manufacturing firms was very low. The combination of these factors placed CEMs in a risky position. This implies that the location benefit of Guadalajara is also at a risk depending on the tariff rates that Mexico imposes on imported components. This led to the government introducing another tariff-reducing scheme PROSEC) to reverse the problem (Hufbauer & Schott, 2005; Therin, 2007).

After 2000, some factories closed their operations and moved with their equipment. One of the reasons for this case was that it was cheaper for CEMs to move their equipment from Mexico to other countries than imports. Secondly, the economy of Mexico recovered gradually, leading to the appreciation of exchange rates (hence making Mexico un-conducive for production). The other reason was the burst of the information technology bubble in the United States and the downtown which reduced the demand for electronic products. Lastly, there was emergence of China as the main competitor of electronic products which changed the location of production globally. These factors led to the decline of exports as from year 2001 (Therin, 2007).

V.IV Performance

In the recent past, the performance of Guadalajara in regard to electronics exports has been growing. In year 2008 and 2009, Jalisco exported 27.1 billion dollars of electronics products of which 16.1 billion were from Guadalajara. This implies that there is a high growth of electronics industries in this area. The sector also improved in terms of employments (10%) where the number of employees increased to 78500 people (Cadelec, 2009). The cluster has also recovered from internet bubble which started from 2004, doubled in year 2005 and 2006 reaching an optimum of 375 dollars. In regard to cluster composition, the cluster is well developed with various anchor companies all along the value chain. There are over 380 suppliers of various products including 25 plastics and thermoplastics manufacturers, 17 label and manual printers, 10 cable companies, and 41 metal stamping firms. The cluster is also supported by different information technology and software companies, for example, 16 outsourcing companies and many software technology incubators. In addition to this, there are over 39 new research, design, and development centers. There are also 12 original equipment manufacturers (which buy products from contract manufacturers and sell them under their own intellectual property. They also carry out distribution and marketing activities, among them, Kodak, HP, and IBM (Gallagher& Chudnovsky, 2009; Hufbauer & Schott, 2005; Therin, 2007).

The major problem which is affecting the economy is that, many companies have relocated to china which has related advantages like the ones in Mexico, for example, cheap labor, geographical proximity, and availability of cheap production inputs. This has led to local managers coming up with a concept of production of value added goods, hiring of software engineers and establishment of more research centers. Many of the brand companies are now upgrading their technology and manufacturing other new products such as auto parts, aircraft components, and medical equipment (Cattaneo, Gerreffi & Staritz 2010; Therin, 2007).

The main important feature which is showing up in Guadalajara electronic cluster is the changing of roles or economic activities of local firms. These companies used to specialize with indirect services such as packaging but they are now been involved in other activities such as supplies. This implies that the cluster is not only supplied by local capital but also by its own human resources (Cattaneo, Gerreffi & Staritz 2010; Gallagher& Chudnovsky, 2009; Hufbauer & Schott, 2005; Therin, 2007, Ali and Rehman, 2015, Ali and Khalil, 2014, Ali, 2015, Ali, 2011, Ali and Chani, 2013).

VI. Conclusion and Policy Implications

The study of the case of Guadalajara verifies that different clusters have their own explanations in regard to their emergence which is specific and unique to different circumstances and geographical locations. The electronic cluster described by Kuchiti and Tsuji (2008) in regard to Asian countries has different aspects from the one displayed in the Mexican city. This model displays the elements of cluster formation in developing countries, which are core firm dominated industrial clusters based on foreign countries. This only considers the conception and the initial stage of the process. The description of other stages of growth and development in the Mexican city helps one to distinguish between anchor firms and seminal firms which help in understanding how clusters are created (general) based on the fact that seminal firms are not essentially supporting firms and supporting firms may not be described as seminal firms.

In contrast to the Asian countries, the development of Guadalajara industrial electronics cluster has never been sequential or linear. As an alternative the cluster has been divided into various branches or cases which have extended in different periods. This element has not been considered in East Asian models, the clusters consists of all the supporting and directing institutions and organizations that contribute in the process rather than only a set of manufacturing companies and associated suppliers. The significance of this scenario or this concept is that the analysis and formulation of cluster policies should not only focus on the main companies that constitute the cluster but also all other actors and constituents that form an industrial agglomeration if one would want to come up with a term industrial cluster. This implies that it is all co-operations, networks, or collaborations that form the foundation of cluster formations (Kuchiti, 2004, Therin, 2007, Haider and Ali, 2015). The case of Guadalajara also

confirms that it is important for one to differentiate between domestic and foreign companies, based on the fact that they have different perspectives, behaviours, and expectations which influence the way they develop if they are to become members of an industrial cluster. Moreover, they may differ significantly depending on their geographical setting (original countries) and the parental firms. This would in turn influence the way they would market their products and the locations where they would outsource their materials as well as their functional and corporate character (Kuchiti & Tsuji, 2008).

The case of Guadalajara's electronics illustrates clearly how a country can capture foreign direct investment as suggested by Campos and Kinoshita (2003) who posit that different republics choose their investment locations based on the availability of cheap labor, location, large domestic market, availability of skilled labor, adequate physical infrastructure, closeness to large markets, existence of supporting domestic institutions, a conducive business environment and a large stream of agglomeration economies, which are just the main elements of Mexican cities. Furthermore, Guadalajara is regarded as a unique case of branch-plant dominated industrial cluster based on the fact that the region is dominated by subsidiaries of multinational companies. This implies that it is consistent with Rugman and Verbeke (2002) but partially in regard to the suggestion that foreign direct investment results in core-firm dominated, uneven clusters where a subsidiary of Multinational Corporations happens to be the cluster's supporter or winner. This is on the dot with the case of Toyota's cluster in Tianjin as claimed by Kuchiki and Tsuji (2008).

The case of Guadalajara is regarded as an archetypal case in point of a small production system as claimed by Hayter (1997) based on the fact that its multinational subsidiaries are active constituents of immediate global manufacturing networks which are employed in many geographical settings globally. These subsidiaries operate beside cross-continental or cross-border supply chains in regard to whether the present firms are in United States, Europe, or Asia Pacific. Even though multinational companies may play an important role of speeding up the processes of development of regional industries in their initial stages, many theorists and strategists correspond that, the subsidiaries tend to form limited networks with local economic settings, in order that local and regional economies can become branch-plant dominated truncated manufacturing structures. Miller and Cote (1987) claim that branch plants would not always lead to formation of self-sustained clusters (clusters capable of gaining different technological infrastructure and creating the agglomeration economies which would raise the local rates of business development). Porter (2008) suggests that republics that come up with policies that support home-grown companies or indigenous companies perform well but those countries which come up with strategies or policies that solely support foreign countries are doomed since they will always remain as factor-driven economies. In addition to this, Porter, (2008) claims that the notion of subsidiaries based on multinational corporations' is okay for developing countries but at the end of it all, the focus should shift to home-grown companies.

The case of Guadalajara illustrates that foreign direct investment-led clusters in developing countries are susceptible to external risks as in the case of the crash of electronics industry which happened in Jalisco. This was as a result of economic recession of United States in 2001 to year 2003 (Porter, 2008). This fall led to relocation to China of many businesses and plants which were operating in Guadalajara, even though this led to the upgrading of industries into high value added operations (high mix-low volume production model). This upgrading led to major changes in the strategies of parent firms in regard to allocation of projects, products and the way they operate in different regions. Nevertheless, there are policies that were raised by various local managers of various companies in Guadalajara in regard to upgrading electronics cluster community of home-grown companies such as the CANIETI, CADELEC, SEPROE, and COECYT (Cattaneo, Gerreffi & Staritz, 2010).

One of the main features of Guadalajara electronics which helps it from adverse effects of global forces is that it comprises many sectors as well as professionals (known students) of clusters in different sectors as claimed by Rosenfeld (1997) and Doeringer and Terkla (1995). In addition to this, the availability of various companies in various sectors help the country to withstand the downturns in the economic cycle.

The Mexican Silicon Valley also bears the elements of Isardian industrial complexes, Porterian industrial clusters, Marshallian industrial clusters, Asian export processing zones, and castellan technopoles, thus, illustrating the overlapping existing among the main ideas that describe the main local industrial formations. However Guadalajara industrial cluster has a high chance of being self-sustained as suggested by Porter (2008) and Maskell (2001) who claim that a cluster which is well defined and located in a good geographical local setting or social and economic setting is capable of generating indigenous businesses hence becoming self-sustained.

The knowledge gained in discussion and analysis of the characteristics' of the Mexican Silicon Valley can help one to criticize various theorists or strategists in regard to the various notions that they have brought forward in regard to policy making and various theoretical frameworks regarding industrial clusters. For example, one may argue that Porters theory of industrial clusters in developing countries should be revised if it would help these economies to be self-sustained. Moreover, Bergman and Fesser (1999) and Cattaneo, Gerrefi and Staritz (2010) suggest that industrial clusters do not have characteristics similar to Porters model. The important element which should be put forward in any theory is the creation and development of local entrepreneurship to enhance the creation of home-grown businesses. Similarly, one should always understand that there are clear differences in regard to the clusters formed by domestic or foreign industries, among them, the differences in interests, behaviour, and objectives.

VI.I Proposed Suggestions/ Analysis

There are different guidelines or suggestions which may be derived from the various discussions in regard to Mexican Valley. These guiding principles may be useful in development of policies for cluster development. When one is coming up with these policies, he or she should consider various principles. For example, clusters should not be created completely anew in the sense that industrial agglomerations are believed to emerge naturally or spontaneously and should only be guided, directed or nurtured. Long-lasting and effective formations cannot be duplicated but only copied or imitated. Lastly, cluster formations should be created based on already existing clusters/formations, otherwise, they should build on developing or emerging clusters in urban areas (World Bank, 2010).

The initial step in cluster formations is definitions of the objectives and the overall goals of the initiatives. Once the goals and objectives have been defined, the overall strategy should be formulated and action plans indicated. In regard to strategy formulation, the clusters to be promoted should be defined together with the industry sectors in which the firms are to operate. This implies that there is need for the definition of whether there is creation of new firms by local entrepreneurs, or development of new firms by local firms. The other aspects to be considered are whether there is relocation of existing plants by local companies or deployment of new plants by outside firms (Porter, 2008; World Bank, 2010).

The next step is decision in regard to the size, origin, and the type of sector in which the cluster members would be based on. It should be clear whether the goal whether the aim is to promote branch plant dominated clusters or home-based clusters. One should then decide whether the main objective is to come up with core-firm dominated asymmetrical clusters or Porter like clusters. One should decide whether the core-firm dominated asymmetrical clusters should be a multiple sector or single sector clusters. The next step is the definition of the time dimension of the strategy which involves the development of the sequence of operation and the decision on whether to promote branch plants for a while and then move to home grown firms, decision on whether to promote branch plants for ever, decisions on whether to promote branch plants mixed with international corporations subsidiaries continuously, or the decision on whether to promote branch plants mixed with multinational corporations subsidiaries for some time then move to home-grown firms, or decisions to promote home-grown corporations forever. Once all these aspects are defined, the processes of cluster formation may be followed which mat emphasize on the possibility of promoting new clusters, development of emerging or existing clusters, or development of the whole regions and societies through development of industrial clusters (Corrochano & Eklundh, 2009; Therin, 2007; Porter, 2008). The procedure involves the development or improvement of efficient urban infrastructure, (telecommunication

networks, urban public services, freeways), one should ensure that there is well-organized customs administrative services and local facilities, build a good/strong education infrastructure plus research centres and development facilities, build enough industrial infrastructure (industrial urban zones and estates), campaign for and establish effective trade administration which would facilitate and support imports and exports (free trade zones and export processing zones), campaign for and organize a public (municipal, state, federal) incentives or inducement policy framework and programs for different industries, establish venture capital finances and companies to supply the start-ups or spin off ventures, commence on aggressive promotion campaign and business undertaking with delegation from the government and different organizations to inform the world about the need for cluster development which would involve local and foreign original equipment manufacturers and the suppliers to target a specific area (a metropolitan, town or a city), create industrial associations and chambers to support, direct, represent and extend the interests of clustered firms, and generate conducive environment for entrepreneurship and local business formation. Lastly, one should start on aggressive promotion campaigns and business tasks to attract supply-chain and logistics management companies which supply the required materials to the cluster companies (Cattaneo, Gerreffi & Staritz, 2010; Porter, 2008).

This procedure would be adopted by various countries depending on the level of development, cultural, social, economic, and geographical features. The components may also vary from one case to another but not to a great extent. One may also employ various steps at the same time depending on time, availability of resources and other factors to be considered when the initiative is undertaken. One should also understand that policies are very important in development of local industrial agglomerations in regard to promotion, support, enticement, guidance and encouragement. However, the end results are determined by the market factors (Porter, 2008; World Bank).

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