Original Research   **Open Access**

Automotive Cluster and Territorial Development: Comparative Cases between Germany and Mexico

Arredondo-Hidalgo María Guadalupe (Corresponding Author)
Department of Business Management, University of Guanajuato, México
Email: mg.arredondohidalgo@ugto.mx

Ojeda-Hidalgo José Felipe
Universidad Politécnica de Guanajuato, México

Marcia Guadalupe Covarrubias Garcia
Bachelor in International Business, Department University of Guanajuato, México

Abstract

This research begins by showing the different meanings attributed to the term cluster by different currents and authors, which suggests definitions that are found around its spatial framework. Next, the factors that intervene in the competitiveness of a region and its growth are shown, for the development of these, Porter's model of competitiveness which was taken as reference, and the contexts: geographical and economic. Therefore, the methodology was used based on a qualitative design, with descriptive and correlational scope since it will analyze differences of each cluster, with respect to the factors of dimensions, establishments, growth, economic impact and policies. To do this, the information-gathering tool was two semi-structured interviews with cluster leaders in both countries, because the approach is based on data collection methods that are not completely standardized or predetermined. And finally, the results of the comparison of the Mexican Bajío automotive cluster with the German cluster located in Baden-Württemberg are presented.

Keywords: Automotive clusters; Competitive strategies.

1. Introduction

The central purpose of this document is to search for, explore and describe the Bajío Automotive Cluster for comparison with the German cluster located in Baden-Württemberg; which is known to be extremely important in the national and international competition and a pioneer of the automotive industry. It is one of the strengths of the regional economy and its participation in German national production has been increasing (European Commission, 2018). With the information gathered from both clusters, it will be possible to analyze and get to know the different structures, dimensions, establishments and policies that exist in the different clusters. The automotive industry is one of the most important productive axes in national economies and its role as a driver for the development of other high value-added sectors, as they have caused several countries to have as one of their main objectives the development and / or strengthening of this industry (Secretaría, 2012). Some of the factors that have helped to consolidate the automotive terminal and auto parts industry in Mexico are: the attractiveness of its export activity, the flow of investments in the sector, as well as the expansion of its productive capacities. Today, the Mexican automotive industry is among the most dynamic and competitive in the world. It is known the economic impact, productive and level of national and international positioning of the automotive cluster of Bajío, which has grown and expanded over time.

This research then seeks to test the model of clusters which proposes to evaluate the size, expansion and growth of the automotive cluster in the Bajío to later compare it with the German cluster Baden-Württemberg and know whether they act in the same way. It is assumed that their functions and operability are similar and that their success is due to geographical factors. The objective of this research is to describe, understand, analyze and contrast the automotive cluster of the Mexican Bajío with the German cluster located in Baden-Württemberg and to report the results obtained by means of texts, photographs, maps, diagrams and conceptual models.

2. Literature Review

Alfred Marshall (1890) establishes that the concentration of industries in specific regions creates several advantages, there is less competition and, therefore, greater profits for companies. The constant presence of an invariable customer base guarantees your business and a stable income. The constant presence of suppliers also means low costs for companies. Geographic concentration also creates more enjoyable relationships, which produce better business in every way. Subsequently to further define this concept, we find author (Krugman, 1991b) who disagrees with the theory that (Porter, 1990b) later puts forward, given that it is difficult to manage to an economist

because he says it is clear that Porter's approach is more a list of variables than a real theory. This author mentions to us that the creation of a cluster is normally an accident, derived from the initial process, since it is that one begins with the construction of a company in a determined place and then a process takes place in which other companies accumulate, as a consequence, in the selected region (Krugman, 1991).

Porter (1990b), is identified as the creator of the term cluster, since the exposure of his work, the study of the concept has grown substantially. Moreover, Porter has not only promoted the idea of clusters as an analytical concept, but also as a key political tool. Similarly, Porter mentioned that the geographic concentration of firms in the same industry is remarkably common throughout the world, suggesting that the best firms in a country are usually geographically grouped. Likewise, it indicates that the cluster is a system of strength for the companies that develops the competitive competences of the institutions that integrate it, and this makes the competitiveness of the cluster rises. This is also related to personal relationships, communication and social capital in such a way that "cluster theory unites network theory and competition" (Porter, 1998c). It goes even further: "Clusters offer a new way of exploring the mechanisms by which networks, social capital and civic engagement affect competition" (idem, p. 227). Therefore, what is proposed here is nothing less than a general theory of clusters and their socioeconomics. It can be affirmed that a cluster goes far beyond the industrial and can also occur in a communications connection, as a kind of network that arises in a geographical zone, in which the proximity of the companies creates a community, which brings as a benefit the positive relation of the ones with the others, as indicated by Den Hertog *et al.* (2001). The authors also emphasize that, in clusters, where all the individual elements found in a delimited area are more the exception than the rule (p. 408). Because the use of the term cluster is still in its growth phase, this term is being used by economic currents of a very different nature, since its meaning varies greatly, depending on the author and his point of view, derived from this Martin and Sunley (2001) have declared how confusing this concept is.

Once the concept has been analyzed, it is confirmed that Michael Porter's definition is the current model, because it is the one that has been repeated the most and from where most economists have based their own definition, therefore, this model will be taken as the basis of this research.

Table 1. Development of the cluster concept

Cluster concepts	Year	Autors
Concentration of specialized industries in particular localities.	1890	Alfred Marshall
He integrated the spatial dimension into mainstream economic theory. To explain why particular industry concentrates on a particular area, he relies on a model based on agglomeration economies.	1991	Paul Krugman
Clusters are defined here as groups of companies within an industry based on a geographical area 1996 Swann and Prevezer	1996	Swann and Prevezer
A cluster is used very simply to represent concentrations of firms that can produce synergy because of their geographical proximity and interdependence, even if their scale of employment is not pronounced or prominent.	1997	Rosenfeld
A cluster means a large group of companies in related industries in a particular location.	1998	Swann and Prevezer
Geographical concentrations of interconnected enterprises, specialized suppliers, service providers, related industries and associated institutions (e.g. universities, standards agencies and trade associations) in particular fields that compete but also cooperate.	1998	Michael E. Porter
Clusters can be characterized as networks of producers of highly interdependent firms (including specialized suppliers) that link to each other in a value-added production chain.	1999	Roelandt and den Hertag
Definition of an innovative cluster as a large number of industrial companies and/or interconnected services that have a high degree of collaboration, usually across a supply chain and operating under the same market conditions.	1999	Simmie and Sennett
National economies, and in the case of regional economies, can be considered to be made up of various mixtures and combinations of these innovative clusters.	2001	Den Hertog, P., Bergman E., Charles D.
The popular term cluster is more closely related to this local or regional dimension of networks. Most definitions share the notion of clusters as localized networks of specialized organizations, whose production processes are closely linked through the exchange of goods, services, and services and / or knowledge.	2001	Van den Berg, Braun and van Winden

Source: Own elaboration based on the cited authors

2.1. Two Significant Regions

One of the main reasons why these two regions were chosen for comparison is because of the great impact each region represents in its country. In the case of Mexico, the economic dynamism of this region has transcended beyond the borders, since this is one of the most important international trade routes in the world which mainly seeks to supply its northern neighbor, the United States. The region that comprises the Mexican cluster of this research is

formed by the states of: Guanajuato, Querétaro, San Luis Potosí and Aguascalientes, which has become an important industrial corridor that today houses national corporations, powerful multinationals and their auxiliary industry.

Figure-1. The Bajio Region

Germany's automotive cluster, on the other hand, is made up of only one federal state in the republic of Germany, which is divided into 12 regions, is one of the most competitive and economically strongest states in Europe, and Baden-Württemberg is the third largest of the 16 states that make up the Federal Republic of Germany. The largest city in this state is Stuttgart, being here the area where Porsche and Mercedes have their headquarters and where 1.2 million cars are manufactured annually.

Figure-2. The German Region
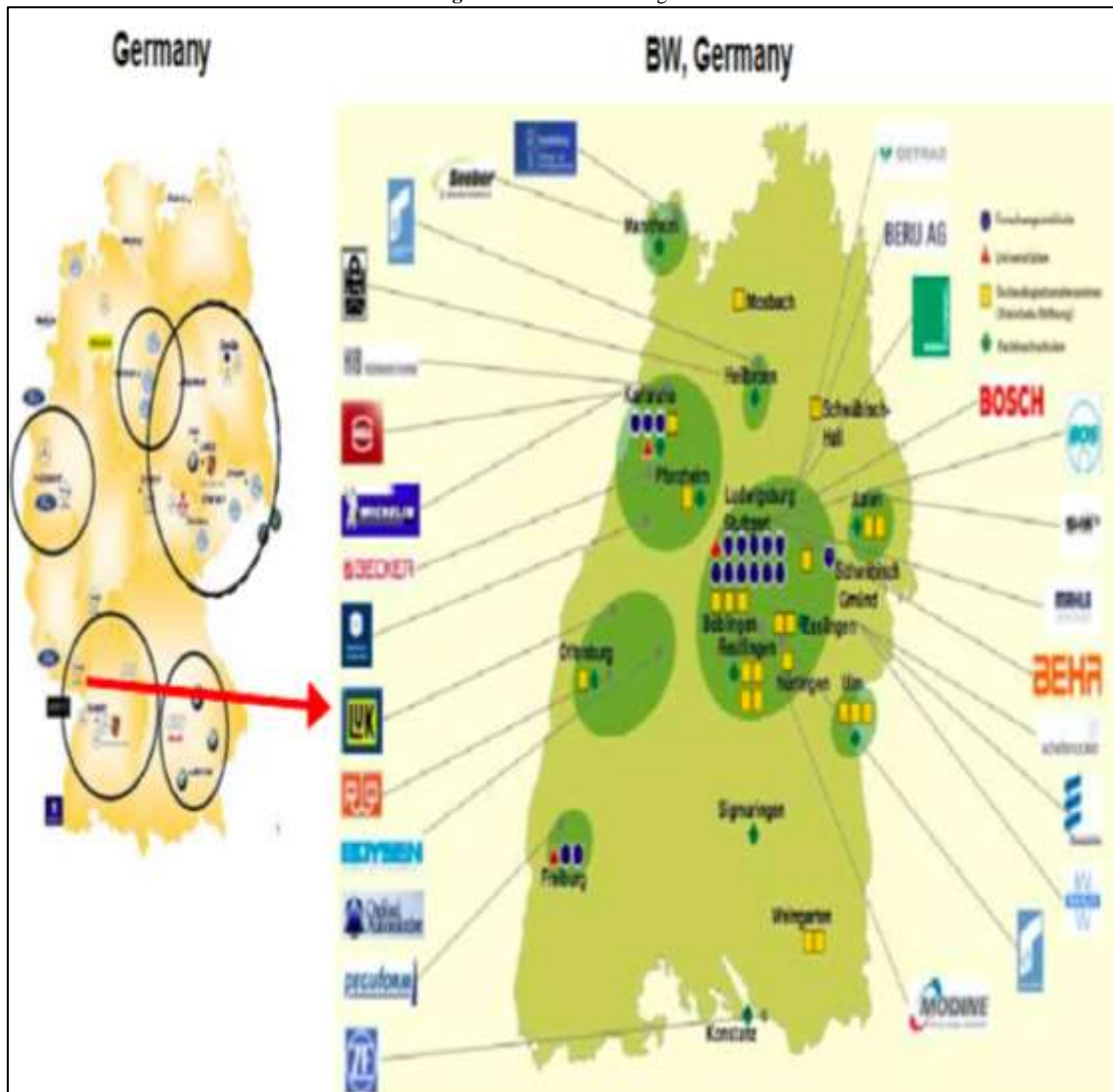
Next, it will be defined based on the industrial clusters model, how the following most relevant variables were chosen for this research and, in addition, to know how when defining each one in a concept with global definition, allows us to make a comparison between what each variable means in a cluster as opposed to the other.

Figure-3. Michael Porter's Theory of Competitive Advantage
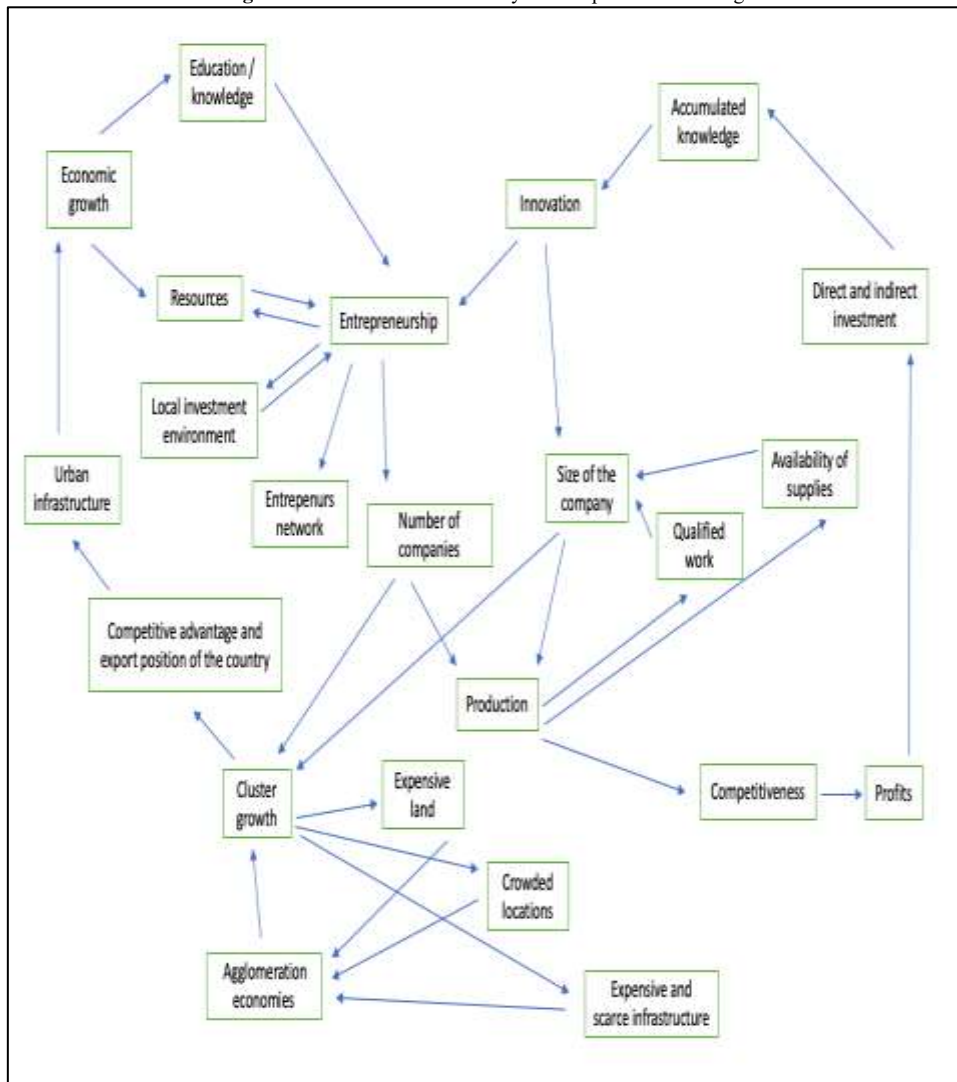
Source: adapted from Buendía (2005), cited in Soriano (2008)

2.2. Business Agglomeration

As defined by Strange (2005), Urban agglomeration is the spatial concentration of economic activity in cities. It can also take the form of concentration in industrial groups or in centers of employment in a city. Companies can be allowed to benefit from various forms of bonding by common and complementary elements, as buying and selling chains are created, as well as a complementation of services. Therefore, a cluster is a form of network that occurs within a geographical location, in which the proximity of companies and institutions ensures certain forms of community and increases the frequency and impact of interactions (Porter, 1998c), which makes companies benefit from the interaction between them, through the reduction of transaction costs.

The Bajío Automotive Cluster is made up of a group of interrelated companies that work in the same industrial sector and collaborate strategically to obtain common benefits. This coincides with the policy that the German cluster proposes, where it demonstrates how the economic soundness of a location and its success in national and international competition depend to a large extent on the degree of cooperation; maintained among political, economic and academic stakeholders, research institutions, as well as business promotion and regional support facilities. The more specific the individual activities coordinated and developed on top of each other, the better the locations and structures of the groups will develop.

2.3. Geographical Proximity

Porter (1998c) mentions that geographical proximity plays a very important role in the birth, formation and development of a cluster. So this author does not precisely define its limits but mentions that this concept is extremely broad since these groups of companies can be found at any economic level: "They are present in large and small economies, in rural and urban areas, and at various geographical levels (e.g., nations, states, metropolitan regions and cities" (p. 204); their geographical scope may even include "a network of neighboring countries" (1998a, p.199). They have no self-defined essential limits, there is no agreement on what degree of territorial concentration of an industry or industrial group constitutes a cluster, as they do not discriminate between the presence of a large number of interconnected small or medium-sized enterprises and the number of employees they employ (Martin and Sunley, 2001).

The geographical location that the Bajío represents is clearly strategic since it is located in the center of the country, within the industrial triangle of Mexico's three largest cities: Mexico City, Guadalajara and Monterrey. In a circle of 400 km² is 80% of the Mexican market, 70% of the industrial establishment, 70% of international trade, 70% of exports, and 60% of the total population of the country (Osiel, 2013).

In the case of Germany, Baden-Württemberg shares borders with the German states of Rhineland-Palatinate, Hesse and Bavaria. It shares international borders with France and Switzerland. Although this region has relatively few natural resources compared to other regions of Germany, it is one of the most prosperous and richest regions in Europe, with a historically low unemployment rate of 3% (compared to 6.8% in Germany). The total area is 35,751 km².

2.4. Economic Growth

Krugman (1995c), developed a theory that talks about the great push that economies have to develop. This theory explains economic growth based on the classical Keynesian mechanisms: the multiplier and the accelerator. The economic growth of a country is considered important, because it is related to the per capita GDP of the individuals that originate it. One of the factors statistically correlated with the socioeconomic well-being of an economy is the relative abundance of both economic goods and natural resources available to the citizens of a country. Economic growth has been used as a measure of the improvement of a country's socio-economic conditions (Clive, 2006). The role that each government has within a cluster is extremely important, since it must promote exports, take care of regulatory reforms, promote foreign direct investment, provide a good functioning in politics, supply science and technology, disseminate economic information and develop complementary factors in the specialty of this. ProMéxico (2016), explains that during the last five years the automotive industry in Mexico has had consecutive record figures in production and export of automobile sales. Currently, the automotive sector contributes more than 17% of Gross Domestic Product (GDP).

Baden-Württemberg has the most important location in Germany for the production of motor vehicles and parts of motor vehicles: approximately 17% of jobs nationwide, corresponding to more than 203,000 employees, are located in the motor vehicle sector in Baden-Württemberg (from 2012). About one fifth of global industry sales are generated in this region (Cluster-exzellenz, s.f). This industry represents 15.2% of GDP. Studies conclude that Baden-Württemberg is one of the most innovative regions in Europe and the world (Einwiller, 2012).

2.5. Size of Companies

The growing autonomy with which these companies operate, both locally and regionally, is combined with the growing autonomy of local governments to create the institutional conditions that make possible the installation of these companies in the automotive sector. Local companies that are within the supply chain of a transnational company that has arrived in the country, and that form part of the cluster of the region, increase their competitive advantage by inserting themselves in global competition through interaction with the transnational company. One of the basic characteristics of the current regions is their growing autonomy to promote strategies that encourage the participation of local companies -small and medium- with transnational companies through subcontracting schemes. The company can be classified into various sizes according to the application of certain measurement criteria. A distinction is usually made between large enterprises and SMEs (small and medium). The former is usually broken down into two groups: mega or very large (global companies with a very complex structure) and large. The latter are usually divided into medium, small and very small or artisanal: microenterprises (Bueno *et al.*, 2002).

The Bajío Automotive Cluster has 71 companies listed as Tier 1[1], 17 supplier developments, 15 institutions, 5 OEMs and 12 collaborators. The OEM[2]s that make up this cluster are: GM, Mazda, Honda, Ford and Volkswagen.

The German cluster is integrated by: 62 companies, of which 31 are small and medium companies, 4 are large companies, 3 are universities/colleges which are catalogued as the best in the country, 11 are economic development agencies/intermediaries and 11 chambers and associations. The most outstanding OEMs of this cluster are: Audi AG, BMW, Citroen, Daewoo, Daimler AG, Dr. Ing. Hc F. Porsche AG, Fiat, Ford, Hyundai, Kia, Mitsubishi, Nissan, Opel, Peugeot, Renault, Saab, Seat, Skoda, Smart, Toyota, Volkswagen AG and Volvo. Porsche AG, Fiat, Ford, Hyundai, Kia, Mitsubishi, Nissan, Opel, Peugeot, Renault, Saab, Seat, Skoda, Smart, Toyota, Volkswagen AG, Volvo.

2.6. Cluster Growth

The evolution of clusters takes time, can be years or decades. Some of them have been created and planned on purpose, others have simply been developed without the presence of strategic planning. The inherent economy of geographic proximity has been sufficient to attract, over time, an increasing number of businesses and other institutions, giving rise to a virtuous cycle often derived from a fortuitous event. But other groups have developed much faster due to the determined action of regional leaders who had seen their region's potential for the cluster, (Serret, 2011).

The automotive and auto parts industry was born in the 1990s with the signing of North American Free Trade Agreement (NAFTA), and since then, it has grown steadily. The Bajío Automotive Cluster is consolidated as one of

---

[1] A company classified as TIER 1, within the supply chain of this sector, suppliers are classified according to their distance from the OEM (Original Equipment Manufacturer) which is responsible for putting the product into the market. In this order, TIER 2 are the companies that supply components to TIER 1 and so on with TIER 3, which supply TIER 2.
[2] OEM stands for: Original Equipment Manufacturer

the main automobile producers in the country. The General Motors plant was a pioneer of this industry in Mexico until, in 1994, the company decided to operate in the state of Guanajuato.

Pioneer Karl Benz invented the first automobile at the end of the 19th century, which was the birth of local automobile manufacturing. After that, in 1950-1960, East German companies moved to the southwestern region of Germany helping the industry consolidate and begin its global competitiveness. In addition, Germany began to participate in the Asian market, which helped position itself globally as explained by Zhakiyanov *et al.* (2019). Baden-Württemberg has faced having a low endowment of natural resources in its territory, which forced the German government to concentrate on investing in human resources, creating a long history of high-quality education for the labor demand that is created as companies compete with each other, not only to offer quality products, but to attract and retain qualified personnel. Thanks to the lack of resources, the region was forced to improve its productivity and competitiveness by concentrating on producing premium products, considered as such when it has some differentiation or service that makes it stand out from a mass-sale product, which makes the final product have a higher price because you pay more in exchange for a differentiation in the market, this can be at the level of engineering, equipment, prestige, performance and level of finishing.

2.7. Competitive and Exporting Advantage of the Country

According to the definition of the Organization for Economic Cooperation and Development (OECD), the competitiveness of a nation is the degree to which a country can, under open market conditions, produce goods and services that pass the test of international markets, while maintaining and growing the real income of its population in the long term (1992). The competitive strategy in the 21st century has as its starting point a high operational efficiency in the following aspects: Geographical location of the production plant facilities, hiring and developing high-capacity personnel with constant training and updating; excellence in purchasing and supply, good logistical performance, competitive cost; eco-efficiency and positive relationship with the environment in which it is developed, constant investment in technology and information technology; managerial excellence with flexibility and adaptability, regional or global strategies, as well as positioning within the major national objectives.

Germany's largest export market is Europe, with more than 50% of exports, followed by the United Kingdom and the United States with 17% and 15%, respectively (Di Bitonto, 2015). Together with mechanical engineering, the automotive industry is one of the leading sectors and with higher revenues in Baden-Württemberg. Moreover, hardly any sector is more export-oriented than the automotive industry. The export value in 2017 was 254,722,692 thousand dollars (International Trade Centre, 2017). Germany is the fourth largest exporter in the world. The largest market for German exports is Europe with more than 50% of exports.

Currently in Mexico, of total manufacturing exports, 25% corresponds to the automotive industry. In 2017, a total of 4,068,415 cars were manufactured, growing 13% than the previous year. Germany manufactured a total of 5,645,581, decaying 1.76% than the previous year. (OICA, 2017). The export value in 2017 was 101,739,525 thousand dollars (International Trade Centre, 2017), letting Mexico occupy the seventh place of export worldwide.

2.8. The Automotive Sector

The automotive industry has a globally defined composition. In first place and at the highest level of the chain are the assemblers or the terminal industry (OEM's), which are owned by trademarks with which the final consumer of automobiles is familiar (Comertia, s.f). The automotive industry is responsible for the design, development, manufacture, assembly, marketing and sale of automobiles. It is a great generator of employment worldwide because in addition to the direct labor required by the final product, it generates a whole parallel industry of components, so the indirect labor created is an extremely large market as well. The automotive sector has positioned itself as a precursor of competitiveness in the regions where it has been established, which in consequence, results in the creation of more qualified and better paid jobs, as in a greater development of human capital. On average, the wages of the terminal automotive industry in Mexico are equivalent to 2.3 times those of the rest of manufacturing (Secretaría, 2012). This shows the importance of this sector.

Baden-Württemberg is strategically located in Germany for the production of motor vehicles and motor vehicle parts. "Made in Baden-Württemberg" is a very popular term worldwide. The automotive cluster is the largest recipient of foreign direct investment (FDI) in the country, accounting for more than 44% of total investment. This cluster produces 3.5 million units more than the next closest European competitor. This industry within the country is not only an armor industry, but also 21 of the world's top 100 auto parts suppliers are also German companies. Almost 740 companies are represented in this region, which corresponds to about one third of all German companies in the automotive industry.

2.9. The Guanajuato Automotive Cluster

The cluster works under the order of working committees, which are constituted in six development initiatives for the automotive industry:

a. Human resources
b. Purchasing
c. Supply chain logistics
d. Technological innovation
e. Supplier development
f. Property Security.

Figure-4. Work of the Guanajuato Automotive Cluster
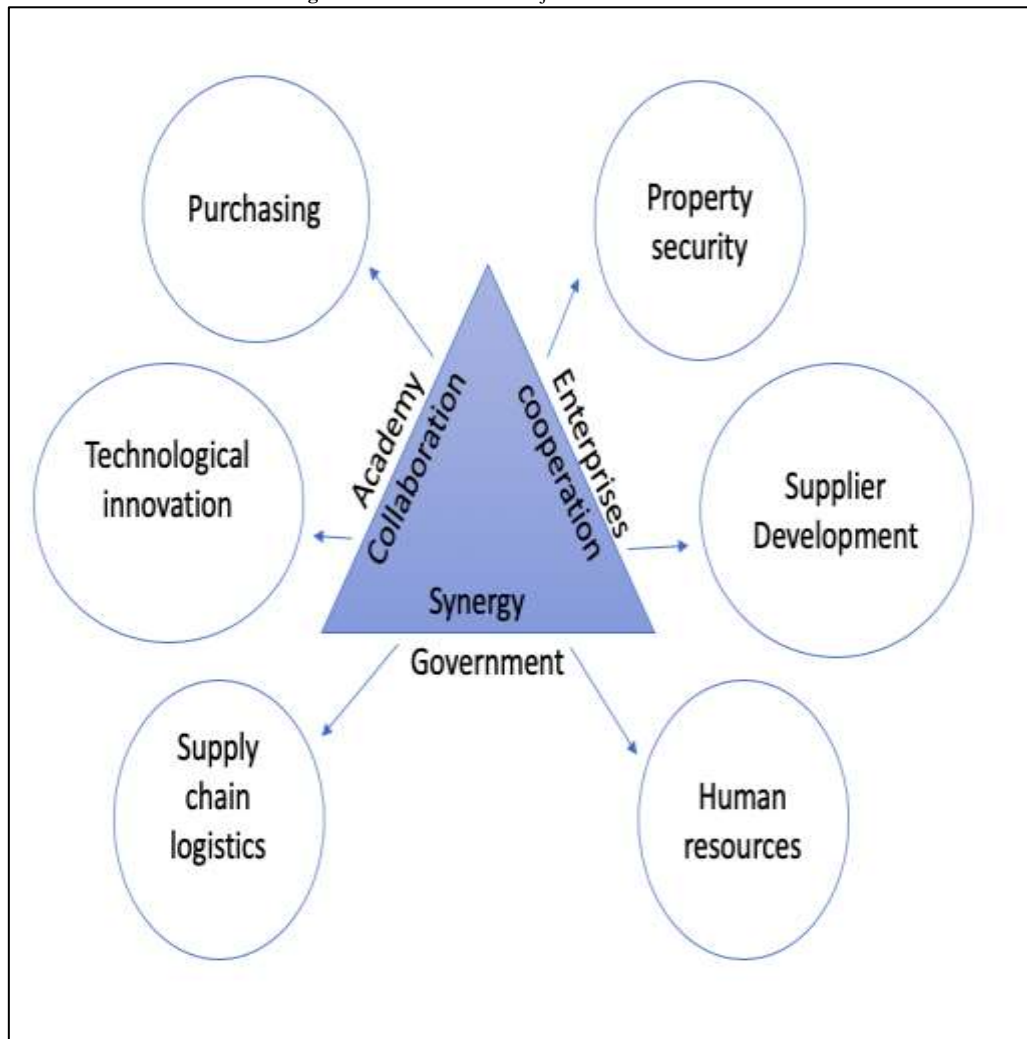
Source: Guanajuato AC Automotive Cluster (2018)

Each committee is preceded and directed by the Directors of the main automotive companies of the entity; this with the objective of joining efforts and directing the work towards the organizational objectives with the unconditional support of government, educational institutions and associates.

2.10. The Baden-Württemberg Automotive Cluster

This cluster is jointly represented by RKW Baden-Württemberg as network coordinator with representatives of regional cluster initiatives and car networks. The regional car networks use their presence in the regions and personal contact to involve local actors. With its range of consulting services, additional training and SME projects, RKW BW is especially committed to small and medium-sized enterprises, especially to the country's key industry suppliers. Regional automotive networks use their regional presence and personal contacts to attract local actors, which they are: RKW Baden-Württemberg (project sponsor), RheinMainNeckar Automotive Cluster, Heilbronn Automotive Region, East Württemberg Automotive Region, Southwest Automotive Engineering Network, Stuttgart Automotive Cluster Initiative Region, Swabia. Commercial Vehicle Cluster; IHK Automotive Network Reutlingen, Economic Region-Southwest Germany and Technology Mountains.

3. Method and Research Design

The methodology will be used based on a qualitative design, with descriptive and correlational scope, since the differences between each cluster will be analyzed with respect to: the factors of structures, dimensions, establishments and policies. To do this, the tool for collecting information will be: two semi-structured interviews applied to cluster leaders in both countries, because the approach is based on data collection methods that are not completely standardized or predetermined. As a second tool, observation, description of participants, and review of organizational documents and structure of each unit of analysis will be used. The record of the information was emptied into research journals, so that the data could be analyzed in the results section.

4. Results

Below are the results of the 7 dimensions considered in the semi-structured interviews and that allow comparing both clusters.

Dimensions	Guanajuato Cluster	Germany Cluster
a. Business agglomeration	A group of interrelated companies working in the same industrial sector and collaborating strategically to obtain common benefits.	A section of vehicle manufacturers, suppliers, regional networks and competence centres, vehicle-related universities and research institutes, as well as support organizations
b. Geographical proximity	This region includes part of the States of Aguascalientes, Jalisco, Guanajuato and Querétaro.	Baden-Württemberg, which has been divided into 12 regions and is one of the most competitive and economically strongest regions in Europe. Baden-Württemberg is the third largest state.
c. Economic growth	It is one of the three most important world destinations for investment in the automotive sector. Currently, the automotive sector contributes more than 17% of GDP.	Pillar of support for the competitiveness of the national economy. The most important location in Germany for the production of motor vehicles and motor vehicle parts. About a fifth of global industry sales are generated in this region 15.2% GDP
d. Size of enterprises	Number of members: 120 71 Tier 1, 17 supplier developers, 15 institutions, 5 OEM's and 12 collaborators. 5 OEM's: GM, Mazda, Honda, Ford and Volkswagen.	Number of members: 62 Small and medium-sized enterprises: 31, large enterprises: 4, universities 4, economic development agencies / intermediaries: 11, chambers and associations: 12. 22 OEMS: Audi AG, BMW, Citroen, Daewoo, Daimler AG, Dr. Ing. Hc F. Porsche AG, Fiat, Ford, Hyundai, Kia, Mitsubishi, Nissan, Opel, Peugeot, Renault, Saab, Seat, Skoda, Smart, Toyota, Volkswagen AG and Volvo.
e. Cluster growth	In the last five years the automotive industry has had consecutive record figures in production and export of automobiles, consolidating as one of the main producers of automobiles in the country. The market has targeted the free trade area: TMEC (Canada, EE.UU. and Mexico).	In the 1950s-1960s, companies moved to southwestern Germany and the industry consolidated its competitiveness. Low endowment of natural resources, creating high-quality education and state-funded research. Greater focus on premium products.
f. Competitive and exporting advantage of the country	Mexico is the seventh largest exporter in the world. Export value in 2017, 101,739,525 thousand dollars. The largest market for exports is the United States.	Germany is the fourth largest exporter in the world. About a fifth of global industry sales are generated in this region. Export value in 2017, 254,722,692 thousand dollars. The largest market for German exports is Europe with more than 50% of exports.
g. Automotive Sector	90 of the world's 100 leading auto parts manufacturers have production units in the country. By 2020 Guanajuato will become the nation's leading automaker.	Baden-Württemberg is the most important location in Germany for the production of motor vehicles and motor vehicle parts. "Made in Baden-Württemberg" is very popular.

5. Discussion

Derived from the assumption that their functions and operability are similar and that their success is due to geographical factors, with this research we can conclude that: The concept of cluster does not mean the same thing in the whole world, each author and in each region the meaning varies around its space and geographical time, although the essence is the same. A cluster can occur anywhere in the world and goes far beyond the industrial, it can also occur in a communications connection, as a kind of "network" in which the proximity of companies creates a community. Therefore, a cluster does not precisely define its limits. This concept is also extremely broad since clusters can be given at any economic level, and serve as a multiplier and accelerator.

Geographical proximity is very important in the birth, formation and development of a cluster, whether or not it occurs within the same geographical location. The fact that there is a group of interrelated companies working in the same sector makes them collaborate strategically to obtain common benefits. This geographical benefit increases the

competitiveness of the region since it encourages the creation of research institutes, civil organizations and universities, which seek to provide qualified personnel who can perform professionally within the highest quality indices, since companies not only seek to offer high quality products but also compete to find the best qualified personnel to work. Thus, it is stated that clusters are formed by the interaction between suppliers, companies and customers thus benefiting from the reduction of transaction costs. It is important to mention that companies cannot innovate alone, but require intense collaboration, as well as an intense commitment to innovation from local companies.

There is a focus on the elimination of obstacles, which allows flexible restrictions to cluster improvements. This can be used as an economic policy concept and instrument. A cluster is a large recipient of foreign direct investment and favors the economic development of a country by helping to increase its GDP. The growing autonomy of local governments to create institutional conditions makes possible the installation of transnational companies since these clusters are pillars for the competitiveness of the national economy, giving export values and favorable economic figures for nations. The automotive sector has become a precursor of competitiveness in the regions where it has been established. Thanks to the development of this sector in Mexico, it has managed to position itself as one of the most dynamic and competitive sectors in the world.

6. Conclusions

A cluster in Mexico is not of the same size as a German cluster. The Bajio automotive cluster is 10 times larger in territory than the German one analyzed here.

It is important to note that the German automotive cluster has a focus on premium cars since it seeks more specialization in its market, which leads German brands such as: Audi, BMW, Mercedes-Benz, Porsche, and Volkswagen to lead this market. The German automotive market is maturing with the aging population, which is slowing growth in the market. And that's where economies emerging markets such as those in Mexico, should seek to expand markets to Europe and not just to the north of our continent. The Baden-Württemberg automotive cluster was created 40 years before the Bajio automotive cluster, thus presenting an advantage in time to develop. Despite this event, today both clusters are at the same level of development, being key parts for each of the countries. It is important to highlight that each one contains a different growth approach, the Mexican cluster seeks mass production, this is what makes it so profitable and has great economic impact on the country, while the German cluster seeks more to bet on specialization and not mass production of cars. Although, it is affirmed that both clusters possess a great geographic location, which has helped them to develop and to have the success that they possess.

Mexico does not have shipowners or terminal industry of Mexican origin, all the companies of this level installed within the country are foreign in comparison with Germany, where it is creator of the most important companies worldwide such as Audi, BMW, Ford, Iveco, MAN, Mercedes, Neoplan, Opel, Porsche and Volkswagen. Although Mexico has grown, is because of the enormous advantage of having a neighbor in the north to the United States because it is the main buyer of the inputs that Mexico manufactures, if Mexico concentrates on expanding to other markets, within a future, could position itself within the top 3 places for export of automotive parts and auto parts in the world, it is clear that is having accelerated growth and that is why within the next 25 years will achieve it, thus breaking the German European country.

References

Buendía, F. (2005). *Towards a system dynamics-based theory of industrial clusters. Published in karlsson, C., johansson, J, and slough, R., industrial clusters and inter-firm networks.* Edward Elgar Publishing Ltd. UK. 83.

Bueno, E., Cruz, I. and Durán, J. (2002). *Economía de la empresa. Análisis de las decisiones empresariales* 15.ª ed. Pirámide: Madrid.

Clive, H. (2006). *El fetiche del crecimiento.* Laeloti: Pamplona, España.

Cluster-exzellenz (s.f). The Autoland Baden-Württemberg. Available: http://www.automotive-bw.de/de/unternehmen/GrusswortMinister.php

Comertia (s.f). Definición del sector automotriz. Available: https://comertia.com/es/report/como-exportar-autopartes-mexico/definicion-sector-automotriz

Den Hertog, P., Bergman, E. M. and Charles, D., 2001. "Creating and sustaining innovative clusters: towards a synthesis." In *Den Hertog, P. et al. (eds.): Innovative clusters. Drivers of National Innovation Systems. Paris: OCDE.* pp. 405-19.

Di Bitonto, S. (2015). Industry overview: the automotive industry in Germany. Germany trade and invest. Available: http://www.ixpos.de/IXPOS/Content/EN/Yourbusinessingermany/_SharedDocs/Downloads/automotiveindustryingermany.pdf

Einwiller, R. (2012). Innovations index 2012: Baden-Württemberg im europäischen Vergleich. In Statistisches Monatsheft Baden-Württemberg 12/2012, 24¬30. Available: https://www.statistik-bw.de/Service/Veroeff/Monatshefte/20121204

European Commission (2018). September). Baden-württemberg. Internal market, industry, entrepreneurship and SMES. Available: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/organisation/baden-w%C3%BCrttemberg-foundation-ggmbh

International Trade Centre (2017). *International trade in goods - Exports 2001-2017.* Available: http://www.intracen.org/itc/market-info-tools/statistics-export-country-product/

Krugman, P. (1991). *Increasing returns and economic geography.* The MIT Press: Cambridge.

Krugman, P. (1991b). *Geography and trade.* Massachusetts: MIT Press: Cambridge.

Krugman, P. (1995c). *Development, geography, and economic theory, Estados Unidos De América.* Massachusetts Institute of Technology.

Marshall, A. (1890). *Principios de Economía.* reprinted by Prometheus Books: London: Macmillan.

Martin, R. and Sunley, P., 2001. "Deconstructing clusters: Chaotic concept or policy panacea?" In *En r. Martin, p. Sunley (ed.) revised version of a paper presented at the regional studies association conference on regionalizing the knowledge economy. London, UK.*

OICA (2017). *International organization of motor vehicle manufacturers.* Available: http://www.oica.net/category/production-statistics/2017-statistics/

Osiel, C. (2013). *Bajío, el nuevo milagro mexicano.* Available: http://t21.com.mx/opinion/bitacora/2013/08/16/bajio-nuevo-milagro-mexicano

Porter, M. E. (1990b). *The competitive advantage of nations (eds.), harvard business review.* Macmillan: London. 71-97.

Porter, M. E. (1998c). *On Competition.* Harvard Business School Press.

ProMéxico (2016). La Industria Automotriz Mexicana: Situación actual, retos y oportunidades Available: http://www.promexico.mx/documentos/biblioteca/industria-automotriz-mexicana.pdf

Secretaría, d. E. (2012). Dirección general de industrias pesadas y de alta tecnología industria automotriz.

Serret, D. (2011). Estudio de la competitividad de clústeres: El caso del clúster TIC del 22@ Departamento de Organización de Empresas (OE), Universitat Politècnica de Catalunya (UPC). Available: https://upcommons.upc.edu/bitstream/handle/2099.1/11149/PFC2.pdf

Soriano, M. A. (2008). *El papel del Emprendedurismo en la formación de Clústeres Industriales. Tesis de maestría no publicada.* Universidad de las Américas Puebla, Puebla: México.

Strange, W. C. (2005). *Urban agglomeration. New palgrave dictionary of economics.* 2nd Edition ednMacmillan.

Zhakiyanov, B., Farooq, A., McCarthy, O. and Platten, S. (2019). *Challenges and strategies for the competitiveness of the baden-württemberg automobile cluster. Institute for strategy and competitiveness.* Harvard Business School.