

Chapter 5 Logistics performance evaluation in the auto parts sector of Tlaxcala

Capítulo 5 Evaluación del desempeño logístico en el sector autopartes de Tlaxcala

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Abstract

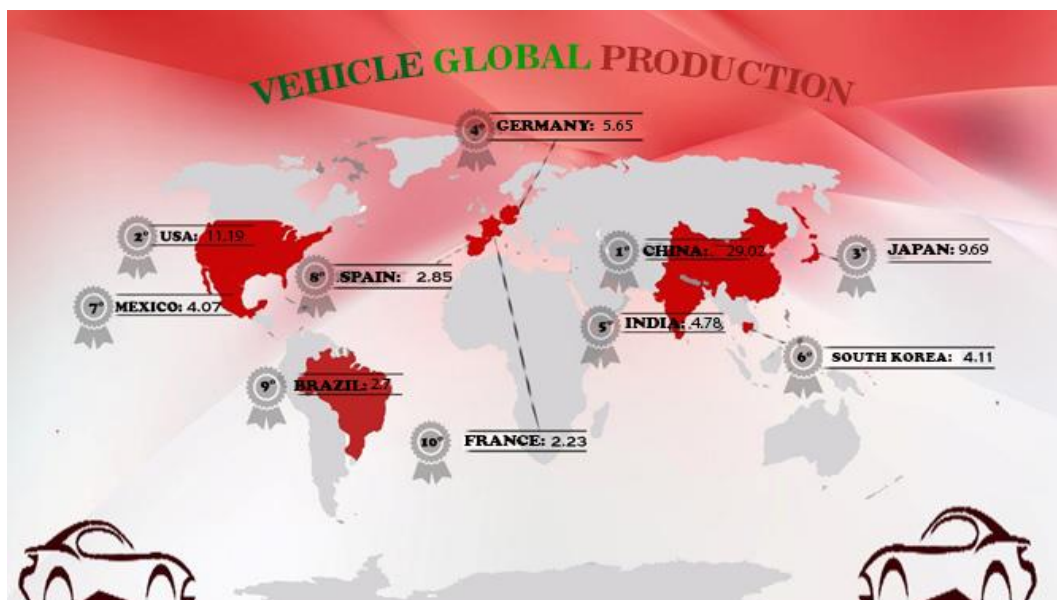
The auto parts industry in Tlaxcala has historically been influenced by the proximity of the Volkswagen plant and, currently, by the opening of the AUDI plant in San José Chiapa, Puebla. The arrival of the main global auto parts companies has driven the domestic sector to adopt the best practices of the supply chain. This has improved the competitiveness that leads to a quantum growth in exports. However, the Tlaxcala auto parts industry has to operate in a unique environment that poses challenges to the already complex automotive supply chain. In this study, we conducted an assessment of the logistics performance of the auto parts sector in the state of Tlaxcala. For its analysis, the indicators of the Logistics Performance Index were used and the variables taken into account are: Infrastructure, tracking and tracking, punctuality and performance of customs. The results within the positive factors are the strategic location of the state of Tlaxcala allows to communicate with the main markets, ports and customs of the country; 76% of cargo transport companies in the entity deliver their products within the stipulated time; 90% of cargo transportation companies in the state have a satellite monitoring system.

Automotive industry

Universally, the automotive industry has been accepted as an important driver of growth in a country's economy and is a major contributor to the global economy. The car has been described as a product based on "form and function" which implies a high level of engineering and is positioned as a fashion product (Thomas, 2013). The industry has been called "the industry of industries", since it uses products from almost all manufacturing industries (Drucker, 1946) and supports industries such as mining, steel, plastics, electronics, petrochemicals; and even companies in the financial sector. (Kearney, 2013). This industry generates 17.8% of the gross domestic product manufacturing worldwide and for the time being it continues to grow, registering an increase of 24.8% in the last decade (2007-2017). The automotive industry is of great importance, both because of the size of the companies that make it up, which have a combined production of more than two thousand billion euros per year, as well as the level of occupation of skilled labor since for the construction of more than 90 million vehicles the employment of about 9 million people directly in the manufacture of vehicles is required.

The estimates of the International Organization of Automobile Builders show that each job within the industry generates five indirect jobs. This indirect effect on employment is achieved by the complex production chain generated by car manufacturers (Oica, 2017). The global vehicle production reached 97.3 million units in 2017, grew at an average annual rate of 2.4% between 2016 to 2017. In 2017, the main automobile producing countries were China, the United States of America and Japan with the 49% of total production. For its part, Mexico ranked seventh as a manufacturer of light vehicles and its production in terms of units represented 3.9% of the world total. Figure 5.1 shows the main automobile producers in 2017.

Figure 5.1 World vehicles production



Source: Self Made. OICA data, 2018

Automotive industry in Mexico

In Mexico, the automotive industry is one of the most dynamic and competitive. The jobs, services and products that derive from it make it relevant in the national and local economy. Its contribution to the national total GDP is 3.3% and manufacturing 18%. Its exports, to more than 100 countries, represent 21.5% of the total Mexican exports, with more than 45,000 million dollars. Generates 1.6% of national employment. In addition, it has become the main generator of foreign currency, above sectors such as electric-electronic, oil and tourism (INEGI, 2018).

In 2014 Mexico became the largest producer of automobiles in Latin America and the seventh producer worldwide, this growth has continued considering that automotive production reached 4,068,415 cars in 2017 and is projected to be 4.8 million in 2019, according to figures of the Mexican Association of the Automotive Industry (AMIA, 2018). For years, manufacturing quality has been the outstanding characteristic of vehicles manufactured in Mexico. They are exported to the most demanding markets in the world, such as the US, Germany and even Japan, where Mexican plants have been presented as examples of quality and commitment to continuous improvement. For automobile manufacturers, the quality of the Mexican plant and labor are some of the most important factors when deciding their investment strategies, location and geographical position.

As proof of the above, in the last five years, the majority of companies manufacturing vehicles and commercial vehicles in our country and a significant number of companies producing automotive, parts and components have made large investments to expand their capacity of production, equipment, modernization and automation.

The production of automobiles reached a new historical maximum in 2017, driven by the installation of new plants in the country and a greater demand in strategic markets such as the United States and Canada. In the year 2017, according to information from the International Organization for the Construction of Automobiles, the assembly of cars broke the record of 4 million units per year, 13% more than the 3 million 600 vehicles made a year before. Figure 5.2 shows the key indicators of the Mexican automotive industry.

Figure 5.2 Key indicators of the Mexican automotive industry



Source: Self Made. Pro Mexico data, 2016

Supply chain

The supply chain covers all activities associated with the flow and transformation of goods and associated information from the raw materials phase to the end user (Ballou, 2004). It is essentially a set of connected providers and customers; where each client is in turn supplier of the next organization until the finished product reaches the end user. Increasingly, companies around the world are turning to the supply chain as the latest methodology to reduce costs, increase customer satisfaction, make better use of assets and build new revenues.

With the automotive industry constantly evolving, the supply chain can be complex. Automotive companies must reconsider their supply chain strategies in order to exploit new market opportunities, reduce costs and maintain a competitive advantage. The OEMs (OEM) operate in an environment with strong global competition, the market is more turbulent, complex and uncertain. The automotive industry offers a rapid increase in the number of models and variants that are available in the global market for customers. The segments of traditional cars such as hatchbacks, sedans, trucks and pick-ups are fragmenting the variety more and more into niches. Derivative car segments, such as minivans, roadsters, two-seat vehicles, SUVs and sports vans, are growing. This fragmentation and segmentation of vehicles results in a more complex supply chain that must be managed flexibly. The key trend in the automotive industry is the standardization of components and construction modules for common platforms. This means that the models can be adjusted to the individual requirements of the customers and the delivery schedules allow OEMs to produce multiple models (based on variable platforms), in the same manufacturing facilities.

The complexity of the automotive supply chain can be measured by the fact that a typical vehicle comprises approximately 20,000 components with approximately 1000 subassemblies or modules (Schwarz, 2008). The automotive supply chain includes many tier 1, 2 and tier 3 suppliers or manufacturers with many assembly operations and a number of dealerships. Customer demand for varied configurations and specific features increases the high level of response needed from automotive supply chains. The delivery time required by a customer is averaged from 4 to 6 weeks in the automotive industry (Meyr, 2004) and there is a definite correlation between the implementation of Supply Chain Management (SCM) practices and quality and Design conformity (Sharma, Sahay and Sardana, 2008).

Supply chain in Tlaxcala

Regarding the state of Tlaxcala, it does not have an assembly company, although the development of the sector has been strongly influenced historically by the proximity of the VW plant and its main T1 suppliers in Puebla and, currently, by the opening of the AUDI plant in San José Chiapa, Puebla, in the limits of Tlaxcala. From the point of view of the state government, the automotive industry is made up of 46 companies, of which 54% are Tier 1, 41% are Tier 2 and the remainder are Tier 3. Of these companies, 71% of the companies they export their products and the rest are for national consumption (Sedeco, 2018).

Regarding the size of the companies located in the entity, 25% are large companies, 44% are medium-sized companies, 29% are small companies and only 2% are micro-companies. The main products for original equipment manufactured in Tlaxcala are: injected plastic parts of medium and high range, such as panels and consoles, including paint or flock finish, finishes of levers, steering wheels and leather and vinyl interiors, seats, harnesses electrical and finally stamped and die-cut parts.

The contribution of the automotive sector of Tlaxcala is a little more than 8% of the national production, obtaining more than 3.5 million gross production. Despite the good level of production there is a low profit margin, considering that the automotive sector represents 2.4% of the state's employed personnel and contributes 2% of the state GDP. For its part, the manufacture of auto parts of motor vehicles, ranked 15 at the national level and represents a little more than 5% of the personnel employed in the sector at the national level (Conacyt, 2016).

However, the proximity to the assembly plants and TIs of Puebla and the connection through the north arch with assemblers located in the State of Mexico and the Bajío, has boosted the growth of the sector in the state. The Autopartes de Tlaxcala companies were created through the natural growth of the VW conglomerate; this has benefited most of the entity's auto parts companies because they present progressive technologies, high-tech production methods and close cooperation. The structure of the supply chain in Tlaxcala was adapted to meet the conditions and requirements of three different cultures of automobile producers (German, Japanese and US). The structure is composed of suppliers 1st-Level, 2nd-Level, 3rd-Level and the cooperation is complemented with other small and medium-sized companies, service providers and institutes.

Auto parts companies in Tlaxcala, in their capacity as strategic partners of car manufacturers, must be able to respond quickly to changing market demands because OEMs are giving up their responsibilities in the areas of development, supply and planning; and Tlaxcala auto parts companies must demonstrate that they can deliver the required design, quality, service and price. Figure 5.3 shows the supply chain of the automotive industry of Tlaxcala

Figure 5.3 Supply chain of the auto parts industry of Tlaxcala



Source: Self Made

The supply chain and the logistics process in the auto parts environment of Tlaxcala start from the client and end with the client. Each auto parts company in the entity is connected to other parts of the supply chain by the flow of materials in one direction, the flow of orders and money in the other direction and the flow of information in both directions. The supply chain coordination focuses on the control of the flow of materials and the flow of information between suppliers, manufacturers and customers through the processes of information exchange, communications and transmission.

The construction strategy of the assembly companies is related to the delivery of parts from the auto parts companies of the State of Tlaxcala to the assembly plant. The customer makes his request through the distributors and the specifications are communicated to the car manufacturers. Orders delivered by telephone, fax or other paper order methods can be processed as those received electronically. The information is captured in a central database and the allocation of invoices is made to determine the cost of production and the place of decision where the car will be manufactured; the nearest location of the production plant of the customer's vehicle model is indicated; Once the production plant is located, Tlaxcaltecas autoparts companies supply their components according to the just-in-time (JIT) or Just in sequence (JIS) methodology to ensure that the parts of the vehicle reach the correct point on the assembly line and at the correct time for installation in the respective body (to insert in the particular vehicle for which they are made).

Based on a scheduled production sequence planned several days in advance (or in the order in which the bodywork of the vehicles leaves the paint shop), the original equipment manufacturers ask the Tlaxcalteca Tierfs to deliver the components for that match the production sequence.

The Tlaxcalteca auto parts industry can guarantee that the order of sequential delivery of these to the assemblers continues to produce components in batches, since they are stored, generally in a location near the final assembly plant. When the sequence orders come from the assemblers to the supplier, the warehouse components are simply repacked (often with the help of information-based tools) in the correct sequence and delivered quickly. Once the car is assembled, it is transported by rail, plane, ship or by tractor-truck to be delivered to the customer.

A change in any link in the chain usually creates waves of influence that propagate through the supply system. These waves of influence are demonstrated in prices (for raw materials, labor, parts and finished products), flow of materials and products (within a single installation or between facilities within the supply chain) and inventories (initial, in process, and finished product). The way in which these influences propagate through the complex system determines the dynamics of the supply chain. Supply chains of Tlaxcala autoparts companies are becoming more demand driven than driven by prediction to respond effectively in real time to the demand of car manufacturers.

Methodology

At an international level, the Logistic Performance Index (LPI) is a measurement made by the World Bank, the LPI works as a mechanism with the objective of showing and describing global trends in logistics, measuring efficiency of the supply chains of each country and how it develops in trade with other countries. The factors that the LPI takes into account are the following: Infrastructure, tracking and tracking, punctuality and customs performance. To evaluate the logistics performance of the auto parts sector of the state of Tlaxcala in its analysis, the indicators of the Logistics Performance Index were used. The methodology used for the study was mixed, in relation to the data presented in the infrastructure variables, customs performance, a documentary and descriptive research approach was used, since it is characterized by measuring or collecting information in a independent or joint on the concepts or variables, that is, its purpose is not to indicate how these relate. According to its temporal dimension it is a cross section, since the data is analyzed at a moment in time.

On the other hand, the methodology used for the punctuality, tracking and tracking indicators was descriptive. These indicators were surveyed by companies in the cargo transport sector that are strategic partners of the Tlaxcalteca auto parts industry for the distribution of their products. To identify which companies in the cargo transportation sector in the state, the Secretariat of Communications and Transportation of the State of Tlaxcala, the National Institute of Statistics and Geography and the field investigation were called upon. 58 companies were identified, of which only 21 companies have the capacity to meet the demand of auto parts companies.

It was determined to apply the measurement instrument to managers, middle managers and operators.

The 21 cargo transport companies were visited to apply the measurement instrument, obtain the information and proceed to the corresponding analysis.

A measurement instrument was designed with 10 questions, these, from the indicators of the Logistics Performance Index and the variables that are taken into account are: monitoring and tracking as well as punctuality. From the questionnaire, 5 questions focused on the tracking and tracking variable; the rest of the questions focused on the variable of punctuality in the shipments. The design of the measuring instrument consists of the following characteristics:

- Method: Likert type
- Measurement level: Ordinal
- Address of affirmations: Positive or favorable
- Measurement scale: 1. Very little, 2. Little, 3. Regular 4. A lot. 5. Too much
- Type of questions: Closed

Theoretical review

The Logistic Performance Index, or LPI for its acronym in English, is a measurement made by the World Bank in order to show and describe the global trends in Logistics. The LPI was launched for the first time in 2007 and was designed to measure the peripheral components of the supply chain, such as transportation and commercial facilitation. The LPI is responsible for measuring the efficiency of supply chains in each country and how it operates in trade with other countries (business partners). In this report, the inputs for the statistical review are obtained through surveys which are carried out to more than 1200 professionals in the logistics field around the world. The factors that the LPI takes into account are the following:

- **Customs.** Measures the speed and efficiency of the procedures and dispatch processes, in terms of speed, simplicity and predictability of the formalities of the customs control agencies.
- **Infrastructure.** Take into account the quality of the infrastructure related to trade and transport: maritime, land, rail and air as well as communications and transport information technologies. Also take into account aspects such as storage and transfer of cargo.
- **International deliveries.** The ease of processing shipments at competitive prices is considered.
- **Quality and Competence in Logistics.** It measures the competence and the quality of the logistics services of transport operators, customs agents, among others.
- **Tracking and Tracking.** Determines the ability to track and track shipments to the final customer. This leads to the exact location and the trajectory followed by the product from the moment it is delivered to the company that provides the service until it reaches the customer.
- **Punctuality.** It is related to punctuality, that is, it determines the delivery of the shipments in the established times, which is important due to the competition in the market, a delay in the shipments is not acceptable.

According to the previous points, it can be observed that the study evaluates the dimensions of the performance of the supply chain, the customs clearance, the infrastructure, quality of the service, reliability of the shipments and efficiency in the customs clearance. In a biannual period, the LPI shows the position (ranking) of the countries evaluated, the relative percentages, and the evaluation in aspects such as cargo transport, storage, and payment system among others.

In the 2016 edition, Mexico's logistics performance decreased positions in four of the six sub-indexes:

- Infrastructure from position 50 to 57.
- International shipments from position 46 to 61.
- Competition from position 47 to 48.
- Punctuality from position 46 to 68.

Some indicators showed improvement over the 2014 edition and these were:

- Customs, from position 70 to 54
- Tracking and tracking, from position 55 to 42.

The results of the indicators in this study provide quantifiable information which allows us to make better decisions and improve the logistical processes in such a way that excellence is achieved in each one of them. On the other hand, the challenge of improvement is also for logistics companies, their evolution in technologies that meet the demands of a more competitive digital market.

Results

Variable Infrastructure

In the automotive sector, after the manufacturing process of automobiles in the assembly plants, the distribution services consist of taking the new units to the concessionaires, borders or to the main ports of the country for shipment and start exporting. At this point, the madrina or wet nurses make 25% of the land transfer of the units without rolling to a warehouse or a loading yard.

At the state level, the strategic location of Tlaxcala makes it a compulsory transit center for different industries in its main commercial routes, it also contributes to the development of productive activity due to the ease of integration of its roads, motor transport and the potential of connectivity to other markets. Figure 5.4 shows the distribution of roads in the state prepared by the Ministry of Communications and Transportation.

Figure 5.4 Map of the State of Tlaxcala and its main land routes



Source: Road network of the State of Tlaxcala, 2012

The communication channels that Tlaxcala has, have become a fundamental factor for economic and social development, such is the case of the German company ODW Elektrikn located in the Ciudad Industrial Xicohténcatl park, where mechatronic systems are manufactured for the market automotive. In this place the accesses were adapted and the road adjacent to this industrial park was expanded to four lanes under the requirements of the businessmen settled in this area (urban center 2016). It is clear that, through this type of infrastructure, the auto parts industries established in the entity contribute to the process of strengthening the Mexican automotive chain, because they have the capacity to capture and link their activities with factors that influence the increase of added value and, consequently, in the generation of innovation factors. Currently, of the total number of automotive companies installed in the entity, 26 are direct suppliers of the main carmakers worldwide, originating in Germany, Austria, Slovenia, Spain, the United States, India, Italy, Japan, Luxembourg, Switzerland, Poland, Portugal, and China (Industrial Cluster, Urban Center 2018). The State has an average of 58.46 km of roads per 100 km² of land, the existing highway is integrated with the neighboring regions, which has generated good communication, see Table 5.1.

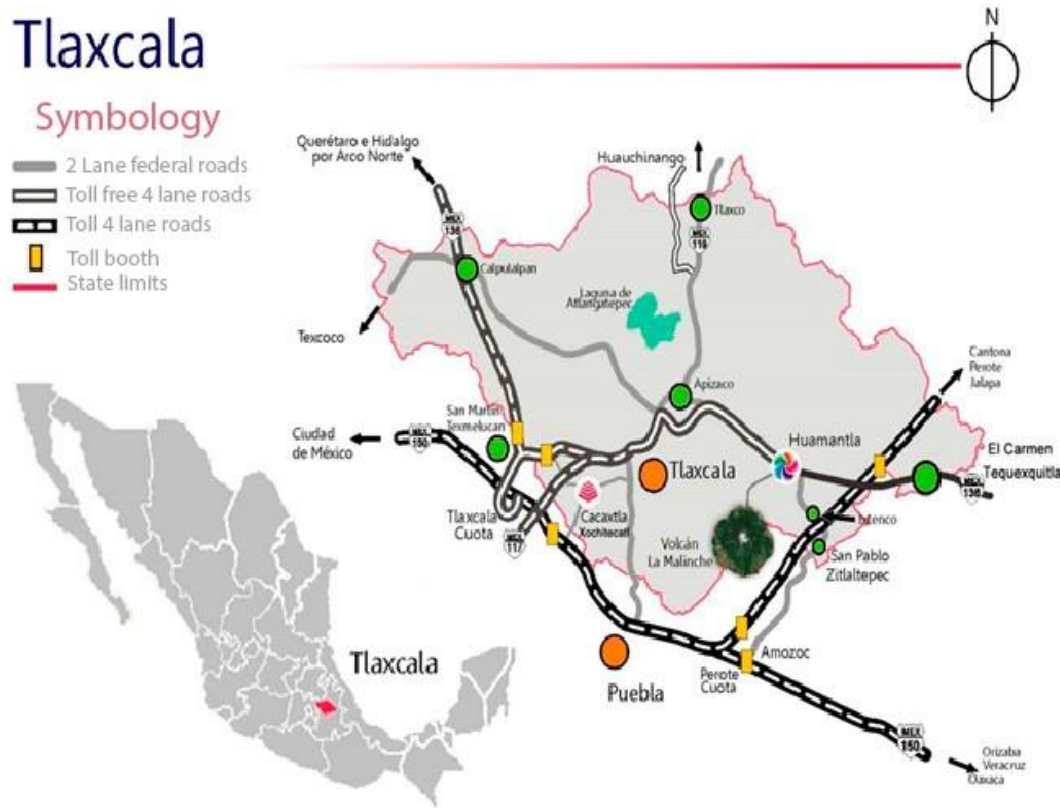
Table 5.1 Length of the highway infrastructure in the State of Tlaxcala

Road length in km				Equivalent			
Linear				Equivalent			
Total	Runner	Basic	High school	Total	Runner	Basic	High school
560.57	141.95	100.51	318.11	814.71	273.96	155.31	385.44

Source: Ministry of Communications and Transportation, 2016

In the western area, where the municipalities of Calpulalpan-Nanacamilpa are located, the Arco Norte, which connects from the southern region of Zacatelco, through the southern center of the municipality of Tlaxcala, to the western region of Calpulalpan. The northern arch is also one of the main communication routes of various states of the republic. The distribution of these roads can be seen in Figure 5.5.

Figure 5.5 Infraestructure highway in the State of Tlaxcala



Source: Economic Development Secretariat of Tlaxcala, 2016

In the northern area, there are the Apizaco Tlaxco, Tlaxco Tejocotal highways. In the southern zone is the Mexico Puebla Texcoco highway that also connects with the North arch. There is also the Tlaxcala Puebla highway and the Amozoc Perote highway. In the eastern area, Cuapiaxtla Cuacnopalan highways are located. The central area of the State has federal roads of 2 and 4 lanes, likewise provided by State communication channels which give fluidity to all Tlaxcala.

Infraestructura ferroviaria

The railway infrastructure crosses the country from north to south and from east to west, connecting the main towns, ports and borders. This infrastructure is considered one of the logistical assets of greater importance because its network allows intermodal transport, where different modes of transport are combined to obtain advantages and greater efficiency. These industries have seen a solution to their national logistics problems in rail transport because they manage to mobilize large volumes of new units and auto parts for assembly or distribute them in the spare parts market..

In this context, the Mexican Association of Railways (AMF) emphasizes that the first requests of the assemblers are to have an effective connection with the railroad (Cedillo-Campos MG, García-Ortega MG, Martner-Peyrelongue, CD et. Al 2017), and that also provides efficiency and competitiveness, security, time and price. Regarding the automotive sector, the railroad transports 75% of the cars produced in the country according to the Mexican Railroad Association (Martínez, E 2016), which shows an economic interdependence between the railroad and the assembly plants established in the National territory. Currently, the company Ferromex has moved 3 million vehicles completed during the year 2017, this is 72% of the production of the assembly plants of Chrysler, Ford, General Motors, Honda, Mazda, Nissan, Toyota and Volkswagen.

As has been described so far, the links between the automotive industry and the railroad correspond to a bilateral relationship that is to say for both, the point of integration is situated in the incorporation of the railroad to the logistics needs of the automotive industry. The railway industry moves large volumes of finished vehicles and auto parts for assembly or spare parts market, have found a strong ally in rail transport to meet their needs for both national and international logistics that allows the movement of compact, medium and large vehicles towards markets in North America and the rest of the world, through the rail network.

Rail infrastructure represents one of the most important logistics assets, because it is the main element within the logistics network that facilitates the so-called intermodal transport, where several modes of transport combine their advantages to achieve greater efficiency. In Tlaxcala, the presence of small and medium-sized companies in the automotive sector has been strengthening, manufacturing plants are concentrated in three industrial cities located in Tetla, Tlaxco and Huamantla; in addition to the corridors located along the two roads that connect the State with the City of Puebla. In terms of rail infrastructure, the entity of Tlaxcala in the year 2017 had 352 km of railways which are integrated by three lines: Mexico-Veracruz, via Apizaco, which crosses the entity from west to southeast; Mexico-Veracruz, via Mena, Tlaxcala and Jalapa; and Mexico-Veracruz, via Orizaba and Córdoba that passes through the municipalities of Calpulalpan, Nanacamilpa, Sanctórum and Mariano Matamoros, see Figure 5.6.

Figure 5.6 Railway network in the State of Tlaxcala



Source: Economic Development Secretaria of Tlaxcala, 2018

Marine transport

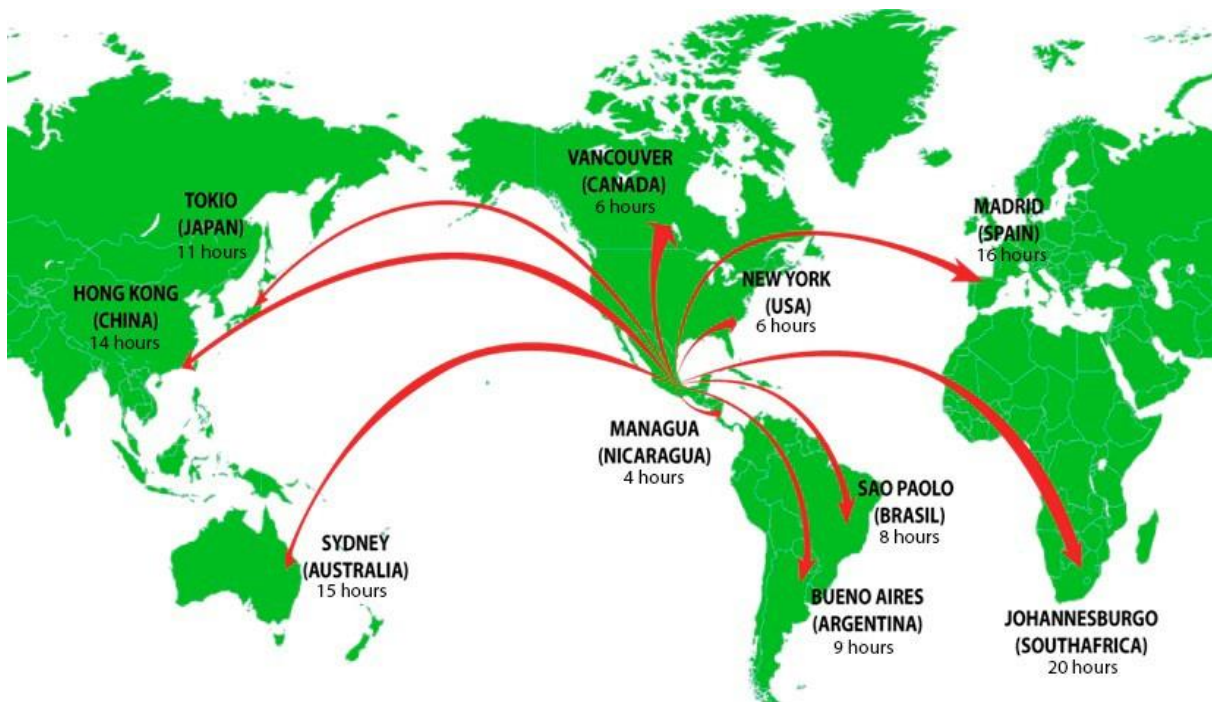
Maritime ports for the automotive industry constitute one of its most important strategic logistics assets, given its participation in the international exchange of goods. According to statistics from the World Trade Organization (WTO, 2012), more than 80% of the merchandise marketed in the world moves by sea, with ports being the nodes that allow this exchange to operate. The port with the lowest distance to the state of Tlaxcala is Veracruz, which is located 309 km away (SCT, 2017). Table 5.2 shows the distances from Tlaxcala to the main high-altitude ports in Mexico.

Table 5.2 Distance to the main ports of height

Port	Distance in Km
Tuxpan/ Veracruz	204
Manzanillo/ Colima	934.90
Coatzacoalcos/Veracruz	502.50
Lázaro Cárdenas/ Michoacán	734.10
Dos Bocas/ Tabasco	681.30
Altamira/Tamaulipas	345
Ensenada/ Baja California	2921
Guaymas/Sonora	1871
Veracruz/ Veracruz	309
Topolobampo /Sinaloa	1548
Puerto Vallarta/ Jalisco	941

Source: Selfmade with information from the communications and transport secretariat

In relation to the State of Tlaxcala, due to its strategic location and its connections to the main high-altitude ports of Mexico, it offers privileged access to the United States and Canada and maritime connectivity to Asia, Europe and South America.

Figure 5.7 Strategic location of Tlaxcala for high altitude ports

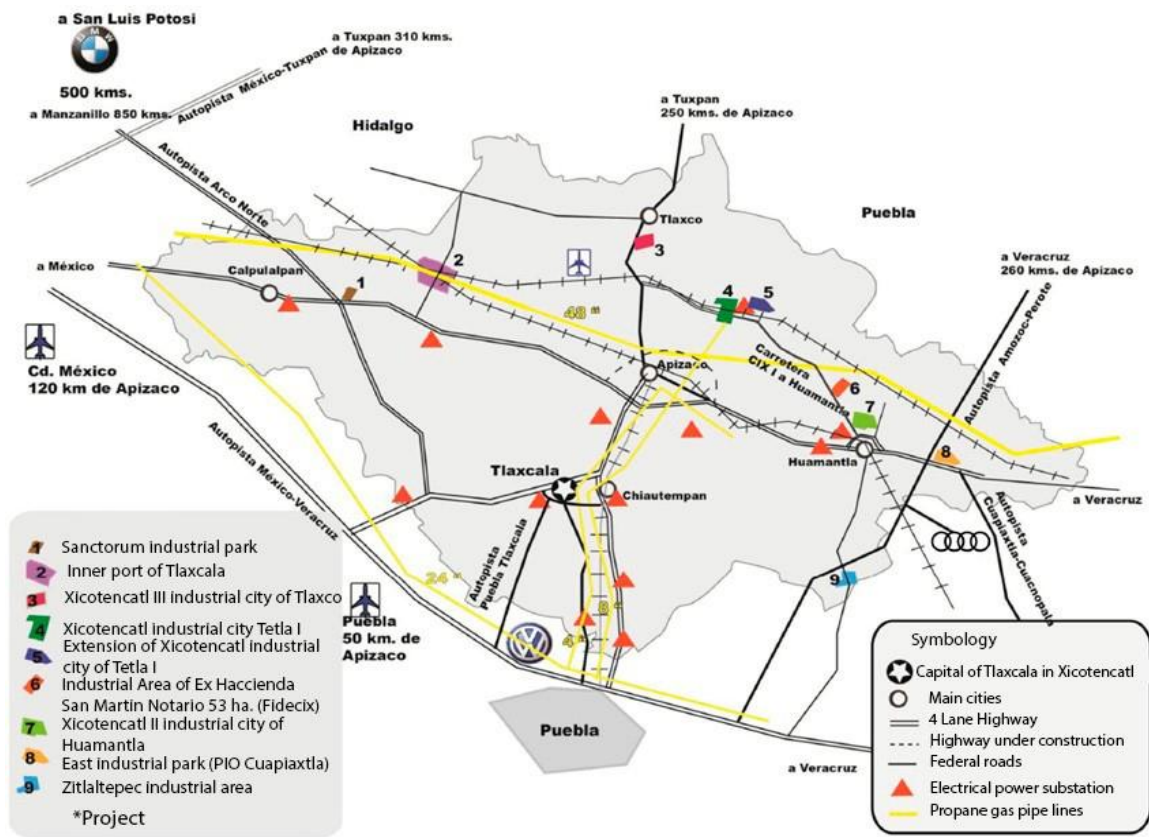
Source: Secretary of Economy Tlaxcala, 2016

The advantages of having a connection to high-altitude ports is to offer companies the ideal conditions to do business, the economic benefit being fundamental, this is achieved by making their logistics operations more efficient, reducing their costs and execution times. Figure 5.7 illustrates the geographic location of the country and the state of Tlaxcala with respect to other countries, the difference in the schedules of the main cities that trade.

Air Transport

Air transport is an innovative industry that guides economic and social progress. It connects people, countries and cultures. It provides access to global markets and generates trade and tourism. Forges ties between developed countries and developing nations. For the automotive industry one of the main factors is the adequate compliance with delivery times for its customers, so air transport plays an important role in the export or import of auto parts and products that provide to the automotive industry. In terms of airport infrastructure, the state of Tlaxcala has a national airport. However, this has only reported operations in 1994 and was only 24. Figure 5.8 shows the summary of the infrastructure that counts the state of Tlaxcala.

Figure 5.8 Productive infrastructure of the state of Tlaxcala



Source: National Institute of Statistics and Geography, 2018

Variable Customs

In Mexico, the General Administration of Customs (AGA) is an entity dependent on the Tax Administration Service (SAT) that is responsible for monitoring, monitoring and controlling the entry and exit of goods from the national territory. The customs offices are the administrative offices which are located in the borders of the country, in the same way borders are established in the littorals and important cities. The distribution of customs infrastructure in the country can be seen in Figure 5.9.

Figure 5.9 Geographic location of the customs in the Mexican Republic



Source: Customs in Mexico, RUBISA group, 2016

In the logistics operations for the supply of raw material in the manufacturing industries, it is common to import special materials from the countries of origin, together with the export of finished products (auto parts, spare parts and new vehicles) it is essential to know the distance from State to each of the customs points as shown in Table 5.3

Table 5.3 Distance to the main customs in Mexico from Tlaxcala

Location of Customs of Mexico	Distance from Tlaxcala (Km)
Northern border	
Agua Prieta, Sonora	2055
Ciudad Acuña, Coahuila	1415
Ciudad Camargo, Tamaulipas	1017
Ciudad Juárez Chihuahua	1092
Ciudad Miguel Alemán, Tamaulipas	1171
Ciudad Reynosa, Tamaulipas	932
Colombia, Nuevo León	1248
Matamoros, Tamaulipas	928
Mexicali, Baja California	3092
Naco, Sonora	2107
Nogales, Sonora	2279
Nuevo Laredo, Tamaulipas	1228
Ojinaga, Chihuahua	1613
Piedras Negras, Coahuila	1354
Puerto Palomas, Chihuahua	2014
San Luis Río Colorado, Sonora	2631
Sonoyta, Sonora	2401
Tecate, Baja California	2826
Tijuana, Baja California	2859
Southern border	
Ciudad Hidalgo, Chiapas	1094
Subteniente López, Quintana Roo	1225
Aduanas Marítimas	
Acapulco, Guerrero	478
Altamira, Tamaulipas	463
Cancún, Quintana Roo	1520
Ciudad del Carmen, Campeche	834
Coatzacoalcos, Veracruz	499
Ensenada, Baja California	3121
La Paz, Baja California Sur	1790
Guaymas, Sonora	1877
Mazatlán, Sinaloa	1123
Manzanillo,	928
Lázaro Cárdenas, Michoacán	726
Salina Cruz, Oaxaca	646
Progreso, Yucatán	1249
Dos Bocas, Tabasco	674
Veracruz,	310
Tuxpan,	253
Tampico,	435
Interior Customs	
Aeropuerto Internacional de la Ciudad de México, CDMX	118
Aguascalientes, Aguascalientes	589
Chihuahua, Chihuahua	1546
Guadalajara, Jalisco	654
Guanajuato, Guanajuato	453
México, CDMX	116
Monterrey, Nuevo León	1008
Puebla, Puebla	37.4
Querétaro, Querétaro	305
Toluca, Edo México	173
Torreón, Coahuila	1101

Source: Self Made with information from Grupo RUBISA

In the state of Tlaxcala has installed a significant number of industrial companies which require customs services motivated by the magnitude of products required for manufacturing and export of various finished products to different countries. The Official Gazette of the Federation establishes the decree establishing the interior customs office of the state of Tlaxcala, where an Internal Customs Office of the State of Tlaxcala is determined, with a location in the municipality of Atlangatepec (DOF: 25/10 / 1984). The customs services of the state of Tlaxcala are in charge of the customs of Puebla, where its territorial circumscription includes the state of Morelos. The customs sections of Cuernavaca, in the Municipality of Jiutepec, in the State of Morelos and the Hermanos Serdán International Airport, in the Municipality of Huejotzingo, in the State of Puebla, also depend on this Customs Office. This customs office is fundamental for the commercial process to all of America, Europe and the rest of the world, providing security and guaranteeing the shipment and delivery of goods and reducing the costs of international trade through the application of regulations such as:

- Study and formulate of the projects of tariffs compensatory quotas and other measures of regulation and restriction of foreign trade.
- Enforce the agreements and conventions that are celebrated in customs matters.
- Order and practice the verification of foreign trade merchandise in transport.
- Verification of the transit of vehicles of foreign origin.
- Determine foreign trade taxes and other contributions.

The proper functioning allows compliance with the provisions on foreign trade, also guarantees national security, protects the country's economy, public health, the environment by preventing the flow of dangerous or illegal goods (Customs, SAT). As expressed (Zamora-Torres, Navarro Chávez, 2015) efficiency in customs has a significant impact on the reduction of costs related to trade and the performance of commercial administration. In this sense, the use of new technologies that the Tax Administration Service grants to the customs service allows obtaining a 100% automated customs clearance, which will reduce the administration of risks.

The investment in 2016 was 8540 million pesos, an amount that covered the installation and replacement (analogous to digital) of 14,400 video surveillance cameras that will be installed at 60 checkpoints in the country's customs, reading boxes and license plates goods that pass through customs (Bulletin of prey, The Economist 2016.)

Variable International Shipments

Currently, the manufacturing companies of auto parts installed in the state of Tlaxcala require very high quality national and international shipping services, since a service of low quality has as a consequence the delivery out of time, delivery in defective form of the merchandise or product. In both cases, the above means losing the client. The courier, parcel, and cargo transportation companies that offer their services in the state to the interior of the Mexican Republic and beyond their borders have a national and international logistics capable of mobilizing shipments efficiently and cost accordingly. the dimensions of the cargo, origin and destination.

By transporting more and more products to greater distances, the optimal management of all the resources involved can not only mean better financial results, but the survival of the company itself (Dorta-González, 2013).

These shipping companies share the philosophy of providing logistical support through effective and qualified processes to ensure the safe transport of cargo, courier and parcel service, in addition to meeting deadlines for delivery. Some of the companies installed in the entity are: DHL, FedEx, Estafeta, RedPack, Multipack among others, while the cargo transport companies are: Grupo Sercomex, Logística y Distribución de Tlaxcala, S.A. de C.V, Transportes Hernández Guevara, S.A. of C.V to mention a few.

Currently, the clients of these companies evaluate the quality of the service, its added value and its availability in a timely manner. In this way, the need to make the processes efficient (Cano-Olivos, Orue-Carrasco, 2013) arises. In competitiveness, logistics innovations and supply chain management are important factors for the distribution of national and international merchandise.

In summary, the service providers in the Tlaxcala must have a local, national and international coverage, in addition they must have a document that explicitly details both national and international destinations. It can also be mentioned, the messaging service which has the telegraphic network TELECOM, which has 5 offices of the 11 that are distributed in the state.

There is also the company Continental Service of Messaging which has coverage throughout the national territory where the areas can be urban, semi-urban and rural representing approximately 7% of shipments. Other companies such as FedEx have a new operating station located in the state of Puebla, which will be functioning as a connection point for the states of Tlaxcala, Veracruz, Oaxaca and Chiapas. The infrastructure has an installation of more than 9,000 square meters, which makes it one of the largest stations in the country, also has two access ramps, six loading platforms and capacity to serve 60 routes.

Variable Traceability and Tracking

The companies involved in the manufacture, storage and distribution of the auto parts sector understand the value of tracking them from the moment they are created until they are sold. To obtain traceability in the automotive supply chain, RFID tags, sensors and smart devices are used to track and optimize the movement of materials from the suppliers to the receiving docks and during assembly. However, they carry the instrumentation even further, using it to improve visibility in all processes; For example, dealers can use smart tags not only to locate specific cars in large batches, but also to ensure that they install the correct customizations on the right vehicles.

The supply chain of the automotive industry is highly interconnected, even in complex distribution networks. Dealers can see their own inventory of parts, as well as the inventory of other distributors and distribution centers to order the parts they need from any location.

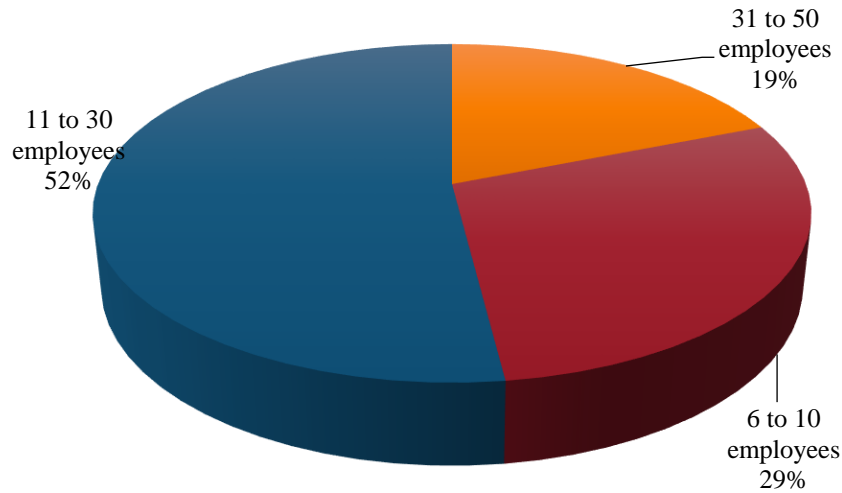
The automotive supply chain uses greater instrumentation and interconnectivity to improve products and operations, as well as to obtain consumer information. The systems and software integrated in the vehicles help the supply chain to obtain data on indicators of possible failures. This information, in turn, provides visibility into the demand for parts and services and helps the manufacturer improve quality and reduce warranty costs. For tracking and tracking in the automotive industry, outsourcing is a potential area of opportunity to reduce costs.

The only function of the supply chain that most automotive executives subcontract extensively is the transportation of up to 76 percent of automotive companies subcontract this service (IBM, 2009). For this reason, in the traceability and follow-up variable, the scope of the study was defined for companies in the cargo transportation sector in the state of Tlaxcala, which are the companies that carry out the distribution for the auto parts industry.

Finally, once the data is collected in the traceability and follow-up variable, we have information from 21 companies that collaborated. According to the statistical procedure determined for the handling of the data, it begins with the description of the demographic variables that were collected in a first questionnaire that was applied to the companies in question. The findings are described below.

Number of employees of Cargo Transport companies

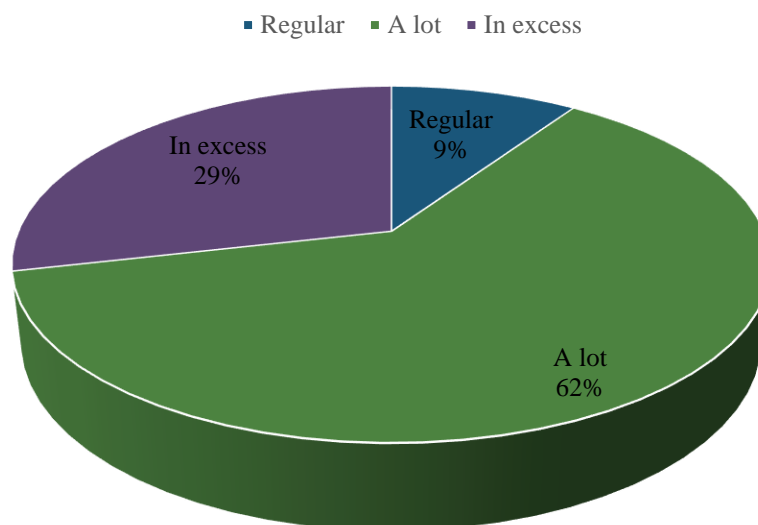
The data arrogan that of the 21 companies established in Tlaxcala that have the capacity to send the products of the auto parts sector are mostly small companies with a range of employees between 11 to 30 which speaks of companies with a low participation in the working market. 29% of the population is composed of micro enterprises, see graphic 5.1.

Graphic 5.1 Number of employees of freight transport companies

Source: Own creation

Importance of technology in logistics processes for tracking and tracking

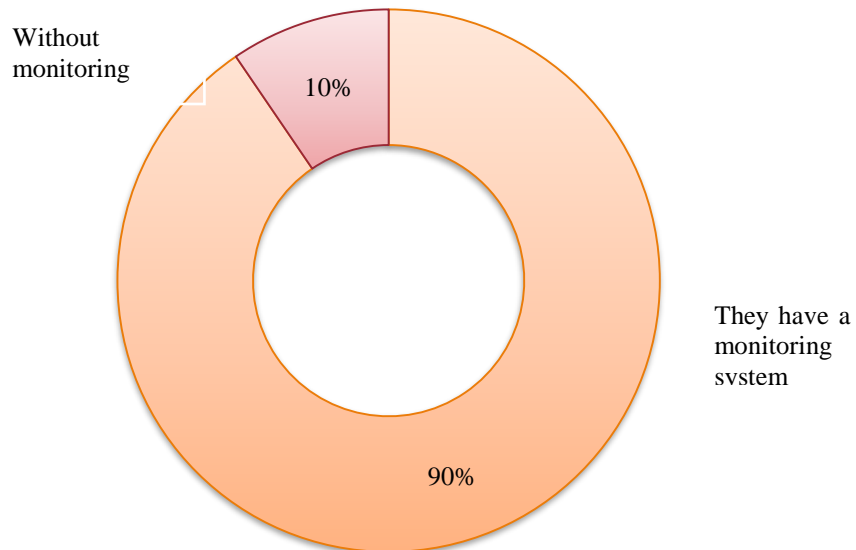
A revealing fact in the companies of motor transport of load that have the capacity to distribute the products of sector autopartes consider in 62% that the technology in the logistical processes has a lot of importance; 29% refers to the fact that in their processes, tracking and tracking of the load units, the technology has an excess of importance and only 9% of the companies give it a regular importance.

Graphic 5.2 Importance of technology in motor transport companies

Source: Own creation

Companies that have a monitoring and tracking system

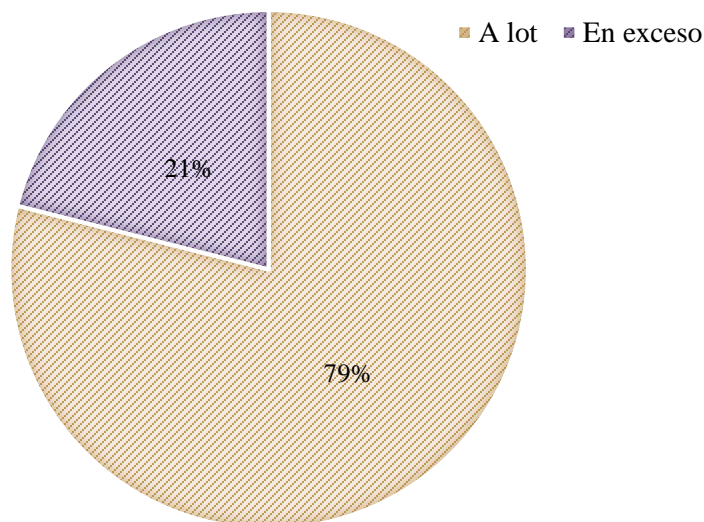
In relation to companies that have a monitoring and tracking system, 90% of freight transport companies in the state do have this system, this shows that companies in the auto parts sector can count on a reliable transport service and efficient. See graphic 5.3.

Graphic 5.3 Companies with monitoring and tracking system

Source: Own Creation

Ability to track and monitor cargo units

Regarding the ability to track and monitor the cargo transport units, 79% of the companies state that at the time of monitoring the units they present some setbacks for their location; 21% of the rest of the companies state that the location of their units is carried out immediately and without any contracting times. See graphic 5.4.

Graphic 5.4 Ability to track and monitor when performing it sent

Source: Own Creation

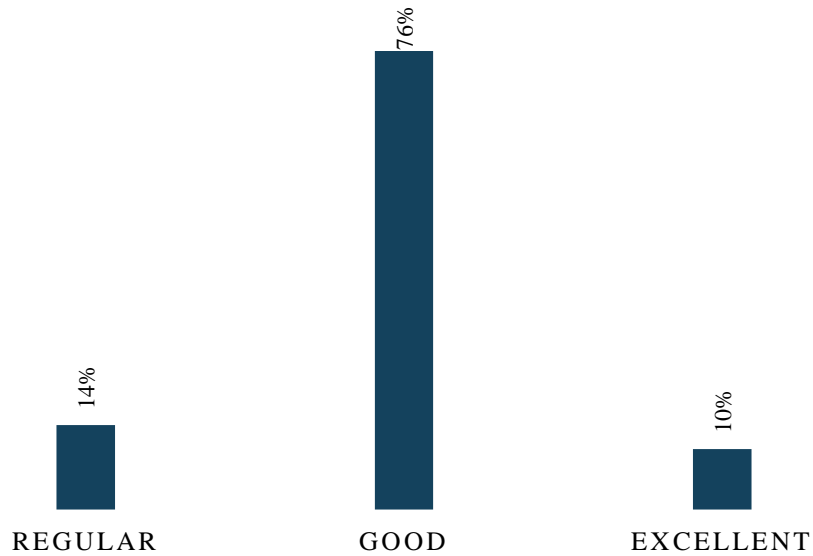
Variable Punctuality

One of the most important factors in the automotive industry is the punctuality in the delivery of the auto parts; the load must arrive on time, in optimal conditions, and without breakdowns. Accomplishing this requires a perfect recognition of the path that this load will take, and monitoring it in all that transit with the necessary quality measures so that the delivery estimates in time and form are effectively met. Regarding the survey, the data obtained in the punctuality variable are presented below:

Frequency of deliveries on time

Graphic 5.5 shows that 76% of companies consider that the delivery of their products to end customers is good, while 14% refer to it as regular and the remaining 10% is excellent. This reflects that the cargo transportation companies of the state of Tlaxcala comply with the provisions on punctuality and competitiveness for the auto parts sector.

Graphic 5.5 Delivery on time

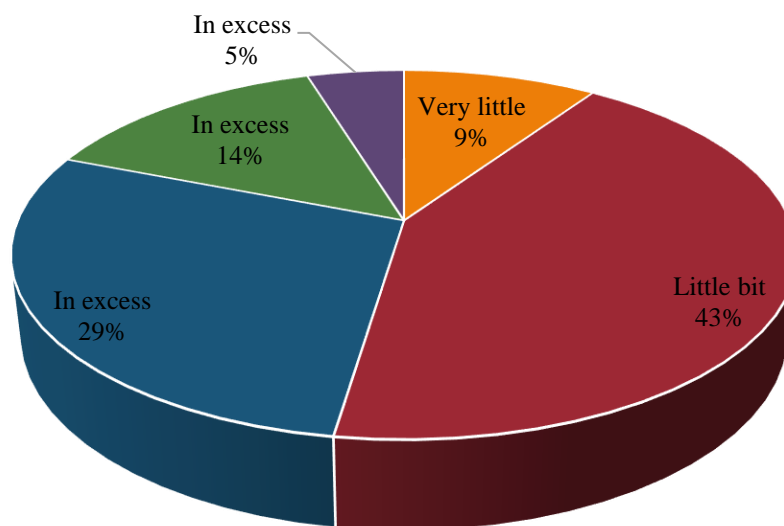


Source: Own creation

Frequency in which the delays of delivery of your product with your customers due to congestion is:

One of the reasons why orders are not delivered on time is urban congestion, 43% of the companies surveyed in the state of Tlaxcala mention that congestion affects little to the punctuality of deliveries, 29% affecting In a regular manner, only 5% refers to the fact that it affects excessively. See graphic 5.6.

Graphic 5.6 Delays due to congestion

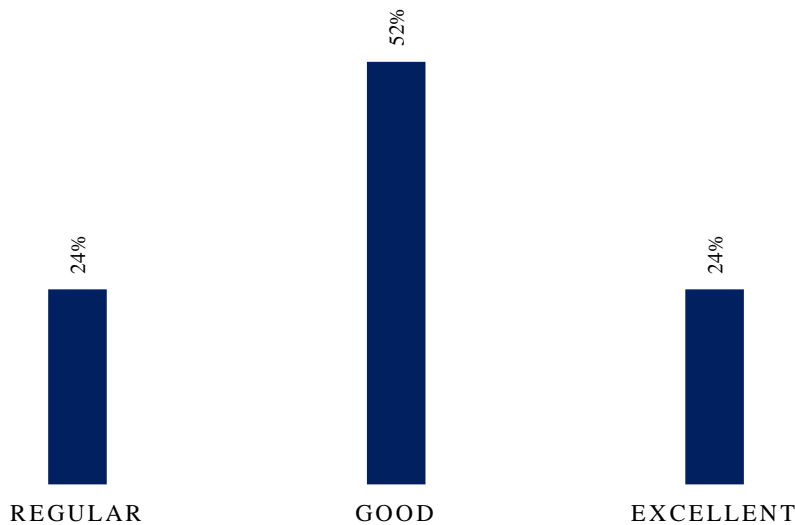


Source: Self Made

Frequency of receipt of product on time

For shipments to be made within the stipulated time it is of the utmost importance that the reception of the products in the transport companies be carried out in the planned time; With regard to this variable, 52% of the companies referred to have received good products on time, 24% consider that they are regular and the remaining 24% are excellent. See graphic 5.7.

Graphic 5.7 Reception of products on time

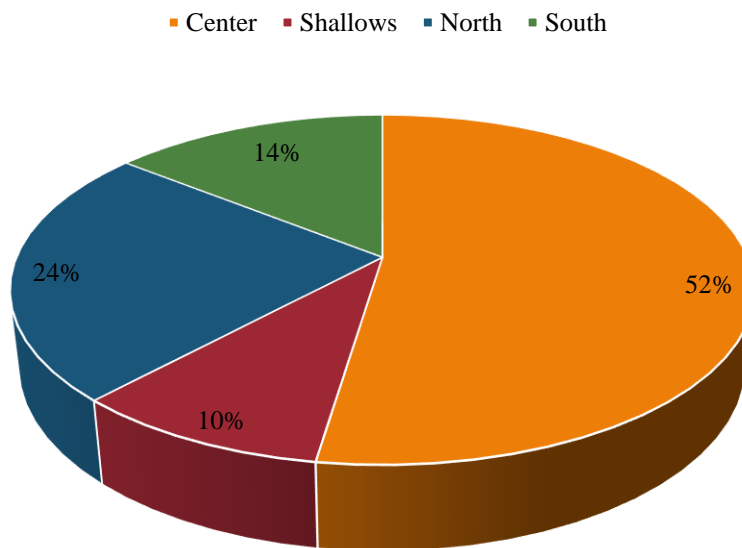


Source: Own creation

9.- When organizing shipments to areas of the country, how often do they arrive late?

Regarding the shipments with setbacks to the zones of the country, 52% of the companies make reference that the center of the country is where there is the greatest problem to deliver the products in the stipulated time, followed by 24% of the north of the country, with 14% the south and finally only 10% present problems of delays with the area of the shoal.

Graphic 5.8 Frequencies of delays to different areas of the country



Source: Own Creation

Conclusions

The strategic location of the state of Tlaxcala allows to communicate with the main markets, ports and customs of the country, which provides to the installed auto parts manufacturing companies the transfer of raw materials and finished products to the assembling companies, agencies or autoparts market. The supply chain of this industry of auto parts in the state involves the participation of a network of companies from the supply of raw materials to the delivery of the final product. Currently, these manufacturing companies move their products such as seat covers, harnesses, safety belts, airbags, automotive electronic components to states such as Puebla, San Luis Potosi, Guanajuato, Aguascalientes, as well as countries in Europe and the United States. United. To this end, the infrastructure available to the state allows access to the Bajío region through the north arch located in the western area of Tlaxcala, and to Puebla via the short route through Santa Ana Chiautempan or from the Tlaxcala bypass Puebla. Regarding exports, these can be made by sea through the Gulf of Mexico through the port of Veracruz, or by air through the international airports of Mexico City and Puebla.

The objective for the suppliers of the entity is to produce the correct pieces in the correct amount at the correct price, delivered in the right place at the right time; However, there are lags identified in the logistic performance of the entity which are mentioned as follows: there is lag in the interior port of the state, such as multimodal internal customs, airport disabled for commercial flights, there is no controlled premises, poor technology point, an infrastructure of industrial parks little strengthened, evidences the lack of technology of the companies of transport of load to realize traceability and pursuit of the automotive units.

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