

## Impacto Socio-económico del transporte de carga en México Socioeconomic Impact of Cargo Transport in México

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### Abstract:

Land transport vehicles, is the mode of transport that moves the most cargo, in Mexico represents more than 50% of the total national movement and generates 49% of jobs in the transport sector, on the other hand, there are more than 400,000 vehicles destined for the road haulage, in this way it ratifies the competitive development of the transport of cargo in the logistics, within the supply chain. Therefore, the present documentary research is derived from the process of scientific research that allows to refer and cite research from other parts of the world contributing information to the research for which they were consulted, where the first phase of research refers to the identification of sources of information on their location and collection, the second phase systematizes all valuable information on the subject of cargo transport, and finally the exhibition or presentation of the information found in the socioeconomic impact that the cargo transport represents in Mexico establishing its growth and development in order to generate strategies that generate support to an integral logistics in the cargo transport.

### Keywords:

Land transport, vehicles, logistic, supply chain

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### Resumen:

El transporte terrestre vehicular, es el modo de transporte que mueve la mayor cantidad de carga, en México representa más del 50 % del total de movimiento nacional y genera el 49% de empleos en el sector transporte, por otra parte, existen más de 400,000 vehículos destinados al autotransporte, de esta forma se ratifica el desarrollo competitivo del transporte de carga en la logística, dentro de la cadena de suministro. Por lo tanto, la presente investigación documental, es derivada del proceso de la investigación científica que permite referir y citar investigaciones de otras partes del mundo aportando información a la investigación para la cual fueron consultados, donde la primera fase de investigación hace referencia a la identificación de fuentes de información su localización y obtención, en la segunda fase se sistematiza toda la información valiosa al tema del transporte de carga, y por último la exposición o presentación de la información encontrada en el impacto socio económico que representa el transporte de carga en México estableciendo su crecimiento y desarrollo a fin de generar estrategias que generen apoyo a una logística integral en el transporte de carga.

### Palabras Clave:

Transporte terrestre, Vehículos, logística, cadena de suministro

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## Introducción

Transport is fundamental to a country's economic and social development, as it generates growth opportunities

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for a vulnerable social sector. Since 2002, the World Bank has helped finance more than 260,000 kilometres of road and road construction, development and maintenance projects. The main objective is to increase the flow and connectivity of the road transport as well as to establish communication routes for the social, commercial and industrial sector and thereby improve transport competitiveness (Banco Mundial, 2017).

In recent years, the exchange and trade flow has increased, this has resulted in a specialization and growth of transportation systems, especially cargo transportation. On the other hand, road cargo transport represents an industry of great importance within the global economy, for its strategic value lies in the fact that it is the vehicle that moves the activity of the countries, thus becoming a basic activity from a scenario economic and social between consumers and producers (López & Pardo, 2019).

The World Bank during 2017, reported the mobility of goods for each system positioning the railway and motor transport system as one of the most influential since during 2017, the railway system to world-wide transport has moved 4.807 billion tons while the aerial system has transported approximately 213.590 million tons per kilometers enlivened in the same year, during 2016 the marine traffic of container has been of 701,420.047,

Meanwhile, the cargo transport system does not have an exact number of tons transported by ground transport, but it is estimated that the road transport industry generates annually \$ 1.49 billion in annual revenues to global level, this is more than 50% of the \$ 2.9 billion in the global transportation and logistics market according to the Boston Consulting Group.

In recent years, cargo motor transport has been one of the most requested means for the movement of merchandise due to the facility to offer one of the best logistics connection and distribution systems in inaccessible places at a better price for those who hire it. Moreover, given the flexibility to move goods, it is possible to satisfy the demand of large cities and metropolitan areas, making it a high-value piece for the most developed countries.

However the rapid growth of the areas with their population and their demand has influenced the number of delivery vehicles in circulation (Betanzo, 2011). that is to say the increase of this sector not only impacts on the vehicle fleet of the cargo transport but also directly and indirectly in social and economic aspects such as the occupied personnel, the Gross Domestic Product (GDP) generated, the amount of cargo mobilized, the growth of

the vehicle park and the expansion of the popularity of this system in urban, metropolitan and rural areas.

Similarly, the vertiginous growth of freight transport implies a constant observation and monitoring of its behavior when it comes to meeting the demand of customers.

The United States Department of Transportation reports in 2018 a total of 445, 267 million dollars of international merchandise trade by road mode in 2016, where US exports were 242, 885 and imports 202, 382 dollars respectively, it is emphasized that within these imports the Mexican road haulage sector had commercial relevance to transport them from Mexico to the United States (United States Department of Transportation, 2018a).

From another point of view, the impact factor of the road transport sector is the regulations applicable to the road haulage of cargo, since these influence and determine to a large extent the operation of the same between two nations and thus condition the trade.

Mexican Carriers that want to operate in the United States Must Register with the Federal Automotive Transportation Safety Administration (United States Department of Transportation, 2018b).

In the last FMCSA record made in 2017, in the year 2015 in the United States of the 263, 610,219 vehicles registered in the United States, 8, 456,302 were single-unit trucks (flat trucks), 2, 746,882 were combination trucks (tractocamions), and 888,907 were buses. While in Mexico data from the Dirección General de Autotransporte Federal (2017) in the year of 2015 between general cargo and specialized cargo units were counted about 806, 405 units; 685, 109 belonged to general cargo transport units and 121,296 specialized cargo, while 149,084 were two- and three-axle trucks and 265,706 were combination trucks (United States Department of Transportation, 2018c).

Considering the above for Mexico, road transport is one of the most influential economic sectors, given the flow of social, labor and monetary activity it controls.

The transport in Mexico is the fundamental activity for generating jobs and social balance, as well as an important factor of productivity, competitiveness and national economic growth. Moreover, it determines the road haulage of cargo as the main mode of transport (Quintanilla, 2017).

Based on the above, the present research will analyze the influence and behavior of freight transport in Mexico, the impact it generates in Mexico and the socio-economic aspects in terms of competitiveness, the complex regulation, challenges and opportunities that have arisen.

The research is documented in 4 sections, the first is an introduction on the importance of transport from the impact of movement and its economic representation, the second section shows us the current situation of the transport of cargo in Mexico and its statistics of movement by type of load and type of unit as well as the economic influence on the operator's wages specified as the socioeconomic impact of cargo transport in Mexico, the third section presents the challenges and opportunities of the cargo transport in Mexico, followed by the discussion and conclusions.

### **Socio-economic impact of cargo transportation in Mexico**

We live in a world based on trade, where cargo transport connects people and goods on many levels, from the local to the global (Asociación de Plan Regional y Fundaciones Volvo para Investigación y Educación, 2017).

With the facility for the distribution of goods through the road circuit, the industrial, commercial and service sectors have benefited the most. Although the challenges to developing the freight transport sector have increased in recent years. A good response to these is to generate competitive advantages that have an effect on the supply chain.

Although the transport sector in Mexico and the world faces unprecedented situations caused by demography, urbanization, pressure to drastically reduce greenhouse gas emissions, transit congestion in cities, old age and deterioration of transport infrastructure and equipment and growth in fuel demand (Rascón, 2012). Actions to improve and make transport and distribution more efficient have been considered. A good practice for achieving this is to use the vehicle of the highest possible capacity considering its maneuverability on the desired route (EY Global Limited, 2014). This reduces time and increases the use of the freight transport in a responsible way, is safe, economical and eco-friendly and improves customer service and complies with the methodology.

Another important factor affecting the progress of freight transport in Mexico compared to other countries is infrastructure. According to the Mexican Institute for Competitiveness (IMCO, 2017a). It points out that data

revealed by the World Economic Forum (WEF) in the Global Competitiveness Index 2017 (IGC) Mexico ranks 51st out of 137 countries in the same competitiveness factor as in the infrastructure scheme, where the quality of road infrastructure ranks 58th. Two more positions compared to 2015, going from the 59th place he occupied in 2015-2016, to the 57th place in 2016-2017, among a total of 138 countries (Cámara Mexicana de la Industria de la Construcción, 2017). While in terms of improved road infrastructure, the top 7 positions are occupied by the Arab Emirates, followed by Singapore, Hong Kong, the Netherlands, Japan, France and Switzerland.

Finally, although cargo transport faces restrictions on trade between nearby countries. In the United States, road freight is the most used freight for trade between Mexico and the United States (71.0%) surpassing the railroad (14.7%), maritime (7.7%), air (3.0%) and pipeline (0.7%). With 366,096 km, the Mexican highway network is considered the most used transport infrastructure in the country (Dirección de Estudios Económicos BANCOMEXT, 2015). As revealed by Cámara Nacional del Autotransporte de Carga (2018), freight transport is one of the first sectors of the national economy to be subject to a new scheme and conditions in economic activity (CANACAR, 2018).

According to estimates by the UNAM in 2015, 67% of the domestic cargo movement was carried out by road and 90% of passengers moved by the same mode of transport, by 2017 the General Directorate of Federal Autotransporte (DGAF) reported that 56% of the national cargo was moved by road and 96% of the passengers moved by the motor transport (Dirección de Estudios Económicos Bancomext, 2016 & Dirección General de Autotransporte Federal, 2017).

In 2017, a total of 546, 588 thousand tons were transported by the road network of which 87.4% belonged to general cargo and 12.6% to the specialized cargo with this is determined that from 2008 to 2017 the service of transport to the specialized cargo has increased 9.2% and the cargo overall 26.1%.

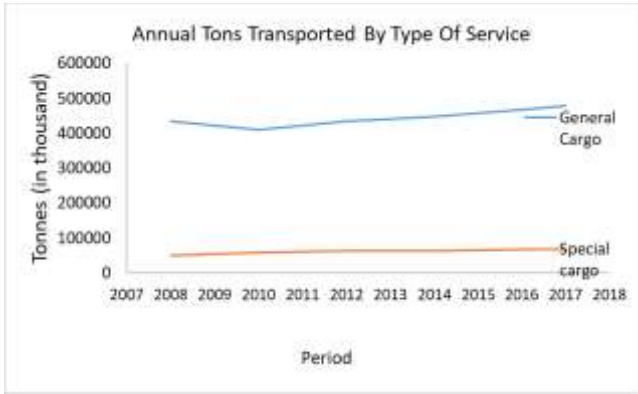


Figure 1. Annual tons transported by type of service

Moreover, the transport and distribution of goods and goods influences the type of units and their configuration. So much so that during 2017 the class of vehicle with the highest number of tons transported by road was the combination with T-3 (three-axle truck tract) when transporting between general and specialized cargo 431, 501, 000 tons and with this represent a value of 79% of the total cargo transported from that year followed by the C-3 (three-axle unit truck) by transporting 73, 206, 000 tons (13.16%) in third place the C-2 (two-axle unit truck) which managed to transport 37, 732, 000 tons between general and specialized cargo and to add 7% of the total load finally the 0,84% of the remaining load is transported through the combination T-2 (Two axle truck tract) (Secretaria de Comunicaciones y Transporte Estadística, 2018a).

Due to the increased demand for transportation, the vehicle fleet has been expanded. The demand factor [ has impacted on the type of service goods require. During the period 2008-2017 the total vehicle fleet of freight transport increased almost twice its original number (Secretaria de Comunicaciones y Transporte Estadística, 2018b).

In addition, since this period the number of units designated to the vehicle park for specialized cargo had an increase of 49.4% while for general cargo it was 44.64%. In other words, the cargo units have developed a specialization that allows them to easily adapt to the conditions of the goods and goods to be transported and thereby generate a significant increase in the vehicle fleet. In 2017 the Secretary of Communications Transportation reported the composition of a vehicle fleet in 14% of units for specialized cargo and 86% of units for general cargo. This increase reflects the importance of the vehicle fleet for the movement and distribution of general and specialized cargo.

The freight transport industry largely determines the country's economic flow. The influence that the freight transport currently generates has been the result of an

increase to the implementation of new economically competitive strategies. For both the public and private sectors, freight transport has become a highly competitive and commercially valuable business.

The flexibility for moving loads in inaccessible locations, the transfer time and the specialization for all types of cargo have become the logistical advantages characteristic of the road transport system. Same that have been conducive to the development of new companies and logistics cargo areas.

During 2017 the economic contribution of the Subsector Autotransporte contributed 83% in the Transport Sector and 5.5% of the GDP. During 2017, the National Institute of Statistics and Geography (INEGI) reported a total GDP of 18, 153, 795,571 million pesos generated by freight transport alone. Over the past 25 and 10 years, the GDP generated by this sector has increased by 62% and 27% respectively.

On the other hand, the social influence of the road haulage of cargo is visualized in the facility to be an important generator of jobs. With a company structure consisting of 81%-man truck, 16.3% small, 2% medium enterprises and 0.7% large companies. Data from the DGAF and the SCT revealed that in 2017 this sector registered more than 2.3 million direct jobs and a structure of 145,365 companies. During the analysis of the behavior of the business sector in the area of road freight transport from 2008 to 2017 was recorded an increase of 33.2%, where large companies grew by 52%, followed by medium-sized enterprises with an increase of 44% finally a development of 42% and 31% for small companies and man truck respectively (Instituto Nacional de Estadística y Geografía Sistema de Cuentas Nacionales de México, 2018).

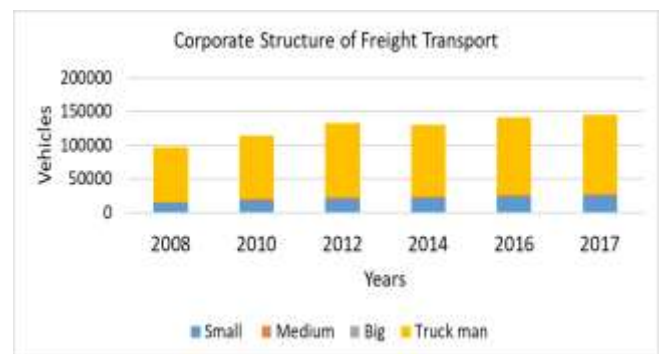


Figure 2. Corporate structure of freight transport

## **Challenges and opportunities of freight transport in Mexico**

The road haulage of cargo in Mexico is considered the most predominant means of transport and used in the territory so given the growth of the same facilitates the opening to a logistic platform of internal distribution of greater influence on the various sectors economic and social policies that include the population and the government.

However, the challenges presented today by the road haulage are given by the insecurity and the increase of polluting emissions, the traffic generated, the lack of operating staff, the health of the operator, the excess of the lifetime of the units. public policies and finally the regulations and regulations that each country imposes according to its interests.

The first challenge to consider in the road transport is safety. According to Fernando J. Bernal, commercial director of Grupo Transportes Monterrey at a meeting of the National Council for Logistics and Supply Chain (Conalog), I point out that insecurity is a daily thing and in 2016 was not the exception because this problem increased, when coinciding with the National Chamber of Freight Transport, it increased 40% (Juárez, 2017).

For 2017, data from the Executive Secretary of the National Public Security System (SESNSP) recorded two thousand 944 robberies to transporters, against one thousand 587 in 2016, although the business sector considers that this year's figure is higher. This indicates that when investing in a unit 12-15% is the cost of security for transportation.

The president of the National Confederation of Mexican Hauliers (CONATRAM), Elías Dip Ramé, mentions that "Thefts on the road easily amount to about 50 units a day, both inside the city and on the road routes", and one of the most dangerous points for operators and companies is the triangle made up of Tlaxcala, Veracruz and Puebla, the Mexico-Veracruz and Mexico-Tlaxcala routes where the Mexican Association of Insurance Institutions (AMIS) revealed that of the total number of vehicles stolen in Puebla in 2017, 34% were heavy equipment. Subsequently, the second challenge is public policies and the state of legality and law regarding the federal obligations of the carrier. Recaredo Arias, AMIS president reveals that in legal matters the recovery of a lost unit (if found) can be between 20,000 and 30,000 pesos (Cruz, 2018).

This fact determines the corruption that is handled in the legal aspect and that directly affects the growth and development of this sector by preventing the unit from improving its quality of service. In this regard, the respective efforts to reduce corruption have not borne fruit and the growth of impunity, corruption and insecurity has grown. In 2012 WEF assessments reveal that in the assessments, it was had in the cost for terrorism in Mexico takes place 117, in cost of crime and violence the 135. In addition, in the 2012 Perception of Corruption index, Mexico ranks 105 out of 174 countries. For 2017 Mexico ranked 135th out of 180, with a rating of 29, one point lower than last year (IMCO, 2017b).

The third and greatest challenge currently facing the country is the issue of high CO<sub>2</sub> emissions, given the ratio of pollutant emissions by number of fleet in the country. In 2012, transport accounted for 22% of carbon dioxide emissions, which is equivalent to 36,457 tons of emissions per year, with freight transport accounting for 77% of carbon dioxide emissions, this is about 28,039 tons of emissions to the environment (Torres, 2013).

A study in Mexico City found that vehicles carrying goods occupy, after cars and taxis, the third place in the transport sector as a source of pollutants to the atmosphere, accounting for 24% of the total. Technologies allowed in Mexico for new vehicles emit up to eight times more nitrous oxides than those in the United States, for example, in the Mexico Valley Metropolitan Area (ZMVM) vehicles represent 15% of the total vehicle fleet and are responsible for 71% and 81% of emissions PM<sub>10</sub> and PM<sub>2.5</sub>, now the biggest problem is concentrated in heavy transport, where new vehicles have as standard (NOM-044-SEMARNAT-2006) two generations of backwardness compared to other countries (Teorema ambiental, 2015). This type of delay in production regulatory policies increases greenhouse emissions.

The use of freight transport in the city is ambivalent, since on the one hand it contributes to economic development and on the other it causes serious congestion problems and high polluting emissions. At the same time, one factor determining pollution is the age of the units. During 2015, the SCT detected more than 304,183 units that exceeded the age of 20 years, a time limit that the Ministry of Communications and Transport decreed in articles 35, 39 and 50 of the Federal Law on Roads, Bridges and Highway Transportation (Senado de la republica, 2017).

## Discussion and conclusion

Cargo transport in Mexico is a relevant variable, implicit in the analysis of national and international trade. It is worth noting that the road haulage of cargo is the most used one for the trade between Mexico and the USA with 71% of the total cargo being evident its superiority of movement on the railway, marine, aerial and ducts transport, which among them generate a charge of 29%. The participation of the articulated cargo vehicles classified as T-3 (tract truck of trawl of three axes) with greater number of tons transported by road is emphasized between general and specialized cargo 431, 501, 000 tons representing a value of 79% of the total cargo transported, followed by the C-3 and C-2 known as 3 and 2 axle cargo trucks respectively where it is established that between the two vehicles carry an average of 20% of the total cargo.

On the other hand, the growth in freight transport has been constant and latent at an average rate of 47% for this sector reflecting the importance of the vehicle fleet for the movement and distribution of general and specialized cargo.

With regard to the economic and social sector, the transportation of land cargo contributes 5.5% to the country's gross domestic product, generating 2.5 million jobs with a deficit employment opportunity in this sector of 24,000 more as part of the demand for demanding ground cargo mobility needs.

With the hard data presented, the question arises whether the country is prepared for this growth? for the number of land cargo transport units under safe conditions, pollutant emission, regulatory regulations on federal and state roads, as well as road mobility infrastructure. Therefore, as future work, the aim is to analyse the conditions of mobility of land transport.

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