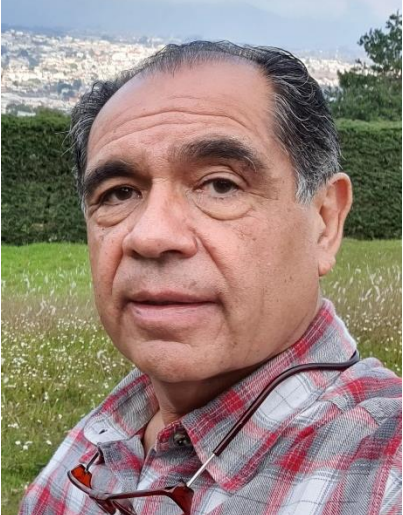



A METHODOLOGY FOR SELF REGULATION ON HIGH CAPACITY TRANSPORT

	
<p>S. SAAVEDRA National Polytechnic Institute (IPN). Mechanical and Electrical Engineering College (ESIME). Graduate of Mechanical Engineering; Master in Management. Currently representative of the National Chamber of Transformation Industries (CANACINTRA) for negotiating Transport and Vehicle Regulations. Active member and cofounder of the National Alliance for Road Safety (ANASEVI) Active member and cofounder of the Technology and Maintenance Council in Mexico (CMT) Partner and Technical Director at Entorno Industrial, S.A. de C.V.</p>	<p>A. THEISSEN Monterrey Institute of Technology (ITESM) Mechanical Engineering and Administration. Panamerican Institute of High Management (IPADE) Master in Executive Management. Currently President of the National Private Truck council (ANTP) Active member and cofounder of the Technology and Maintenance Council in Mexico (CMT) Director of Institutional Relations of Femsa Estrategic Business Unit.</p>

Abstract

This paper presents the development of the high capacity transport in Mexico, the social problems it has faced and the self regulation proposal by the private fleets affiliated to the National Private Truck Council (ANTP) to show regulators, media and the general society the benefits in using the double trailer configurations, its economical, ecological and transit implications. Double trailer configurations have been in use in Mexico since the mid 1980's. The first edition of the regulation NOM-012-SCT-12 was released in 1997, after several years of negotiations. Since, then regulation has been revised three times, increasing the technical specifications required to transit, limiting the road access, and reducing the weight limits. During this time period, there have been more than 20 initiatives of law, to forbid or limit the transit of double trailer configurations. The self regulation proposal is shown in this paper. Prototype tests are on its way regardless of the pandemic.

HVTT16: A methodology for self regulation on high capacity transport

Keywords: High Capacity Transport, Double Trailer Configurations, Weight and dimensions regulation in Mexico, Self regulation, ANTP (National Private Truck Council) that represents major private fleets and major trucking service customers.

1. INTRODUCTION

From the mid 1980’s transportation companies, mainly those related with corporate companies, have been looking for ways to reduce the cost of transporting goods. The initial large configuration was called “Frente de Full” which consisted of a 3 axle truck which towed a 3 axle trailer, the trailer front was a single axle type A converter dolly, while the semitrailer was 35’ in length. Currently this configuration is called C3-R3, figure 1, but its use now is almost non existing.

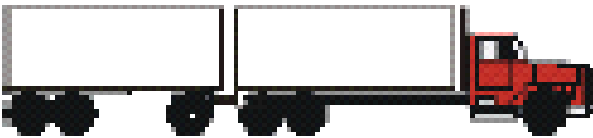


Figure 1 – Frente de Full, currently C3-R3

By the late 1980’s several transportation companies started using double trailer configurations, as they appear to be more practical, since the tractor can be used for hauling while the trailers were being loaded or unloaded (figure 2). In order to reduce their transportation costs, corporate companies started promoting the use of double trailer configurations among the transportation companies bringing in raw materials as well as those transporting finished goods from their manufacturing locations to their distribution centers.



Figure 2 – Typical double trailer configuration T3-S2-R4

1.1 Trends on GVW for double trailer configurations.

The regulations on allowable weights for double trailer configuration have changed substantially since its conception in the ‘80s. The initial allowed GVW was 80 tons without any specific technical requirement, went up by the mid ‘90s to 81.5 tons with a requirement of frictionless brakes and air ride suspension, down to 75.5 tons by 2017 with additional safety requirements to the equipment and transit regulations. Shown in figure 3 are the allowable GVW for the 2 main heavy configurations T3-S2 (3 axle tractor with a 2 axle trailer) and T3-S2-R4 (3 axle tractor, 2 axle semitrailer and 4 axle trailer). The maximum allowed GVW is noted as BASE, while DIF means the maximum allowable GVW when meeting the capacity and safety specifications.

CONFIGURATION	1997		2008		2014		2017		2019	
	BASE	DIF	BASE	DIF	BASE	DIF	BASE	DIF	BASE	DIF
T3-S2	44.0	49.0	41.5	46.5	46.5		46.5		46.5	46.5
T3-S2-R4	66.5	81.5	66.5	80.0	66.5	75.5		75.5		75.5

Figure 3 – Trends on maximum GVW for two main configurations.

1.2 Current GVW and dimensions for double trailer configurations.

The maximum dimensions and allowable GVW for the eleven double trailer configurations included in the Mexican regulation are shown in figure 4. Eight of the eleven configurations (T-S-R) include a converter dolly, while three of them follow a B train structure (T-S-S).

GVW AND DIMENSIONS FOR DOUBLE TRAILER CONFIGURATIONS ALLOWED IN MEXICO PER NOM-012-SCT-2-2017				
NAME OF CONFIGURATION	NUMBER OF AXLES	NUMBER OF TIRES	LENGTH MAX (m)	MAX GVW (METRIC TONS)
T2-S1-R2	5	18	31.0	52.0
T2-S2-R2	6	22	31.0	60.0
T2-S1-R3	6	22	31.0	60.0
T3-S1-R2	6	22	31.0	60.5
T3-S1-R3	7	26	31.0	67.5
T3-S2-R2	7	26	31.0	67.5
T3-S2-R3	8	30	31.0	71.0
T3-S2-R4	9	34	31.0	75.5
T2-S2-S2	6	22	31.0	57.0
T3-S2-S2	7	26	31.0	64.0
T3-S3-S2	8	30	25.0	68.0

Figure 4 – Maximum length and GVW for double trailer configurations.

All vehicles doing transport service in double trailer configuration must comply with the safety and capacity specifications indicated in figure 5.

SPECIFICATION	TRACTOR	SEMITRAILER	CONVERTER DOLLY	ADMIN
GPS reporting position and speed	X			X
Minimum engine HP and Torque (depends on each configuration)	X			
Minimum GAWR of drive axles	X			
Emissions inspection	X			
Mechanical conditions inspection	X	X	X	
Electronic controlled engine	X			
Frictionless brake	X			
Safety chains			X	
ABS	X	X	X	
Air ride suspension	X	X	X	
Emergency and service brake actuator	X	X	X	
Automatic slack adjusters	X	X	X	
Maximum speed regulated	X			

SPECIFICATION	TRACTOR	SEMITRAILER	CONVERTER DOLLY	ADMIN
Conspicuity tape	X	X	X	
Authorization by the SCT				X
Maximum speed 80 km/h				X
Lights ON				X
100 m separation to other heavy vehicles				X
HOS record				X
Co-responsibility in case of full loads				X
Front rear mirrors installed on fenders	X			
Maximum length of semitrailers 40' to 42'		X		

Figure 5 – Specifications to be allowed to transit in double trailer configuration

1.3 Road safety for double trailer configurations.

Some independent transportation companies have not been happy with the double trailer configuration as they insist that it reduces their profit per transported ton, requires higher investments, better trained drivers and better logistics to have return freights.

As they were unable to take the double trailer configuration out of the regulation, they started gathering information of the road accidents in which those configurations were involved. With a data base in hand, they managed to get it to the media, so every time an accident of such configuration occurred, they send information and images to the media to alert the society of the “danger to other road users” of such big configurations. Official statistics show that casualties due to double trailer configuration for the last seven years have been the lowest of all types of configurations. Statistics on highway accidents for the period of 2010 to 2016 have been reported by the Mexican Transportation Institute on the Technical Publication 529 dated 2018, a summary of which is shown in figure 6.

BALANCE	LIGHT VEHICLES	BUSES	TRUCKS	SINGLE TRAILER	DOUBLE TRAILER	TOTAL
Collisions	100 585	5 350	18 839	15 318	5 966	146 058
Casualties	19 019	1 943	3 475	2 703	999	28 139
Injured	105 459	11 692	14 287	8 181	3 050	142 669
Collisions w / victims	57 356	3 540	8 553	5 601	1 860	76 910
Nr of vehicles	175 140	6 248	21 595	17 650	7 102	227 735

Figure 6 – Balance of Road Safety on Federal Highways 2010 to 2016

1.4 Opposition for double trailer configurations.

In July 2016 a tragic incident involving a double trailer configuration resulted in the death of three young persons, one of them being the son of a high official at the Ministry of the Interior in charge of information to the media. The “noise” on the media created by the official and

backed by the trucking organizations against the double trailer configuration was so intense that most of the communicators started with a stigmatization of the configuration of it being hazardous to the society. Several congressmen presented more than 20 initiatives of laws to forbid or limit the transit of double trailer configurations. The industry that uses such configurations presented their arguments. As a result, the weights and dimensions standard was revised to include more safety and administrative requirements to the trucks, trailers and companies willing to transit with double trailer configurations.

The situation of stigmatization of the double trailer configurations as a hazard to those in transit over the roads prevails so there are still some congressmen willing to forbid the configuration.

2. THE SELF REGULATION PROJECT.

Being aware of the situation, the National Private Truck Council (ANTP), mainly corporate companies with private fleets and big customers of independent transportation companies, decided to start and fund a project to self-control the way they comply with the safety and administrative requirements of the weight and dimensions regulation, in order to prove to the authorities, the media and the society that the double trailer configuration is the safest way to do massive transportation of goods, the least pollutant, the one that creates the lowest traffic congestion, more productive and thus the most friendly to society.

The Board of Directors of the ANTP has agreed with the Federal Transport Authority that the project is open not only to ANTP affiliates but to all transportation companies that operate double trailer configurations. This decision is aimed to improve the compliance and road safety rates of all interested transportation companies.

2.1 Objective and processes of the project.

The ANTP hired several consultants to work together with their affiliates to develop the project following the following objective:

To create a digital platform on the cloud, which will contain all the necessary information to guarantee that the affiliates to the ANTP have the best practices in the transportation services for their logistics. This information will be shared with the authorities and other interested stake holders.

The tool will be a way to verify that the logistics operations are done following the best practices to:

- Improve road safety
- Prove compliance with the standards and regulations that rule the transportation operations.
- Have a more efficient and clean transportation.

The tool will have three major processes as follows:

- The process of self regulation on current laws and regulations on transportation industry (weight and dimensions, hours of service, licensing, etc.)
- The process of road safety compliance and certification.
- The process of telematic control of double trailer configurations.

2.2 Self regulation to show compliance with current laws and regulations

The process of self regulation on weights and dimensions required the development of a cloud data base where each transportation company will upload the static data required to comply with the weights and dimensions regulation, data related to the vehicles, the drivers, and the cargo as well as the routes approved to transit on. The system reminds the company when an action needs to be taken to remain in compliance, such as the need to have a periodic inspection on emissions complying with NOM-045-SEMARNAT-2017 or mechanical conditions of the vehicles complying with NOM-068-SCT-2-2014, validation of driver's licenses, validity of permits to transit on lower specification roads, etc.

Before a trip is initiated, the transportation company will enter the identification of the vehicles that will form the configuration, the driver identification, the load on the trailers and the designated route. The platform will then put together the configurations and verify that it complies with the regulation in terms of vehicle specifications, driver's license and training, route and permits and will issue the BOL. If any of the previous is not met, it will inform the transportation company of the issues to modify regarding vehicles, drivers or route, before releasing the BOL.

Even though the system is designed to prove that all participants meet all the regulations, it allows the transportation company to "release" the BOL even if there is a noncompliance; in such a case, the system will record the action with details of the issue; the noncompliance is not shown on the BOL. Noncompliances are classified as critical, important and mild; such information is shown on the screen, so the person in charge of releasing the BOL is aware of the risk he is taking when deciding to release the BOL. The system sends daily reports (if any) to a designated person in each transportation company which released a BOL with noncompliance (s) rating the daily performance. The compliance performance is computed by the system and kept in record, so every month a statistical report of each company is sent to the manager in charge, as well as a statistical report which includes the performance of all the companies in the program is shared with all involved.

2.3 Road safety compliance and certification

The process of road safety compliance and certification is a four level systematic approach to road safety as follows:

- First level is a basic self evaluation based on an internet survey consisting of more than 100 questions in ten different subjects regarding road safety.
- The second level requires the companies to add their statistical data regarding severe accidents from the last twelve months of operation, based on a common reporting standard.
- The third level requires the visit of a qualified safety expert to perform an audit of the information company stated in the self evaluation.
- The fourth level is the recognition of those companies that have achieved a certain number of points stated in the road safety national awards which has been organized by the ANTP for more than twenty years. Figure 7.



Figure 7 - Award ceremony of the 21st National Road Safety Contest.

The system calculates an initial rating for each participant company depending on the result on each of the levels as well as the number of levels it has successfully completed. The rating is updated every year.

2.4 Telematics control of double trailer configurations

The process of telematics control of trucking operations is designed to benefit from the current weights and dimensions regulation that requires that all double trailer configuration working in Mexico must be equipped with telematics capabilities. Though the regulation specifies that the telematic system must report at least speed and position of the configuration, so far there is no formal rule indicating the use for such data, nor the way the authorities will get it and process it.

In order to have a clear and transparent process, the industry has decided to work, and release 3 national standards based on the ISO Standards 15638-1, 15638-15 and 15638-16 Intelligent transport systems. Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV) – Frameworks and architecture, - Vehicle location monitoring, - Vehicle speed monitoring. As of now the first standard is in the process to be sent for public opinion, while the other 2 are under elaboration to be released early 2022.

Telematics control is an extremely ambitious part of the project, as it may become as detailed and advanced as it is now in the IAP of Australia. The initial project will overlook three operation conditions: operating at speed faster than 80 km/h at any moment for more than X minutes; operating on not authorized roads for double trailer configurations and finally operating over the limit of consecutive hours of service permitted by law. The following

HVTT16: A methodology for self regulation on high capacity transport

parameters for the system have been agreed by the participants in order to measure the performance of the participating transportation companies regarding speed, position and driving times:

- The telematics system should be able to alert the driver when driving at a speed higher than 80 km/h, when entering and transiting over a not authorized road for double trailer configuration when not having a special permit, and when the driving time is approaching and / or exceeding the allowable driving time specified by the NOM-087-SCT-2-2017.
- The system reports speeding whenever the vehicle travels at a speed equal to, or faster than 84 km/h for a period of at least 2 minutes; this issue is labeled as instantaneous speeding. It also reports whenever the vehicle travels at speeds equal to, or faster than 84 km/h for 20 minutes in a period of one calendar day. Both types of speeding are reported to the management of the transportation companies; they also become part of the compliance statistic per company and per group of companies in the self regulation program.
- The system reports the kilometers traveled on not authorized roads in relation with the total kilometers traveled each day.
- The system reports the excess hours driven in relation with allowed hours to drive of the regulation. The periodic statistical report shows the percentage of excess hours driven by company and by the group of participating companies.

This telematics control system will be applied also to any willing vehicles in other configuration that are equipped with telematics capabilities.

2.5 Utilization of the statistics and data generated.

The program prevents that statistic for each company be disclosed to anyone but the company that generated the statistic. In this way all company data, privileged and operations information is protected.

The ANTP is allowed to use the general statistics to show the authorities, and the public in general, of the performance of the double trailer configurations.

As a measure of confidence, the program is audited by an independent third party.

In case of a road accident in which casualties are involved, the road safety group of the ANTP performs a review of the regulation compliance by the transportation company, the operator, the vehicles and the actual travel conditions before and during the accident to find out the root causes of the accident and, if necessary, propose actions to implement to reduce the possibility of recurrence of similar accidents to the companies involved in the program.

The prototype run of the system is under way regardless of the SARS COV-2 pandemic, and we expect that we may be able to disclose the results of the project at this stage during the HVTT 16.

REFERENCES

- NOM-012-SCT-2 Mexican Official Technical Regulation for the maximum weights and dimensions of transportation vehicles on federal jurisdiction roads

HVTT16: A methodology for self regulation on high capacity transport

- ISO-15638-1 Intelligent transport Systems – Framework for collaborative Telematics Applications for regulated commercial freight vehicles (TARV) – Part 1: Framework and architecture
- ISO-15638-15 Intelligent transport Systems – Framework for collaborative Telematics Applications for regulated commercial freight vehicles (TARV) – Part 15: Vehicle location monitoring
- ISO-15638-16 Intelligent transport Systems – Framework for collaborative Telematics Applications for regulated commercial freight vehicles (TARV) – Part 16: Vehicle speed monitoring
- Intelligent Access Program (IAP) – Australia