

THE FACE OF THE PROJECT - REGULATING FOR SOFT AND HARD SKILLS IN DRIVER TRAINING TO SUPPORT THE IMPLEMENTATION OF HIGH PERFORMANCE VEHICLES

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Abstract

The importance of mandatory truck drivers' soft and hard skills training for the use of High Performance Vehicles (HPVs) is examined in this paper. The research was triggered after findings in the courses at the Bitrain Drivers School (EMaBi) in Argentina, where B-double driver training is mandatory since 2016. Instructors found that (1) a high percentage of the trainees had not received appropriate training on the new fuel efficiency and safety technologies - particularly auxiliary braking systems - included in their vehicles, even when this training is freely available from the Original Equipment Manufacturers (OEMs) when selling a new vehicle, (2) did not use the technology or used it incorrectly. The paper reflects on the need for training also on soft skills (stress management, fatigue awareness and risk avoidance techniques) to help drivers enhance safety and disseminate the benefits of HPVs with their attitudes and thus, enhance public support for HPVs implementation and use. The possibility of online training substituting in-person training, and training for second hand vehicles is left for discussion at the HVTT15 Symposium.

Keywords: driver training, high performance vehicles, behavioural skills

1. Introduction

The driver is the critical element which can make, or break, even the most advanced technological and policy measures. In fact, as the title says, they are “*the face of the project*”. However, transport companies balance the need to have drivers available with their need for training, so they would operate the vehicles more efficiently. And the balance many times falls on the side of the daily operation. The importance of mandatory truck drivers’ training for the use of High Performance Vehicles (HPVs) is examined in this paper. The paper reflects on the need for training on both soft and hard skills, to help drivers, who ultimately are the ones sharing the road with other road users, to enhance safety and to disseminate the benefits of HPVs with their attitudes and thus, enhance public support of HPVs implementation and use.

The advent of High Performance Vehicles (HPV), specifically B-Doubles, on the Argentinian national network requires mandatory training of drivers. The Bitrain Drivers School (**E**scuela de **M**anejo de **B**itraines or EMaBi) was created by the San Luis province government in December 2016, to attend the demand from the province’s and regional transport operators. It is the first and to date, the only dedicated training school in South America for HPVs.

By definition, bitrains in Argentina are coupled by a fifth wheel. Minimum power to tonne ratio is 6.75CV/tonne, and prime movers and semitrailers need to be built to purpose (*apt bitrain*), which is shown in the certificate provided by the Original Equipment Manufacturer (OEM) when selling a new vehicle. Heavy vehicle technology devices, such as on-board scales, GPS, Electronic Braking Systems’ package (containing ABS, traction control, emergency assisted braking EBA, hill start assist or hill hold, stability control and other devices) are compulsory, as well as auxiliary braking systems (retarder, engine, exhaust). Spring chamber external brake is also compulsory for each element of the HPV, as are speed control, retractable axle automatic control, LED lights and pneumatic suspension. (Subsecretaría de Transporte Automotor y Secretaría de Industria 2015)

Training on the vehicle’s safety technology alone does not lead to safer driving behaviors and on the contrary, could and has encouraged unsafe maneuvers, if only just to show how it works as if the truck was a toy. Therefore, the inclusion of the so-called “soft” skills, such as stress management, fatigue awareness, hostile situations’ avoidance behavior, volumetric self-image and risk avoidance techniques help make the drivers aware of the importance of safe driving for themselves and other road users.

EMaBi’s advanced curriculum addresses many issues that do not appear in standard Heavy Goods Vehicle (HGV) training courses. EMaBi partnered with OEM and operators to provide a comprehensive instruction -both theory and practical- on the safety technologies compulsory in Argentinean HCV, as well as addressing soft skills such as stress management, risk avoidance, and how to disseminate the benefits of HCV to the wider community while on the road. The course consists of 32 hours, evaluations included.

To date, 53 drivers have been trained and an important common theme has emerged. Very few of the participants knew of or understood how to use safety features modern prime movers have to offer, used them incorrectly or even knew their purpose. For example, a significant proportion did not understand that a few control functions were defaulted to be active, and pressed the button therefore deactivating the function. Participants explained that the transport company operators would not avail of the training on the tractor efficiency and safety features

even though this was freely available from the OEMs, as it would reduce the availability of drivers to the transport company. Participants explained they were sent to “learn while driving”, so had to ask other fellow drivers with similar vehicles for assistance, many times while on the road, via a mobile messaging service like *WhatsApp* for example.



Figure 1 - Class at EMaBi showing instructors, participants and the 30m and 25m practice vehicles (EMaBi 2017 www.emabi.com.ar)

The intention of the study is to generate a discussion on the need for mandatory theory/practical driver training on hard skills and soft skills to help implementation of HPVs in different countries. A survey with the bitrain trainees at the EMaBi and interviews with driver instructors from OEMs were conducted with this objective. These initial results will be used to provide suggestions as to how the benefits of new efficiency and safety technologies and behavioral management knowledge might be included so that a balance between driver availability for the transport operators with road safety can be achieved. The possibility of online training substituting in-person training, which was asked to all participants, is left for further discussion.

2. Literature Research

A variety of international studies have demonstrated the importance of driver behavior to the efficiency of vehicle performance safety. The research conducted by the Council for Scientific and Industrial Research in South Africa (Magazi & Mohammed 2015) concludes that “*although some companies require and encourage their drivers to continue their driver training through refresher training, this is not necessarily the norm. The requirements for obtaining a Professional Drivers Permit PrDP can be questioned as it seems that there are is no compulsory further training and testing of the driver. A number of initiatives exist to improve heavy vehicle driver education, training and skills development but is not compulsory and only larger companies seem to have the means to teach drivers*”. One of the conclusions of a survey

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of Alberta's trucking industry, (EBA Engineering Consultants Ltd. 2008) is that *“the driver training for all drivers should include special emphasis on the characteristics of large trucks, and on “dos and don'ts” of driving safely in the presence of large trucks”*.

A 2015 study by the New Zealand Transport Agency (New Zealand Transport Agency 2015) found that, although New Zealand and Australia have established a graduated driver licensing system (GDLS) for trucks, *“other jurisdictions have different age and experience requirements for different license's classes, establishing a ‘quasi’ GDLS”*. One of the conclusions of the study is that *“licensing approaches which restrict access to the largest combination vehicles to older, more experienced drivers, continue to be largely justified in terms of safety”*. However, the study also indicates that there is a current worldwide trend that proposes more intensive training and education and enhanced skill tests to overcome younger age and inexperienced drivers, although success of this approach has not been yet proven.

In 2003, the US Department of Transportation's (USDOT) Federal Motor Carrier Safety Administration (FMCSA) proposed new training requirements for operators of longer combination vehicles (LCV) (Anon 2004). The new licensing requirements for LCV drivers in the US started in March 2004, and its curriculum includes driving and non- nondriving activities, such as route and trip planning and checking on cargo and weight.

In Mexico, there is a compulsory training program for High Capacity Vehicles (HCV) drivers (Secretaría de Comunicaciones y Transportes 2015), with a duration of 70 hours (44 theory and 26 hours practice). Its objective is not only to increase operational knowledge and driving skills, but to promote accident prevention, social and environmental awareness. Driver training and special licensing for HCVs became compulsory in 2015 after a revision in 2014 of the official regulations NOM-012-SCT-2-2008 (Secretaria de Comunicaciones y Transportes 2014). Drivers' training and compulsory safety technologies have shown to be one of arguments private transport associations recur to when public media strongly argues the HCVs should be banned, usually after an accident involving them.

The province of San Luis, Argentina, passed in 2009 a Law VIII0676-2009 (El Senado y la Cámara de Diputados de la Provincia de San Luis 2009), by which authorized the circulation of bitrains in its territory in an experimental way, for a period of three years. Truck and trailer safety technologies such as ABS, EBS systems, onboard scales, air suspension and others were compulsory, as it was that all elements had to be coupled by fifth wheels. Drivers' training was not though, however the transport operators were only four, and knew they were being closely examined by the authorities. It would take another five years for a national decree authorizing the circulation of bitrains nationally to be passed (Decree 574/14), and almost two years more for its regulation. In the national regulation for bitrain circulation drivers' training is obligatory, both in theory and practice, and the elements they should be trained on detailed in one of its articles, as well as the preconditions drivers need to present before being admitted to the course. The places where these courses would take place would be homologated by the National Transport Regulator. To adjust to this new context, and in view of the excellent safety and productivity results achieved throughout the years – 18 bitrains, zero accidents-, the province of San Luis passed a final law in August 2016 for the circulation of HPVs, where it included drivers' mandatory training, besides increasing dimensions to 30.25meter total length -(Efron & Corvalan 2016).

3. Summary of the EMaBi Course

The course is held in a newly built racecourse, with bitrains of different lengths available for practice. The instructors along with the material -videos, slides, written material- address and intertwine the contents during the course. During the practice, theory and even at times of recreation, there is an exchange of opinions and enriching experiences of which all learn, participants and instructors. This is due to the fact that the drivers need to have a minimum of five compulsory standard trainings before entering the EMaBi, and proven experience in the handling of heavy vehicles.

The approach in the development of contents is multidisciplinary. The environmental part, for example, is addressed from a technical and social point of view. Technically, it explains the correct use of the various mandatory devices that the bitrain has, which reduce the use of fuel, tires, lubricants, indicating the most efficient regimes and helping the driver in his conductive ability. It is also explained and shown -both in theory and in practice- how the use of idling fuel is recorded separately from the use of fuel by actual circulation of the vehicle, encouraging elimination of the use of idling, so associated with road heavy vehicles.



Figure 2 – Getting acquainted with the elements of a 30.25m bitrain (Source author)

The correct use of the accelerator, the various braking systems, and the correct driving on slopes, among other elements of driving, are qualified by a vehicle system, which also offers the driver suggestions. Another example of a multidisciplinary approach can be found in the part of overtaking, safe driving, and other maneuvers. Here the technical, social, normative and health knowledges are intertwined. The handling, stowage and mooring of the cargo is also addressed in a multidisciplinary way (social, regulatory, technical, health and environmental), explaining that the objective is to protect the people involved in the process of loading, unloading and driving the vehicle, as well as other users of the road, pedestrians, the load itself and the vehicle. It is explained with normative recommendations from the (IRU 2104) code.

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The topics of work stress, unwanted effects of transculturation, role of the bitrain driver in the road community, volumetric self-image, road safety and risk management is explained and discussed. The enrichment here occurs by the exchange between the instructors and the participants, who tell their different experiences, and with whom they discuss how to behave when confronting hostile attitudes. These topics have proven so interesting that even the members of ambulances and police, who are present during the course, participate in the exchange and have requested the material for dissemination among colleagues.

The curricular design responds to national legislation, as well as the evaluations. The course, of 32 hours, is divided in four days, with half day theory and the other half practice. To reduce the time the drivers spent at the EMaBi, two other schedules besides the one detailed where tried: one of two days of 10hs a day, with less trainees, and another one of 3 full days. Results from the evaluations showed the 32 hour/ 4 day course was the correct one if the school was to award a responsible HPV driver certificate.

Initially, a brief introduction to the course and presentation of the instructors, and the definition of an HPV is explained. Then a first approximation to the bitrain and to the obligatory technology of the tractor and semi-trailers that compose it. This serves two purposes: the first is to show the vehicle to the trainees, and the second is that the instructors can make a personalized diagnosis that serves as the basis to improve the conductive capacity of each particular driver. At the same time, a discussion of common driving techniques among participants and other instructors takes place in class. In the afternoon of the first day, and on the morning of the second, the instructors explain the technological devices on board, both for the tractor and the semi-trailer, and the driving techniques that must be learned to handle a bitrain properly.

In the afternoon of that second day, a corrective driving practice is carried out in natural environments, with real situations, using the concepts learned. While the drivers drive, the class talks about the role of the bitrain driver in the road community and the correct attitude towards their peers, exchanging experiences among the participants and instructors.

The third day in the morning the legislation regarding bitrains in Argentina and other countries of the world that use them is taught. The myths and prejudices of the social imaginary towards the bitrain are discussed, along with the arguments and counter-arguments with which the drivers will find themselves along their way. The undesired effects of transculturation, new thresholds in risk management, work stress management techniques are addressed. Finally the cargo preparation, with its responsibilities, is discussed 2014 IRU Code. In the afternoon in practice, various maneuvers are performed such as cones slalom, parking, turns, among others. While the drivers drive, in the classroom a review of the topics of the course is made, and a review before the evaluation.

The fourth day is theoretical / practical evaluation. In the afternoon the results are returned in a personalized way, and it is closed with a video that Australian engineer Bob Pearson - known worldwide as the father of the B-double- made especially for the EMaBi, and the delivery of the certificates to those who approved the course in its entirety.

It should be noted that the EMaBi, although homologated by the national road authorities, does not provide the national certificate to drive HPVs. It only provides advice to these authorities about drivers which had passed or not the course.



Figure 3 - Course attendees watching the video from Bob Pearson (source author)

4. Research Approach

At the time of this paper was written, four courses and 53 drivers had been trained and certified. One common theme was perceived and discussed among all the instructors: a number of fuel efficiency and safety technologies - particularly braking systems- were either unknown or known but applied incorrectly, therefore making those technologies which had been developed and included specifically to provide higher levels of safety, useless. Several of the drivers who attended the course were already driving modern prime movers with the latest of safety technologies included in their units. A handful of them commented that it was only when they were on the road with a problem -from a noise to a flashing light indicating a problem, to a complete stop of the unit- that they would ask peers via mobile phone or *WhatsApp* how to resolve it. In regard to the “soft” side, comments on the reactions experienced on the road while driving HPVs, or with colleagues or union representatives when knowing they were attending the course, and how they felt about those reactions, were exchanged.

The authors conducted a survey of driver awareness of modern road vehicles' safety and efficiency technologies, as well as their need for behavioral tools for safe driving, such as stress or conflict management. The survey was conducted among the drivers participating in EMaBi's training program, who come from a wide geographical spread across Argentina and represent a variety of industrial sectors including forestry, petrochemical, grains, steel and automotive.

Besides the driver awareness survey, the authors conducted interviews with OEMs instructors and sales departments, to establish the degree to which purchasers of new vehicles with modern efficiency and safety technologies avail of the freely available training in the proper use of such technologies.

The use of online-interactive training as an alternative to traditional in-person one was included both in the survey and the interviews.

The survey was simple and conducted online and in class. It should be noted that the drivers attending these first courses were specifically chosen by their transport operators, so they would be expected to be the best among colleagues. Many have finished primary school and to a less extent secondary school. They are not very used to reading or writing.

The first three questions were multiple choice. In the fourth question respondents could select more than one choice, and the last two questions were for them to write their opinion.

1. During the course, did you learn about safety devices that you did not know about?
2. Did you know the devices to improve the use of fuel?
3. Did you know the different types of brakes, what they are for and how to use them correctly?
4. Select the “soft” skills you found useful to learn about
5. What do you think about online tutorial courses, with online exams? Write your answer
6. Other comments you would like to write about the course

5. Results

The drivers’ survey collected eighteen answers, from the 53 graduates. From question 1, 90% of respondents answered they had learned new safety devices and how to use them correctly in the course. One respondent answered he knew all the devices of the bitrain and used them correctly before the course, while another one indicated that he knew them, but used incorrectly.

From question 2, 62% learned about the devices to improve the use of fuel during the course, 10% knew about them, but used them incorrectly, and 28% of respondents knew them and used them correctly.

Question 3 regarded knowledge of the different braking systems mandatory to bitrains. Three respondents of the 18 (17%) answered “yes to everything”, meaning they knew the devices, what the systems were meant for and how to operate them correctly. From the other respondents, 61% answered they had learned the braking systems in the course, and 22% that they knew about them but used them incorrectly.



Figure 4 – EmaBi Director discusses outcome of course with attendees

Regarding the “soft” skills considered useful, learning about legislation and stress management techniques were unanimously chosen. “Driver attitude”, which is taught as risk avoidance behaviours and hostile situations avoidance behaviours, was chosen by 50% of the respondents.

All participants wrote they enjoyed the course and would gladly come again. Four comments repeated among the answers: (1) the high quality of all the instructors, in knowledge, experience, and

transmitting that knowledge in a way they could easily understand; (2) surprised by all they learned, particularly in regards to technologies they did not know or used incorrectly, as well as on legislation and how to become a better and responsible driver ; (3) easy to study material provided (manual), which they would keep in their units; (4) dynamic and very good companionship with the rest of the drivers, the respect that was there at all times.

As explained previously, bitrains in Argentina need to be new and built to purpose. In order to understand the interviews with the instructors and sales departments, a little knowledge on how transport operators buy their 0km units is needed. Medium and large companies buy in bulk, say 40 units at one time. They will then send one driver, who usually is the mechanic of their fleet, to collect the units, one by one. The first time, the OEM explains the different devices, and how they operate. That is called “technical delivery” and takes approximately 2 hours. Then, the driver will collect the rest of the 39 units. At the transport operator’s facilities, s/he will pass to the drivers the knowledge s/he understood from the technical delivery. Smaller companies may buy one or two new trucks, and in this case, it is typically the owner who collects the unit, with the family! But seldom s/he is who will operate it daily.

Since the transport operators have purchased new units, mainly on behalf of shippers who awarded them a contract, drivers will start driving the units immediately after received. According to the interviews, around 40% of the transport operators will request and/or make time for the free/low cost training the OEM offers with the purchase, even at their own facilities. In the mining sector, some OEMs decided to provide personalized training, simply by sending the instructor to sit next to the drivers while on the job, for a trip at a time, as the best way for training them on fuel efficiency, braking systems and other safety devices the new units include. Others wait for a month from to call on their client and offer again the training, with the incentive of reducing fuel or tires consumption.

Interviews showed very similar responses to the survey. Little or no knowledge of auxiliary braking systems and the different devices for driver assistance the new units bring, and when known, their use is rarely the correct one. One concept infrequently known is the concept of how the 6x4 operates, with the double rear power bridge.

A sales manager told me a story which happened to him with a client who operated in the mining sector, in the north of Argentina, where the high mountains are. The slopes are so steep – dropping from 4800mt to 938mt- , that inspectors from the road authority stops trucks at one point to measure the temperature of their brakes, and compel them to stay until that temperature cools down, if they find it is higher than what it should be. The client bought new vehicles, with auxiliary braking systems; when the inspector measured the new unit, its brakes were almost cold, so the inspector assumed something was wrong with the vehicle and ordered it to stay aside anyway! The driver did not know how to explain what happened, and the client called the sales manager very angry indeed.

5.1 Online tutorials and exams

Only 12 of the 18 drivers who answered the survey knew what online tutorials were. From these 12, 100% answered that while it could be possible, or should be tried, but only for a second training or revalidation of the certificate. And very well controlled by the authorities. All agreed the first time the course should be compulsory and in person, because you learn from instructors and other fellow drivers alike. Also, the time given by their bosses to learn; if training is

mandatory like the current one, in a physical space, then their boss is compelled to send them the four full days. But if it was online, then they would have to study in their own time, and drivers are not very keen to study like that, and bosses do not give the time to study either. That while it would be wonderful, for a matter of time, having a classroom course is better for the laws and the technical part, and practicing on driving the vehicles is unique. The course in person guarantees everything is studied, understood and approved.



Figure 5 - Attendees working together with theoretical materials



Figure 6 – Participant making notes on the theoretical material

Answers from the interviews were on a similar path. The first course should be in the classroom/practical area, with experienced instructors. Online tutoring could be useful for refreshing concepts and for revalidation of the certificate, in case there were not too many new devices to be taught from the previous course.

6. Conclusions

Results from both the research and the interviews confirmed what instructors had perceived during the courses at EMaBi: that new safety devices included in the modern units HPVs employ will be of no use unless driver training is mandatory. Drivers learned during the course about safety technologies used in the bitrains, particularly braking systems, where only 18% of the participants answered they knew all about them. Between 70 to 90 percent indicated they did not know all safety devices included in the modern units previously, or used them incorrectly. Similar results with fuel efficiency technologies.

Training, regardless of driver experience, benefits drivers and carriers alike through improved safety, fuel savings, and not incurring in unnecessary costs because of the misuse of the vehicle's technology. Knowing the importance of the role of the driver, the size of the vehicle s/he is driving, as well as how to deal with stress issues while on the road and confront with hostile and risk situations also benefits the road community.

Following the theme of the HVTT15 conference, technologies are changing fast, however time to teach their correct operation and purpose to those who ultimately use those technologies is not always spent. Correct use does not mean only technologically speaking, but also that HPVs are no toys, and that the driver is the ultimate responsible for his/her safety, and others. Using material and language which drivers understand, with knowledgeable and experienced instructors, provides a context of mutual respect which benefits the community as a whole.

Both the driver survey and the interviews with OEM instructors and sales managers agreed that online tutoring could be useful for refreshing concepts and for revalidation of the certificate drivers, however there is no substitute for in-person courses. The first HPV's drivers training course needs to be in person.

One Argentinean thinker wrote once, "the urgent does not leave time for the necessary". The authors think mandatory driver training is urgent.

7. Discussion

The issues perceived at EMaBI's training course and highlighted in this paper are for new units, since bitrains are just starting to circulate in Argentina nationally and the vast majority of the trainees work for the market's leading logistics operators in terms of performance and safety. These operators purchased new trucks (and could avail of the free/low cost training) and conduct continuous training of their drivers.

Respondents were drivers working for these logistics providers. The first question left for discussion is that, if awareness levels of the safety and fuel efficiency technologies of those companies who would purchase these HPV's secondhand would be even lower than in our sample, since these organisations are further disadvantaged by not being able to access the free/low cost training from OEMs.

A second question for further discussion regards the need for training road controlling authorities. Should there be a mandatory training for them in the new technologies, so they are acquainted with the modern road heavy vehicles, what to look according to legislation both physically and documentary, when stopping a vehicle on the road? For example, legislation in Argentina regulates that vehicles with air suspension are entitled to carry 5% more load per tandem of axles, as a way to incentive this type of suspension. HPV's have air suspension mandatory; unless the road control authority knows the 5% is included in the 75ton GTW, carriers could get away with 3 extra tonnes, with the increased road damage HPV legislation tried to reduce.

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