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The New Brazilian Automotive Policy Challenges in the Technological Advancement of Vehicle Security in Brazil

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Abstract: With almost 23% of the industry's GDP (gross domestic public), the Brazilian automobile industry confirms, once more, to be one of the most important sectors for national economy in the past years. Due to this relevance, in October 2012, the Brazilian government has approved by decree a program of incentive to innovation and intensification of the local productive chain in the automotive industry called "Inovar-Auto". The new Brazilian automotive policy aims by encouraging R & D (research and development) to raise the technological level of vehicles manufactured in country. Undoubtedly, those initiatives contribute hugely for inserting the country on worldwide route of technological development encouraging the local production of safer vehicles and better technological contents. The search for this standard of vehicles has been a subject of several studies in the automotive world and in recent years it has gained importance, including being one of the Inovar-Auto challenges. In this context, this paper aims to present, through a theoretical research, key technologies and vehicle security initiatives developed so far in worldwide and to point out the challenges for development in the national market.

Key words: Inovar-Auto, vehicle security, R & D.

1. Introduction

In quantitative terms, the Brazilian automobile sector keeps its main position in the scenario, represented almost 23% of industrial GDP (gross domestic public) and 5% of entire Brazilian GDP, with revenues exceeding USD 100 billion in 2013 [1]. In the outside scenario, the Brazilian automobile industry stands with the fourth bigger vehicle worldwide market with yearly sales of 3.6 million and seventh position among the worldwide manufacturers with 3.4 million of produced units [2].

The future projections for this sector, both in terms of investment, and market growth are pretty meaningful. Until 2017, investments approximately R$76 billion are scheduled [3], and until 2020, the Brazilian automobile industry will achieve the production of approximately six million vehicles/year [4].

Although the perspective of the market and investment for the automotive sector is exciting, there are also serious challenges ahead, specially related to vehicle security. Vehicle models manufactured in Brazil do not have the same security level than its same types manufactured in Europe or United States. For example, while in Europe countries and North America, the ABS (anti-lock braking system) brakes and airbag are obligatory and also are already working more than one decade. In Brazil, only until 2014, these devices have been obligatory for all of vehicles manufactured or sold in country [5].

The new Brazilian automobile industry cycle which starts through the Inovar-Auto from 2013 to 2017 will demand a commitment of all automotive chain actors for the achievement of its goals, specially, those who are related to the R & D (research and development) investments and engineering that are essential for the

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devices development of vehicle security.

This paper is organized as follows: Section 2 explains the panorama about vehicle security; Section 3 introduces some obstacles for vehicle security; Section 4 presents the new Brazilian automotive policy; and Section 5 gives conclusions.

2. A Panorama about Vehicle Security

The progress in the vehicle security field has mobilized political efforts, public authorities and assembly plants worldwide, which are encouraged by a serious scenario.

The traffic accidents kill every year, around 1.3 million of people on roads in the world [6]. And traffic accidents leave 20 million to 50 million people injured each year [6].

Certain countries, especially in Europe and North America, have been acquired important progress on vehicle security in traffic through great investments in road improvements and especially in actions to make the vehicles safer for drivers and passengers in case of accidents [6].

Inside this context, this chapter will present a historical brief of key vehicle security technologies already developed, the initiative of the Latin NCAP (New Car Assessment Program) and a fast presentation of the worldwide plan of traffic accidents prevention by the Organization of the UN (United Nations).

2.1 The Key Vehicle Security Technologies

The vehicle security devices are classified in two categories [7]:

- Active: Those that avoid that the accident occurs. For example, headlights, lights, signals, brakes, shock absorber, rearview mirrors, horn, windshield wipers, sun visor, sound signals and luminous of alert that indicates mal functioning of some components, etc.;
- Passive: Those that act especially in the protection of the vehicle occupants in case of accident. For examples, seat belt, head rest, airbags, retractable steering column, protection door bars, bodies with structures that absorb greater impact energy, bumper, etc.

The search for safer vehicles has encouraged several automobile researches for the development of new security devices. Below a historical brief of the main passive vehicle security technologies that date more than fifty years is presented.

- Three-point seat belt, designed in 1959 by Volvo, the three-point seat belt is considered until today one of the most important innovation in vehicle security;
- ABS: a system that avoids the blocking of one or more wheels during a sudden braking, keeping the vehicle stable and under control [8];
- Airbag: the airbag system works by using sensors located in the front of the vehicle, which are activated by the force generated by a collision. These measure the deceleration rate of the vehicle which will activate the air bags;
- EBS (electronic brake systems): a system of electronic control of brakes that allows a response time faster than the classic brake systems, and the stop distance is shorter, resulting in a better road security [8];
- ESP (electronic stability program): a technology that has an important role of reducing the risk of skidding and rollover [8];
- ACC (adaptive cruise control): a system that works through installed sensors in front part vehicles that control the acceleration or the brake, independent of driver's participation, and allows keeping safe distance from the vehicle ahead [8];
- LKS (lane keeping support): a device that beeps when the vehicle crosses the lanes without signaling;
- DAS (driver alert system): a system that beeps and a message on the dashboard when the driver drives incorrectly and the system understands that he is tired;
- EAS (electronic actuation system): a traction control system of the vehicle height from the ground and also of ABS assistance. Its function is to control the height of the vehicle in extreme braking conditions.
- EBD (electronic brake distribution): a system that doubles the braking force and as a result decreases the

space until the vehicle stops;

• BAS (brake assist system): a system that keeps a braking maximum pressure in a way that the ABS system works with more effectiveness;

• ASR (anti slip regulation): a system that controls the grip and allows keeping the maximum traction whatever the state of using the vehicle;

• LCS (lane change support): a system with radar that informs if there is any object or other automobile to the right of the vehicle in lane change;

• AEBS (advanced emergency braking system): a vehicle security system that has sensors for monitoring the vehicle's proximity ahead to detect risk situations of imminent collision. In that case, the emergency brakes are automatically activated in order to avoid collision or to reduce their effects;

• Crash box: the vehicles are currently designed so that in case of a collision, the energy generated by the impact is distributed over the structure in order to avoid that the box in which the occupants are to be crashed.

2.2 Latin NCAP—Results and Goals

The Latin NCAP was launched in 2010 as a pilot of three years to show the potential contribution of an independent evaluation program of new cars for road security in Latin America and Caribbean. It is an initiative of FIA (Federal International Automobile), Foundation FIA, GNCAP (Global New Car Assessment Program), Foundation Gonzalo Rodríguez, do Interamerican Development Bank and the ICRT (International Consumer Research & Testing) [9].

The purposes of Latin NCAP are: (1) to provide consumers across the Latin American & Caribbean region with independent and impartial safety assessment of new cars; (2) to encourage manufacturers to improve the safety performance of the vehicles they offer for sale in the Latin American & Caribbean region; and (3) to encourage governments across the Latin American & Caribbean region to apply UN vehicle crash test regulations to passenger cars [9]. There are three kinds of collision tests: front impact, side impact, and pole impact, from which the most important is the front impact.

The test results showed that the most popular cars initially performed, until now still available in south-American market, were unsafe and had a comparable classification to the cars manufactured in Europe, North America and Japan manufactured in 20 years ago, with high risk of deadly injuries for drivers and passengers [10].

Since 2010, the Latin NCAP has tested different vehicles and the results are still worrying in comparison to the other markets. European which is rare a vehicle does not have three stars [10]. Only by the end of 2013, for the first time, three vehicle models manufactured and sold in Brazil, tested by Latin NCAP earned the maximum classification of five-star collision tests against barrier using dummies [9].

2.3 Decade of Action for Road Safety 2011-2020: Global Launch

The United Nation has established in March 2010, the Decade of Action for Road Safety from 2011 to 2020 [11]. This decision was taken to encourage the efforts to stop and reverse the tendency growth of fatalities and serious injuries on the roads all over the world [11].

Brazil stands in an intermediary situation in violence's classification of the traffic among member nations of UN [11]. According to the data of the Health Ministry, Brazil has approximately 19 fatalities rate per group of 100 thousand habitants. In some European and Asian countries, the rate is expressed much less than 5 deaths/100 thousand. But in some African nations, for example, the value is almost 50 deaths per group of 100 thousand people [11].

The program was designed in five pillars: (1) road safety management, (2) infrastructure, (3) safe vehicles, (4) road user behavior, and (5) post-crash care.

In response to the UN's resolution, the Brazilian government created an Accidents Reducing and Road Security National Plan also from 2011 to 2020. Various

actions are scheduled: surveillance, education, health, road infrastructure and vehicle security that has the purpose of reducing mortality rate and injuries caused by traffic accidents [12].

3. Some Obstacles for Vehicle Security

In this chapter, some themes that in the world represent obstacles for the technologic development progress of vehicle security in Brazil will be mentioned.

• Vehicle security law: the main criticism is that the regulation about vehicle security has not been developed in Brazil and we are behind regarding other countries [9]. While in Europe countries, the ABS and airbag obligation is required since the 90's, here in Brazil, it became a reality only this year [9]. In the same countries, the devices such as ESP and others should also be obligatory in the next years [9];

• Tax burden: in technological terms nowadays, the vehicles manufactured locally can be equipped with the same security devices available in developing countries [13]. However, the high incident tax burden on auto parts related to security [13] has been an application restrictive in large scale of these devices, impacting negatively the automotive sector competition;

• Imported components: an important part of the components used in manufacturing of security devices vehicles that equip our vehicles are not manufactured in Brazil. These inputs possess importation tax aliquots that vary from 14% to 18% [14].

• Road infrastructure: there is no point of having vehicle totally equipped with the latest security vehicle devices if the roads do not have a compatible level of security. The road network is 1.7 million kilometers of roads, however, only 13% are paved and the most of them are still in poor driving conditions [13].

• Vehicle safety culture: major advances are still necessary in this regard in Brazil. Comparatively, other European countries and the United States, the results of the impact tests (the Euro NCAP, for example) are important propaganda tool for assembly plants in order to show costumers that vehicles are better than the competition [15].

4. Inovar-Auto and Incentives Development of Security Devices Vehicle

The new Brazilian automotive policy, called "Inovar-Auto" was regulated in October 2012 by Decree No. 7,819/2012 [16, 17]. The program valid from 2013 to 2017 is specific for automakers who produce in Brazil and also those who do not produce, but are trading in the country, as well as those who have investment projects approved for the establishment of new factories in Brazil. The Inovar-Auto provides tax benefits related to the IPI (industrialized products), in the form of presumed credit [16, 17].

The main goals of Inovar-Auto are: (1) to protect the industry and domestic market; (2) to increase the stimulation of investment and innovation; and (3) to enhance the energy efficiency of vehicles produced in Brazil [16-19].

To achieve the benefits of the program, automakers need to fulfill certain general and specific requirements [16, 17]. For purposes of this paper, we will only focus on two specific requirements: (1) R & D investments and (2) engineering investments, industrial technology improvements, and supplier development whose are intrinsically related to vehicle security issues.

According to the program, the automakers need to invest in R & D, engineering, industrial technology improvements, and supplier development in Brazil that corresponds to the minimum percentages indicated in Table 1, which is applied to the gross revenue of products and services, excluding taxes and contributions over sales.

The R & D activities considered by Inovar-Auto are: driven basic research, applied research, experimental development and technical support. It can also be considered the development of new vehicle active and passive security devices, as long as they are incorporated into products until July 2017 and consist

Table 1 New Brazilian automotive policy specific requirements.

Year	Minimum share of revenue invested in R & D (%)	Minimum share of revenue invested in engineering, industrial technology improvements and supplier development (%)
2013	0.15	0.50
2014	0.30	0.75
2015	0.50	1.00
2016	0.50	1.00
2017	0.50	1.00

driven basic research, applied research, experimental development and technical support. It can also be considered the development of new vehicle active and passive security devices, as long as they are incorporated into products until July 2017 and consist in functional and technological advances stipulated by the National Traffic Council (CONTRAN) [16, 17].

The activities considered for the engineering requirement, industrial technology and supplier development are: innovation in processes or products which results in better productivity or quality, basic industrial technology, training of R & D personnel, laboratories for emission tests, automotive safety and design, tooling development, and supplier development [16, 17].

5. Conclusions

With reference, examples of European and North American countries, it can be perceived that the improvement in vehicle security, especially as regards security devices, is a continuous process of investment and technological development of the automotive industry.

In this point, it confirms that the Inovar-Auto requirements are aligned with such a proposal with levels of continuous investments over the period from 2013 to 2017 in R & D and engineering activities. These initiatives, among other goals, have a supportive role in the development of new passive and active vehicle security devices to be applied in vehicles until 2017.

However, Inovar-Auto challenges for technological advancement of vehicle security go far beyond the development of such devices. The main challenges to be faced are to promote:

(1) Technology's nationalization for the local manufacture of vehicle security devices;

(2) The development of suppliers of raw materials and strategic inputs for these products manufactured;

(3) Training of the national supply chain for the local manufacture of the vehicle safety device components;

(4) The establishment of laboratories and tests required in order to validate new products;

(5) Partnership with academic research institutions in vehicle security.

Another significant issue that deserves to be reviewed is whether the minimum percentage of expenditure on R & D, engineering, industrial technology improvements, and supplier development required by Inovar-Auto during the period of the agreement will be sufficient for the purposes which they propose associated with improvement in security of our vehicles.

The initiative proposed by Inovar-Auto is an important contribution in the advancement of vehicle security, but it is necessary to go far beyond the technological aspects, and also work on other important issues such as: improvements in road conditions, tax burden reduction that focuses on auto parts regarding safety, changes in vehicle security laws in Brazil, government test vehicle programs, fleet renewal program, etc.

With new technologies, better road infrastructure and vehicle safety culture, it will be possible to mitigate the consequences and many accidents will be avoided.

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