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**IMPLEMENTATION OF AUTONOMOUS VEHICLES AND
ADVANCEMENT OF PERTINENT LAWS- A COMPARATIVE STUDY
BETWEEN INDIA AND US.**

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INTRODUCTION

This paper is going to deal with very relevant topic in today's modern technology's age specifically i.e. IMPLEMENTATION OF AUTONOMOUS VEHICLES AND ADVANCEMENT OF PERTINENT LAWS- A COMPARATIVE STUDY BETWEEN INDIA AND US.

Vehicles that can run entirely without human intervention are getting closer to becoming a reality. Along with all the technical difficulties, this development also raises a number of legal issues. This is hardly shocking considering that the majority of domestic and international traffic legislation are built around the idea that a human driver is operating the vehicle. This paper will concentrate on the legal issues that autonomous driving raises for traffic law. This paper further also deals with all the answers to other legal questions may be influenced by other legal questions. The Geneva Convention on Road Traffic of 1949 and the Vienna Convention on Road Traffic of 1968, which serve as the foundation for many national traffic laws around the world, will also be touched upon in this contribution. However, the emphasis will be on questions regarding traffic laws as the answers to those will determine whether an automated vehicle still has a driver under those conventions.

The future replacement of a human driver by automated driving systems (ADS) is anticipated to result in a safer, more productive society where a variety of societal challenges can be addressed.

OBJECTIVES

The objective of this research paper is to highlight the issues related to implementation of

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autonomous vehicle and the lacunas in legislations for the same in India. One of the most important concepts discussed in this paper would be related to the liability in case of accidents while operating these autonomous vehicles and search for probable solutions through the research.

SCOPE

The scope of this research paper is limited to Motor Vehicles Act, 1988, Geneva Convention and Vienna Convention and their comparison in order to conclude with applicable solutions for the matters.

RESEARCH QUESTIONS

- 1) Whether the contemporary infrastructure of India is ready to adopt autonomous vehicles?
- 2) Whether these conventions and laws require revision in order to accommodate automated vehicles?
- 3) Whether traffic liability or product liability shall be responsible for damages?

RESEARCH METHODOLOGY

This paper is based upon both the doctrinal and research-based methodologies. All the data are collected from secondary sources like journals, articles, Books, case laws by using the website of International Court of Justice. The secondary sources will be used as a reference to analyse and understand the reasoning behind the study of this research paper. The research would be consisting of the various provisions contained under Charter of United Nations, Statue of the Court of International Court of Justice. Motor Vehicles Act, 1988 of India with the comparison of US laws.

HYPOTHESIS

Our Research topic is “Implementation of autonomous vehicles and advancement of pertinent laws- A comparative study between the India and U.S.”. We have compared the laws of autonomous vehicles between the two countries, and the contemporary infrastructure of the countries. We have discussed the problems lying in India regarding the implementation of autonomous vehicles and the laws related to that. Our hypothesis is to develop the laws of India regarding the regulation of autonomous vehicles. The research would be consisting of the various provisions contained under the Geneva Convention, Vienna Convention and Motor Vehicles Act, 1988.

CHAPTERISATION

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Chapter 1: Contemporary Infrastructure of INDIA

1.1 *The brief history of the idea that how the 'concept of autonomous vehicle developed in the world'?*⁴

The concept of autonomous vehicle was developed long back in the middle ages. Leonardo da Vinci's sketches of the self-propelled cart was designed to be powered by collide springs with programmable steering and breaking capabilities.

In 1925, the idea of driver less vehicle was traced when Francis Houdina discovered a radio controlled car, known as '**Phantom Auto**'. It was controlled through radio signals sent from another vehicle that drove close behind. After a long period from then an industrialist, Norman Bel Geddes developed the idea of automated highway system where cars controlled through electric circuits built into the pavements. This was examined but didn't execute because of the large financial investment required. Then the idea of similar driverless car was adopted by the Transport and Road Research Laboratory in the UK, whereby it was highly assumed that because of this the road accident would reduce and increase road capacity. But it also failed because government was not able to raise fund for the project.

But the automobile industry didn't stop here. Again in the year of 1977, a model was developed by the Tsukuba Mechanical Engineering Laboratory which moved away from external road technology in Japan. It was the first and foremost autonomous vehicle and capable of moving at a speed of 20 mph. Then a German aerospace engineer invented a prototype i.e. VAMORs by using artificial intelligence inspired by Mercedes.

In the similar way, in 1987 The Eureka Prometheus Project for self-driving car was took off. In Paris VaMP and VITA-2 was invented with the autonomous capabilities.

In 1995, Navalb self-driving car system in America came where supercomputer got used.

In the recent phase i.e. 2010 it was announced by Google that they had been working on a secret project testing and developing a system that could help reduce the number of accidents through autonomous driving. From that time Google has driven its self-driving cars more than a million and tried for so long to pass the legislation to legalise this in four US states. From then self-driving cars are at its pick in the country of Boston, Phoniex, Pittsburgh and NVidia.

However, it's very sophisticated driver assistance technologies like Tesla's Autopilot and

⁴ <https://www.truebil.com/blog/the-history-of-self-driving-cars>

Cadillac's Super Cruise are evidence of how far autonomous car technology has evolved, it remains to be seen whether regulators will permit the unrestricted use of self-driving cars throughout the world.

Moreover, a lot of AV businesses have been testing their products on public roads in order to create more sophisticated ADS that aren't currently in use. For instance, the American Automobile Association (AAA) said that since its launch, the "Free Self-Driving Shuttle" had safely transported over 32,000 passengers. Waymo, a division of Alphabet that specialises in autonomous vehicle technology, also declared in 2018 that it would launch a self-driving ride-sharing service called "Waymo-One" and that it has already covered 10 million miles in its AV testing programme on public highways. 12 Moreover, from roughly 500,000 miles in 2017 to more than 2,000,000 miles in 2018, the number of miles driven in California for AV testing expanded drastically.⁵

1.2 Indians auto carmakers defines that how India is responding towards the development of 'Autonomous Vehicle' in the road of our country.

Industry of India's autonomous vehicle is at its developing stage. It is still in the process. And it will take long time to start autonomous vehicle in the India's road and publicly accepted. Though there are now accessible semi-autonomous features in the upscale Indian luxury car market, however the options are limited and only available to a select group of affluent customers. On the other hand, in 2020 India was expected to become world's third largest car market. But the development and adoption of autonomous vehicle is still slow in nature due to the lack of technological development and acceptance, lack of proper infrastructure, and due to the lack of proper traffic management and due to various legal challenges with the comparison of foreign country. India's autonomous vehicle industry is in the frontline by the local automakers i.e. ***Mahindra & Mahindra and Tata Motors.***

On a note, currently Tata Motor is actively progressing on autonomous vehicle in India. Moreover, the newly announced strategic partnership between ***Minda iConnect and Microsoft India,***⁶ which aims to create locally developed connected vehicle technology and improved driving experiences. Both businesses will concentrate on private and commercial automobiles, combining a variety of programmes and technology like artificial intelligence and the Internet of Things. Real-time driving behaviour benchmarking, real-time coaching,

⁵ https://www3.weforum.org/docs/WEF_Filling_Legislative_Gaps_in_Automated_Vehicles.pdf

⁶ <https://www.ipsos.com/sites/default/files/ct/publication/documents/2018-01/driving-mobility-through-autonomy-in-india.pdf>

and vehicle-to-vehicle and vehicle-to-infrastructure connectivity are among the major objectives for the upcoming years.

1.3. *The comparison between the infrastructure of adopting autonomous vehicle in the western country and in India show India is not still developed to adopt autonomous vehicle due to the lack of technological advancements with the various recent example of autonomous vehicle*

Survey SC.⁷

If we compared the infrastructural development for adopting autonomous vehicle between the western country and India, we will find lot of lack behind this. Some of those are as follows:⁸

Firstly, India is still not technologically advance to adopt the system of autonomous vehicle than western country. In this regards we can also state that the people or the consumers of India also not that much technologically advance rather than western country. We can refer a very simple example that our parent's generation was not so comfortable with smart android phone when it came in India. It took long days to accept the process. In the similar way that is the case for adopting autonomous vehicle also. Because India is still a developing country.

Secondly, to start fully autonomous vehicle system it needs better roads, infrastructure and proper traffic regulation. Because Indian automakers observed that India's road is not sufficient to support the both i.e. human operated vehicle and autonomous vehicle simultaneously. It would take at least a decade.

In comparison, Infrastructure and technology of US and Europe is more advanced. For instance, California's roads are typically well-maintained and marked, making it possible for technologies like LIDAR (light detection and ranging), a computer-vision tool for seeing the road and objects like other cars, road boundaries, lanes, barriers, and trees, to operate and safely control a car's direction and speed. Currently, India's lack of infrastructure makes such technology unworkable.

Thirdly, due to the poor data and traffic condition India's development of autonomous vehicle is in its challenging phase. Because traffic data is inadequate in India. Along with this infrastructure is the main issue. These issues all because of the bad traffic which cause technical challenges when it comes to the developing algorithms for operating autonomous cars.

In addition to that, price is the most important factor because Indian consumers are very price

⁷ Autonomous Vehicles in India, Ipsos Strategy.

⁸ <https://www.ipsos.com/sites/default/files/ct/publication/documents/2018-01/driving-mobility-through-autonomy-in-india.pdf>

sensitive due to the poor economic growth whereas the foreign countries are able to afford the system. Local automakers will also find it difficult to slow down their speed to market in comparison to multinational firms that profit from established global production platforms.

Fourthly, it is very difficult to earn the trust of the Indian consumers specially when its related with the safety and data privacy issues. Data from an Ipsos Business Consulting survey show that perspectives about the adoption of technology are also influenced by demographic considerations. While just approximately 50% of Indians believe in driverless vehicles, that number is substantially higher among millennials, at nearly 70%. However, data privacy and system failure, particularly response to driving conditions and possibility of equipment failure, were mentioned as serious concerns with autonomous vehicles by 62% of respondents.

Chapter 2: Modifications of Conventions

2.1: *Legislation concerning automated vehicles in US:*

Federal motor vehicle standards can be found in Title 49, Subtitle VI of the US Code and Title 49, Subtitle B, Chapter V of the Code of Federal Regulations. Many, if not all, of these standards were created with human drivers in mind. But the federal government has realised that it needs to reassess these regulations given the recent acceleration of technological innovation in autonomous vehicles. The National Highway Traffic Safety Administration ("NHTSA") of the Department of Transportation, not Congress, has been the driving force behind change thus far.

Only two federal measures dealing with autonomous vehicles have been introduced since 2013, and only one of those has been passed⁹. The "Surface Transportation Reauthorization and Reform Act of 2015¹⁰" was approved on December 4, 2015. This Act makes a few modest requests, including funding for research into autonomous vehicles, reports on the autonomous transportation technology policy developed by public entities from the Comptroller General of the United States, an evaluation of the organisational difficulties, and implementation suggestions for the technology, applications, and policies.

The Preliminary Statement of Policy Concerning Automated Vehicles (the "NHTSA Policy") was released by the US Department of Transportation through the NHTSA in 2013. In it, the NHTSA drew forth a framework identifying five "levels" of autonomous capability and charted a course for future study. These levels are intended to track autonomy advancements in an

⁹ The second currently sits in the House Subcommittee on Highways and Transit.

¹⁰ Public Law 114-94

organised manner, stagger research objectives, and make it easier to establish regulations for each level.

The development of autonomous vehicles can be based on these levels for either mandatory regulations or optional recommendations. The NHTSA Policy just advises states to forbid the use of level 3 and level 4 self-driving vehicles "for reasons other than testing." Since, "There is no principle more essential to liberty, or more deeply imbued in our law, than that what is not prohibited, is permitted."¹¹

Article 4, para 1 of Geneva Convention, Article 1 (v) of Vienna Convention and Section 2(9) of Motor Vehicles Act, 1988 mentions and discusses about the term driver i.e., a person who drives the vehicle. In this context, and given the current stand of the discussion, this 'person' is a human, not a legal person¹². There are no specifics about what it means to "drive" in the Geneva or Vienna Conventions. A few potential "drivers" may come to mind when considering automated vehicles i.e., the user—the person who specifies the location and dispatches the vehicle, the manufacturer, and the vehicle's self-driving system. Regarding longitudinal and lateral movements, a combination of hard and software is used to make judgments. The hardware and software that the manufacturer inserts in the car has a significant impact on this. According to the definition of "driver," even if they are both not humans, the manufacturer and the self-driving system are not the ones operating the automated car. Hence, given rise to the fact that these conventions and laws are incompatible with the concept of automated cars.

2.3 Sources from Customary International Law:

Automation has been more widely used in aircraft and maritime traffic; both modes are accustomed to using an autopilot. Nevertheless, these autopilots might not be as advanced as autonomous vehicles. In the examples of COLREGS 1972¹³ and Annex 2 Chicago Convention¹⁴, for both maritime traffic and air traffic, it becomes irrelevant whether a vehicle is driven by a system, a human, or something else, as long as the ship or aircraft alters its course in the right direction, it is obeying the law. Whereas, if a vessel or aircraft does not modify its course in a head-on situation, the owner of the craft, the master of the craft and the crew, or the pilot-in-command, may be held liable. It is irrelevant whether or not this person was in control of the controls, as is made very clear in 2.3.1 Annex 2 of the Chicago Convention.

¹¹ United States v. Gourde, 440 F.3d 1065, 1081 (9th Cir. 2006)

¹² United Nations Conference on Road and Motor Transport, Committee III on Road Traffic, Summary Record of the Seventeenth Meeting, held at the Palais des Nations, Geneva, on Tuesday, 6 September 1949 at 3 p.m., E/CONF.8/C.III/SR.17/Rev.1, 21 November 1949, p. 2; Vellinga et al. 2016; Lutz 2014; Smith 2014

¹³ Convention on International Civil Aviation (Chicago Convention)

¹⁴ Annex 2 to the Convention on International Civil Aviation

Hence, when a self-driving system performs a dynamic driving task, responsibility for the task's execution can be delegated to a (legal) person. If a conventional driver performs the activity, he can be held accountable for its execution.

Chapter 3: Traffic Liability or Product Liability in Case of Damages done by Automated Vehicle

Whenever we speak regarding auto-driven cars, the name which comes in our head at the first instance is Tesla. Tesla, the most valuable automobile manufacturer in the world, recently announced that it would enter the Indian market. It established a Bengaluru office and registered itself in January 2021. The question of whether self-driving cars are appropriate for Indian roads right now is whether Indian laws are prepared to solve problems brought on by such vehicles.

Artificial intelligence is used to steer self-driving cars. The camera, radar, and ultrasonic sensors that are mounted on the cars provide the AI program with their data. With the use of sophisticated algorithms and a machine learning system, it can detect the surroundings of the cars. The majority of self-driving cars employ "LiDAR" technology, which uses sensors to fire pulses of light from the car's surroundings to gauge distances, find road boundaries, and recognize lane markings.

The two main laws that control motor vehicles in India are the Consumer Protection Act, 1986, and the Motor Vehicles Act, 1988. The minimum age to drive a car, as well as the liability and registration of the vehicle, are all governed by the Motor Vehicles Act of 1988. On the other hand, the Consumer Protection Act of 1986 governs losses brought on by carelessness, workplace mistakes, building flaws, and unfair business practices.

This research topic discusses the methods and requirements for legislative inclusion of self-driving automobiles in India through a doctrinal analysis of the country's current motor vehicle regulatory system and a reform-oriented strategy through analysis of legal arguments.

There isn't currently any specific regulation in India to control autonomous vehicles. Even the 2019 modification to the motor vehicle legislation has no discernible effect on autonomous or self-driving vehicles. The issue of personhood and agency is one that AI raises over and time again.

There hasn't been much discussion of AI's accountability in India. Notably, the NITI Aayog

published a policy paper titled National Strategy for Artificial Intelligence¹⁵ in 2018 that examines how AI can be implemented in industries including healthcare, agriculture, and transportation, but it also omits to address the problem of AI liability. Now, the key question is whether India should adopt the British approach, where the owner is responsible even if the AI makes a mistake, or the German model, which places responsibility for mistakes made by the AI on the car's manufacturer.

The newly passed Consumer Protection Act, 2019, section 2(34)¹⁶ defines product liability as "the responsibility of a product manufacturer or product seller, of any product or service, to compensate for any harm caused to a consumer by such defective product manufactured or sold or by deficiency in services relating thereto," if reference is made to another statute. Therefore, if we see AI as a product, the manufacturer is solely responsible for any harm it may create.

But since AI is essentially a big amount of programming code, and programming code loaded into a system is typically thought of as a service rather than a commodity, there is also the question of whether AI is a service or a product. Instead of being considered product responsibility, these situations are typically addressed as breach of warranty.

Another unspoken but more important query is whether the concept of "no fault liability," which holds that a defendant is responsible even in the absence of error or "fault" on his part, should be applied to accidents brought on by self-driving automobiles. The Motor Vehicle Act of 1988, Section 140, mandates the payment of compensation in the amount of Rs. 50,000 in cases of fatalities and Rs. 25,000 in cases of permanent losses. But in the case of *Haji Zakaria v. Naoshir Cama*¹⁷, a crucial question arose: Can the owner be held responsible for paying compensation when reckless or negligent driving was not present? The Supreme Court held that in the absence of fault, neither the owner nor the driver can be held liable. Accordingly, if this ruling is followed, the maker of the self-driving car should be held accountable for compensating the victim of the accident rather than the owner or driver.

Similar to this, if we follow the court's reasoning in the case of *United States v. Athlone Indus Inc.*¹⁸, it was decided that robots cannot be held accountable for their mistakes. The case also extensively covered the possibility of the manufacturer being held liable due to a

¹⁵NITI Aayog

¹⁶The Gazette of India

¹⁷*Zakaria & Ors. v. Naoshir Cama & Ors.*, AIR 1976 AP 171

¹⁸*United States v. Athlone Industries, Inc.*, 746 F.2d 977 (3d Cir. 1984)

malfunctioning robotic system.

Given that India ranks first in the world for the number of fatal road accidents each year-4.5 lakh; proper legislation is required to clearly define who is responsible. According to a recent World Bank estimate¹⁹, India has 1% of the world's vehicles but is responsible for 11% of all road accident fatalities. Given these horrible numbers, it would be disastrous if India let autonomous vehicles to operate without sufficient legislation.

The other regulations that will also be important must be addressed in order to address the issue of autonomous vehicles in the context of India. For instance, as this technology is susceptible to hacking, the position of the Information Technology Act, 2000, in particular Section 66 of that law, must be examined when it comes to privacy and confidentiality, which frequently include sensitive personal data. Autonomous vehicle hacking would be outside the purview of the present ban on hacking under the IT Act because the concept of "computer resource" does not apply to them. It costs money to secure self-driving cars; the question is how much manufacturers are willing to pay. According to Petit, extra sensors should be installed by automakers as part of the hardware so that if one becomes faulty, another can take over. The majority of manufacturers are attempting to do away with redundant sensor systems, though, in order to save money. Therefore, the Legislature ought to pass strict laws mandating auto manufacturers to include anti-hacking systems and safety measures and widen the scope of hacking under the IT Act. Therefore, it must address the concerns of accountability and defence that might arise in the event that a hacking-related injury occurs.

The Geospatial Information Regulation Bill, 2016²⁰, is another significant piece of law. This legislation aims to regulate the collection, transmission, publication, and dissemination of geographic data. By permitting Restricted Entities to purchase a license from Indian Entities for certain Geospatial Data/Maps only for the specific purpose of providing services to their Indian consumers, the Bill makes its objectives clearer. In order to prevent the data from passing via the Restricted Entity or its servers, APIs must be utilized to see it. The selling or reusing of such information is likewise prohibited. Ground checking and verification are frequently prohibited for Restricted Agencies, ostensibly because enabling foreign organizations to gather extensive information inside Indian territory raises security concerns.

¹⁹Documents & Reports - All Documents | The World Bank

²⁰Home: PRSIndia

The Guidelines state that DST would be provided with a negative list containing sensitive features that would be subject to acquisition and/or usage rules in order to protect privacy. These qualities would not be able to be labelled on any Map by any person. The Geospatial Data Promotion and Development Committee ("GDPDC"), which will have representatives from other government departments, will also be established by DST. The GDPDC shall make decisions regarding any issues arising from the finalization of negative attribute lists and the draught rules on such attributes. Additionally, Restricted Organizations are prohibited from doing ground checking or verification, ostensibly because it would be unsafe for foreign organizations to gather precise information on Indian soil.

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Since it would address the issue of driverless cars, this bill is now being negotiated.

Dealing with the issue of current applicable sections of the Motor Car Act and the Consumer Protection Act will be another significant challenge; in order to fully adopt the autonomous vehicle into the regulatory framework, it would be necessary to alter these two rules. In this case, a section-specific modification is not being considered. As stated in the second half of the concluding paragraph, a change should be made so as to include self-driving car owners in the laws governing matters not directly related to driver error.

Additionally, a clause that requires a corporation whose self-driving vehicles are unfit for Indian roads to pay a larger fine and, if the situation gets worse, to have their license revoked should be included.

Next, either the government should amend the Motor Vehicles Act of 1988 to include self-driving cars or the government should create a specific piece of legislation for self-driving cars, similar to what Germany and Britain have done. In this legislation, the government should make rules regarding charging and liability in the event of an accident explicit.

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Additionally, the law ought to hold the AI creator accountable for any flaws, as doing so would be advantageous on two fronts. Due to their vast coffers, automobile manufacturers are in a far better position to provide compensation. Additionally, when manufacturers pay compensation, they have an increased motivation to make their goods as error-free as possible.

CONCLUSION

This paper carefully examined how India still requires legal reforms before adopting the idea of autonomous automobiles. It is not only because of the lack of technological advances, societal issues, and environmental issues, but also because of the differences between India and Western nations in the legislative requirements to use autonomous vehicles. This paper also analysed who would be liable in the event of an accident involving an autonomous car, which is arguably the most crucial.

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