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 ISSN: 2582-6433

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ROLE OF TRANSFER OF TECHNOLOGY IN THE INDIAN AUTOMOTIVE INDUSTRY

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PREFACE

This dissertation is aimed to analyse the impact of Role of Transfer of Technology In The Indian Automotive Industry. A brief introduction has been laid down to establish the aim and objectives of this research. An in-depth analysis of the history of transfer of technology in India and around the world is also conducted to trace the origins of transfer of technology.

The aim of this paper is to establish a link between transfer of technology and the automobile industry through a diversified timeline. To analyse this impact, an in-depth analysis of the Technologies used in this Industry have been thoroughly analysed and aspects like importance and functions and historical examples as well new modern techniques adopted have served as a base for studying for a better conclusion.

The processes adopted by various Companies and the types of contracts and agreements usedby them have also been taken into consideration. It is to be noted that various of aspects of litigation and major case laws have also been looked upon to understand the laws and the infringement of rights regarding various aspects such as royalty, competition have been takenin consideration.

Various case laws and examples have also been taken in consideration in respect of Indian Courts and their jurisdictions and in some cases international forums as well. The analysis of such case laws is undertaken to understand the strategic moves made by companies and its overall impact

 ISSN: 2582-6433

in the Role of Transfer of Technology in The Indian Automotive Industry. Further, how overall government legislations, stringent and ever-changing laws have made changes in the overall automotive environment which have made incorporation of technologyever important causing a chain reaction for technology transfer in this Industry.

Thus, this research has been undertaken to study the overall Impact it has on the Indian Automotive market and the importance of technology in the overall automotive industry andthe transfer of the same on the Indian market with the challenges, solutions and case laws along with a complete study of the same and its overall impact on the Indian market.

ACKNOWLEDGEMENT

I owe an indeed thanks to many people who helped and supported me during the making of this Dissertation who all put faith in me and supported me directly or indirectly throughout the research and study made in this regard.

I would like to express my gratitude to **Amity University, Noida (Uttar Pradesh)** for providing me the foundation and opportunity to be a part of the university.

Foremost, I would like to express my sincere gratitude to my guide **Dr. Saltanat Sherwani** for the continuous support of my Dissertation throughout my study and research for her patience, motivation, enthusiasm and immense knowledge. Her Guidance helped me in all the time research and writing of this thesis. I could not have imagined having a better advisorand mentor for any mentor for my dissertation.

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Signature:

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 ISSN: 2582-6433

INDEX

 ISSN: 2582-6433

TABLE OF CONTENTS

 ISSN: 2582-6433

CHAPTER 1: INTRODUCTION

HISTORICAL ASPECT:

The Indian Automobile Industry has been in place even before the independence of India. It was a time where there was no domestic industry and rather was completely dependent uponimported automobiles be it in the form of commercial or vehicles for private usage.

It was an era where every part and every minor issue were to be resolved by importing the parts from the country of origin and where the seeds of early transfer had already begun. Thereason behind this particular statement because a simple part like a wheel was to be importedand installed in a particular way which required special tools and knowledge which in turn lighted the possibility of transfer of early on techniques and technologies for the said simple task to be accomplished.

In times and with the evolving need for automobiles in the Indian market created a new demand for vehicles which were meant for rugged roads and were long lasting in nature. Thiskind of situation was noticed in the post-independence era where mining and various construction activities were emerging and which created a need for foreign entities to partner with Indian companies and create joint ventures and in-turn cater to the demand of commercial activities which required tools, machines, techniques and technologies to be introduced in the Indian Subcontinent which thus created an era in the post-Independence period of 'License Raj' which produced some of the most iconic automobiles used by both businessman and politicians alike and used for both commercial and private usage and actedas a symbol of status as well in the Indian Public Mindset. This also ushed in an era where theworking class was allowed to be accessed to affordable 2 wheelers which created a boom in the production and sales of 2 wheelers in the subcontinent and helped the working class realize that an automobile was not a 'luxury' but rather a 'need' for the working class.

Moving on the period of the 90's where the Indian Market was introduced to the Liberalization, Privatization and Globalization; this was an era which introduced the products of modern technology to the Indian Market where various automobile makers entered and created a market for themselves with introduction of fuel efficient and reliable automobiles with compact sizes and luxuries as part of their product. This also allowed these manufacturers to set-up shop in India and create jobs as well.

 ISSN: 2582-6433

Now, skipping to modern times the Indian Automobile Industry is under a complete 'renaissance' where it is evolving and adopting new and future friendly Electric Mobility withfocus on electric and fuel cell technologies which are helping Automobile makers to be on theedge and introduce new and more modern technologies and with the stringent and more strict emission norms in place, automobile makers are forced to adopt the hybrid and electric technologies to cater to the technology friendly markesst of Indian Automobile market.

However, it is to be noted there in the ever-evolving Indian Automobile Industry there is one component that has only grown with time i.e. dependence and use of technology that has been sourced from all over the world from time to time and used in every stage of the Automobile Industry. From the production of steel and other components and to moulding the said into a body shell and creating a chassis to creating a product. The transition from handmade products to production line manufacturing to introduction of semi-manual labourto the introduction of robots in the production process and ultimately introducing Artificial Intelligence to the production process has helped reduce and overcome a lot of challenges.

These challenges include the cost of production, time of production, quality of production, ease of manufacturing and to delivery of the finished products which could have only been done with the introduction of modern technological advancements through 'transfer of technology'.

This leads to a school of thought arising that whether all the latest technological advancements are in turn beneficial to the end consumers and another school of thought arising and asking the question that whether a dormant or a stagnant technological world would be the most beneficial in the rapidly evolving modern times.

CONCEPT:

The Concept of transfer of technology may be defined as the shift or movement of inventions,data, software's, hardware's, technical knowledge, inventions, discoveries or trade secrets from one person to another or one organization to another.

Transfer of Technology is commonly referred to as (Tot), and this process can take place between any entities or organizations which may be banks, manufacturers, universities, governments, companies and so on. The aim is to usually transfer the knowledge and the know-how of achieving a particular goal. This ensures that there is a wider range of people being catered to and technological developments available to a wider range of people who may use it for their own benefit. The transfer may occur in a variety of formats like domesticto international or from

 ISSN: 2582-6433

international markets to domestic markets, it may occur in a verticalor a horizontal chain as well.

These are promoted at various international levels and it is also to show that cooperation amongst international levels can also be achieved though Tot. This also facilitates in creating major international markets and expansion of organizations and higher facilitation of international trade. This is achieved by various phenomenon such as creating sister concernsor subsidiaries or by making various expansionist approaches by organizations which makes it a ground for more trade facilitation and expansion of technologies through transfer of technology measures through various channels.

These kinds of achievements are made by tools such as licensing agreements, royalty agreements, joint ventures and tools such as venture capital funding. This also involves higherrisks and higher rewards as well. The use of technology by government and private entities both include various transfers which affect and benefit the end user such as doctors, lawyers,engineers, market experts, scientists and other users as well.

With Tot comes the part of the IP or the Intellectual Property connected and concerned with innovations developed at various research institutions. These include various patents, licenses, trademarks, processes, and technical know-how of innovations developed at research institutions. This can also mean licensing patented IP's to other business or organizations for commercial purposes.

IP's also play an important role in emerging entities and start-ups as well. A part of the sameis Tot in the Indian market, the automobile sector is going through a "renaissance" as quotedby one of the renowned Bollywood actors. The saying is very true considering the huge amounts of start-ups acting as OEM's (Original Equipment Manufacturers) for the major automobile brands. The effort of these start-ups to provide the latest cutting-edge technological advancements under an effective cost module begs to show that latest cutting-edge technology is actually being used to bring out new products in the market which is eitherbeing invented or being imported or exchange from developed foreign markets.

Technology Transfer may include a lot of activities which may include, but not limited to:

1) Securing the IP's and other patents
2) Understanding the commercial implications of the newly developed technologies
3) Using the new technology for marketing purposes
4) Creating new strategies keeping in mind the commercialization aspects

 ISSN: 2582-6433

5) Assisting in new product deployment
6) Securing the necessary fund for research and start-up funding
7) Negotiating the necessary contracts and agreements
8) Creating a business idea and the subsequent business plan
9) Creating of appropriate infrastructure to support and create product innovation
10) Facilitate economic development with product promotion
11) To encourage and engage in a entrepreneurship model

These are just a few steps on the hands on know how on how to use the Technologytransfer.

Further, Technology transfer is divided into 6 processes:

1) Disclosure of Invention/Process
2) Evaluation of the process
3) Application for the patent
4) Marketing and assessment
5) Licensing Formalities
6) Commercialization

These steps take a step further in the innovation and its ultimate market potential. It helps realize the impact of the product on the market post its effective use and deployment enabling higher commercial activities.

Now the question that arises is why is Tot important?

Well, Tot is important as it facilitates technological innovation, promotes scientific research, enhances technological advancements and introduces associated needed to make it work allowing a higher market place to be catered to.

It allows research to develop from the scratch from novel technologies along the line of command and chain for protection of the breakthroughs. From that moment onwards, activities like licensing, marketing and further product development allows an impact to be created on the society itself. Also, the product if it is successful can create a huge impact andcan be used again to create a better product.

This results in technology transfer acting as a revenue generating machine, or may be deemedas a system to enhance the structure and reduce loopholes. The advantages of the same canbe seen through a successful technology transfer which enhances growth of innovation and creates an

 ISSN: 2582-6433

employment boost to the industry. This also comes along with saving the environment and reducing the irreplaceable damage to the environment[1].

What are the laws governing Transfer of Technology in India ?

It is note that in India, it is necessary to highlight the laws governing transfer of technology inIndia which have been mentioned as follows:

- The Copyright Act,1957
- The Patents Act,1970
- The Indian Contract Act,1972;
- The Trademarks Act,1999
- Foreign Exchange Management Act,2000 [Rule 4]
- The Competition Act,2002 [Section 3(5)(a) – (f)][2]

TRIPS:

Technology Transfer as we now know plays an important part in creating and maintaining international relations and combining the same with IP's and IPR's.

To facilitate this the Trade Related Aspects of Intellectual Property Rights (TRIPS) Came into being w.e.f. 1st January 1995 and was signed in 15th April 1994 in Marrakesh, Morocco. The agreement aimed to achieve the transfer of technology as a part of its major objectives. It also required member nations to create incentives for facilitating their nations to promote the Tot to underdeveloped or developing nations.

The Article 7, a part of the "Objectives" of the TRIPS Agreement stated

"….that the protection and enforcement of Intellectual Property Rights (IPR) should contributeto the promotion of technological innovation along with the transfer and dissemination of technology to the mutual advantage of producers and users of technological knowledge and in a manner applicable to social and economic welfare and to a balance of rights andobligations…..".

This obligation for the developed nations to provide for the incentives for Tot is titled in Article 66.2 of TRIPS which was recommended by developing countries = to be mandated and in effect. Thus, in Doha November 2001, the ministerial board had agreed to the TRIPS Council to be

[1] Reji K. Joseph; "Outward FDI as a Strategy for Technology Catch-Up: A Case Study of Two Indian AutomotiveFirms", 7-18, SSRN (1 September 2020)
[2] https://ksandk.com/information-technology/technology-transfer-regulations-in-india

 ISSN: 2582-6433

"….*putting in place a mechanism for ensuring the monitoring and full implementation of the prescribed obligations*….".

The TRIPS Council had also adopted a decision for creating a system in February 2003 and it had detailed the information that had informed about the intention of developed nations to provide the assistance by the end of each year and the implementation of incentives and practicing the same. In 2003, the TRIPS Council met in November as this decision was being implemented and was reviewed. This enabled many developed member countries to submit various new reports every 3rd year with updates.

During the same time, there were various decisions that took place under the TRIPS Agreement, this raised the question of Tot and had reiterated the commitment to implementArticle 66.2.

There was also a talk between climate change negotiators for discussing the link between technology transfer and the TRIPS.

TYPES OF AGREEMENTS:

The transfer of knowledge and information about technology can happen by way of informal transfer of knowledge or a formal transfer of knowledge through technology transfer agreements or contracts.

In formal channels of technology transfer, there is no such standard contract or agreement. There are some institutions that propose standard models as part of their IP policies but such models are only to be used as a source and a support and needs to be adapted to the specificrequirements of each case individually.

Therefore, it is also important to consult an IP Professional from the initiation of the negotiation and in particular when signing the agreement. Then we have types of agreementswhich have been listed below.

1) Technology Transfer Licensing Agreements (TTLA):

These kinds of agreements are legally binding contracts where the intellectual property (IP) owner of a valuable technology i.e., the licensor issues the licensee permission to use the IP in terms as per the agreement.

The terms determine the rights of the licensee usually are as follows:

 ISSN: 2582-6433

"…a broad license for any purpose in any territory and field of use, or a narrow license only for distribution or manufacturing in defined territories or technologies, or somewhere in between…"

These are usually summarized as a maze with multiple layers amongst negotiation partners. That they may change and alter to co-construct a solution beneficial to both parties. A licenseis an official approval by the owner of the IP in exchange for commercial or monetary benefitor something else of value. It becomes an actual transfer when the owner of the license delivers the technology, knowledge and technical know-how to, to the licensee and the it learns how to use it effectively and adapt to the same.

A) Royalty for License:

There are some licenses that bear royalty and some licenses which might be royalty free thereare also which are related to the development of technologies and the access to standards, manufacturing, or distribution. But despite various difference's in the licensing agreements, these are found globally in various types of technology deals ranging from businesses and from B2B amongst a few.

B) Intellectual Property Licensing:

This occurs in various business and collaborations such as mergers and acquisitions and joint ventures and various other ventures such a joint initiative. In IP Licensing, there is a method known as 'Technology Licensing' which only occurs when either of the parties own a valuable intangible asset known as intellectual property. Then the cause of the ownership of the same,there arises a legal right to prevent the other party from commercializing it.

C) Innovation:

In today's market scenario there are knowledge-based economies which are prevailing on the model of IP collaboration amongst academic and business organizations. This phenomenon isalso known as "open innovation". This is based on various licensing deals amongst various participating partners between business and commercial houses. Further, there is a growing interest on the part of innovative proprietors for acquiring more knowledge about the licensing as a useful tool for transfer of knowledge.

2) Intellectual Property Rights Assignments:

The assignment of IPR involves the transfer of ownership of IP which includes but not limitedto patent, utility model, trademark, copyright, know-how protected by a trade secret etc.

 ISSN: 2582-6433

The assignment of a contract must be accurate and should identify the subject matter of whatis being assigned. For patented inventions there are patents granted but also provisionally granted patent applications including trade secrets that are intended to remain as a secret.

There is a difference between licensing & assignment of IP where in licensing relations there are right to use the IP temporarily which is then transferred to the licensee and which also gives the licensor the right to continue to commercialize the same IP in a different field at various times. Also, under negotiated circumstances there is a licensing agreement which canbe terminated and all rights transferred back to the licensor. Thus the former owner will be permanently divested of the ownership of the IP.

3) Non-Disclosure Agreements:

Non-disclosure agreements (NDAs) are legally binding agreements which bind both parties tonot to disclose confidential information which a party has learned and not to use it for any purposes other than those specified in the NDA.

Usually, before an IP license is used or before other agreement is established, the user is to have further detailed information about the IP or technology. Further, in the context of an NDA both the parties can make an obligation to either disclose or use the information regarding background of IPRs of the other party or not use it in a wrongful way.

An essential condition for NDA to be efficient and define what information is considered confidential and which is not and who would have access to the same. It also mandates the measures to be taken in order to keep it confidential and to limit those obligations.

4) Collaborative Research Agreements (CRA's):

These are concluded by either 2 or more parties that wish to cooperate to develop and possibly commercialize a new technology and enter into an agreement.

These parties would invest their manpower, financial, assets and IPR's and skills for working jointly to define the objectives and legal framework of the collaboration, including IPR's ownership, access rights, benefits, sharing of risks and rights to commercialize the same.

5) Consultancy Agreements:

These involve consultancy work done by consultants or researchers who provide expert advisory consultancies to an industry partner in exchange for a retainership or a payment often on a personal or contractual basis.

 ISSN: 2582-6433

In normal cases, the resulting intellectual property rights are taken over and owned by the company with limited rights to the creator.

When involved in negotiations, the creator will try to preserve his/their rights of the creationwhile keeping the info. confidential for a reasonable period of time, to allow the company toprotect IP and assert their position on the market.

6) Sponsored Agreements:

This agreement establishes the relationship between a government body or commercial entity interested in developing scientific results or relevance for its business.

The govt. body would receive funding to support the research in return for preferential accessand/or rights to IP deriving from the research. Unlike the collaboration agreements, the sponsor doesn't participate in the activities and is not interested in the commercialization of the result. Further, the R&D institution usually owns the results and IP developed and furthergrants a license either exclusive/non-exclusive to the sponsor as they are ones sponsoring thesame.

7) Material Transfer Agreements (MTA's):

An MTA governs the transfer of physical assets and tangible materials from the supplier to the receiver that intends to use them for their own commercial purpose.

Further, the transferred assets may also include the patented materials which are transferredthrough either a license or software. These agreements define the rights & obligations of the parties regarding the transferred materials, other materials & related IPR's.

8) Contractual Agreements:

These are concluded when a commercial company "hires" a professional or a company to conduct research towards a commercial goal.

The terms of the agreement are defined by the company where the goals are commercial in nature with various points being covered and agreed upon mutually. It fully covers the costs to develop and also covers IP protection along with bears all the risks. The results are ownedby the company and with patented inventions or other IPR's assigned appropriately.

9) Joint Venture Agreements:

A JV is a business entity that is created by 2 or more parties by pooling together their resources. The aim for implementing a common commercial purpose. Which is characterizedby a sense of

 ISSN: 2582-6433

shared responsibility, governance, risks and profits.

If one party may contribute with technology or know-how and the other party may provide investment then this is often the case in joint ventures between companies and industry partners.

Amongst the most important factors of a successful joint ventures is an adoption of IPR principles for managing the issues such as the use of the information and background of IP that each party has brought into the business.

There are two main forms of joint ventures:

A) Equity Joint Venture;
B) Contractual Joint Venture;

Firstly, the equity joint venture is an arrangement, which is a separate legal entity created towork as the instrument for executing the project and commercializing the final result.

Secondly, the contractual joint venture is where parties would come together for a particularproject in which the terms and conditions are outlined under which they would co-work jointly.

The parties usually don't create a separate legal entity for the project but would work together in a partnership and understanding for sharing the risk and the profits as per the terms and conditions[3].

Objectives of Research:

The Primary objective of the research would be:

- To understand the meaning, types and scope of Transfer of Technology;
- The working of Transfer of Technology;
- The impact of Transfer of Technology on the Industry;
- How various automobile makers have opted and adopted the Transfer of Technology;
- The impact of sharing of Transfer of Technology on the industry;
- What are the pros and cons of Transfer of Technology;

[3] Smita Miglani; "The Growth of the Indian Automobile Industry: Analysis of the Roles of Government Policy and Other Enabling Factors" 17-20, Routine Library Editions (2005)

 ISSN: 2582-6433

Research Methodology:

The Empirical, Doctrinal, Research, Analytical Methodology is being used in this research with focus on literature, examples, policy documents and various historical examples and various books and contracts for references.

For this purpose, analysis of various books, research papers and various materials from various internet archives and portals of World Trade Organization and World Intellectual Property Rights Organization have been adopted.

It is to be further noted that for this particular research, adoption of doctrinal methodology is most appropriate and feasible which bring out both the positive and negative aspects of the overall research.

Statement of Problems:

With all the technology and the advancements in Indian Automotive Industry, there are alsolies a dark side which is often overlooked in this sector which is to be highlighted:

1) Does all the transition, introduction, transfer of technology and the ultimate hastening of production often degrades the quality and longevity of the Automobiles and its parts?

   [The question has been raised by many scholars and has often been observed by Automobile from time to time that the quality and the long-lasting nature of the productshave often been reduced which actually questions the reliability of the Automobiles]

2) What would happen to the unorganized labour and unorganized sector of mechanics,painters in the unorganized sector who thrive on the repair and maintenance of the automobiles as modern technologies often allow higher expertise and hampers old techniques to be used for traditional tasks. Does it mean that it would snatch away the livelihoods of the unorganized sector altogether?

   [The question arises because it has been noted and seen that as technology has progressed, it often requires the automobiles to be repaired, serviced and maintained bythe manufacturer in order to maintain the sanctity of the complete process but often ruins the livelihoods of the mechanics and painters and welders whose livelihoods depend uponthe said tasks and modern technology would interfere in the same.

 ISSN: 2582-6433

Limitation of Research:

The primary limitation would be the lack of credible source and a limited publications in this particular niche field of research.

Since this is a field where even though substantial progress has been made, the timeline is fartoo long and lengthy to identify specific timelines and research.

Also, limiting the possibility is the credibility of sources and the identification of the major technological leaps which have been made earlier. In recent times, it is quite easily to be identified due to various government regulations and stricter norms.

However, the earlier or historical aspect is yet to be fully discovered and expanded.

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 ISSN: 2582-6433

CHAPTER 2

THE INDIAN AUTOMOBILE INDUSTRY

HISTORY OF THE INDUSTRY

In the year 1897, in the age of horses and carts there appeared a vehicle without an animal and 4 legs which would actually shake the entire continent by its knees…. It was called an 'automobile'. Since then, all cars were imported from all countries across the globe and sine India did not have its own manufacturing facility, all cars imported were completely built unitsfrom abroad i.e., CBU units.

Till the independence of India until 1947 all cars and automobiles were imported. But in the late 1940's and early 1950's there came a wave of revolution with the likes of domestic manufacturing facilities and cars made by Hindustan Motors and Premier. This was also the decade where Mahindra and Mahindra came up with its own manufacturing of cars. It is alsoto known that all these companies had started and initiated manufacturing with a sort of transfer of key technological advancements, designs, parts and patents from already existing cars in global market. HM did with Ambassador as a variant of Moris Minor and later the Contessa which was a derivation of the Vauxhall VX series. Premier did it with Padmini and later with the 118NE, Mahindra and Mahindra chose a different genre which was the jeep a derivation of the Willy's Jeep highly used by Allies in the World War, which was then shared with M&M for licensing and domestic manufacturing. M&M's cars were both commercial andprivate for use in India. The Tata's had always focussed on Commercial Trucks with a joint venture with Mercedes for trucks of which instances can be still seen today.

Post Independence trends showed a huge dominant market of HM Ambassador which was a symbol of pride and ownership for car owners. Since in those days there were import restrictions and key role of the 'License Raj' imports reduced and HM grew rapidly at an exploding pace and which affected the market by allowing car buyers to look for a domestically manufactured car within a good budget. This was also the period where sale of commercial trucks, buses, tractors were all growing. This also meant that Foreign Collaboration between International and Indian Automakers had been on a huge successful scale. A golden era for the automakers during those days in the market capture and sale of automobiles.

With India's decision to clamp down on imports in order to save foreign exchange, the foreignauto sector brands had little choice but to exit. Among those who left were a clutch of

 ISSN: 2582-6433

companies that included names like Ford, Skoda, Studebaker and Buick, to mention a few. Some of these names are familiar to us today, but in the early years of independence, these companies brought their completely built up (CBU) cars into India via the import route, and came via a docks near you. They were not manufactured here, there was no suppliercommunity, and to afford a car, one had to be really very wealthy to buy one and sadly the banks or financial lenders did not offer schemes as we see today.

While Nehru appealed to Indian business men's entrepreneurial instincts, some of those whotook up the gauntlet were pioneers in the automotive sector. The Birlas forayed into car making, rolling out the first domestically made cars, the Morris Oxford-based Ambassador. The model was manufactured in Kolkata in 1948 through a technical collaboration with MorrisMotors, UK.

Over time, the Ambassador would become synonymous with government officials, and Indian politicians even as it also established a reputation of sorts as a durable but spacious as a taxi and capable of surviving on all kinds of road conditions. India's other automotive pioneers were Seth Walchand Hirachand, whose quest to make cars actually began eight years beforeIndependence when he visited the US to talk about a potential collaboration with the US big 3 carmakers.

But he did not meet with success, and so Hirachand set up Premier Automobiles in 1944 and signed up with Fiat in 1951 to assemble the Fiat Millicento in India. That association would continue for many decades. Pioneers' grit There were other pioneers too, and they included two brothers, Kailash Chandra and Jagdish Chandra Mahindra who had cushy government jobs but responding to Nehru's call, decided to tie-up with Ghulam Mohammed to assemble the American Willys Jeep in India.

Looking back on those year, Keshub Mahindra, a descendent of those pioneers, a former chairman of the Mahindra Group would later recall that the government wanted India to haveits own auto industry, but was clueless about how to go about it. Also, the government had asay in every aspect of the manufacturing, it even determined the make and type of each vehicle, and these included three passenger cars, three medium trucks, one heavy truck and Jeep and light truck.

That explains why these early pioneers had to make everything on their own. HM's build quality for Ambassadors was often questioned and reliability was one of its weak points. Apartfrom the manufacturing, there were also controls on capacity and distribution, but price control was the key issue. Actually, the government determined the price and even dealer commissions. Exasperated, these carmakers even approached the Supreme Court and Car Price Commission was set up to work out a price increase formula. One outcome was that carmakers had very little

 ISSN: 2582-6433

encouragement for investments in R&D.

For the three subsequent decades, car ownership was a bitter experience. Even a simple pre-delivery inspection could take as much as 10 days! By 1956, the industry was pretty much sealed off from new players, and the world itself, as assemblers like GM and Ford had decidedto leave the country rather than manufacture here. Looking back, it can be said that it was totheir credit that none of these early pioneers gave up their automotive or entrepreneurial ambitions. Also, two were located in Bombay, and one was in Calcutta so these were in a sense, the early automotive hubs, and as recently as the 1980s, their imprint could be seen in the Premier taxis in what was then Bombay, the Willy's Jeep, and in the never-say-die Amby that ruled Calcutta's potholed streets. From a government standpoint, the car was seen as elitist, and that a poor country could not waste scarce resources on these cars. From a macro-perspective, the transport policy favoured public transport and the railways.

It must be mentioned that not all cars before Maruti came on the scene were made from Uttarpara or Kurla. UK's Standard Company inked a deal with the Indian government to set up a car making unit in the south and Standard Motor Products of India or STAMPRO was born. Through the 1950s, it assembled a trio of models including the Standard Vanguard, Standard 8, Standard 10 and Pennant.

In 1961, it launched the Triumph with a 946-cc engine plonked under its hood and called in the Herald. Like its counterparts in Mumbai and Calcutta, STAMPRO also tried to localise parts, and designed and launched the Gazel, a first for an Indian carmaker. The Rover-based Standard 2000 that was launched in 1985 was a generation ahead of other cars. Another company that tried its hand at cars was Bangalore-based Sunrise Automotive which tied up with a UK company Robin, a three-wheeler, fibre-glass bodied Badal.

The company also launched the Dolphin, an Indian version of a UK car and the Sipani Montana, a hastily put together product to take over the Maruti 800. With the 800, India's car sector was headed for sea change with all other players gradually falling by the wayside. The company with the support of the Indian government was soon to herald a new benchmark chapter in India's automotive history. In the trucks and buses sector, it was the Tata Engineering and Locomotive Company or Telco that was a byword for trucks even as its southern counterpart, Ashok Leyland, forged a tie-up the British Leyland group that made trucks and buses.

As in the case of cars, the government regulated product specs including engines and the tyresizes. Given the scarce foreign exchange, import substitution was the mantra. The government also

 ISSN: 2582-6433

determined technical fees and royalties that had to be paid. The UK partnermanaged product development and technology even as it complied with the phased processof manufacturing. A fact that may not be known to many was that TVS & Sons ran a rural transport service in Madurai. That was even earlier in 1912, and the company tried to run itsservices in time.

Over time, the company tried its hand at cars and even acquired a GM dealership, and to appeal to the wealthy to buy cars as against using horse-driven carriages and replace the same with a Chevrolet added on with a chauffeur would be sent to a zamindar's house. This wouldobviously come with a request for the car to be used for a week. Finally, the family being impressed by the car's comfort and status that the car gave them, would buy one. Another automotive pioneer in the south was Ashok Leyland that began its innings around the time HM was taking its first steps into car making

All as we know it today began as Ashok Motors and was founded by an Indian freedom fighterfrom Punjab, Raghunandan Saran who set up a CV plant and named it after his son, Ashok. Hewas apparently persuaded by Nehru to invest in a modern industrial venture and incorporated the company to assemble and sell the Austin brand of cars from England. Headquartered in Chennai, and with a manufacturing plant at Ennore, where proximity to the sea meant risks of erosion, the company dealt with Austin A40 passenger cars in India. Over time, and with engineering support from British Leyland, the company made buses like the Leyland Tiger andLeyland Titan.

Coming back to Telco, it was established in 1945 and its legacy kicked off with 443 indigenously developed commercial vehicles (CVs) in 1954. This was also the plant where TELCO developed various armoured vehicles, Commercial Vehicles, steam road rollers, excavators, forklifts and diesel shunters – all the vehicles that "played a vital part in building our nation" as the company's website describes it. The company played a major role and wasactively involved in nation building since its inception in 1945. In a sense, it was a kind of 'AtmaNirbharta' of those days.

Telco's leveraged Mercedes to roll out the TMB 312 from Jamshedpur in 1954. During this time period the government had announced a new industrial policy. Under this policy, a limited number of licenses would be given to each industry and to manufacturers who wouldmanufacture their products in India and achieve 90% domestic production within five years. During this time, a German company named as Daimler-Benz signed a 15-year technical collaboration agreement with Tata to procure the license in order to manufacture medium and heavy trucks, the resulting initials TMB stood for Tata Mercedes Benz.

The person in charge of the project with Daimler Benz was Tata's MD Sumant Moolgaokar who

 ISSN: 2582-6433

was solely responsible for building up the company's technical skills. To its credit, Telco never scrimped on making the investments that were required to develop internal talent andskills, a legacy of its top brass. The German partner, which is somewhat in contrast with the car making pioneers, also gave all its support to Telco never compromising on what it was keen to give its Indian partner. In fact, the TMB 312 took eight long years to localise but all along, the company upgraded the truck and made sure it was robust enough to tough operating conditions.

In 1969, the technical collaboration ended, but Benz would still continue to hold a 12-per cent equity stake in the Tata company even today. With the alliance, Telco decided to go it alone, selling all the trucks that it made were sold under the Tata brand name. Then with labour being a problem, it set up a plant at Pune spread over 1010 acres and to this day dominates that part of a sprawling Pune city. The site of the new factory, as Arun Maira of Arthur D Little,a consultancy puts it was a sun-baked, rocky plateau and the first building that was constructed contained the training centre for employees. This was in lines with Moolgaokar'smaxim of "Train your workers before you build your machines".

Further, he had directed that two lakes be excavated and the soil used to plant over a hundred thousand trees which in many ways pre-figured the corporate social responsibility (CSR) and environmental initiatives that the company is well regarded for today. Telco used Daimler 's engineering and it was only much later that the company would foray into making LCVs with the 407, a product that the company pioneered from the drawing board upwards and a testament to its expertise was that it was able to take on DCM Toyota's LCV, Dyna. In the LCV space, the company has gone it alone in the field while other manufacturers had opted for working in collaboration with Japanese firms like Isuzu, Toyota, Mitsubishi, Nissan and Mazda. A prime example would be the Firodia-owned Bajaj Tempo.

The first signs that change was in the air came in the government's Industrial Policy Statementof July 1980, which was based as the Industrial Policy Resolution, 1956 and this spelt out a new set of socio-economic objectives. These included amongst an variety of optimum utilisation of installed capacities, maximum production levels and achieving higherproductivity in work, higher job generation, correction of regional imbalances, the promotionof export-oriented industries and consumer protection against high prices and bad quality.[4]

All that would change in the 1980s with PM Indira Gandhi's government taking a stake of 74

[4] David T., Tom Donnelly; "The Motor Car Industry in Coventry Since the 1890s" 20-26, Routine LibraryEditions (2017)

 ISSN: 2582-6433

percent in Maruti Udyog. Then there was no looking back with the change in laws & regulations as Maruti Udyog had teamed up with Suzuki, Japan and formed a joint venture to produce automobiles in India. This was the first of a kind alliance which had turned out to be hugely successful even as of today.

Exports of cars was quite slow as the manufacturing process during early 2000 decade gained traction, in that period. It is to be noted that Maruti Suzuki was amongst the 1st to start shipping vehicles to major European markets. It is to be noted that during this period, the Govt. of India had introduced mandatory emission norms known as the 'Bharat Stage' norms that came into effect in major cities in India. These were emission standards that were based on stringent European norms being already practiced in Europe and other nations.

With the onslaught of different foreign manufacturers tying up with Indian automobile companies aided by economic reforms, this had then given them an opportunity for welcoming them to India. Companies like Hyundai and Honda both entered the country and had started to invest in manufacturing facilities in the years between 2000 to 2010 and almost every manufacturer had got a place in the Indian automobile industry Their aim was to expand their manufacturing facilities across the country including luxury brands like Audi, Mercedes Benz and BMW[5].

CURRENT MARKET SCENARIO

The automobile industry has advanced so much so that India has become the hub for domestic and international markets and as of today all car manufacturers have a strong foothold in India.

The major locations of automobile manufacturing are the South, West and North of India. In the South Chennai is the epicentre which dominates for automobile manufacturing. The West has Mumbai and Pune come in a close second place and in the North of India we have the Delhi/NCR region that holds the top spot for manufacturing of vehicles and production facilities home to the famed Maruti Suzuki Manesar Plant.

In the year 2009, India had become the fourth largest exporter of cars in the world which was just behind the South East Asian countries of South Korea, Thailand & Japan. The following year, India became the third largest automobile exporter in the world. This in turn was a commendable feat indeed.

Looking back at time it can be seen that the Indian auto market evolved by ten folds in almost all

[5] https://carorbis.com/blog/history-of-automobile-industry-in-india/

 ISSN: 2582-6433

major companies that are currently present in the country, it can also be seen that India has now become a hub for auto makers to start and set up their plants for manufacturing vehicles for both domestic and international markets.

To mention a few achievements of the Indian car industry, it is to say that it had emerged as the 4th largest exporter of passenger cars after Japan, South Korea and Thailand in 2009 but then 2010 it became the third largest exporter of cars in Asia and the sweet point came for the Indian car market in the year 2011 as it became the 6th largest country in the whole world(in terms of production of automobiles).[6]

The Indian market used to be focussed on 1st time buyers which had long dominated the automotive market. But with the focus shifting on selling cars to repeated customers for retaining brand value. It is also to be noticed that if the automakers were wanting toconcentrate on repeated set of buyers who purchase vehicles, then they must develop new strategies in order to increase the resale of existing vehicles. There are some start-ups that have attempted to streamline and improve the process of buying/selling used and new cars it is to say that if automakers could proactively change the resale landscape, then they couldhelp revive urban demand for used cars as well.

There could be an initiative from the Indian automotive players in the sector for bringing a budget sensitive customers interest back into the market, the reason that this segment has reduced in size is because the Indian governments initiative of Bharat Stage VI emissions norms which have the increased the overall prices by about 7 - 9% for two wheelers and 3 - 5% for cars in order to reduce the upfront cost of owning a vehicle. For this, the automakers would either consider bringing out a new vehicle range altogether.

It is to note that as an advice it to be said that automakers may usually take up new methodsand innovate by creating alternate options specially for interested customers and they can initiate additional and new options for new customers to purchase a product in their price bracket. There are some automakers that are offering leasing options in the in the PV segment but their offerings have very narrow solutions for different vehicle types with various lease durations and various other features as per the mobility needs to evolve and shift from direct ownership to other alternative development models which is basically meant for the development of better leasing options.

[6] Jatinder Singh “India's automobile industry: Growth and export potential”,7-11, Journal of Applied Economics and Business Research (2014)

 ISSN: 2582-6433

Indian Automakers must develop direct-to-customer options as per digital channels gaining popularity among India's middle and upper classes and a highly specialized best-in-class digital transformation needs to be there for a different perspective.

In International markets like Africa that are similar to India, it has been seen that there has been a raise in the economic growth of the country and they are reaching the levels at whichautomotive sales tend to boost significantly like the Indian companies that are already present there and that have already and have understood the change in the Indian market and are adopting the new markets and understanding the scenario to adopting to the same for growing in international markets. It is to note by increasing their international presence the Indian automakers are increasing growth while sharking risks.

When going abroad and expanding the business it is seen that the Indian automakers would not have to start from the scratch because their brands have already gained a huge and strong global presence in segments such as 2-wheeler and 3-wheeler in where brands like Bajaj andTVS have learned from their business experience and with their Indian products they have an advantage of a good service, high customer value, good quality are likely to offer a good playerfor emerging-markets. The Indian automakers have made their way in the international opportunities and they would need to work higher on the new international markets that theyhave approached upon and invest in expanding their brand and services.

It can also be said that this might be an opportunity for Indian automotive suppliers to grow internationally and create an impact in decades. Now, global automakers are in the process of rebalancing their supply chains and they are looking for alternative sourcing solutions outside China in keeping in mind, the Indian govt. has offered PLI Schemes to encourage exports, of which automotive suppliers can enhance their costs, high quality, innovation and the sheer will have an international growth. There are many Indian companies that have already done the same and for instance the total exports are accounting for about 60% of revenues. With this trend continuing, more companies could achieve similar results.

Once there is an expansion into the lower value chain, there could an additional growth for automakers and auto manufactures as the upfront cost of a vehicle only accounts for 25 percent of lifetime ownership costs. Then there are other major components like fuel, service, loans, insurance and resale value.

It is also noticed that there some OEM's that have started going into the value-chain business environment, one such example is BMW with its BMW's Secure Protect Package, which provides

 ISSN: 2582-6433

an in-house finance and insurance services for new car buyers creating a complete peace of mind package and reducing the hassles of ownership. Then there are others that have pursued joint ventures or partnerships such as Ford's and Geotab. Then there are services in India such as the Service Mandi from Ashok Leyland and an assured second-hand dealership by Maruti Suzuki of TrueValue. There is a momentum that is gained by those whoenter this value chain system first and then gain an opportunity to shape a digital ecosystem of value-added services and which also provides a one-stop solution for the widespread customer which include scheduled services, road side assistance, resale of cars and exchangeprograms and then customization and the purchase of accessories. This combined with such a varied spread of solutions would create a complete piece of mind ownership experience.[7]

Post the COVID19 pandemic, there has been a drastic change in the way customers want to communicate and have a purchase decision. One prime example is the creation of online portals for booking and purchase of automobiles enabled with increased digitalisation, customers now want to get everything delivered at their doorstep from vegetables to buildingmaterial to now … automobiles. This has led to companies changing their traditional mindsetof dealing manually and thinking digitally-first. Though this is usually true for consumer goodssuch as groceries, purchase of automobiles is slow to adapt to this kind of trend and is likely to witness a change in the upcoming years. To enable this trend, various automakers have started automation of new online business models in order to offer their vehicles directly to consumers via mechanisms like 360-degree virtual configuration and online demo experience. Further, there are some car manufacturers and dealers that are betting on new and better technologies to offer a more personalized customer experience beginning from the inquiry to booking and to payment and then delivery. This helps the dealers and their sales persons to engage in a much better position and the after sales services like maintenance and insurance can be managed accordingly.

Then we have technologies like AI (artificial intelligence), VR (virtual reality) and (IoT) internet of things which enable their growth and are more connected in nature. Then there are services and features which are expected in vehicles keeping in mind the today's consumer which is hungry for features and technology in their life's and in their vehicles as well. Then of course there are benefits to integrating technological advancements in automobiles, firstlyas we are seeing even now that the connected car technology can improve communication between owner and the car and communicate with a range of systems to send data for remote diagnostics along with vehicle

[7] https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-indian-automotive-industry-from-resilience-to-resurgence\

 ISSN: 2582-6433

health reports to companies. Additionally, it also allowsto maintain the required speeds and reduce fatalities and can also detect early possibilities ofcrashes. This further prevents breakdowns and also averts accidents and as of date India's connected car market is in early stages but it is expected to grow in the coming years.

Then we have the issue of rising fuel prices, limited charging infrastructure and the increased demand for CNG vehicles across the country specially in the field of Commercial Taxis and Private user. As per a major bank report, the penetration of CNG vehicles in the PV segment increased to 9% in FY22 from 6% in FY21. To be exact the cost of running a CNG vehicle is nearly less than half of the price of petrol vehicles which makes the cost of running a CNG vehicle, much-much lower than a conventional petrol car with better fuel efficiency and moreover the emissions are less, making it is environmentally-friendly option. Also, it is to note that more and more customers are looking for a reliable passenger vehicle in the budgetfriendly price of less than 10 lakh rupees on road with adequate boot space and high reliability. In this case, several automakers have shifted their focus towards CNG fitted vehicles.

Again, for those who are looking for a more premium vehicle, there are the hybrid vehicles asa symbol of future ready technology are gaining immense momentum these days. Since EV infrastructure is at early stage some users prefer a current model with a future vision for hybrid vehicles, which is a promising alternative for a normal petrol car. These hybrid vehiclesoffer numerous benefits such as higher fuel efficiency with lower emissions along with regenerative braking system and of course a smoother and cleaner drive. It is to be noted thatthe adoption of this technology has somewhat changed the entire landscape, although very owners have opted for hybrid vehicles but it is to be noted that it is all because of the skyrocketing high pricing. Automakers have realized this and are betting quite high in this space with various new launches and sweet price point.

To be honest, with the onslaught of EV's, hybrids and CNG vehicles the petrol vehicles are getting cornered and the diesel vehicles are getting axed in a proper way. But there is an aceup the sleeve of petrol cars i.e., lower capital cost, lower maintenance costs, easier to run andmaintain and better peace of mind that the counterparts. Earlier in PV segment there was a time period in the 2014's where diesel engines dominated the market with their higher performance and better fuel efficiencies along with longer lasting engines, but these engines required quite a bit of maintenance and with government opting out of diesel cars due to environmental concerns and that the fact that upgrading diesel engines is a mighty task in itself to meet stringent emission norms, the automakers have opted out of it altogether. Further, the only segment that is currently

 ISSN: 2582-6433

having diesel cars is the SUV segment and the commercial vehicle segment. Since the sector is to have a CNG oriented buses and trucks andas per the latest auto expo LNG & PNG commercial heavy trucks being showcased, it is not long before the bi-fuel buses and trucks would take over the market. Even now, electric buseshave made their way into the market and are already pushing behind diesel and CNG buses simply on the basis of running costs and reliability. It is not long before petrol cars are axed and diesel as we all know is already a fuel of the past.

As India witnesses a huge disruption by the EV segment which has the Central and state govt's. support. The current govt's EV policies along schemes like the FAME subsidies have enabled a new interest for the premium car buyers. It is to note that as EV's have received a greater demand 2 wheelers, compact SUV's and even luxury vehicles, there is the most demand in the 2-wheeler category because the prices of EV 2W's and conventional petrol 2W's have received almost the same price and consumers are looking for a value addition, peace of mindand higher reliability with less running cost. This has enabled higher consumer interest and acceptance in the geographies. As a perspective to look at, it can be seen that apart from EV's,the Indian govt. also is trying to ask consumer for hydrogen fuel cell vehicles, but the lack of options and non-availability of vehicles have questioned the industry whether there is another alternative or not?

It is believed that both EV's and hydrogen fuel cell vehicles have a potential to bring a notable change in the Indian Automotive sector in the upcoming years and in this decade itself.

FUTURE OF THE INDUSTRY

The future of this Industry is very bright as India would be expected to be 3rd largestautomotive market in terms of volume in the world by the year 2030.

Since this industry has produced a whopping of 229.3 Lakh vehicles (Passenger Vehicles, Commercial Vehicles, 3Wheelers, 2Wheelers, Quadricycles) from April 2021 to March 2022; it is correct to say that India holds very a strong position in the heavy vehicles arena internationally as stands as the biggest tractor manufacturer (in terms of volume) and the 2nd largest bus manufacturer. It also stands as the 3rd largest heavy trucks manufacturer in the whole world. As of date the whole auto industry contributes a whopping 7.1% of India's total GDP. Further, it contributes to an astonishing 49% of its manufacturing capabilities.[8]

The Indian EV market is expected to grow annually at a rate of 49% from 2022 to 2030. This is

[8] https://www.investindia.gov.in/sector/automobile#%3A~%3Atext%3DThe%20number%20of%20trucks

 ISSN: 2582-6433

further expected to reach an annual sale of 100 lakh by 2030 further it is expected to provide 50 lakh direct and indirect jobs in an industry that is about 80% of the current size orworth 60 billion Dollars of India's vehicle industry.

Talking about number, the PV segment saw the highest ever sale for in FY 2022-23 (Nov 2022)at 25 Lakh units. With this in mind, the industry is expected to at a pace of 16% overall in theFY23. Further, India's trucking industry is expected to grow four times in size and capacity bythe year 2050, this is simply because the number of trucks to be sold and used is expected toskyrocket and quadruple from a current 4 lakh to 17 lakh trucks alone by 2050. To have a rough estimate, India's Auto Industry is currently valued at more than This industry iscurrently worth 223 Billion dollars which is in terms of quantity, 8% of the country's total export. This would also accounts for 7.1% of India's GDP which would spiral it to become the3rd largest market in the world by the year 2030.

In a sudden shift for the automotive market, it has been seen that consumers now require a bigger and better car and have started to move towards larger and more powerful vehicles inorder to upgrade their current choices. This industry is currently worth 223 Billion dollars and would surpass 300 Billion Dollars in the future.

In the FY 2022-203 the export of PV's increased from 4.05 Lakh Units to 5.77 Lakh Units creating a cumulative positive growth of 42.9% & in the Commercial Vehicle segment, exports had increased from 50k units to over to 90k units. In the 3Wheeler segment, exports had increased from 4 Lakh Units to 5 lakh units and 2Wheeler segment saw exports from 32 Lakhunits to 44 Lakh units.[9]

This sector is expected to grow more and is a vital key element of the Indian economy and it is contributing to more than 49% of India's manufacturing capability, further it also goes fora 7.5% of the total GDP as well making it a lifeline for the Indian economy, as it creates jobs for more than 3.6 lakh people, this sector can be called as a bread earner for a lot of people. Further, this employment figure is going to be going up as it is expected by 2026 to be a corepart of the economy and since most of the production levels are now at par with pre covid levels it can be rightfully said that this sector will grow even more in the future.

In India more than 60% car buyers are the Gen Y & under the age of 30 years old and keepingthat

[9]https://www.investindia.gov.in/sector/automobile#%3A~%3Atext%3DThe%20number%20of%20trucks%20is%2Cin%20the%20world%20by%202030

 ISSN: 2582-6433

in mind the demand for vehicles and luxury vehicles has risen highly over previous yearshas pumped up demand for this sector even more than before at a rate of 32%. The demandfor luxury vehicles would continue to rise before reaching an astonishing level of sale. Since the pandemic has made some people and young generations to live life only once, the gen Y & gen Z are willing to pay more to fulfil their wish of owning their choice of vehicle regardlessof the cost.

Earlier there was a question of buying the EV's without a demand, now the situation has changed as EV's command a whopping 1% share of the Automotive market without any subsidies as of date. The figure is expected to reach a rate of 3.8% very soon and would continue to grow rapidly. In order to capitalize on this growth, the govt. brought about the PLI scheme which focussed upon the hydrogen fuel cell vehicles and electric vehicles along with hybrid vehicle sales. Since this scheme came in, a concept of flex fuel long prominent inthe automotive field (petrol + cng) came into a new phase with the showcase of hydrogen fuel cell vehicles being showcased and Commercial trucks being showcased in (LNG + CNG) format and various other derivations as well in the Indian market. This gave a new hope to new fuel advancements and technological advancements for various automakers and for thegovt.

The pandemic showed a lifestyle of online shopping and with this transition, automakers and consumers alike made a decision to commercialize vehicle shopping though online mediums. Earlier customers used to visit dealerships and used to test drive vehicles and then move for the buying experience. But today, the new generation wants to skip the line and get their hands on their choice of a car. In order to cater to this demand, automakers are now using e platforms, websites and apps to monitor and understand the needs and the interest of the 'new next-gen customer' before such launching an automobile. This knowledge is now helpingautomakers to launch products that as per the customers requirements and needs which theydesire in a car.

The future is making it seem that the market for EV's is growing and higher sales are initiatedfor the EV market. A perfect example is the vehicles that are more than ever tech-laden and a major stimulator for the semiconductor shortage which had earlier led to a supply crunch. Such a trend is expected to continue in the auto industry where higher tech assisted and connected car tech would be the part of future mobility and perhaps the most important partis that of vehicles that would be much safer for passengers and vehicles alike.

Since energy prices are likely to remain high in the upcoming future, the next phase of vehiclesis bound to be either EV's, Hybrids or CNG for passenger vehicles. For commercial vehicles the demand for diesel, LNG, LPG, CNG are likely to be stable.

 ISSN: 2582-6433

Notably, the answer to the question, "will autonomous vehicles become a reality on Indian roads?" seems to be not for a very long time.

In India's chaotic roads there is a surprise around every corner in these cases collecting data can be huge task and because of this there is far too much change in the Indian roads, since we know that AV's are usually used by huge tech giants for making giant maps and trained todo so, their training encompasses data that is nearly possible to understand every road situation that a vehicle may encounter in various situations but Indian roads and lanes often confuse these systems altogether. But in developed nations they have huge roads and clear maps which combined with efficient road networks makes the task easier and the number ofsuch situations smaller.

There are various factors in this field, such as the availability of skilled labour at very low and reasonable cost and robust R&D centres along with low-cost steel production that the automobile industry is dependent on these days. With that being said, the industry is set to create huge investment opportunities in regards to direct and indirect employment and withkeeping in mind skilled and unskilled labour segments as well, it is evident to say that the EV industry alone would be able to create 5 crore jobs by 2030.

As on August 2022, India launched its 1st double-decker E-bus in Mumbai and as a long-term operation the govt. is of the sentiment that it is necessary to change the overall country's mobility and transportation system, keeping this in mind it is working towards creating a highly integrated ecosystem with core focus on EV segment which has a low carbon footprint.Further, the passenger volume is meant to increase as the need for a clean and efficient urbantransportation system is the need of the hour. The govt. aims cash on in this and has a policywhich is in turn intended to promote higher adoption of EV's in response to rapidly growing demand for cleaner alternative transport solutions.

The Govt. of India requires and wants the automobile sector to be able to attract an investment of 8 to 10 billion dollars by 2023, ambitious but a farfetched expectation. As a spectator, it is easily understandable that India could be the next leader overall mobility market by the end of this decade and leading the opportunities for electric and other vehiclesand this industry is expected to smash previous sales records and aims to achieve the numberone slot for automotive sales across the globe. As seen from post COVID-19 pandemic sales, the market for is rising by the day and is also likely to witness positive sales by 2022-23.[10]

[10] https://www.ibef.org/industry/india-automobiles

 ISSN: 2582-6433

MAJOR MILESTONES ACHIEVED:

- Contribution of 6.4% of the total of India's GDP; total of the 35% of manufacturing GDP (Indian automobile industry).
- A leading employment provider in the Indian Subcontinent.
- A new record of 1,557,238 units from a combined total of production of passenger vehicles, 3-wheelers, 2-wheelers, and Quadricycles, in December 2022.
- An emerging leader in shared mobility, which is aimed to be achieved by 2030 and becoming a provider for opportunities in the electric vehicles market with a focus on shifting to electric vehicles in order to reduce emissions. This would further create fivecrore jobs by 2030 in the electric vehicles industry.
- This sector is one of the only sectors to receive a cumulative FDI of about 33.77 billionUS dollars between 2000 and 2022. This sector is also further aimed at attracting a figure of around $10 billion in local and foreign investments by 2025.
- In regards to Govt. Initiatives', the Govt., the Indian govt. had issued a the PLI schemefor automobile & auto components worth Rs. 25,938 crore approximately $3.49 billion dollars in September 2021. This was preceded by the Automotive Mission Plan (2016-26). This was an initiative by the Govt. of India along with this Industry.
- India is currently the largest of tractor producers in the world and the second-largest bus manufacturer, and third-largest heavy trucks manufacturer in the world. It is to be noted that India's automobile sector is divided in four segments, i.e., 2wheelers, 3wheelers, passenger vehicles and commercial vehicles (both small and large). In eachsegment there are a few market leaders. In the domestic market, 2 wheelers and PV'sdominate the domestic demand of vehicles in the market.
- The market capping of the India's PV car market was valued at approximately at $32.70 billion in 2021 and is further expected to reach $54.84 billion by the year 2027.It is also forecasted that the EV market would reach an estimated Rs. 50,000 crore or $7.09 billion by 2025.
- In terms of domestic demand and exports from India, Our India has a strong market and as on FY22 the total passenger vehicle sales stood at 30 lakh vehicles. The exportor cars stood at 31k units as on September 2022. This scenario is achievable because there are significant cost advantages for automobile firms as they save 10-25% on

 ISSN: 2582-6433

overall expenses in Europe and Latin American markets via this route and in future this Industry would increase export of vehicles by 5X times by 2026.

- Then there are foreign automakers such as Kia Motors, Volkswagen and MG that havemoulded their strategies to understand the needs of the huge number of middle-classbuyers by shaping of their traditional structure & designs, allowing them to compete directly with domestic companies.
- There has been a shift of focus to electric cars in order to reduce emissions and this can be seen in terms of sale of electric vehicles in Quarter 3rd of FY22. It is to be noticedthat there has been sale of EV's and a new top line of 5,592 units has been achieved. As of 2021, there has been a 168% Year on Year growth of sale of EV's in India.
- In order to meet the need to set up proper charging infrastructure for Evs in India, there has been an investment flow into EV start-up sphere or nearly Rs. 3,307 crore with reaching an all-time of nearly 255% growth. The effort is supplemented by the need to install EV electric equipment infrastructure by various PSU's and firms and other players.
- M&M had announced in November 2022, that they would be tying up with 3 EV infrastructure partners – Jio-bp, Statiq, and Charge+Zone for offering charging solutions. Further, the Indian government a corpus of incentives to be given over a five-year period to encourage production and export of EV & Hydrogen Cell vehicles. This is supplemented by Initiatives like Make in India, the AMP 2026 and PLI scheme.
- Our Minister of Road Transport and Highways, Hon'ble Mr. Nitin Gadkari Ji, has revealed his plans to roll out a safety programme called as Bharat NCAP. This would be India's own vehicle safety assessment program. In compliment to the same, out Hon'ble Prime Minister Sh. Narendra Modi Ji had flagged of the Vehicle Scrappage Policy which aims to go away with old polluting vehicles in an cost effective and also aenvironmentally-safe mechanism to dispose off old cars.
- On a long term view, the GOI thinks it is necessary to transform the country's transportation system on phase wise manner and is working for creating an EV mobility ecosystem with a low carbon footprint and high passenger mobility with an focus on urban transportation. The government's policies are in the view to promote higher adoption of EV's in response to the growing customer's demand for environment and cost friendly alternatives.
- Even after the COVID-19 pandemic had affected India, the Indian automobiles sector has eventually bounced back and has shown a strong growth in FY23 and if the same would continue, it would grow exponentially and in move towards creating a leader inthe shared mobility sector by 2030[11]

[11] https://www.ibef.org/industry/automobiles-presentation

 ISSN: 2582-6433

CHAPTER 3

TRANSFER OF TECHNOLOGY & INDIAN AUTOMOTIVE INDUSTRY

INTRODUCTION OF TECHNOLOGY AND ITS TRANSFER

The first technological advancement in the automotive industry was the introduction of the engine itself also known as the Internal Combustion Engine or the ICE. Since the 1860's the first car or the automobile was invented which was an invention that did not require any animals but rather an engine to drive the carriage forward. This was followed by a revolutionof advancements and never-ending series of industrial events and never before seen advancements. One such advancement was the introduction of the Assembly line system by Mr. Henry Ford of Ford Motor Company, who had first started the mass production of vehicles. His first vehicle i.e., the Ford Model T had sold more than 17 million units all over the world in various iterations and variants. It was the time when cars didn't have any basic parts such as doors, windshields or indicators or lights, but with the introduction of this car the car industry had changed altogether.

Now taking into case of India's auto industry the case started post-independence era where at that time the ruling government under the leadership of then prime minister, the automotive industry was understood as a key industry to focus upon as this was the industrythat could create a wave of change in the overall growth of the country. But there were various restraints such as the 'License Raj' which allowed only a selected companies to operate in the economy. Amongst those were a selected few company with the names that still exist today namely, Tata Motors, Ashok Leyland, Mahindra and Mahindra to name a few,but during those days it was Mercedez Tata trucks and the company was TELCO (Tata Engineering and Locomotive Company Ltd.); Ashok Motors and Leyland (British) Motors whohad first ventured into the commercial vehicles, trucks and buses segment during those days.The other arm was the passenger vehicle segment which was led by Hindustan Motors in collaboration with Morris Minor (for the engines and designs) and Premier Motors which hassome existence even today. In those days, car production was slow and took ages to manufacture with manual labour techniques and manual machinery. Since it was the age of the 'License Raj' foreign companies could not enter the market and some few existing playerslike General Motors had to exit in a short span of time. The rate was slow and there was no need for innovation or major overhaul and automakers which exited had monopoly over the market and were simply providing the same or very similar products for decades at a time unlike today's major facelifts. Since measures like Restrictive Trade Practices were already in

 ISSN: 2582-6433

place and exchange controls were stringent, the need for actually making any real innovationat all. The best example was the Ambassador which never really changed its original body shape throughout its lifetime.

Though in the global scenario, cars had already got turn signals, coil springs, air conditioning and improved suspensions by 1950's. The world saw features like cruise control, seatbelts before the end of the 60's. However, India was far from the same until a certain period of time.

Then came the year 1991, and India's fiscal deficit had forced new foreign companies to enterthe Indian market, along with it came international innovation and the first ray of hope for technological advancements. During this time India saw the likes of India's own Govt. led Maruti and Japanese owned Suzuki Motors tie up to form the 'Maruti Suzuki India Limited' the biggest passenger vehicle manufacturer in India. It was also the time when India saw an emergence of small, practical cars meant for the masses of India. These were cars that were budget friendly, reliable and easy to navigate for the roads of India. It was also during this time cars saw an emergence of features such as power windows, electric door locks, music and cd systems and fogging and defogging systems. These systems were by those days the most basic of features in all the cars.

Nowadays technology has been at the forefront of the production and increased market competition has caused the automakers to be in a constant race for the best innovations for be provided to the customer in the most efficient manner possible. Since vehicles are now technology oriented, customers are now more tech savvy and want the latest technologies intheir car for the premium they pay for a product!

Since price always matters to a customer, every customer wants to have the best of all features with the best of quality at the best price with a peace of mind. Though this equilibrium is not ideally possible, there are some knicks and knacks that are still left out by automakers. The products are perfect in their own manners where some might lose out to other products altogether, the differences between them make them very unique for the endcustomer.

It can historically be seen in the last 3 decades this sector has changed drastically and has caused various innovations to be made and done in this entire period. These include Limited Slip Diffrentials and Electronic Torque Control measures introduced by Mitsubishi in 1996. Then we have the introduction of Turbocharging systems in early on diesel engines and prevalent even till now. There was a time when the 1.3 Litre diesel engine of Fiat saw its dutyon almost all Indian cars including companies of Fiat, Maruti Suzuki and Tata where this engine saw maximum

 ISSN: 2582-6433

reliability and low fuel consumption. Fiat is still known to provide dieselengines to automakers and has long abandoned the need for selling vehicles in India. It now thrives on providing its proven, emission compliant and fuel efficient 2 Litre diesel engine to Tata & Jeep. Another feat in this matter was achieved by Hyundai which started providing itsfeature laden cars to the public with Bluetooth, touchscreen and android auto and apple car play in their entry level budget cars with special recognition to the Grandi10 and Elite i20.

This sector has also seen the exit of many proven automotive giant such as General Motors (1993-2020) and Ford (1995-2021). Though Ford has already seen exit in 1953 and then comeback as Mahindra Ford in 1995, it has now exited the Indian market though it does planto make a comeback thorough imported unit route.

But carmakers like Kia Motors, sister concern of Hyundai started its operations in 2018 and isnow a prominent player in the Indian auto market. It has seen a substantial growth in its products and portfolios and also meant to provide more products including the all new EV6 as its latest offering. The latest player is the French Citroen which aims to establish its products in the market on the basis of their USP of the best-in-class suspension.

There is no end what automakers would to do innovate their cars and technological advancements are the ladders to their advancements it can be seen that the transition from fossil fuels to electric vehicles has been a long but fruitful journey, this has also brought about new safety advancements all thanks to the new technologies that have made it superior in every way possible with driver assistance systems and all mechanisms to make the driver avoid fatalities and crashes.

This has also paved the way for technologically advanced vehicles and automated systems tobe incorporated in cars and make them more reliable. The need for these advancements would only increase as the number of automobiles would increase in the market. This wouldmean higher investments by companies into their products, faster production times and techniques, better tools and advancements to made in product designs and better-quality products to be used to be used to make quality products.[12]

As this sector progresses, mobility as whole would progress with the adaption of modern techniques and higher reliance on artificial intelligence, virtual assistants, Internet of things and various other new modern mechanisms, it would obviously mean advancements in the infrastructure to support and allow these systems to grow and flourish even further than anticipated.

[12] https://www.extentia.com/post/the-evolution-of-automotive-technology

 ISSN: 2582-6433

PROCESS OF ADOPTION BY INDIAN AUTOMAKERS

The auto sector had come to life in the year of 1983 with the introduction of the Maruti Suzuki800. This small car was a product that changed the entire market. This not only brought low-cost advantages and high fuel efficiencies, but brought a step closer to the common mans dream of purchasing a vehicle. The whole concept of a small car brought together an environment of high-quality automobiles to be manufactured and but gave importance to various other sectors such as the 2wheeler market. In the 1980's India had the likes of Yamaha, Suzuki, Honda and Kawasaki brands in the 2-wheeler segment which was dominatedby the Japanese Motorcycle makers. They had combined high quality performance with high fuel efficiency and extreme reliability for motorcycle enthusiasts, what's more was that therewere hardy motorbikes with good performance that enabled the first breed of motorcycle enthusiasts. The most noticeable and name worth model was the Yamaha RX100 which probable one of the most sold bikes in India in the 90's. We also had the Japanese carmakerssuch as Mitsubishi, Nissan and Toyota enter the market with the hardened 4x4 pickups and SUV's for establishment in the Indian market but through various Joint Ventures and partnership models. These early players could not survive the currency onslaught and had toshift to producing more efficient, reliable and budget friendly cars for the Indian market. Unfortunately, Mitsubishi lost out to other player simply due to lack of bringing about newercars of newer make and models. We then see the of new ventures, the likes of these were Bajaj Auto and Hero Motor Corp formerly known as Hero Honda. Bajaj had transformed the market with its range of performance friendly budget motorcycle of Pulsars. This was post their venture with Kawasaki.

It is to be noticed that post opening the market to foreign players, the automobile market changed completely and it allowed various Japanese, German and American Automakers to enter the market and change this Industry forever. These carmakers were aimed producing vehicles in masses for the masses itself, this caused rampant development as they required huge labour and specialized work personnel creating an ecosystem where they set up their manufacturing facilities. Usually the most notable was Gurgaon-Manesar which earlier knownfor their plant and later the whole area developed due to their allied industries and partner OEM working with them to develop and cater to the huge demand of automobiles in India.

This Industry even saw a higher growth as it made various ventures into various expansion of portfolios. The reason behind this was that the Indian auto purchase market is very varied asearlier customers used to buy small cars in mass and it was the trend up until 2008, then thetrend changed

 ISSN: 2582-6433

altogether for better cars and premium hatchbacks such as the i20 and sedanssuch as the Octavia, Verna, Superb and more. Then in the 2012's the market then adopted and changed its mindset for bigger SUV's such as the Scorpio and Fortuner, but in this segment, there was a huge price gap between small and large cars and thus it formed the segment of Compact SUV's which was first introduced by the Hyundai Creta. Then the automakers started opting for sub 4 metre vehicles including sedans, SUV's and more which gave birth to the Maurti Dzire, Hyundai Xcent and many other compact sedans. This further the development of sub 4 metre SUV's which was introduced by the Ford Eco Sport and thenthe likes of Tata Nexon, Hyundai Venue and other vehicles.

In the last 20 years, the market such huge transitions and changes that it can be mentioned as a highly dynamic market in regards to size, manufacturing capabilities and volume of sales of automakers.

Then we have another very good example of India's own die casting forge. The company is Bharat Forge which become the 2nd largest manufacturer of forged products in the whole world only being 2nd to Thyssen Krupp, a company which has been forging tanks and other heavy industrial parts since before the world war.

In order to achieve this feat, Bharat forger had increased its forging capacity and provided high quality forge as per the requirement and demand. Then it has created a rapid expansionin work force and working upon inducting highly experienced work personnel. It further usedthe latest design and technological blueprinting techniques to create precise die-casts along with increasing the export opportunities globally. Thus, Bharat Forge became a global player in manufacturing capabilities.

It is to be noticed that there are major Indian automakers that have created a history by playing a major role in creating of a landmark from their overall technological advancements,introduction of new products, major changes in company's sales and overall infrastructure and lastly the everlasting impact on the overall market itself that make these two companiesworthy of a case study which would be discussed in detail.

 ISSN: 2582-6433

Case Studies:

1) Case 1: Mahindra & Mahindra:

History:

The Company Mahindra & Mahindra Ltd. (M&M) was founded in the year 1945 by Mr. J.C. & K.C. Mahindra. It was one the first companies which ventured into the farm manufacturing business with the tractors initially. This made them by far the biggest tractor manufacturer inthe world in terms of volume of sales in farm tractors and other farm equipment. They further ventured into the manufacturing of passenger vehicles with the manufacturing of jeeps in collaboration with the American manufacturer of Willy's who had been manufacturing jeeps for the US Army and allied force in World War 2. M&M then started manufacturing the Jeep under a license, and since it was an era of the 'License Raj' which disallowed other major players to enter the market and allowed the current manufacturers to sell vehicles without any major obstruction in the Indian market. It is to be noticed that Mahindra was even then a major manufacturer of Jeep vehicles for almost 60 years creating a major brand name to beassociated with jeep being synonymous. In the 80's, Mahindra started the manufacturing theMarshall as a variation of the Jeep and turning out to be the Bolero which is very much shownin hilly, desert and lower backward areas and in mostly village areas. Further, over time Mahindra has introduced a range of Utility Vehicles as per the market demand and since othermajor market players entered the market post the 2000's. In 2002, the Mahindra introducedthe Scorpio which was an instant success in the SUV market with a decent size, ruggedness, reliability and a good alternative to other options in the market within a budget rather than alternative more expensive options. Mahindra had very small partnership with Ford for sometime in the early 90's however with the business operation of creating utility vehicles. Mahindra had then introduced the Xylo, TUV300 as other products as an alternative to othercars as well, then they also introduced the Verito sedan which was a moderate success. Then there was an early attempt my Mahindra at creating Reva, the small electric car but the car could not reach the right audience at the right time. Currently, Mahindra has its own service of pre-owned cars. They also have Mahindra Finance as a finance partner for customers, Mahindra has also ventured into the commercial heavy trucks and buses segment. Mahindrahad also at one point of time ventured in the Formula 1 racing team as well at one point of time as a part of a marketing and expansion program of theirs. In the current market scenario, market has emerged as one of the major market players by launching the latest products suchas the Thar as variant of the Jeep Rubicon and the Scorpio N as a luxurious successor and theXUV700 premium SUV. Mahindra also created the compact SUV segment with the XUV300 and the latest electric compact SUV

 ISSN: 2582-6433

with the XUV400 which is one the fastest electric vehiclesin the Indian market with the right price point. The company is already one of the top 5 car manufacturers in the passenger vehicle segment in terms of sales and is already working on launching new future ready products as well.

Technological Advancement:

The Scorpio N is was a flagship project taken on by the M&M team of only 120 and some design engineers, but a very concentrated team that focussed on creating a perfect future ready product for the Indian masses. The very first feature that was introduced was the Driver Drowsiness Detection amongst a lot of features in their cars. This system enabled the driver'sfatigue and lack of attention to be detected which is a very key feature in chauffeur driven cars and even in self-driven cars to avoid any collisions.

In another product which was the XUV700, it was the first car to feature AI enabled connectedcar infotainment and driver information displays to be connected. Further, this was one of the first cars in the market to feature ADAS or Advanced Driver Assistance System that was one of first systems to be adopted in a premium SUV. The technology adopted in this car established a first in segment feature benchmarks for all the other cars in the market

One of the key factors in any car is the engine and the engine of car of the Scorpio N and the XUV700 was developed, established and made product ready with the collaboration of AVL which is an Austrian company which developed the petrol and diesel engines with various vendors that made the product a market ready product to be launched. The engines were also made compliant with European Emission standards first and then with Indian emission standards as well in order to match the norms. Mahindra had chosen the Korean vendors to develop various electrical requirements and sophisticated technological advancements. Then there was the challenge of preparing for the production of these vehicles and the whole production line was revamped with keeping in mind the costs of setting up the same and asa result they had prepared a production line of producing 45 thousand vehicles at maximum capacity. The overall cost of the project landed at approximately 120 Million US Dollars and to have a cherry on the top, the ScorpioN and XUV700 won the 'Car of the Year' and variousdesigns awards as well.

There is one factor which is the expansion into other markets. For example, the Scorpio Getaway also known the Scorpio Pickup is a very popular product in the South African and Australian markets. Mahindra manufactures the products at a local plant in their country. Themain purpose behind the same a fuel efficient and reliable pickup truck that is produced andmaintained locally and purchased at a very cost-effective price. This product was launched inthe year 2006 in the

 ISSN: 2582-6433

South African market and somewhere around the same time in Australian market as well. In Australia, people love the car because it can withstand the temperatures and meant for the rough terrains that are present there in their country. The car also is easier to repair and maintain and costs 1/3rd than that of the other SUV.

In recent times Mahindra has moved ahead with future ready product series of XUV series ofXUV 300, 400, 500 & 700 as of date.

This new automobile division is now being headed by Mr. Pratap Bose, Head Designer for all new vehicles that are currently being designed by him and his team. Further, new design techniques and designers have been called from abroad to execute the said task of designingnew vehicles which provides an opportunity for M&M to obtain Transfer of Technology fromvarious other sources. This provides an opportunity for the Indian Market to be able to have future ready products as well.[13]

2) Case 2: Tata Motors:

History:

Tata Motors Limited was launched in the year 1945 as the Tata Engineering & Locomotive Company Ltd. (Telco). Tata started out as brand that built locomotives but later moved on to production of commercial vehicles in the year 1954 with Mercedes Benz at that time until 1969. Under that era Tata became a major commercial manufacturer of trucks for the entire Indian subcontinent and is still known to be as the number one manufacturer of trucks and buses in India. Tata motors first ventured into the passenger vehicle car segment with the announcement of the Tata Indica in 1998 with more premium products such as the Sierra andSienna Estate. These later cars were the first cars to get features like power windows and power brakes.

Tata then ventured from private car sales to a major provider of commercial passenger vehicles for cab and taxi use with their Indica and Indigo series. But these cars always requiredsome kind of maintenance in various formats. Their reign went on for a good period until thearrival of rival products and ended their monopoly in commercial passenger vehicle segment.

Since Tata cars had gained as image as a cab vehicle and was already quite obsolete the brandwas one of the lowest selling brands in India. What it required was an overhaul and too a major one not only for the fresh line of products but for the brand image as well.

[13] Zafar Husain & Professor Sushil; "Active transfer of technology in the automobile industry: Indianexperiences", 13-20, Routine Library Editions (2000)

 ISSN: 2582-6433

Then in order to change the system and the image of the company, Tata created a major breakthrough in their product line up with the launch of the Tata Nexon. The Nexon was immediately loved as it was a car with a futuristic design. Plus the Nexon was sent for a Global Crash Test Rating which solidified its position as India's first 5 star rated safe car which madeits Unique Selling Proposition and made it the most selling product of the Company even till date.

Post changing the name from TELCO to Tata Motors in the year 2003, there some very important chain of events that followed which can be mentioned below:

- Tata Motors acquired the Korean brand Daewoo's heavy commercial business arm inthe year 2004 and allowed them to get their hands on advanced engines and better built mechanical parts;
- In 2006, Tata Motors announced their partnership with Fiat Motors for obtaining theirreliable diesel engines and for other related technologies as well;
- Tata then launched India's first mini commercial vehicles for rural and urban shared mobility, known as the Tata Magic and a mini pickup truck in the form of 5 ton capacitytonnage vehicle called as the Tata Ace.
- The world's cheapest car and India's first and the most affordable car i.e., the Tata Nano launched in 2008. The same year, Tata Motors acquired the JLR or Jaguar Land Rover Group from Ford Motor Company.
- Launch of Tata Harrier, Nexon on the Omega Arc Platform;
- Launch of newer products such as the Tiago and Tigor for catering to smaller carmarket;
- Launch of Premium Hatchback of Altroz and Sub-Compact SUV. Tata Punch;
- Producing the first 5 Star Safety Rating Car and the only company to have the completeof vehicles obtain 4-5 Star Safety Rating.
- Jump from Number 6 in Passenger Vehicle Sales to Number 2 as of FY 2021-22 & 2022-23;
- The only Company to be Number 1 in Commercial Vehicles and Number 2 in PassengerVehicles in terms of overall sale in the market.

Technological Advancement:

In the matters of technology, Tata has always led the race whether in commercial or passenger vehicles or even in locatives back in the day. One the most successful products to be launched was the Tata 407 that had been sold in lakhs of units.

But the first actual innovation started with the development of the first Tata car i.e., the Indicawhich was based on the Rover car of Britain. The cost of development of the car? A whooping378 million

 ISSN: 2582-6433

Dollars in todays currency and which gave the motivation to build better cars for the future.[14]

Since then, Tata has come a long way in the fields of innovation in terms of design, overall product quality, features and reliable engines with good fuel efficiency.

Tata Motors has always been very innovative and its innovation techniques has always been unique and modern. The current philosophy makes their cars of quality and tough build quality while laden with the most of the premium features which are necessities. But unlike other carmakers, unnecessary features are avoided which would rather cause distraction thanactually help the driver such as fancy oversized tablet touchscreens rather than practical normal sized easy to use touchscreens.

The Major breakthrough was the adoption of the Omega Arc Platform from the Jaguar Land Rover which gave birth to remarkable products such as the Tata Nexon, Harrier, Safari.

They involved high-end design mechanisms and adoption of new technologies used in the JLR line-up. Further, a lot of new investments had to be made to make entire production setups which using of advanced robotics and high tensile steel as well.

Further, the use of advanced mechanisms and technological features to be provided in a product paved the way for new arrangements and agreements to be forged and formed between various OEM suppliers from all across the globe. This also further strengthened the goals for future products to be developed.

Tata Motors has also cashed in on their heritage and relaunched the Safari brand and would relaunch the Sierra as an EV vehicle. Even today Tata Motors boasts in their total line-up being loaded with safe cars and 3 of their cars i.e., the Nexon, Altrozz and Punch being the 5 Star rated cars and the Tiago and Tigor with 4 Star ratings each. It is to say Tata would continue todevelop their cars further and has come down a long way from being the humble passenger vehicle manufacturer to being the 2nd Biggest Player in the PV segment in terms of month onmonth sales beating Hyundai to the 2nd spot continuously in a row and being one of the mostfavoured car manufacturers in India.

[14] Ashok K. Mohanty; “Technology Transfer in Indian Automobile Industry” 6-19, SSRN (2005)

 ISSN: 2582-6433

EVOLUTION OF TECHNOLOGY IN AUTOMOTIVE SECTOR

Technological evolution has played an important across times and ages and with the growth of many sectors and the rapid development of the auto industry the evolution has been reaching heights and breaking ceilings witnessing a huge development and unparalleled growth in this sector. Since automobiles and self-mobility have become the major focus in today's time, automobiles have gone a step further in introducing technologies to the customers that not only help and assist the customer but also helps the customer in saving their lives. It is to be noted such a change was not an immediate action but rather a long sustained progressing feat.

Since the first automobile was produced in India, a number of technological advancements have taken place since then and a number of key important advancements have taken place which have been highlighted and explained properly in the below mentioned points. It is to be noted that these are not just technological advancements but lifesaving tools as well.

1. Self-Driving or Autonomous Vehicles:

These are the kind of vehicles that reduce the need for a human driver and increase the self-driving programs through various onboard computers, GPS mappings and other software's toreach the desired locations. SDV's reduce the need for drivers and increase the efficiency in the transportation solutions. This also negates the effects of driver laziness, number of accidents and 3rd party damages caused. Further, there is also a reduced risk of total loss of vehicles. In India, there is actually very growth of these vehicles but in the coming times it would be quite prominent.

2. Connected Vehicle Technology:

In todays times, all new vehicles are enabled with connected car technology and this containsa load of features such as tracking vehicle analytics and vehicle diagnostics and further helpsin analysing the problems and faults in a vehicle. In commercial vehicles, this helps in trackingvehicles and the maintenance schedules of vehicles. This further enables owners to keep a track of the movement of vehicles and their routes. Further, such a system helps in the changein the overall system of vehicle ownership as well.

3. Adoption of EV's:

Since the dawn of Electric Vehicles, it has been noticed that the need for fuel burning cars and vehicles is reducing and the need for electric vehicles is now the need of the hour. In this period, it is necessary for the growth of this sector. Of course, there are issues such as low battery performance, questionable reliability and still growing charging infrastructure, however all these

 ISSN: 2582-6433

issues can be addressed with proper aggressive campaigns for growth of the EV sphere based on renewable energy sources.

4. Mobility as a Service:

In India there are various companies such Uber Share and Ola Share and RedBus Services and other options that act as a service for transportation rather than a complete ownership and the renter can drive and ride the vehicle as he pleases as per his own will. Further, this helps in providing service as an aggregator, this helps in transporting multiple passengers at a time and reduced the number of vehicles on road along with reduced pollution levels.

5. Data Collection and Analytics:

In the era of data and data volumes, it is seen that even in car technologies data can play an important role as important as the vehicle itself as the data genre is so huge and important that it contains the whole cycle of production of vehicle and the sale of it and the ownership and then the resale of the same and change of ownership of the vehicle itself. This is usually checked by the Vehicle Identification Number or VIN Number and the Registration details as well. It is to note that such details as necessary in case of theft, fire or other accidents. Such details are absolutely necessary for securing the vehicle history as well. This data further helps various business in generating the exact values of vehicles and their parts and decide their margins accordingly.

6. Artificial Intelligence Technology:

AI technology is now driving not only cars but the world as well, the perfect example is ChatGPT and its variations. Similarly, in automobiles we have various techniques such as fleetmanagement and self-driving vehicles and radar assisted adas features along with other important features.

7. Human-Machine Interface's (HMI):

HMI is an interface of connected car technology that would fundamentally change the type of interaction between a vehicle and a driver with voice command functions and live feedback features along with voice assisted features. Then there are virtual assistants in cars for the driver to enhance the driving experience. Along with it the HMI's are a tool of the future that would allow the machines to operate independently.

8. 3D Printing Technology:

This is a technology that saves costs, enhances rapid deployment and high printing of 3D models

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with ease. In Auto industry, this enables for test equipment and vehicle interfaces tobe made and checked for further production. Also, 3D Printing techniques helps in printing ofdesigns that usually were very highly high costing. The quality of these are usually durable and strong and very much above in quality than others.

9. Internet of Things (IoT):

Iot is a system that allows communication between vehicles, equipment's and machines. Thisis usually seen in cases of FastTag option of deducting tolls all across the country. It is to be noted that this allows easy collection of taxes and reducing traffic congestions along with reduced expenses in the overall technological advancement. The Iot has enabled the toll collection to be very easy with connection between the bank and the toll authorities and thegovernment with a seamless connectivity.[15]

10. Cruise Control:

Cruise Control is a system that fixes the speed of a car at a particular speed until braked or stopped manually. In this system the driver reaches a speed and fixes the speed of a car without the use of any pedals as this system is done at a particular gear and a particular RPMand speed. This has now been supplemented by Adaptive Cruise Control, in this system thereare sensors that sense an oncoming vehicle and that reduces automatically the speed of the vehicle and stabilizes it. This can be seen in almost all cars with radar sensing.

11. Predictive Technology:

This is a kind of technology that incorporate algorithms for a predictive driving experience that allows the vehicle to understand the functions that are needed to manoeuvre the cars ina much more significant manner and helps in setting the preferences in a user-friendly manner. Example such as driving modes and terrain modes for the car to be selected and driven upon the exact manner a driver wants the vehicle to driven in.

12. Driver Drowsiness Detection:

This is a kind of system that detects the driver's mood and fatigue and vibrates the wheel andwith various warnings asks the driver to wake up or take a break in order to drive much morecarefully and in a road friendly manner. In India, it was first introduced in the new Mahindra Scorpio N.

[15] Florian A. A. Becker Ritterspach, "The development of India's small car path", 15-21, Oxford Management Publishing(2009)

 ISSN: 2582-6433

13. Commercial Vehicle Aggregators:

Cab aggregators such as Uber, Ola and Blu Electric have dominated the market in cab aggregating services by providing their services for cab hailing services and allowing owners to help in ride sharing services. A simple mechanism of ordering a cab and reaching your destination simply with the touch of your mobile screens. This sector is dominated aseverybody needs a cab hailing service today for today's mobility. While all the app does is connect with you a driver and go for a precalculated fee.

14. Advanced Driver Assistance Systems (ADAS):

ADAS is a system that allows driver to ensure a complete environment that helps the driver to overcome obstacles such as blind spots and allows driver in highways and in normal roadsin case the driver gets distracted. There are various aspects to this function to work properly and effectively which combines various cameras, sensors and radar to understand the position of the vehicle. This system not only helps the driver but advises him to do the smallest things such as change lanes.

Such an example is now seen in Honda City as Honda Sense and Tata Safety programs in premium cars. There are various functions that combine the said functions which are follows:

A. Adaptive Cruise Control:

Adaptive Cruise Control, in this system there are sensors that sense an oncoming vehicle and that reduces automatically the speed of the vehicle and stabilizes it. This can be seen in almost all cars with radar sensing.

B. Blind-Spot Alert System:

In this system there is a warning on the side view mirrors that detects traffic and warnsthe driver of the same along with helping him to avoid the same and avoid unnecessary hassles.

C. Forward Collision Alert System:

In this system the car would first wobble the steering and then reduce the speed andthen brake the car to a complete stop for the car to avoid a front collision system.

D. Lane-Departure & Lane-Keep Assistance:

This system enables the driver to change and keep the lanes in case there is an oncoming traffic and to sense and stop the same from colliding into oncoming traffic.Further, if there is any vehicle

 ISSN: 2582-6433

that is coming from the side lane then the car would warn and advise to maintain the lane altogether and even allow for correction of the lane in some cars.

E. Reverse Parking Brake Assist:

During reverse parking if the sensors detect an object, then they would automaticallystop the car and avoid a collision. This is a key system is reversing the vehicle and saving the unnecessary hassles.

F. ABS/EBD/ESC:

Autonomous Braking System, Electronic Brake Force Distribution and Electronic Stability Control System are the key safety features that have been mandated and required in today's system as they keep a vehicle stable during cornering and hard braking along with rainy roads.

15. Connected Mobile Apps/Digital Key:

In India almost all automakers are now providing Connected Car technological features, but what are these features?

These are simply a remote control to your vehicle such as remote start/stop, air conditioning controls, headlamp controls, geo-fencing, mapping of the vehicle and the position of the vehicle along with majority of the controls being used from the user's phone and even smartwatch. Then there are various programs and subscriptions to these programs which areeither prepaid at the time of the purchase of the car or post purchase after a certain period of time.

Major Companies such as Tata, Honda, Kia, Hyundai and even Maruti Suzuki have started providing the features as part of their programme.

16. Wireless Smartphone Connectivity and Charging:

In an age of wireless technology, cars tend to get full of wires and tangles which affects driver attention and affects driving ways of the driver. In order to avoid this, automakers have introduced wireless charging systems for cars which helps driver to simply put the phones oncharge without thinking about charging issues in their cars or in emergency's.

This simple system allows for the driver to simply get unaffected and concentrate on their driving system and helps them to drive properly.

 ISSN: 2582-6433

17. 360-Degree Camera:

This is a system where most automakers have brought in a bird eye view of the whole car. Inthis system the car 4 cameras and multiple front and rear sensors. The cameras are placed atthe front and the back while the other cameras are at the side view mirrors. This causes a bird's eye view and a 360-degree view altogether, then the sensors detect the movements during parking and reverse and in some cars during driving as well in tight streets and cornerswhere the car cannot be navigated. Further this system helps the driver to notice the incoming and opposite side traffic and helps the driver understand better the blind spots with the accuracy of whether it would cause any harm to the vehicle or not. In a country like India,this system helps in the basic driving conditions and allows the drivers to understand that whether at what angles do they need to navigate the car and how accurately can they tacklethe corners without slowing down the car itself.

18. Blind-Spot View Monitor (BSVM):

This is a kind of system that actually helps while driving in tight lanes and narrow roads and edges which might harm the vehicle and as such this is a system that negates the blind areasat the corners and helps in locating the blind spots with camera on either of the side view mirrors by showing the view on the touchscreen system. This system also helps in peak trafficto tackle oncoming and side-lining bikes and other vehicles. In India Honda City was the first vehicle to introduce such a system in their cars.

19. Rear-View Mirror System:

This is a system that has been created to avoid all kinds of blind spots and activates at the flipof a button at the rear-view mirror that provides a crystal-clear image of what Is behind the car and captures the blind spots that otherwise not seen by the driver while driving the car. It is most beneficial for those who use tow hooks on their cars.

20. Reverse Park Assist System:

In India, there are systems that help a driver in parking their cars in a particular spot which isdone automated by the car itself and helps guide the car further down the parking spot untilit reaches the exact spot.

Thus, it is noticeable to say that technology has come a long way than just nuts, bolts and hammers and it is proper to say that even now newer features are still being incorporated inthe system itself.

 ISSN: 2582-6433

IMPACT OF TECHNOLOGY TRANSFER

The transfer of technology has had a huge impact on the automotive sector, since the year 1992 when the market had opened up for Foreign Investments for the first time. Since then, technology has not only impacted the automotive sector but also overall lives of consumers.

This is because technology has taken over most of the manual tasks and labour that was earlier being done by hand, it has obviously helped people and their lives but also taken awayemployment of some. The role of technology is such that only the people with expertise and know how can execute the job. For example, if a robot is to be used to for drilling and mining,only the engineer with the particular knowhow can execute the said task at hand without anyhassles, while it would take hours and days for a newbie to do the said task.

Similarly, in the auto sector there were earlier tasks being done by hand most of the workers. Now the said tasks are mostly done by robots like the paint work of a car or the welding of a chassis. This has reduced the dependency on the manual labour and has increased the amount of automated machine works that is used to execute the making of automobiles.

Now, if we look closely this sector has changed from being fully manual to being fully automated over the years with the introduction of robots, sophisticated techniques and machines and high technology transfers including AI, IoT. It is also to be commended that datahas now been playing a major role in all of this and collection of data is being by almost all major companies to analyse its problems, solutions, shortcomings and streamlining the processes in a very subtle manner.

Further, the logistics have been now sorted out as there were lot of logistic problems earlier and huge amounts of backlogs, problems, unaccounted stocks, loopholes and various thefts and fraudulent activities taking place within the system that were never looked upon. With the onslaught of technologies and logistics industry overhaul, now everything is tracked and monitored with proper digital accounting and stock management software and there is also proper track of goods and vehicles along with paperwork and higher incident protection measures and safety guidelines that have helped in creating a closed loop of logistics and in further helped the automotive industry as well.

The impact of technology is such that the Indian Auto sector is highly dependent upon the Support provided by technology influenced availability of R&D centres and low-cost steel production facilities. In an era of technology various new techniques and cutting-edge mechanisms have changed the way even the simple nut and bolt is manufactured. Now the basic steel bending and cutting techniques have shown that in an environment whereproduction time and production costs

 ISSN: 2582-6433

need to be kept to a minimum but with a standard quality, at that point there arises a point where the manufacturer needs an equilibrium of all the above factors and in order to fill this void technology plays a very important role in this.

But before all this, it is important to know that setting up and an Automobile industry is not such an easy task because as a manufacturing company, the operation of the same requires huge monetary funds and various approvals from various authorities in respect to acquiring the lands for manufacturing and further registering a company and getting the necessary safety and security regulations approved from various departments and arranging for funds from stakeholders and other promotional activities which again require both offline and online mechanisms.

In order to start the manufacturing process, the statutory compliance requires an industrial license to be acquired from the central government, state government and selection of the land for setting up for industry and acquiring the same and getting investment from investorswith arranging raw material suppliers for manufacturing and dealing with transport companies. Then lies the headache of obtaining a license for setting up a dealership, pollutioncontrol license, safety licenses and any other license as required. Post pandemic it can be seenthat most of the licensing procedures have been shifted online rather than offline because the increasing need to reduce manual labour and increase the accountability even in government departments has established that the next phase of licensing would be the ‘online raj’.

Further, there is a phenomenon that is getting triggered is that the end of the dealership model. The is an attempt to create a centralized stock management by the automakers whichwould help them control the prices of their vehicles from one singular level rather than various different levels. This also helps the automaker control the discounts, offers, prices andthe overall production of vehicles at a central level. Further, this also enables automakers to decide which models to manufacture for optimum sales. Such a kind of model has already been adopted by Mercedes India and other luxury car manufacturers are already moving towards the same path. This was noticed during the COVID pandemic where consumption patterns shifted making higher sales of online vehicle bookings than ever before, practically creating an online system of vehicle purchase making this a very viable option.

For example, showrooms have experienced that customers would opt for pre-booking their vehicles that are only present in either online platforms or as concepts and early release concepts, even before the launch of the official products. Prior to this visiting the dealershipsand seeing automobiles was a mandatory procedure before buying a car and then the processof test driving was the actual process before buying. This has now been replaced by the process of simply

 ISSN: 2582-6433

booking the product online and then purchasing the same.

This phenomenon was an eye-opening aspect to the automakers and they had then shifted to websites and apps to understand customers.

To understand the whole impact of technology transfer it is to be noted that even though many automakers have left the market, this still huge a potential for new products and innovation. Example of the same is the exiting of Ford and GM but introduction of MG & Citroen in India. With the incoming of new makes and models of EV's, hybrids and other majorvariations. There will be an even new dawn of technological advanced automobiles making their way further in to the Indian auto sector and before we know it the market would not bethe same as it was before.

 ISSN: 2582-6433

CHAPTER 4

GOVERNMENT SCHEMES AND INITIATIVES

AUTOMOTIVE MISSION PLAN

The Automotive Mission Plan also known as AMP 2026, is a 10year plan from 2016-2026 which is the vision of Government of India and this Industry.

The key focus is on the sector of Automobiles and Auto-components with aim to for making it reach over and above the current scenario in terms of market capping, Indian automobile development, global image of Indian automotive Industry, technological advancements,global competitiveness and institutional capabilities/structure in the next ten years.

The AMP 2026 seeks to change the graph of the automotive ecosystem in India and the of evolution of the industry with regulations and policies governing research, design, technology, testing, sale, use, repair, manufacturing, import/export, with respect to recycling& components, services of automotive vehicles.

AMP,2026 aims at India and overseas for seeking to communicate with the Government in lines with the objectives of growing this Industry. This comprises of the automotive vehicle manufacturers and the auto-component manufacturers in India.

Objectives of AMP 2026:

a) It aims to more forward the Indian Automotive Industry to be the heart of "Make in India" as it is one of the top most drivers of this sector. It is aimed that over the next 10 yearsthat this sector will grow more than 12% of the country's GDP and makeup more than 40% the manufacturing sector in India. This Industry can also be termed as the 'father of the manufacturing sector' because it creates a direct impact on the demand and supply of severalallied manufacturing industries such as Iron/ Steel, Plastics, Glass, Machine tools, Moulds & dies, Aluminium, Lead, Rubber, Chemicals, and various Capital Goods. Further, several areas in the Services sector such as Sales & distribution, Logistics, Banking, Insurance, , Service & repairs and fuels are also adversely affected. It is right to say that the huge growth of this industry will provide a strong support to the Micro & Small and Medium industries (MSME) of the country.

b) Another aim is to make this Industry a significant contributor to the "Skill India" programme. Since this Industry is one of the largest job creating engines in the Indian economy, it is being tailored to lead the 'Skill India' movement as the potential for the sheer

 ISSN: 2582-6433

amount of both direct & indirect jobs upcoming in this Industry is exponential and in over thenext decade it is estimated to reach nearly 6.5 Lakh jobs. This figure is over and above the additional 2.5 lakh jobs that were created in the previous 10 years and this industry has numerous linkages with more than 25+ industries across manufacturing and service sectors affecting both rural and urban India. This also covers the formal & informal sectors of the economy and most of the jobs in this Industry require acquiring of specialist skills and only requires a person with sufficient technical and soft skills to progress in their career. This industry is known for creating and providing employment opportunity to a large number of skilled, semi-skilled and under skilled workers in India.

c) This policy expects the overall mobility for the masses with the main focus it to promote safe, efficient and comfortable mobility for each and every person in this country. There is a major focus on environment protection and convenience to both public and personal transport options across the country. The aim also is to provide a choice to the consumers across multiple strata, various options for mobility and with the aim of enhancingmobility for all the people while addressing the need for minimization congestion, air pollution, global warming, and road accidents, this policy aims to achieve a healthy balance of the human ambition of owning a personal transport and to achieve the efficiency of publictransport all across India.

As it has been observed over the years that the public transport in India has been of rather unreliable and quite relatively poor quality. It is also to say that the reliability is a major concern in public transport which has become a major issue for the people unable to actuallyafford a personal vehicle or transport and huge increase in traffic and congestion and the resulting negative consequences thereof would result in the shift of urban India going for thewidespread growth in the usage of personal transport vehicles on an unimaginable scale similar which is same as that of developed nations. Thus it is important that appropriate resources be concentrated to the formulation of policy, planning, development of quality, ^ & a good public transportation across India.

d) The scheme also seeks to increase net exports by several fold and recognition that this Industry consisting of both i.e., vehicles & auto-components have the potential to increase the exports to an extent of 35-40% of the total overall output. This can be achieved over a period of next ten years enabling India to become a major automotive export hubs in the

 ISSN: 2582-6433

world. In order to achieve this, there are several remedies to improve competitiveness, technological advancements, infrastructures, capital investment and collective branding. Buton the opposite side, the imports of automobile components is likely to grow in the coming years with the higher use of electronic equipment and higher enhancements in the areas of design and engineering and in making of vehicles and components which at present is still time to cope up for the deficiency in skills and capabilities in both of these areas. This is specifically seen in areas of auto-electronics, design & engineering. This seeks to increase the percentage of locally manufactured vehicles and components with in particular focus on automotive electronic equipment, light-weight materials, moulds, mounds, dies and machinery. This is poised to save the country from substantial foreign exchange and be a supplement in domestic manufacturing. This scheme also aims to increase the quantum of domestic research, design, engineering and manufacturing in this sector.

e) A Comprehensive and stable policy is the need of the hour and this policy aims to fulfil the same by providing the much-needed contribution of this Industry should be in lines with socio-economic development. It is required that this industry be subjected to a better policy regime that could govern the same in a very stable and sustainable manner. It is globally seenthat no developed and economically stable nation has succeeded in obtaining the 'developedstatus' without growing and helping its automotive industry. With the widespread and differential impact of the Auto sector and the high volatile nature of regulations and policies that govern the Auto sector, it is a subject interest for several groups. Therefore, to ensure a fair and predictable governing environment for this Industry. In order to achieve the same, the next policy has given a major push to increase the friction of quantum of manufacturing and production and to support the allied products as well.

PRODUCTION LINKED INCENTIVE SCHEME:

1. Background:

This Industry is a major economic contributor to Indian GDP this sector has been responsiblefor approximately 35% of India's manufacturing. This sector also has been a key growth driverfor the economy of India and as of today it has created many component makers that are Tierone suppliers to global automakers and as of date there are several Indian-manufactured motor vehicles that are making their way to international markets and are being sold there. This shows that the Indian automotive sector has been an fluid in adoption of global technological advancements and has

 ISSN: 2582-6433

adopted changes along with global standards for manufacturing of superior quality automobiles.

The Production Linked Incentive (PLI) Scheme for Automobile and Auto components has proposed financial incentives to grow and enable the domestic manufacturing of Advanced Automotive Technology vehicles and products. It also further to attract investments in the automotive manufacturing supply chain. With the primary objective of skipping hurdles like overcoming cost disabilities, building an efficient supply chain and creating economies of unthinkable measure along with creating advancements in areas of AAT products. This is alsoan incentive to generate employment and facilitate Automobile Industry to move up the global rankings in higher value-added products chain and global automobile market.

The following vehicle technologies are prescribed by Ministry of Heavy Industries (MHI) as Advance Automotive Technology Vehicles which are as follows:

A) Battery Electric
B) Hydrogen Fuel Cell Vehicle

2. Current Scenario:

In the current scenario, the PLI Scheme has in cumulation a proposed investment of Rs. 74,850Cr. unlike the initial target investment estimate of Rs. 42,500 crores for a period of 5 years. Also, the proposed investment of Rs. 45,016 crore (Champion OEM Incentive Scheme); Rs. 29,834 crores (Component Champion Incentive Scheme) is from approved applicants.

A total 115 companies had applied under this scheme which was notified on 23 Sept. 2021. Most of them i.e., 95 applicants were approved under this scheme, earlier there were 20 applicants approved (along with their 12 subsidiaries) for Champion OEM scheme. Subsequently, the department had processed the applications received under Component Champion incentive scheme and 75 applicants (along with their 56 subsidiaries) for approval and along with another two Auto OEM companies for both the parts of the scheme. In a peculiar situation, 5 Auto OEM companies had applied for both Champion OEM and Component Champion parts of the scheme.

In reaction to the response received, Union Heavy Industries Minister Dr. Mahendra Nath Pandey had expressed by saying, *"…The overwhelming response shows that Industry has reposed its faith in India's stellar progress as a world class manufacturing destination which resonates strongly with Hon'ble Prime Minister's clarion call of Atma Nirbhar Bharat - a self- reliant India. India will surely take a huge leap towards cleaner, sustainable, advanced and more efficient Electric*

 ISSN: 2582-6433

Vehicles (EV) based system…".

The Scheme had proposed to boost domestic manufacturing of Advanced Automotive Technology (AAT) by providing financial incentives. With the objective of creating a robust supply chain and to generate employment there had to be overcoming of cost disabilities.

To future vision of this scheme for aims growth of automotive sector with an outlay of Rs.25,938 crore along with the already launched PLI scheme for Advanced Chemistry Cell (ACC) with an outlay of Rs.18,100 crore and Faster Adaption of Manufacturing of Electric Vehicles (FAME) Rs.10,000 crore is to distributed to the players on fulfilling all the conditionsof the schemes will enable India to leapfrog from traditional fossil-fuel based automobile transportation system to environmentally cleaner, sustainable, advanced and more efficient Electric Vehicles (EV) based system. This scheme in the auto industry has been a huge successin terms of the applications received and has got a huge response. This overwhelming response shows that Industry has regained its faith in India's stellar progress as a world classmanufacturing destination which enables an ecosystem for a self-reliant industry with a futuristic vision to be established.

3) Preliminary Achievements:

As part of the PLI Scheme, it was already open to existing automotive companies. But as partof the scheme, new investors who are currently not in automobile or auto component manufacturing business can also opt for entering in the same.

This scheme has two components i.e., Champion OEM & Component Champion Incentive Scheme both of which are a 'sales value linked' scheme which is applicable on Battery Electric Vehicles and Hydrogen Fuel Cell Vehicles for automobiles of all segments.

In terms of the applications received, this scheme in this Industry has been a huge success receiving applications from both local as well as globally players such as Republic of Korea, USA, Japan, France, Italy, UK and Netherlands who are already in manufacturing or proposingto manufacture Advanced Automotive Technology vehicles.

 ISSN: 2582-6433

LIST OF APPROVED APPLICANTS:

The list of applications approved under Champion OEM Incentive scheme can be found below:

A) CHAMPION OEM 4-WHEELER:

1	Ashok Leyland Limited
2	Eicher Motors Limited
3	Ford India Private Limited
4	Hyundai Motor India Limited
5	Kia India Private Limited
6	Mahindra & Mahindra Ltd.
7	PCA Automobiles India Private Limited
8	Pinnacle Mobility Solutions Private Limited
9	Suzuki Motor Gujarat Private Limited
10	Tata Motors Limited

B) Champion OEM 2 & 3Wheeler:

1	Bajaj Auto Limited
2	Hero MotoCorp Ltd.
3	Piaggio Vehicles Private Limited
4	TVS Motor Company Limited

C) New Non-Automotive Investor (OEM):

1	Axis Clean Mobility Private Limited
2	Booma Innovative Transport Solutions Private Limited
3	Elest Private Limited
4	Hop Electric Manufacturing Private Limited
5	Ola Electric Technologies Private Limited
6	Powerhaul Vehicle Private Limited

 ISSN: 2582-6433

D) Component Champion OEM (Components Manufacturers):

1	Maruti Suzuki India Limited
2	Pinnacle Mobility Solutions Private Limited
3	Bharat Forge Limited
4	Hero MotoCorp Ltd.
5	Advik Hi-Tech Private Limited
6	Aisin Automotive Haryana Private Ltd.
7	Alicon Castalloy Limited
8	Aptiv Components India Private Limited
9	Aptiv Connection Systems India Private Limited
10	Asahi India Glass Ltd.
11	Asia Investments Private Limited
12	Automotive Axles Limited
13	Axletech India Private Limited
14	BASF Catalysts India Private Limited
15	Bosch Automotive Electronics India Private Limited
16	Bosch Chassis Systems India Private Limited
17	Bosch Limited
18	Cummins Technologies India Private Limited
19	Daicel Safety Systems India Private Limited
20	Dana Anand India Private Limited
21	Dana TM4 India Private Limited
22	Danblock Brakes India Private Limited
23	Delphi-TVS Technologies Limited
24	Denso Ten Minda India Private Limited
25	Garrett Motion Technologies India Private Limited
26	Hella India Automotive Private Limited
27	Hero Cycles Limited
28	Imperial Auto Industries Limited
29	International Tractors Limited

 ISSN: 2582-6433

30	Fenner (India) Limited
31	Jay Ace Technologies Limited
32	Jay Fe Cylinders Limited
33	KalyaniTechnoforge Limited
34	Krishna Landi Renzo India Private Limited
35	Krishna Maruti Ltd.
36	Kyungshin Industrial MothersonPvt Ltd
37	Linchpin Technologies Private Limited
38	Lucas-TVS Limited
39	Lumax Auto Technologies Limited
40	MahleAnand Thermal Systems Private Limited
41	Mando Automotive India Private Limited
42	Minda Corporation Limited
43	Minda Industries Limited
44	Mitsubishi Electric Automotive India Private Limited
45	Motherson Sumi Systems Limited
46	Motherson Sumi Wiring India Limited
47	Musashi Auto Parts India Private Limited
48	Napino Auto and Electronics Limited
49	Neel Metal Products Limited
50	Neolite ZKW Lightings Private Limited
51	Nidec India Private Limited
52	Padmini VNA Mechatronics Limited
53	Pricol Limited
54	Rockman Industries Limited
55	Sandhar Technologies Limited
56	Sansera Engineering Limited
57	Schaeffler India Limited
58	Sharda Motor Industries Limited
59	Sona BLW Precision Forgings Limited
60	Steel Strips Wheels Limited

 ISSN: 2582-6433

61	Sundram Fasteners Limited
62	Tata Autocomp Systems Limited
63	Tata Cummins Private Limited
64	Tata Ficosa Automotive Systems Private Limited
65	The Hi-Tech Gears Limited
66	Toyota Industries Engine India Private Limited
67	Toyota Kirloskar Auto Parts Private Limited
68	Tube Investments Of India Limited
69	Valeo India Private Limited
70	Varroc Engineering Limited
71	Vitesco Technologies India Private Limited
72	Wabco India Limited
73	Yazaki India Private Limited

E) Component Champion (Non-Automotive) Investor:

1	Bharat Heavy Electricals Limited
2	CEAT Limited

EMMISION NORMS:

History:

Since automobiles are one of the main contributors to air pollution, it is felt that there is a need to reduce emissions. This Industry understand this fact and is continuously working towards controlling the emissions as suggested by the Government Policies and is working fordeveloping environment-friendly technologies which has made India introduce some of the most prominent fuel-efficient vehicles in the world.

The 1st mass emission norms had come in effect in 1991 for petrol vehicles and in 1992 for diesel vehicles.

Since India had started a formal journey on an emissions control regime in 1991. There has been a void in implementation of these norms in comparison to Europe. However, in order tobridge this

 ISSN: 2582-6433

gap, various technologies had been adopted which in turn facilitated the Indian Auto sector to meet the regulations at an affordable cost.

Since April 1995, there was a system of mandatory installation of catalytic converters in all types of new petrol passenger cars which were sold in the metro cities of i.e., Delhi, Calcutta,Mumbai and Chennai. This was supplemented by the supply of Unleaded Petrol (ULP) in all 4metro cities. Thereafter which the availability of ULP was then further spread to 42 major cities; which is now available throughout the country.

From the year 2000 onwards, passenger cars and commercial vehicles had been mandated tomeet Euro I equivalent India 2000 norms also called Bharat Stage – 1 norms. It was the time in which two wheelers were meeting one of the tightest emission norms in the world.

Then in the year 2001, Euro II equivalent Bharat Stage II norms were then in force 4 major cities of Chennai, Delhi, Mumbai, and Kolkata.

in August 2002, the 1st Auto Fuel Policy was announced which had laid down the foundationof Emission & Fuel Roadmap. Till the year 2010, it was provided in the roadmap, that four- wheeled vehicles were moved to Bharat Stage III emission norms w.e.f. from the year 2005 and in 13 metro cities.

The next stage was Bharat Stage IV, which was launched in 13 Metro cities and was implemented in the year April 2010. The rest of the country had moved to Bharat Stage III. Further, the Bharat stage IV norms were extended to additional 20 cities from October 2014.

The next phase of Auto Fuel Policy 2025 was submitted to the Ministry of Petroleum & NaturalGas (MoP&NG) who has assembled an expert committee for drafting the same in December 2013. This policy document then laid down the fuel road map for emissions up to 2025.

This proposed road map thought about the implementation of BS IV norms across the country by April 2017 in a phased manner. This was further supplemented by the BS V emission normsin 2020.

However, in those Delhi NCR regions had become widely known for its exorbitant rise in the air pollution levels which had attracted a lot of attention from the media and this had led to the government making an environment conscious decision of jumping from the Bharat StageV emission norms to skipping and altogether advancing into the introduction of Bharat StageVI emission norms, and in 2020 the and BS VI norms came in effect and to be kept in effect 2024.

 ISSN: 2582-6433

Year	Emission norms
1991 and 1992	Mass emission norms for petrol and diesel vehicles, respectively
2000	Bharat Stage norms are introduced
2001	Bharat Stage-II established in Delhi, Mumbai, Chennai, and Kolkata
2002	Auto Fuel Policy 2025
2005	Bharat Stage-III in Delhi, Mumbai, Chennai, and Kolkata Bharat Stage-II in the rest of the country
2010	Bharat Stage-IV in 13 metro cities Bharat Stage-III in the rest of the country
2014	Bharat Stage-IV in 20 additional cities
2017	Bharat Stage-IV across the country
2020	Bharat Stage-VI across the country

Current Scenario:

Bharat Stage 6 RDE (Real Drive Emission) Norms:

In India, Air pollution is becoming one of the biggest health concerns and there are various factors that have contributed to the said phenomenon. It can be said vehicular emissions is ahuge part of the problem. To solve the same, the Govt. had implemented the Bharat Stage 6 or BS6 Norms and in an attempt to further reduce more pollution causing agents, the Government is planning to initiate Phase II of BS6 Standards also known as BS6.2(RDE) norms also known as Real Driving Emission (RDE) Norms which calls for the implementation of thesenorms. In order to know more about the BS6.2 RDE norms it is natural to understand what the same is based upon.

In order to understand these RDE norms, it is very important to understand Bharat Stage Emission Norms being regulated by the Government of India. The BS Emission Norms are those emission standards which are mandated to be followed by automakers to control and check vehicular emissions in India and across the Globe. In order to have a specific focus on the emission of certain harmful gases like Hydrocarbons and Oxides of Nitrogen, carbon dioxide (CO2), carbon monoxide (CO); the BS6 Norms aim to improve the environment by refining and processing the same. It also important to note that the important aspects such as the timelines for implementation of these norms which is formulated by the Central Pollution Control Board (CPCB) under the Ministry of Environment & Forests and Climate Change (MoEFCG).

The BSVI is the latest iteration of the BS Norms which are in line the Euro Emissions Standards w.e.f. from 1st of April 2020. In comparison to the BS4 norms, the BS6 have higher and increased restrictions on the allowed limit of pollutants and gases being emitted by either diesel, petrol, hybrid and CNG/LPG engines.

 ISSN: 2582-6433

Major additions in the BS6 Norms are:

- Mandatory fixation of Diesel Particulate Filter (DPF's) & Selective Catalytic Reduction (SCR) filters and to track and control the emission levels in all BS6 vehicles. This particular aspect was not there in the previous BS4 norms.
- Mandatory integration of an On-board Diagnostic (OBD) device which would track andinform vehicle owners/technicians about the efficiency of various vehicle systems.
- The recent introduction of BS 6.2 Real Driving Emission (RDE) Norms to calculate and track the real-time emissions in the real-world vehicles.

The Real Driving Emission (RDE) Norms is the pushback for the Phase II of the BS6 norms. These are already to be implemented from 1st of April, 2023 and automakers have already started tuning and fine-tuning with various technological advancements in order to comply their vehicles with these norms. Before the BS6.2 norms came into being the Vehicle Emissions were calculated and tests were largely done determined in the laboratories. Theseare demo's that replicate the real-world scenarios in real life driving conditions without any influence and as result of this automaker emission figures are usually generally different fromthe real-life driving conditions. This created a need for the government to develop a methodof testing that would measure the pollution levels in real on-road driving conditions rather than lab conditions.

The RDE Norms are designed to solve the problem as it would make carmakers measure and calculate pollutants emitted from their recently launched vehicles in real world. To achieve the said task automakers would be required to equip their vehicles with Portable Emissions Measurement System (PEMS) along with Selective Catalytic Reduction (SCR) &Diesel Exhaust Fluid (AdBlue) for all diesel cars and vehicles that would reduce the levels of nitrogen oxides (NOx) by converting pollutants into water, nitrogen and minute amounts of carbon dioxide.

The Phase II of the BS6 norms was introduced recently but before that automakers were ablewith previous BS6.1 regulations through a system of Lean NOx Trap (LNT) system. With this system, cars with a smaller diesel engine could use this system to achieve the wanted levels of emissions (usually below 2.0 litres). In order to comply with the current emission standardsautomakers are already using the SCR systems. With this, the bigger and higher capacity dieselengines of 2.0 litres or 2000cc or more have upgraded accordingly.

As RDE Norms are implemented for measuring pollutants being produced from vehicles in real life driving scenarios. Newer vehicles would come equipped with an OBD Device to checkand analyse the emission levels and monitor the same on a real time basis.

 ISSN: 2582-6433

In a vehicle, the OBD device would be responsible for monitoring and measuring the checking emissions levels constantly by analysing readings from components such as oxygen sensors and catalytic converters and during this period, at any time the vehicle's emission levels are to exceed the required levels of the BS6 Norms, a warning is to be displayed to the driver thatthe vehicle needs to be serviced immediately. This in addition to the vehicle it would now berequired to be sold with programmed fuel injectors for managing the amount of injected fuelalong with its variable timing along and with a more sophisticated catalytic converter to achieve desired levels of emmisions.

This will allow the automakers to get the biggest blow of the upcoming RDE Norms and will affect the consumers as facing the impact in the form of a significant price increase is likely to happen very soon. The new RDE Norms requires automakers to get increased costs in order to get their engines in full compliance with BS6 norms, it is likely increase the overall production cost and this will be passed on to the consumers through price hikes.

Since an upgrade to the SCR system requires automakers to take undertake various highly valued amendments, the entire cost of conversion becomes too over expensive for various smaller diesel engines and many small diesel engine cars would in their untimely discontinuation. Also, as per reports, as many as 17 cars would be discontinued from April 2023. In a very sad situation, the variants of popular cars and their diesel variants of the HondaCity 5th Generation, Hyundai i20 & Verna, Tata Altroz along with various other smaller cars are axed and other cars might be gone as well. Which even hints at discontinuation of NissanKicks, Skoda Superb and Octavia and might not go on sale from April,2023. This is the situation even with higher capacity petrol engines cars in the market.

Once these norms are mandated, carmakers would now be facing a challenge to either upgrade and make their vehicles compliant or axe some of their most demanded models. With the current RDE norms appearing too harsh on carmakers, it is also to be noticed that with the nation's current situation of rising vehicular pollution and environmental damage, itis as if RDE is the need of the hour.

These new rules would be introducing more environment friendly engines that burn their fuelmore efficiently with new mechanisms. This would increase the fuel efficiency in real word driving environments but from a buyers point of view, it would only result in buying a car to be more

 ISSN: 2582-6433

expensive from now onwards.[16].

VEHICULAR SAFETY STANDARDS & REGULATIONS

1) Safety Standards as per Indian Rules and Regulations:

There are 2 two critical issues facing the automotive industry worldwide i.e., Environmental imperatives and safety requirements. The Indian Automobile Industry has achieved milestones on the environmental front in the last 10 Years by adopting strict emission standards, and is working towards safety standards on an international scale via technical alignment.

Indian Standards (IS) and Automotive Industry standards (AIS) have to be met by vehicles manufactured in the country. Since the late 1960s, Indian Standards are being issued and at that time these standards were for Automotive Components that were based upon EEC/ISO/DIN/BSAU/FMVSS, etc. standards.

India stance on the various safety regulations is chaired by SIAM who are members the different expert groups formed to formulate. In the developing nations, it has helped in the overall development and taking into account the traffic and driving conditions. It is noted that 70% and more safety regulations are technically aligned either partially or fully with UN Regulations. This has been met while retaining Indian specific driving and environmental conditions.

These regulations are reviewed periodically and amendments are recommended by AISC to the Technical standing Committee on CMVR. The roadmap was prepared by the CMVR, Safety& Regulations Committee and in order to have a strategic approach for the launch ofadvanced safety features in the Automobile Safety Standards by SIAM.

The steady tightening of safety standards with account of India's requirements taken in to consideration the roadmap with a view to reduce accidents and improving road safety alongwith safety of occupants of the vehicle with the current traffic conditions and driving habits that need the driver to be a good road-user and have a good road sensical behaviour which would help in the maximum safety to be incorporated into the vehicles.

[16] Florian A. A. Becker Ritterspach; "Maruti-Suzuki's trajectory: From a public sector enterprise to a Japanese ownedsubsidiary" 14-21, Oxford Management Publishing, (2009)

 ISSN: 2582-6433

2) Global Safety Standards for Vehicles of Indian Origin:

This year is a historic year for vehicle safety in India because it is this year that four and two wheelers will be subject to new regulatory standards that will transform the safety performance of India's future vehicle fleet. These will include Anti-lock brakes (ABS), airbags,Electronic Brake Distribution, Electronic Stability Control and Speed Alert Systems, Seat belt reminders, Crash test for all new cars being launched.

This represents a great leap forward in the safety of road vehicles in India. All these regulatory actions will enable the reduction in the road accidents of Indian roads and the death toll on India's roads which gives India a unique opportunity for global effort for safer vehicles.

The Global New Car Assessment Programme also known as the Global NCAP is an institution which is said to have contributed to the vehicle safety in India. This was the authority that made an impact by showing 5 star and 0 zero-star crash test results of crushed and crumpledcars which created a shocking but a huge leap in the increased safety for car consumers and a demand for safer vehicles.

 ISSN: 2582-6433

Initially there were some manufacturers that tried to discourage from such tests being conducted. Then there were some automakers that had acted in a more positive manner andhad made air bags standard along with efforts to improve their crash tests ratings. This in effect resulted in the in first Indian car i.e., Tata Nexon to achieve the title of 'India's first ever'five-star' rated car. This enabled 3- or 4-stars automobiles to become much more common.

The Government of India lead by Prime Minister Shri Narendra Modi Ji had also responded with an aim to upgrade India's vehicle safety regulation. India has achieved more advanced crash protection requirements which are currently more than that of America. This example of global leadership from the 4th largest vehicle producer in the world meant that the Indian Government receiving 2018 GNCAP Safety Award recognising the action to improve car and motorbike safety.

The Global NCAP is a platform that hopes that more manufacturers will follow excellent example of Tata's and aim for five-star safety rating. A way that Indian Government could allow this would be to adopt a mandatory safety labelling requirement.

From a technology perspective, India has now adopted fitment of electronic stability control (ESC). This is a lifesaving anti-skid system which helps to avoid up to 40% and more of run-off road crashes and accidents which has been mandatory in the Australia, the European Union,the Japan and the USA since the year 2012. The system of availability of ESC in India was still less than 10% of new vehicles but now the figures have increased as almost all new vehicles have ESC, ABS and more. This step to mandate ESC was taken by the Minister for Highways and Transport, Sh. Nitin Gadkari Ji who had pledged to mandate ESC and ABS by 2021.

The strong leadership of India has already paved the way on vehicle safety which will be a powerful example to other nations.

It is to be noted that improved vehicle safety is just one part of the complex and that road safety challenge is faced not just by India but all nations and every day almost 3,700 people and more are killed in road crashes worldwide. This type of accidents on such scale simply is unacceptable. A holistic approach is required which would combine high and improved road management design that offers much better enforcement of road traffic rules and vehicles that would minimize the risk of injury not just to vehicles occupants but to road users as well.

It is to be noted that Indian has come a long way since then and that in the current year we have seen prime examples of safety being shown by major manufacturers such as Skoda and Volkswagen gaining 5 stars in both adult and child safety for their cars of VW Virtus and Skoda

 ISSN: 2582-6433

Slavia. It is just previously that Mahindra had sent it newly launched Scorpio N and XUV700 for the crash test ratings which brought out a remarkable 5 Stars in adult safety and 4 stars inchild safety. Further, Companies like Tata dominate the safety record in their cars and allow other manufacturers to do so as well. Further, there are manufacturers such a Maruti Suzukithat still do not compete or match the appropriate standards of safety and are below the average level of safety standards that usually required. Even the Korean giants Hyundai and Kia have failed to reach even 4 stars of safety for their cars which is highly odd for an Automobile Giant. Even though there are various automakers that still shy away from sendingtheir cars for a crash test or safety test rating which seriously show how consumers are beingdenied of safer cars and such a mandate is yet to be included in the automotive agenda.

The average mindset has to be changed from low cost and maintenance and feeble things such as mileage to a proper mindset of safety, quality and reliability with the additional feature of mileage and cost of ownership and running. Thus, a change in mindset is necessaryto change the overall consumer approach for better designing of products and the overall benefit to the customers and consumers.

FOREIGN TRADE POLICY

A) Duty Drawback Scheme:

The Duty drawback scheme means the refund of customs duties paid while importing the goods which are used to manufacture final products then meant for exports from India.

It was introduced by the Ministry of Finance under section 74 and 75 of the Customs Act, 1962 and all the provisions in this scheme are described under said sections of the Customs Act, 1962.

The customs act 1962 states that the following conditions must be met in order to claim duty drawback:

- The imported goods have to re-exported within a period of two years from the date of payment of duty. This would result in the exporters claiming a benefit of 98% of the dutypaid.

In order to apply for the claim duty drawback, the following aspects should be considered:

- The products being exported must have to be different from the imported product;
- The products which are used in producing the goods must have undergone a physical change;

 ISSN: 2582-6433

- The products used in the processing of export products must not be uniform and shouldbe different.

The government fixes a rate of drawback (for different types of goods) of the final product atthe time of export. This rate would depend on various factors such as mode of manufacturing,type of raw materials used, amount of duty paid on imported items and standards of exportedgoods.

The Duty drawback would not be allowed if the following conditions are not met:

- If the export value of products would be less than the value of imported products;
- If the sale of produced goods is not received by the exporter within the allowed time, then drawback shall be deemed by the government.

B) Export Promotion of Capital Goods Scheme:

The Export Promotion Capital Goods (EPCG) scheme was introduced to increase and improvethe manufacturing quality of Indian goods in international markets. The scheme enabled exporters to import capital goods at a reduced or NIL custom duty rate and produce six timesthe custom duty saved amount and export the same value of goods.

Through this scheme, exporters can export goods like spare parts or other finished products at zero or reduced customs duty rate for the purpose of pre-production, production and post-production. The concessional 3% duty EPCG scheme allows the import of capital at 3% customs duty with a condition that an export obligation has to be equivalent to 6 times of theduty saved on capital goods which has to be fulfilled in 6 years from the date of installation of goods.

This license is essentially meant for manufacturers of exported, imported goods to deal in large quantities.

C) Advance Authorization Scheme:

The export industry is one of the major pillars of the Indian economy, contributing significantly to its growth. According to a Ministry of Trade and Commerce report, India's overall exports stood at $61 billion as of September 2021.. To further accelerate exports, theGovernment of India takes active measures to support Indian exporters by offering various export incentives and duty exemptions that enable easy trade. The Advance Authorisation Scheme (AA) is one such duty exemption scheme offered by the government.

The Government of India provides duty exemption for exporters under the Advance Authorisation

 ISSN: 2582-6433

Scheme (AA). Issued by the Directorate General of Foreign Trade (DGFT), it encourages importing essential raw materials and additives that are incorporated physically into goods intended for exports. Raw materials like fuel, oil, electricity or catalysts may be used in the manufacturing of exported goods, which can be imported duty-free through the Advance Authorisation Scheme (AA). The program also provides a standard allowance for thelosses faced by exporters on these materials.

There are four ways through which exporters can apply for an Advance Authorisation license:

- SION (Standard Input and Output Norms)
- Self-declared norms
- Self-ratification
- Applicant specific prior-fixation of norms

D) Duty Entitlement Passbook Scheme:

The Government of India had launched the Duty Entitlement Passbook Scheme (DEPB), which was notified on April 17th, 1997.

This scheme benefitted exporters by offering them a range of financial and non-financial incentives which under these schemes meant that the government would collects fewer taxeson input products used in the making of export products which thereby meant cutting down manufacturing cost.

The DEPB is an export incentive scheme which was started by the GoI, where exporters could avail the benefits at a pre-determined credit on the Free on-Board value of goods. The dutiesthat were arising were refunded in the form of a credit in against the exported products in pre-determined percentage of the Free on-Board value of those exported products.

The Exporter could have then claimed the credit at a pre-determined FOB value. The benefit of DEPB could be availed on all items to be imported except restricted goods such as gold nibs, gold pens, gold watches, etc.

The main objective behind this scheme was to balance the customs duties imposed on the importing products as against the export products. This facility could be availed on almost all ports in India.

 ISSN: 2582-6433

WTO AND INDIAN AUTO INDUSTRY

The negotiations of WTO on the Industrial Goods have been making good progress based onthe agreement which was signed on 2004, August. The main discussions have been very technical and to-the-point in nature which has been attended by trade ministers from 30 nations including our very own Minister of Commerce on behalf of the Government of India in order to provide a push for trade negotiations.

In order to confirm the on-ground progress it can be rightfully stated that there are various things at play and that there has to be 2 parts of the formula for success i.e., a strategy for developing and a strategy for developed nations. This has initiated a debate on whether amongst WTO members whether such a formula should be initiated or not and whether sucha strategy would be effective or not. The question also arises that whether altogether price cuts or substantial tariff cut would be effective or not in the long run between developed anddeveloping nations.

The negotiators in developed nations have indicated that application of such formula will mean reduction in flexibilities which include keeping a percentage of tariffs outside the bound level or keeping some products out of the formula for lower cuts. The European Union has expressed that this can possibly bring down the ambitions in the Doha Round of WTO Negotiations. It was said that the Framework Agreement in itself would provide for enough flexibility for the existing and new players.

The measures which were suggested were as follows:

1) Selection of Sectoral Initiatives:

This would mean that nations would be able to have choice whether they want to join the sectoral initiative or not and if the countries would decide to join, then they would have to doso for all sectors which would bring under the sectoral initiative. If nations would decide to stay away from the sectoral initiatives, then they it would result in nations paying a duty for the export of those products which would be fixed during the round of negotiations.

Then there are sectors which would be negotiated and which would be as decided earlier i.e.,

- auto components, electrical/electronic products, footwear, textiles, clothing and leather goods, fish/fish products and lastly gems and jewellery.

2) Special Provisions for New Member Nations:

In this field, China has been leading the discussions and has stated that new member nationsthat would need a completely different leverage that will result in smaller cuts in tariffs and longer on

 ISSN: 2582-6433

ground setting up periods for the tariff cuts.

3) The Low Duties Elimination:

In this case, most of the developed nations have wanted that all the nations should have to eliminate any low tariffs and to provide immediate market access opportunities in overall global market.

In the case of most developing nations, they have rejected the said proposal. Further, Kenya has specifically stated that it was imperative for developing nations to retain miscellaneous tariffs.

4) Special Preferences:

In various discussions, there are many nations have said that they do not wish to receive such preferences and have said that they would need to be eliminated from the said quota. However, there is also a lot of support for the said such preferences specially from nations that would have received preferences from the European Union.

5) Non-Tariff Barriers:

In this case, an example was from United States on Automobile's and another was from United States, New Zealand combined on wooden products and wood and allied products.

Particularly for this case, India & many other developing nations have asked for higher attentiveness to this round of negotiations. Further, India has also submitted a joint proposalalong with Brazil and with Argentina on Tariffs.

The main purpose is not Harmonization of tariffs and it has not been seen in the Mandate. It is to note that this wasn't included in the framework amongst many important features. Further, harmonizing customs tariffs amongst nations along with various industrial and commercial capacities is not desirable and would not cater to the objective of this round.

This improves the tariffs by compacting the variation of tariffs amongst Members. It is also very transparent as it uses a factor i.e., each Member countries tariff average as per the need.

The impact of any reduction in tariffs would completely depend on the quantum, that are an essential component of this round. At this stage, the main question is whether this round complies by it's with the mandate or not? and whether it reduces or eliminates tariff ceilingsor high tariffs and tariff escalations?

It is after taking into account the requirements and wants of the developing, developed and least-developed country participants.

 ISSN: 2582-6433

CHAPTER 5 CONCLUSIONS AND SUGGESTIONS

CONCLUSION:

To conclude the same at an early stage is difficult but it would rightful to say that transfer of technology has impacted the automobile Industry in ways it itself cannot imagine. There are obviously negative and positive side of it, with the positive being it has introduced modern- safety techniques that have in fact saved lives and made cars stronger and much safer on theother hand it has helped the automobiles to be safer and allowed the automobiles to be much more technologically advanced and allowed the vehicles to be even more driver friendly thanbefore. However, it has meant that automobiles are now more autonomous and have taken the control away from the driver by introducing modern technologies and foreign mechanisms. It is also to said that the unorganized sector would often benefit less and lose more from the said advancements in technology than before but a tentative conclusion is yetto be decided in this matter.

However, it can be said that this automotive has crossed oceans and has moved over and its capacities since the past 2 decades with its effect on a global level. It also to noticed that in terms of the ranking status it currently stands as the second largest 2-wheeler along with being the eighth largest in the commercial vehicle segment. In the last decade itself India hasproven to be the ground for being one of the most preferred location for manufacturing of quality automobiles and automotive components for all tasks necessary. It is also predicted that over the next decade this industry will have a very significant transformation and makinga shift in the automotive market. This shift will also be significant from developing nations who are mainly a part of the BRICS nations. This will also cause a rolling effect and would make India as one of the major exporters of automobiles in the world making it a global exporter of automobiles. This would also include self-driving and vehicles consisting ofArtificial Intelligence and vehicles with latest safety and modern mechanisms making the products a future ready !

SUGGESTIONS:

1. With the unlimited increase in automotive prices which is currently being regulated asper the automakers choice, will and wish; it should now be mandated for a price control measure and a proper price audit for the ever-increasing price inflation to be kept in check and for the same a governmental intervention required to achieve to control and regulation of the price of the vehicles

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in this industry.

2. In continuation with the above point a proper price slab of the current product market should be maintained as per various requirements such as vehicle size, engine displacement, type of fuel used and vehicles type to determine slabs of prices for eachand every vehicle being produced in the domestic market.
3. There has to be a standard of practices that has to be maintained; example a formal Standard Operating Procedures to reduce the discrepancies in the overall safety of theproducts and a proper guideline to be mandated and followed by every automobile manufacturer in India.
4. Another aspect that is still not entertained and is a hidden fact is that most automakers want to shift to a price slab over and above the 9.99 Lacs ex-showroom price which automatically inflates by a big margin and makes an opportunity for the automakers to make money between the lines of the compliances. This practice has to be checked, controlled and audited in order to control wrongful trade practices and a proper regulation is required to reduce such a practice by automakers which ultimately effects the end user.
5. A single document should be created in order to reduce production deficiencies and curb the wrongful trade practices being carried out by dealers of automakers in orderto create a quality product.
6. All passenger vehicles in the Indian automobile industry should be mandated to undergo a proper safety mechanism test in order to curb any deficient product from being launched in the Indian Automobile Market.
7. A proper resolution mechanism should be created for timely solving of disputes between customers, buyers, dealers and automakers with a proper legislation in practice.
8. A 10-point check mechanism should be created between automakers, dealers and customers consisting of all parameters to be met before delivering the vehicle to the consumer and it should be well known to be customer/buyer of the vehicle that all parameters have been checked and confirmed for better customer experience.
9. Since a customer spends a whole fortune on buying a vehicle for his convenience, customer satisfaction and overall customer should a priority for each and every buyerof vehicle regardless of automaker brand.
10. A clear description of all the components being provided along with the vehicle shouldbe declared and there should be a clarity on all aspects such as the brand of insurancewith the exact price quotation which is to be given to the customers.
11. There should a particular document or an official policy that governs the Transfer of Technology and other allied agreements between automotive and allied companies.

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