

The Impact of Covid-19 Pandemic in Automobile Industry. A Study on Selective Automobile Companies in India.

Prof. Sankar Mistu , Priya Varshney

MASTER OF BUSINESS ADMINISTRATION ,
SCHOOL OF BUSINESS
GALGOTIAS UNIVERSITY



ABSTRACT

One of India's fastest-growing sectors is the automobile industry. In 2017, India was the world's fifth-largest producer of automobiles. An examination of India's car industry's development and trends was the focus of the research. Secondary sources included the International Organization of Automobile Manufacturers' and the Society of Indian Automobile Manufacturers' annual publications. COVID-19 status in India's vehicle sector, its effect on sales in a pandemic scenario, and the market share of automobile industries in a pandemic situation are the subject of this research paper. These findings were drawn based on secondary data acquired from several automobile-related websites including IBEF (India Brand Equity Foundation), Minister of Health Welfare, Government of India; as well as the Ministry of Heavy Industry and Public Enterprises. According to the findings, automakers could take steps to boost sales during a pandemic by lowering prices or offering special deals. After the New Industrial Policy was implemented in 1991, the Indian automobile industry gained a huge boost. De-licensing and 100% FDI in new plants were the result of this. In 1993, a new vehicle policy was put in place that helped the industry flourish by allowing global assemblers to enter the market. Competition and innovation were brought to the industry by Tata Motors and Bajaj Auto, Maruti Suzuki, Hyundai, Ashok Leyland, and many more big enterprises. In 2017-18, India was the world's sixth-largest automaker, churning out 29 million cars annually, 4 million of which were exported. The industry makes a

major contribution to India's gross domestic product as a whole. Pre- and post-pandemic car industry conditions will be examined in this article.

Keywords: Automobile industry, Pandemic, COVID-19, Pre and post analysis etc.

CHAPTER 1: INTRODUCTION

Growth in the industry was aided by government action. It also helped influence technological advancement by facilitating and expediting the use of fiscal policy tools to assist "firm-level learning processes." Automobile manufacturers have set goals for creating jobs, contributing to GDP, and manufacturing two- and three-wheelers as part of their Automotive Mission Plan's first phase (2006-2016). There were 32 million people employed in 2016 as a result of its 7.2 percent contribution to India's GDP. As a result of positive improvements like GST, BS6 emission requirements (from April 1, 2020, onwards), and so on, its growth slowed in 2017. These were, however, not the last of the obstacles to overcome. The pandemic of Covid-19 intensified the effects, which are still being seen today.

In the wake of the COVID-19 pandemic, the world's economy and population are on the verge of collapse. A national lockdown has been ordered by all governments in an effort to combat this virus. This has had a terrible impact on the nation, disrupting value chains in many of its most critical businesses, even if the lockdown may have helped to restrict its spread. As a result of the outbreak, the automotive industry is feeling the effects most acutely, with major manufacturers either being forced to shut down entirely by local authorities or operating with the bare minimum of staff at their manufacturing facilities to ensure the safety of their employees. Because of structural changes such as the goods and services tax, axle load reforms, the shift to shared mobility, liquidity crisis, and other factors that had already taken place over the previous 12–18 months, the automobile industry has been slowed considerably, and it has been virtually idle since March 24, when COVID-19 imposed its lockdown. Automakers are in a world of hurt as a result of the lockdown's devastating impact on their sales. In order to sustain their core activities and maybe recoup the progress gained on mobility technologies and alternative fuels, the majority of enterprises are thirsty for the assistance of R&D (Research and development).

The impact of the COVID19 on the car industry has been discussed in few academic papers. According to a research done by Rajmohan et al. (2020), the stock market, namely the National Stock Exchange for the car

industry, has been negatively affected by COVID19. According to the findings, higher-value stocks were disposed of at a loss. In addition, the returns of the car sector index have been found to be lower. COVID19 epidemic has had a considerable impact on the stock market of the car sector, as seen by these findings. When (Yan et al.,2020) wanted to investigate consumer decision-making and the variables influencing the purchase of a car during a pandemic, they suggested a SEM-Logit model, a hybrid of the two. The automotive purchasing decision-making process was studied using the suggested model. The findings show that the epidemic has had a negative impact on automotive purchases. Household income, travel vulnerability, and the intensity of epidemics in the local area all have an impact on how people make purchasing decisions. To help policymakers deal with the current issue in automotive purchasing, researchers also do research.

The automobile sector in India was severely affected by pandemic-induced shutdowns. An estimated \$300,000 in production turnover was lost every day of lockdown, according to the Society of Indian Automobile Manufacturers (SIAM) (Handa, 2020).

Prior to the closure of production facilities, a cautious stance on spending, and weaker local and foreign demand, the Indian market saw a three to four-year delay in the expansion of the automotive industry's sales volume (Reuters, 2020).

India is following the global auto industry trend of introducing electric and hybrid automobiles into the marketplace. Increasing R&D for electric car production is being funded by the Government of India and automakers alike, and strategic measures are being pursued to increase production capacity in current manufacturing facilities. The Indian government implemented stronger pollution limits in order to speed up the transition to electric cars. This resulted in higher pricing for internal combustion engines.

The demand for agricultural vehicles and agriculture equipment in rural India has showed potential. Rural vehicle demand may continue to rise in India throughout the harvest season because of increased government investment. As a result of the epidemic, rural areas have also recovered more swiftly and are returning to business as usual. Compared to the previous year, Mahindra & Mahindra's Farm Equipment segment witnessed total sales of tractors (domestic and overseas) at 25,402 units in July 2020. (ETMarkets.com, 2020). Two-wheeler demand was also high, with Hero MotoCorp achieving up to 90% of its pre-COVID-19 level demand in rural areas alone (Bhatia, 2020). In rural regions, vehicle demand is expected to surge for short to intermediate periods of time after the pandemic's end.

As lockdowns are removed, urban demand for autos is showing signs of revival. Vehicle reservations and enquiries are at or above pre-COVID-19 levels, which is good news for the auto industry (Singh, 2020). It's unlikely that people moving back into the city to work in the near future will want to continue relying on public transportation in the long run. There has been a continuous rise in sales of small and compact cars and compact

SUVs as a consequence. Sales of compact automobiles accounted for 72% of Maruti Suzuki India LTD's total sales in June 2020, compared to 0% to 0% for firms that did not have compact vehicles in their portfolio (Singh, 2020). As businesses in various parts of the nation slowly go back to work, one of the most important trends for meeting local demand will be to increase manufacturing capacity for small cars.

AUTOMOBILE INDUSTRY BEFORE PANDEMIC

From 2013-14 to 2018-19, manufacturing trends for automobiles are shown in Table 1. In 2018-19, overall automotive manufacturing increased to 30 million units, an increase of 7 percent over the previous year.

Category	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CAGR
<i>Passenger Vehicles</i>	3,231,058	3,087,973	3,221,419	3,465,045	3,801,670	4,020,267	4,026,047	3.7%
<i>Commercial Vehicles</i>	832,649	699,035	698,298	786,692	810,253	895,448	1,112,176	4.9%
<i>Three Wheelers</i>	839,748	830,108	949,019	934,104	783,721	1,022,181	1,268,723	7.1%
<i>Two Wheelers</i>	15,744,156	16,883,049	18,489,311	18,830,227	19,933,739	23,154,838	24,503,086	7.7%
<i>Quadri-cycle</i>				531	1,584	1,713	5,388	116.5%
<i>Grand Total</i>	20,647,611	21,500,165	23,358,047	24,016,599	25,330,967	29,094,447	30,915,420	7.0%

Table 1: Automobile Production Trends (in numbers)

With a CAGR of 7.7 percent, two-wheeler output jumped to 24.5 million units in 2018-19. In 2018-19, the number of commercial cars produced rose by 1.11 million, with a compound yearly growth rate of 4.9%. Indian manufacturers of commercial vehicles ranked seventh in the world in 2018. The positive yearly compound growth rate for all vehicles indicates an increase in car manufacturing from 2012-13 to 2018-19.

Y-O-Y growth rate of Automobiles production

Table 2 displays the increase rate of automotive manufacturing from 2012-13 to 2018-19, year on year.

Category	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
<i>Passenger Vehicles</i>	2.63	-4.43	4.32	7.56	9.71	5.75	0.14
<i>Commercial</i>	-11.59	-16.05	-0.11	12.66	2.99	10.51	24.20
<i>Three Wheelers</i>	-4.71	-1.15	14.32	-1.57	-16.10	30.43	24.12
<i>Two Wheelers</i>	2.01	7.23	9.51	1.84	5.86	16.16	5.82
<i>Quadricycle*</i>					198.31	8.14	214.54
<i>Grand Total</i>	1.29	4.13	8.64	2.82	5.47	14.86	6.26

Table 2: Production of Automobiles (Y-O-Y) growth rate (% change)

The reduction in commercial vehicle manufacturing between 2014 and 2015 was caused by a lack of demand in the market. Despite this, output grew by 24.2 percent in 2018-19. Although manufacturing of three-wheelers has decreased in recent years, it increased significantly in 2017-18. Except for two-wheelers, all vehicle manufacturing fell in 2013-14. This was related to the worldwide economic slump. The drop in two- and three-wheeler output dragged down overall vehicle production in 2015-16. Slowing economic growth is the primary cause of the automotive industry's predicament. 2018-19 saw a 214.5 percent growth in the production of quadric-cycles. While the industry's overall growth slowed in 2012-13 and 2015-16, it grew positively in subsequent years.

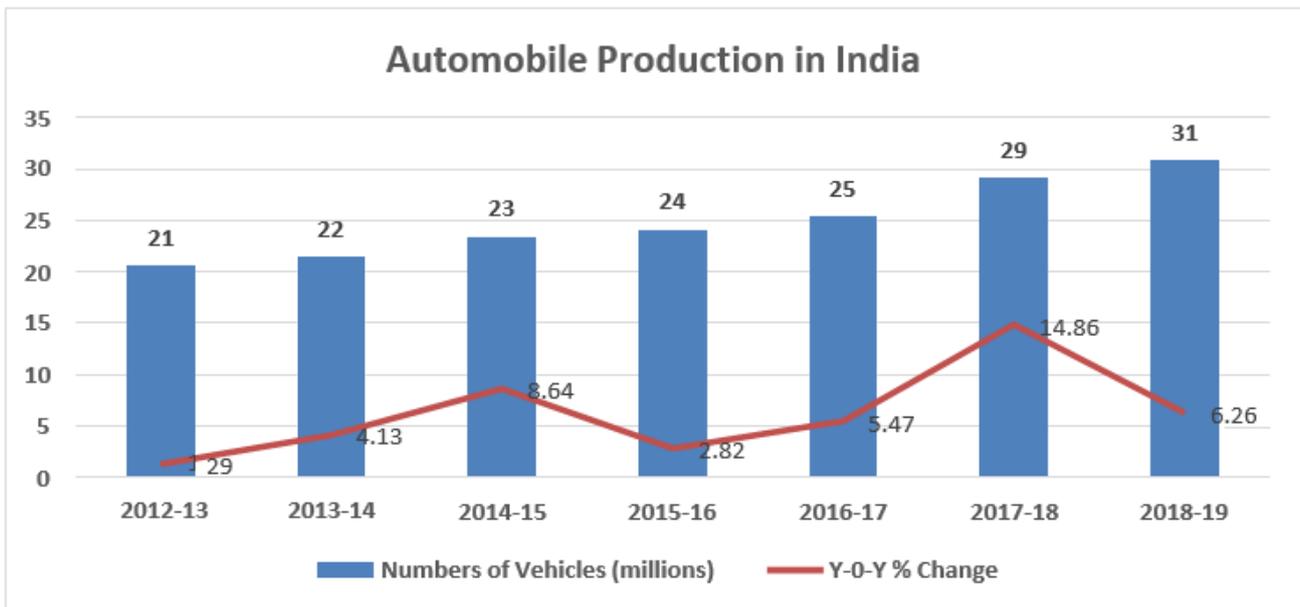


Fig1: Automobile Production in India (2012-13 to 2018-19)

Sale of Automobiles in India- Domestic

For the period 2011-12 to 2018-19, automotive sales in India are shown in Table 3.

Category	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Passenger Vehicles	2.63	2.67	2.50	2.60	2.79	3.05	3.29	3.38
Commercial Vehicles	0.81	0.79	0.63	0.61	0.69	0.71	0.86	1.01
Three Wheelers	0.51	0.54	0.48	0.53	0.54	0.51	0.64	0.70
Two Wheelers	13.41	13.80	14.81	15.98	16.46	17.59	20.20	21.18
Grand Total	17.36	17.79	18.42	19.72	20.47	21.86	24.98	26.27

Table 3: Domestic Sales of Automobiles in India (No. of Units in million)

From 2011-12 to 2018-19, India's domestic sales of all autos increased. The growth in middle-class income was the driving force behind the increase in demand. Both passenger and commercial car sales in the United States fell in 2012-13 and 2013-14. Consumer demand for passenger vehicles (cars, utility vehicles, and vans) and commercial vehicles has decreased as a result of the current economic climate. Sales of two-wheelers were highest in domestic sales during the time, followed by passenger vehicles, commercial vehicles, and three-wheelers. The domestic sale of two-wheelers grew steadily, while the sales of other vehicles grew with some variance.

Automobiles Export Compound annual growth rates

For the years 2001-2005, 2006-2010, and 2011-2018, the compound annual growth rates of vehicle exports were calculated.

<i>SITC CODE</i>	<i>Product Categories</i>	<i>2001-05</i>	<i>2006-10</i>	<i>2011-18</i>
78	<i>Total Road Vehicles</i>	38.6%	26.4%	9.5%
781	<i>Passenger motor vehicles (excluding buses)</i>	80.6%	44.0%	10.2%
782	<i>Lorries and special purposes motor vehicles</i>	41.8%	36.5%	6.4%
783	<i>Road motor vehicles, nes</i>	56.3%	11.5%	0.6%
784	<i>Motor vehicle parts and accessories, nes</i>	36.6%	11.0%	10.5%
785	<i>Cycles, scooters, motorized or not; invalid</i>	12.4%	17.3%	8.2%

7851	<i>Motorcycles, auto-cycles; side-cars of all</i>	32.3%	24.2%	8.2%
7852	<i>Cycles, not motorized</i>	-0.4%	3.1%	-0.8%
786	<i>Trailers, and other vehicles, not motorized,</i>	22.0%	5.7%	9.6%

Table 4: Automobiles Exports Compound Annual Growth rates

'Total Road Vehicles' CAGR decreased dramatically from 38.6% in 2001-2005 to 9.5% from 2011-2018, as can be seen from Table 4. Growth rates for all vehicles decreased at the same time.

There has been a dramatic decrease in the growth rate of the product categories 'Passenger motor vehicles (excluding buses), Lorries and special purposes, and Road motor vehicles ' throughout the period 2011-2018 compared to 2001-2005. Since 2001-2005 and 2011-2018, the product category "Cycles, not powered" had negative growth rates. Because to the worldwide economic slump in 2012 and 2013, exports have decreased.

IMPACT OF COVID-19 IN AUTOMOBILE INDUSTRY IN INDIA

In the wake of the COVID19 virus, the world economy and the human race have been plunged into anarchy. A national lockdown has been ordered by all governments in an effort to combat this virus. It is possible that the lockdown has helped to prevent the spread of the illness, but the nation has been severely damaged and major industry value chains have been upset as a result of it. The outbreak is wreaking havoc on a wide range of businesses, including the automotive industry, which has been forced to shut down or conduct operations with the bare minimum of people at production facilities to ensure the safety of its employees. Because of structural changes such as the goods and services tax, axle load reforms, the shift to shared mobility, liquidity crunch, and other factors that had already taken place over the previous 12–18 months, the automobile industry has been slowed considerably, and it has been virtually idle since March 24, when COVID-19 imposed its lockdown. Lockdown-related shortening of client demand is a major concern for automakers. In order to sustain their core activities and maybe recoup the progress gained on mobility technologies and alternative fuels, the majority of enterprises are thirsty for the assistance of R&D (Research and development).

As a consequence of the pandemic-induced lockdown, original equipment manufacturers had to cease manufacturing (OEM). The whole value chain of major Indian industries was disrupted as a result, and this had a detrimental impact on the manufacture of car spare parts in micro, small, and medium-sized businesses. Reduced demand for passenger cars also resulted in revenue declines and a serious financial issue for the industry.

	<i>Sales</i>	<i>Percentage</i>
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<i>OEM</i>	<i>FY'19</i>	<i>FY'20</i>	<i>GROWTH</i>	<i>FY'19 MS Pre COVID</i>	<i>FY'20 MS during COVID</i>	<i>MS Diff</i>
<i>Maruti Suzuki</i>	17,29,55 5	14,14,34 6	-18	51.90	51.30	-0.60
<i>Hyundai</i>	5,45,243	4,85,309	-11	16.40	17.60	1.20
<i>Mahindra</i>	2,36,854	1,80,244	-24	7.10	6.50	-0.60
<i>Tata</i>	2,10,143	1,31,197	-38	6.30	4.80	-1.50
<i>Toyota</i>	1,50,525	1,14,081	-24	4.50	4.10	-0.40
<i>Honda</i>	1,82,586	1,02,016	-44	5.50	3.70	-1.80
<i>Renault</i>	79,654	89,534	12	2.40	3.20	0.90
<i>Kia</i>	0	85,171	0	0.00	3.10	3.10
<i>Ford</i>	92,937	66,415	-29	2.80	2.40	-0.40
<i>Volkswagen</i>	34,850	25,736	-26	1	0.90	-0.10
<i>MG</i>	0	21,954	0	0.00	0.80	0.80
<i>Skoda</i>	16,521	14,441	-13	0.50	0.50	0.00

Table5: Sales Report of Passenger cars in pre and during Covid in India

As seen in the accompanying table, vehicle sales have decreased during this pandemic time caused by covid 19. Maruti Suzuki is India's top-selling automaker, but the epidemic has taken its toll on sales there as well. Only Renault's sales have grown, according to the report. The sales value of MG and Kia, which are both new to the Indian market, cannot be determined from the statistics. The market share of the automobile industry was also decreasing. Specifically, Honda's market share dropped by 1.8 percent. Because they are newcomers to the market, Kia's proportion of the market has grown, followed by Kia. This lockdown in India has resulted in an increase in Hyundai's market share.

Automobile sales in India decreased in FY21, as reported by the Society for Indian Automobile Manufacturers (SIAM) (2.24 percent decline in sales of passenger vehicles, 13.19 percent fall in sales of two-wheelers, 20.77 percent fall in sales of commercial vehicles, and 66.06 percent fall in sales of three-wheelers).

Cuts in output resulting from a drop in demand also had an adverse effect on job creation. The loss of 3.45 lakh jobs in the Indian car industry was predicted by the Parliamentary Panel in its report to Rajya Sabha chairman M Venkaiah Naidu. In response to a decrease in vehicle sales, Maruti Suzuki slashed its temporary staff by 6%. There has been a significant recession in the car industry, which has contributed more than 7% of India's GDP, with several automakers reporting year-on-year losses of much more than 30% in recent times.

Some research literatures have explained the consequences of the COVID-19 on the automobile industry. Rajamohan et al. (2020) has conducted a study on how the stock market particularly the National Stock Exchange of automobile sector has been distressed due to COVID-19. The results reveal that higher value equities have been sold at depreciation value. Moreover, lower returns have been reported for the returns of

the automobile sector index. Hence, from the results it can be concluded that COVID-19 pandemic has created a significant effect on the stock exchange of the automobile industry. A hybrid model named as SEM-Logit model was proposed by Yan et al. (2020) to explore the consumer decision making as well as the factors affecting the purchase of automobile during pandemic. The proposed model was used to investigate the effect of social-demographics, epidemic-related and psychological latent variables on the purchase decision making process of the automobiles. The results reveal that pandemic has generated an adverse effect on the purchase of the automobiles. The factors such as household income, travel vulnerabilities and epidemic severity in local regions have influenced the purchase decision making process of individuals. Further, study is used to assist the policy makers in implementing significant measures to overcome the present crisis in the automobile purchase.

AREA UNDER AUTOMOBILE INDUSTRY AND THE COVID-19 IMPACT

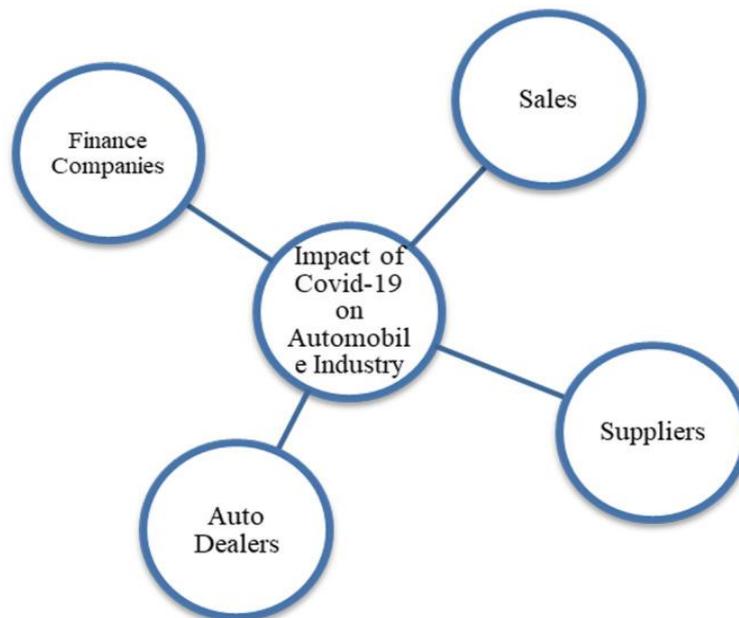


Fig2: Impact on automobile industry fields due to COVID-19

Auto dealers

Auto dealers have had a lot of difficulties. Auto dealers for two-, three-, and four-wheeled vehicles number 15,000 or more in India. During the lockout, they were unable to transfer automobiles. Prior to the shutdown, auto dealers warned customers that finished items would be significantly discounted for 30–45 days. At least 8% to 10% of these dealerships are expected to be closed during the next six months.

Auto suppliers

Due to their dependence on immigrant labor, auto suppliers fear that the extra delay caused by the shutdown would have a cascading effect across the whole assessment chain. Suppliers are dealing with liquidity issues that might be exacerbated by deteriorating market conditions, resulting in widespread problems for the whole production chain.

Finance companies

Loan evasions are projected to rise, while new loans are expected to decline, due to the difficulty of determining a customer's credit worth. Used automobiles, mobility solutions, and automotive service providers are projected to be affected by the COVID-2019, which is expected to put pressure on their financial support.

Sales

As a result of COVID-19, new-vehicle sales for automobiles suffered greatly in February 2020. In China, for example, new car sales fell by a whopping 92% in February alone. Overall car sales in Europe fell 7.4 percent in comparison to previous year's figures. As a result of the lockdown, numerous industries in India, such as TVS and Mahindra, have been impacted, as have many other areas of the economy.

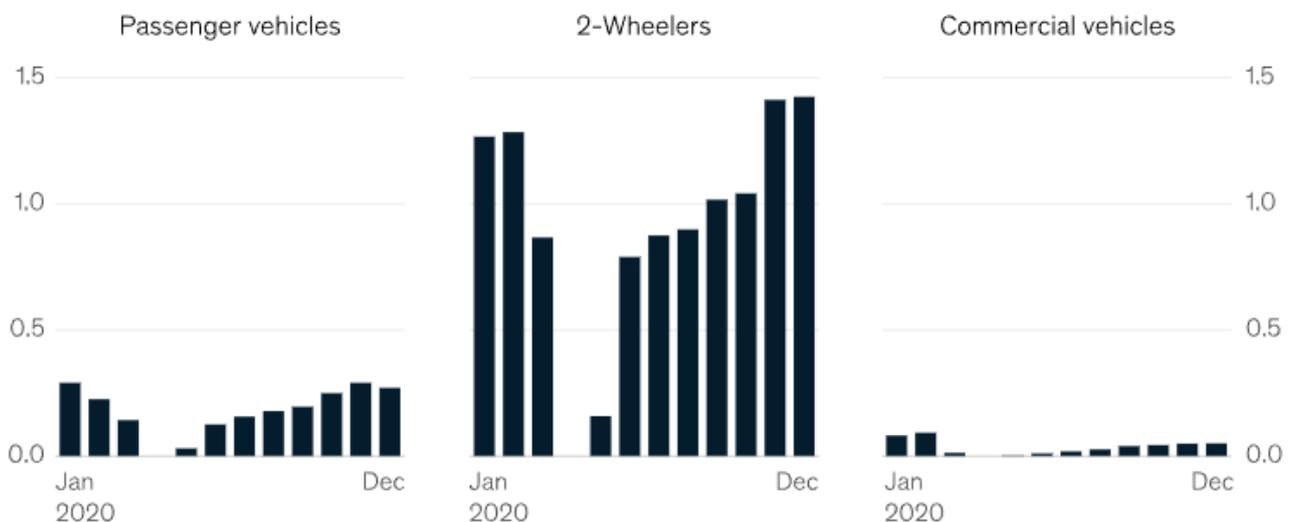


Fig3: Automotive retail sales in India, millions in unit.

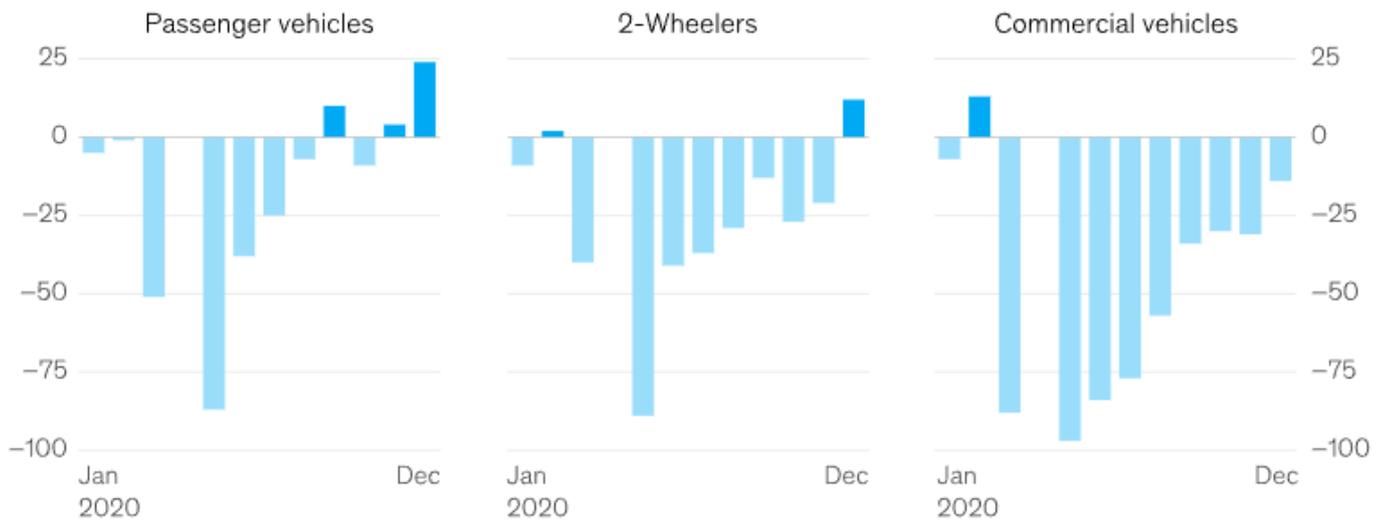


Fig4: Automotive retail sales in India, year by year, % change.

ISSUES FACED BY AUTOMOTIVE SECTOR DUE TO COVID-19

The automobile industry is in a precarious position owing to the epidemic's disruption of business as usual and the uncertainty it causes in the financial situation. There are a number of significant supply chain sectors that are located in the impacted regions. Emergencies such as power outages, cyber events, natural catastrophes, and so on necessitated unique emergency plans that allowed for operational efficiency. Widespread impacts have sped up the mobbing process. Crisis management and reaction, workforce, supply chain, finance & liquidity, tax & trade, and strategy are some of the most important aspects of these problems.

Crisis response and management

Preparation for tense situations is essential. Automotive firms must keep up with the times in order to respond to the pandemic, which has moved its epicenter from Asia to North America and Europe. In addition to considering the epidemic's influence on a range of vital areas, businesses should also take the rapidly expanding economic, strategic, and financial market landscape into consideration. and financial markets.

Workforce

More than a million Americans have been employed by automakers and their suppliers, according to the Bureau of Labor Statistics. As a business leader, you should focus on the well-being of your staff. If the pandemic spreads and a large number of workers become ill, it might have a significant impact on production capacity. Workers need to be informed in a clear, concise, and suitable manner, especially as the quantity of detailed instances increases as a result of increased access to testing

Supply chain and Operations

COVID19 might have a significant effect on the automotive supply chain. As a result of the outbreak of this virus, vehicle production in nations like Japan, China, and South Korea has plummeted. Two- and three-tier dealers are projected to be the most impacted by epidemic-related disruptions by automakers with global supply networks. Enhancing channels of communication and chain visibility are a few of the approaches being considered for early detection of possible issues and development of repair strategies.

Liquidity and Finance

Early in the first quarter, there was a rapid spread of the COVID19 outbreak. This has resulted in functional difficulties that have delayed the capacity of enterprises in Spain, Italy, and France to finish financial statements. To make matters worse, a small number of automobile manufacturers are becoming more concerned that the financial effect of the pandemic might lead to recoverability of receivables sparking measures as well as to reform events as well. In the next weeks, the financing team might see a significant increase in the quantity of work they are able to obtain. When it comes to money and liquidity, the majority of suppliers and multi-national corporations should take a careful look at their policies in light of such epidemic's influence on the worlds and global credit markets.

Strategy

Economic uncertainty and the COVID19 outbreak might lead to decreased consumer demand in the near term, which could lead to delayed sales of new vehicles and delaying payments for further maintenance. Employee relaxation and support responsibilities might be compromised if the vehicle supply chain is disrupted. A new strategy may be devised to ease the effect of declining intent cash in the marketplace for an extended period of time because of the causes for its inactivity.

In addition, the table below lists several obstacles (Accenture, 2020) that must be overcome in order to implement the aforementioned solutions.

Challenge	Present scenario	Future scenario
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<p>Supply</p>	<ul style="list-style-type: none"> • China is heavily reliant on the global manufacturer of automobiles. • In Europe and Asia, the car industry is concerned about a lack of supply. • Almost two-thirds of China's car manufacturing was directly impacted by supplier disruptions. • Several key ocean transport routes have been cancelled because of a lack of timely supply. 	<ul style="list-style-type: none"> • Many variables, such as labour availability and safety elements and regulatory requirements, contribute to the time it takes for car traders to recover from their losses. • Because the supply chain must be synchronised, the restart will be complex, expensive, and time-consuming. • Production elasticity will be increased to facilitate the movement of production from one facility to another.
<p>Manufacturing</p>	<ul style="list-style-type: none"> • Automobile manufacturers in China, North America, and Europe have all halted manufacturing. • An electric car manufacturer in the United States was forced to shut down its manufacturing. • Overtime reduction, short-time labour, and other labour-saving measures have been used by most automakers in certain management departments. 	<ul style="list-style-type: none"> • In the short to intermediate future, the financial effect of production stoppages due to falling demand, supply issues, and staff safety will be the most significant. • The loss of 14 million jobs in Europe if manufacturing services are halted is expected.
<p>Working capital and liquidity</p>	<ul style="list-style-type: none"> • The transaction is now burning cash at a rate less than 2 months • To weather the crisis, several businesses are negotiating higher loan limits with their depositors. 	<ul style="list-style-type: none"> • During the catastrophe, major automakers should anticipate to suffer liquidity issues as working cash flow decreases.

Vehicle sales	<ul style="list-style-type: none"> • There has been a decrease in the overall sales of automotive light vehicles (LV). • Sales in China, the first nation most hit by the COVID-19, fell by more than 80% in February. 	<ul style="list-style-type: none"> • By 2020, sales in China are forecast to decline by more than 10%, while sales in the United States are likely to decline by 15%. • In 2020, Western European sales are expected to decline by 14 percent.
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Table6: Various challenges of auto-mobile industry

IMPACT OF RECESSION

A recession is a long-term downturn in a country's/region's/economic world's position, resulting in lower trade, per capita income, unemployment, GDP, and so on. The decline in the production of passenger vehicles, light vehicles, commercial vehicles, tractors, and buses in Europe and the United States from 2007 to 2009 may be attributed to the recession that began in the United States and moved to Europe. However, India's GDP declined, which in turn reduced the manufacture of heavy buses, even if it wasn't as bad as in the United States and Europe. The Great Recession had little direct impact on India and Asia/Oceania, and the manufacture of automobiles has risen. In 2013, the decline in GDP in India had an impact on automotive manufacturing. Since the European Union's GDP growth was stunted in 2012 and 2013, American and European auto manufacturers have been unable to ramp up output to their previous levels.

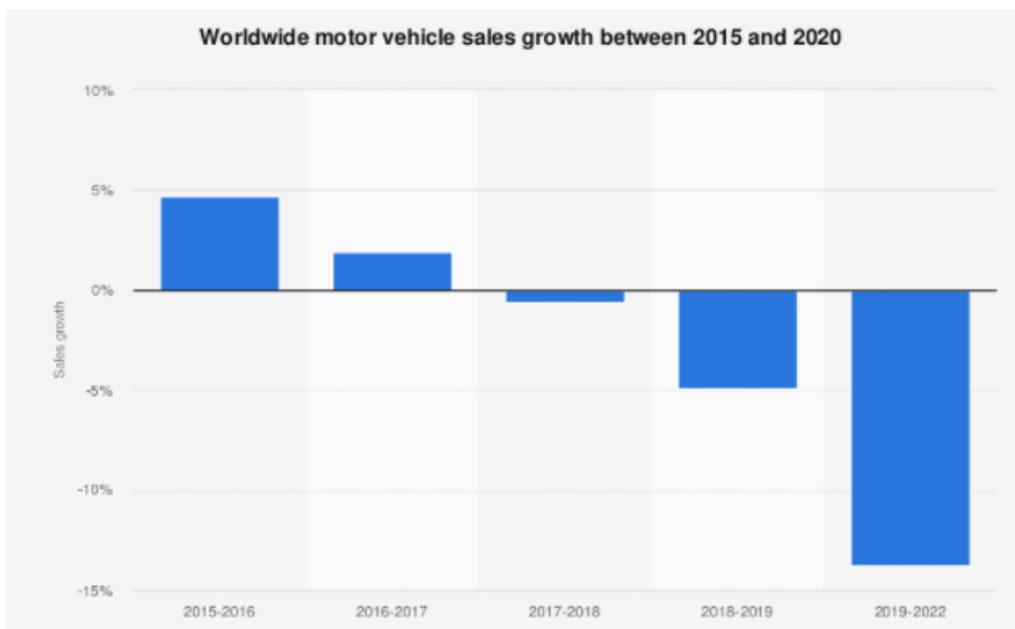


Fig5: Worldwide motor vehicle sales growth between 2015 to 2020

Automobile manufacturing was negatively impacted by the global decline in GDP in 2018. The Great Recession of 2007–2009 and a drop in GDP led to a reduction in automotive sales in all areas. Across all locations where we can discern a clear correlation between GDP growth and automotive sales, sales fell in 2018. There has been a significant drop in Indian automotive sales and manufacturing since 2018 as a result of the new Motor Vehicles Bill and the country's impending crash requirements beginning in 2017. Many lives will be saved as a result of this legislation helping to strengthen vehicle safety measures. To strengthen and support emission standards and improve air quality, India is moving from the April 2020 BS-IV system to the BS-VI system in April 2019.

- **Impact of COVID**

Well before the pandemic COVID-19 ravages the planet, the global car sector is reeling from a drop in GDP growth. There are a variety of government initiatives aimed at improving air quality, as well as improvements in vehicle safety that must be made in order to reduce the number of accidents. Oil prices, registration expenses and insurance premiums are putting a strain on the sector. Authorities adopted lockdown to restrict the spread of COVID-19 in order to keep it under control. The global financial status quo was adversely impacted by the lockdown in all sectors. Due to COVID-19's direct impact on all nations, it is projected that the recession would be more serious than the Great Recession, however it is assumed that the economy will recover by 2023.

- **Travel Restrictions**

Because of the lockdown, COVID-19 primarily impacted the car sector, which in turn hindered tourism, hotels, and transportation. People are staying away from busy areas in order to keep themselves safe. Slowly but surely people are adapting to a simpler way of life because of lockdown.

- **Canceling and Rescheduling of Auto Shows**

Auto shows serve as a stage for the introduction of new automotive models, the debate over emerging technology, and the stimulation of consumer demand among enthusiasts. Auto exhibitions have been cancelled and new cars have been delayed because of this, delaying projected investments. Tokyo Motor Show (2020) has been moved from March to July; the New York, Geneva, Detroit, and Paris auto shows have been cancelled; and the Brussels auto show, which was originally slated for January 2021 but has now been postponed to January 2022.

- **Measures to Overcome Recession**

Adaptability, operational quality improvement, and enough financial resources are all essential for companies in a recession. Debt-ridden companies are in a precarious situation, and issuing stock is a good way to prevent growing their debt levels. By lowering interest rates, taxes, tolls, and other fees, the government can attract new consumers and relieve the burden on automotive makers.

MEASURES TO OVERCOME RECESSION

Adaptability, operational quality improvement, and enough financial resources are all essential for companies in a recession. Debt-ridden companies are in a precarious situation, and issuing stock is a good way to prevent growing their debt levels. By lowering interest rates, taxes, and tolls on automobiles, the government can boost sales and relieve the burden on automotive producers.

- **Developing Nations and Renewable Resources**

On average, the automotive industry focuses its efforts on a younger population. Investing in renewable energy research is necessary to ensure that it is utilized effectively. As the price of petroleum products rises, consumers are eagerly expecting the introduction of a more affordable and efficient car that runs on renewable energy. The use of renewable energy is also encouraged by the authorities since it decreases the load on petroleum goods and the worldwide focus is given to minimize pollution or waste.

- **Increasing the level of expertise of workers**

Layoffs may seem like a good way to reduce losses, but when the economy improves, it will be more costly to hire and educate new employees. The layoff will also have a negative impact on morale and productivity among employees. In order to preserve social distance and reduce working hours, employers might utilize shift-based scheduling. This reduces the amount of money that must be paid.

- **Safety Feature**

Since people are shunning public transit and automotive sales/registration are expected to rise from April 2020, the automobile is shifting from a luxury item to a necessity. COVID-19 is causing people to shun public transit. As a result of this, vehicle sales are likely to rise, and a study of the Great Recession shows that demand for used cars rose.

- **Adapting to the Latest and Greatest Technology**

Salespeople at car dealerships may boost their profits by encouraging customers to do test drives at home, in virtual reality, via review videos, and in a digital showroom, among other methods. A digital auto show will

aid in the introduction of new vehicles and information exchange instead of cancelling or delaying traditional car exhibitions.

IMAGE PROCESSING METHODS FOR SMART VEHICLES

As a result of technological advancements, the vehicle industry continues to expand. Making driving more enjoyable, safe, swift and comfortable is the goal of the vehicle industry's latest innovations. The versatility of image processing in autos is enhanced by its widespread use. ADAS and ADS systems are the primary use cases for this technology. There is now only Level 3 automation available in the automotive sector, while efforts are being made to introduce Levels 4 and 5. Many automakers, such as Renault, Tesla, Toyota, and Nexans with Google, NVIDIA, and Mobileye, are unable to execute it.

Continuous real-time video feed is employed in a smart automobile to recognize the kind of route and barrier, which helps reduce the environmental impact. In order to improve speed, Yixu Chen employed bitmap preprocessing and cross-edge search technique. It is essential that the self-driving car be able to recognize urban and rural traffic lanes as well as map formation, road type, steering angle forecasting, proximity determination, traffic signals and obstacles including such pedestrians, animals, other automobiles and speed bumps, and make decisions based on the information it collects. The video stream from the embedded camera is subjected to image processing in order to aid autonomous vehicles. Cranny's edge detector was employed by Shriram K V et al. to improve edge detection performance, which is useful for lane/obstacle identification.

Graphical dimensions of such vehicle may be used to classify the kind of vehicle. End-to-end learning aids the autonomous vehicle's deep learning convolution neural network. The network receives training videos straight from the cameras and LIDAR. With a convolution neural network, image processing can be done more efficiently because of the convolutional neural network's training network. A convolution neural network with computer vision with deep learning technologies are being used by many businesses to produce self-driving automobiles. Images are processed in a manufacturing line using deep learning to identify stains, damages in paint, various flaws, and damages in manufactured parts, which reduces the final product's defects and increases consumer confidence in the brand.

It has been shown that the performance of object recognition may be improved by using a novel algorithm difference of gaussian. A panoramic picture of the car's surroundings may be generated by combining photos taken by several cameras implanted in the vehicle's body. Smart cars, lane change, security, object recognition, and seeing cars in the blind spot will all benefit from this technology.

CHAPTER 2: LITERATURE REVIEW

As (**Jatinder Singh, 2014**) highlighted, the Indian car sector has experienced a major reorganization since the introduction of reforms in 1991. About 8% of India's GDP was attributed to the car sector. As middle-class families in India see a rise in their earnings, Easy lending rules for purchasing two-wheelers and vehicles adopted by the banks fueled the automotive sector's fast rise.

Growth in the FDI sector has also contributed significantly, accounting for about 48% of total inflows between 2000 and 2011 (**Jimmy Corton Gaddam, 2013**). This was attributed to both India's burgeoning economic prosperity and rising middle-class demand. There is a lot of room for growth in the car business in India, where there is still a lot of room for growth.

An analysis of the historical development of the Indian vehicle industry was provided by (**Lokhande, et al, 2013**). After the deregulation of the Indian car industry in 1990, the vehicle market became very competitive. Organizations need to be innovative and creative to survive in today's competitive economy.

Car manufacturing and exports have increased steadily in India during the last decade, according to (**M. Krishnaveni, et al., 2015**). The surge in production and exports of autos in India may be attributed to both an increase in demand and an increase in FDI inflows of 100 percent.

According to (**Alpana Roy, 2016**), climate change has been exacerbated in major cities throughout the globe because of an expansion in the transportation sector. Vehicle expansion is connected with a rise in the average temperature in Delhi and Kolkata, according to research by this author.

People and the environment are in danger because of fast urbanization and an increase in the use of motor vehicles. (**Shrivastava R. K., et al, 2013**) Air pollution is a major problem in many South Asian cities, including India. There is a significant amount of CO, SO₂, NO₂, PM, and other pollutants released into the air by the transportation industry.

(**Geetha P, et al, 2015**) noted that fast urbanization and population expansion led to an increase in the number of automobiles in major cities throughout the globe, which in turn led to a rise in air pollution as well as health and environmental concerns. Hysplit4 is used to simulate the effects of contaminants on the environment. Trace the path of the contaminants. The wind speed, temperature, and direction all have an impact on the pollutants' path. Environmentalists utilize the simulation data to plan roadways, industrial sites, and other infrastructure.

It was stated by **(Kokila M, et.al, 2016)** that an area's air pollution contamination is a consequence of pollution in the area itself as well as pollution from adjacent areas due to variables such as wind speed and direction. Measurement data is obtained, and the dispersion pattern of pollutants emitted by automobiles is mapped using a hysplit4 simulation.

The vehicle business is directly influenced by economic development. Because the recession is projected to recur, and the GDP continues to fall. Instead, then expanding the number of cars on the road, the automotive industry should focus on research and development of ADAS and ADS. In order to drive safely and securely, vehicles need the assistance of cameras, thermal cameras, and infrared cameras. **(Diane, 2020)**

The system becomes more taxed as the kind and quantity of cameras grows. Research has to be done on integrating several cameras and sensors into a single entity, as well as how to use the same technology to handle multiple kinds of cameras and sensors. Vendors and dealers need to come up with alternative business models to avoid more losses in the sector, such as providing vehicles for hire and drivers' services. **(Shalini Aggarwal, 2019)**

Because of the slowdown in the economy and in GDP, the automotive sector is in a difficult position (GDP). Visitors to car exhibitions are being affected by the COVID-19. New developing technologies like image processing, machine intelligence and deep learning are used to make transportation simple, easy and secure. It transforms from basic automobiles to smart and autonomous vehicles. **(Frick, W, 2019)**

Although COVID-19 continues to pose a problem, the Indian automobile sector seems to have overcome the majority of its difficulties, and many of these issues are already in the rear view. Global supply-chain balancing, government subsidies to enhance exports, and technological upheavals that generate white spaces are all contributing to the sector's growth. As a result of these advancements, new job opportunities will be created across the whole automotive value chain. **(Kyle, K., 2020)**

It's becoming more apparent to the industry's players that there is a path forward that they can take advantage of. In order to accelerate their value creation trajectories, industry players must comprehend a set of imperatives and enablers that we condensed from our study. **(Chen, Y.,2018)**

An effort to re-enter the market by Indian automakers should also be made. Bharat Stage VI emission rules imposed by the Indian government pushed up the price of 2Ws and vehicles by 7 to 9 percent and 3 to 5 percent respectively. New productivity transformations by manufacturers should be considered in order to decrease the initial cost of car ownership. **(Viswanathan, V., 2018)**

Creating alternative ownership alternatives for potential consumers is a way for automakers to innovate. New clients might join the market via these routes at the same time. Several car manufacturers now provide leasing

alternatives, particularly in the PV market; nonetheless, their products have tight constraints for vehicle types, lease durations, and other characteristics as mentioned before. The development of improved leasing choices in the domestic market will become crucial as millennials' mobility demands change and move away from direct ownership. **(Gandikota, R.,2018)**

Automakers must provide direct-to-customer choices in light of the growing popularity of digital channels among India's consuming classes. Leaders may also set themselves apart from the competition by implementing best-in-class digital and analytics transformations. **(Henderson, 2018)**

APPROACH FOR INDIAN AUTO SECTOR TO RECESSION

The Indian automobile industry has now reached a point when major changes are needed to maintain its long-term viability. It is unlikely that this study will investigate the role played by the government. Instead, significant OEMs in the commercial and passenger vehicle manufacturing industry will be questioned about their future plans and the changes they need to make in order to survive the current global economic downturn.

In the three recessions of 1980, 1990, and 2000, 17% of public companies either went bankrupt, went private, or were acquired; 80% of them couldn't achieve prerecession growth rates of sales and profits; and 9% of them flourished by outperforming their competitors, according to a Harvard Business Review article (Gulati et al., 2010b).

Neither the companies that immediately reduce expenses, nor those who lead the expenditure dashboard at such times compared to their competitors, are included in the 9 percent that is wealthy. There are 21 percent and 26 percent, respectively, of possibilities that minded companies would improve their financial situation following this recession according to academics. However, firms that combine both types of strategy have a 37% chance of surviving the recessionary downturn. They cut expenses by spending more in new assets, marketing, and R&D than their competitors, all while concentrating more on operational efficiency.

During a downturn, one rule of thumb prof Rebecca Henderson (Henderson, 2018) suggests is "not crash the firm" (Henderson, 2018). If you don't run out of money at these stages, you're good to go! Financial debt management is a need during a downturn because of the decline in sales and the resulting lack of operating capital. Amazon is a good example of this assertion, according to this statement.

During the dot-com bubble, Amazon would not have been able to launch the Amazon Marketplace, which launched later that year and functioned through a negative cash conversion cycle if money had not been obtained before the year's end. An organization's ability to carry out its plans is directly correlated to the amount of cash it has on hand. The best use of money must be taken care of at all times, including during a recession.

Companies' investment/divestment responses to the crisis have led me to divide them into three groups:

- Corporations that play defensively in order to reduce costs to avert more losses are known as defensive companies.
- These firms invest in as many sectors as possible so that they may get the most rewards from their investments.
- Tilted firms—these companies have a mix of both methods, but they lean toward one side to a greater degree than the others.

FUTURE OF THE AUTO SECTOR: POST-COVID-19 SCENARIO

Indian automakers were already tormented by the 18 percent growth shortfall in FY 2020. According to Figure 4, sales and manufacturing of vehicles had already begun to drop in February 2020. COVID-19 also devised its own plan for an apocalypse to add to the flames. Additionally, BS-VI emission standards and relaxed economic growth, anxious consumer attitude and reduced utilization of workers, as well as probable bankruptcies and a liquidity crisis have placed additional dangers on the business community. Production and sales of automobiles in the United States are seen in Figure 6.

Even if the International Monetary Fund (IMF) forecasts a negative growth rate for FY 2021 globally, these three factors would keep the Indian car industry in a perpetual state of crisis:

- a. After this worldwide contingency, which is based only on human proximity, the market may see a big increase in the sale of four-wheelers after the lockdown. Analysts, on the other hand, do not expect personal vehicle sales to rise more than 2% this year (Coronavirus Crisis, n.d.). 'Work from Home' is becoming the norm among white-collar workers, which means that demand may be reduced even more.
- b. Customers would get less financial assistance to purchase electric cars (EVs), with sales of EVs increasing by 20% in FY 2020 over the previous FY. There were 156,000 electric vehicles sold in 2019–2020 vs 130,000 lacs in 2018–2019, according to the Society of Manufacturers of Electric Vehicle (SMEV). In FY 2021, electric four-wheeler sales in India would grow due to the favourable cost-benefit ratio accessible to the country's middle class, although in FY 2019, sales of electric four-wheelers fell by 5% (3400 units sold) compared to 3,600 units sold in FY 2019. (Electric Vehicle Sales in India, 2020). Due to a lack of mass purchases of electric vehicles and a model's withdrawal from the market, demand has decreased. Because battery costs are dropping so rapidly, a conventional passenger car would be more expensive to operate after seven years than an electric car, according to a study by renowned Indian media and information portal Inc42 DataLabs (Are Electric Vehicles, 2020). Increasing EV sales are a result of the same. Because the typical Indian family's income and the cost of electric vehicles varies by almost \$14,000–\$18,000k, this business has been unable to reach the

general public. In spite of the fact that India has a wide variety of major and small businesses in this sector, the demand is unlikely to rise as a result of the income–cost gap.

- c. At this point, the Federation of Organizations in Indian Tourism & Hospitality (FAITH) believes that tourist contributes roughly 10% of India's GDP, which is the governing body of all the national organizations representing all the tourism, travel, and hospitality industries in India (Tourism & Hospitality Industry, n.d.). Therefore, the Indian tourist sector is likely to suffer a revenue loss of 1.25 trillion rupees (Dash, 2020). Tourism may take 2–3 years to stabilize due to the aforementioned fact and social distance problems. As a result, the Indian automobile industry might anticipate a direct effect as a result.

CHAPTER 3: METHODOLOGY

Research Questions

- How automobile industry of India got affected due to Pandemic?
- What are the challenges faced by Automobile Industry?
- How to overcome the challenges faced by automotive sector.

Objectives of the study

- Analysis of automobile industry car sales during the Covid 19 pandemic and lockdown in India is the goal.
- To assess the automobile industry's share of the Indian market during the Covid 19 epidemic
- To find out where India stands in the world market for the manufacture of automobiles.
- To learn about India's car industry's current trends and future prospects.
- To have a better understanding of the industry, sales and production figures from various regions are provided.
- By comparing COVID-19's recession to comparable circumstances, different solutions may be taken to alleviate it.

Research Methodology

Research methodology is that aspect which is being followed during the thorough research for reaching the perspective of the people and examining the literature which is already in existence regarding the topic which has been chosen. As in this particular study we have been deliberating about the worker retention strategies, so the plans of chosen company have been examined using existence literature and the viewpoint of the workers concerning the organization is being collected with the help of primary research method. Questionnaire method technique was used for the collecting data. All respondents were given numerous questions on the subject of their company and their marketing suggestions to support the firm in the pre-structured questionnaires. The interpretation of outcomes has been developed and the final results have been computed.

Tools Used

The instruments considered for the analysis of the collected data with the help of questionnaire are:

- Microsoft Excel
- Normal calculation method

Type of Data

Primary data was considered for the purpose of analysis which has been collected with the help of questionnaire that was distributed with using the digital platforms to different areas for respondents. In further to these responses has been collected. Collection of responses has been additional examined using the help of analysis tool.

Sampling Technique

Random sampling technique was carried into significance for choosing the sampling for responding the issues that were plated in questionnaire. Majority of the people chosen were working or pursuing higher education.

Sample size

76 people responded the questions mentioned in the questionnaire and those responses has been collected and further being utilized for analysis.

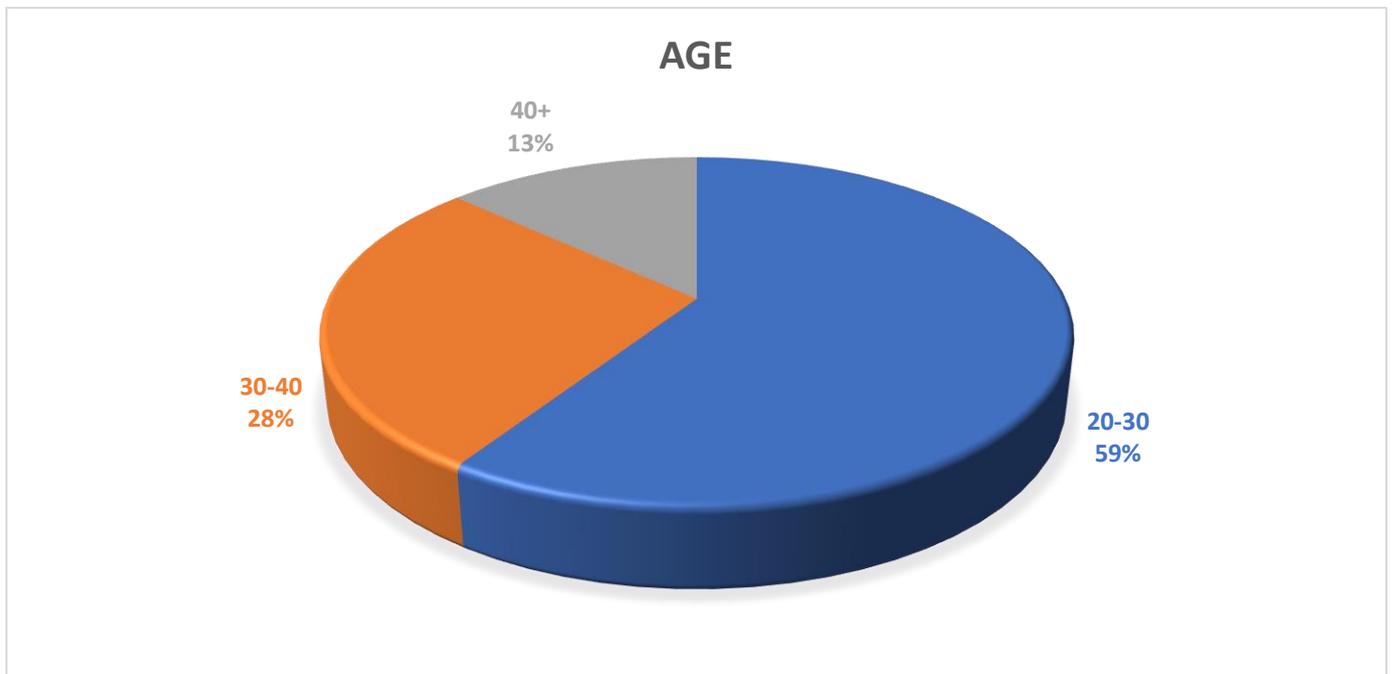
Analysis Tools

For the computation of the primary data analysis, normal excel calculations was applied, and other statistics analysis was done with the help of Microsoft Excel tabular and chart form. All the data has been represented in the chart form for the prospects of analysis. Data has been represented in the form of pie chart and prior to it, it was collected in tabular form with the use of Microsoft Excel.

CHAPTER 4: DATA INTERPRETATION

AGE

	Responses	Percentage
20-30	45	59.2
30-40	21	27.6
40+	10	13.2
Total	76	100

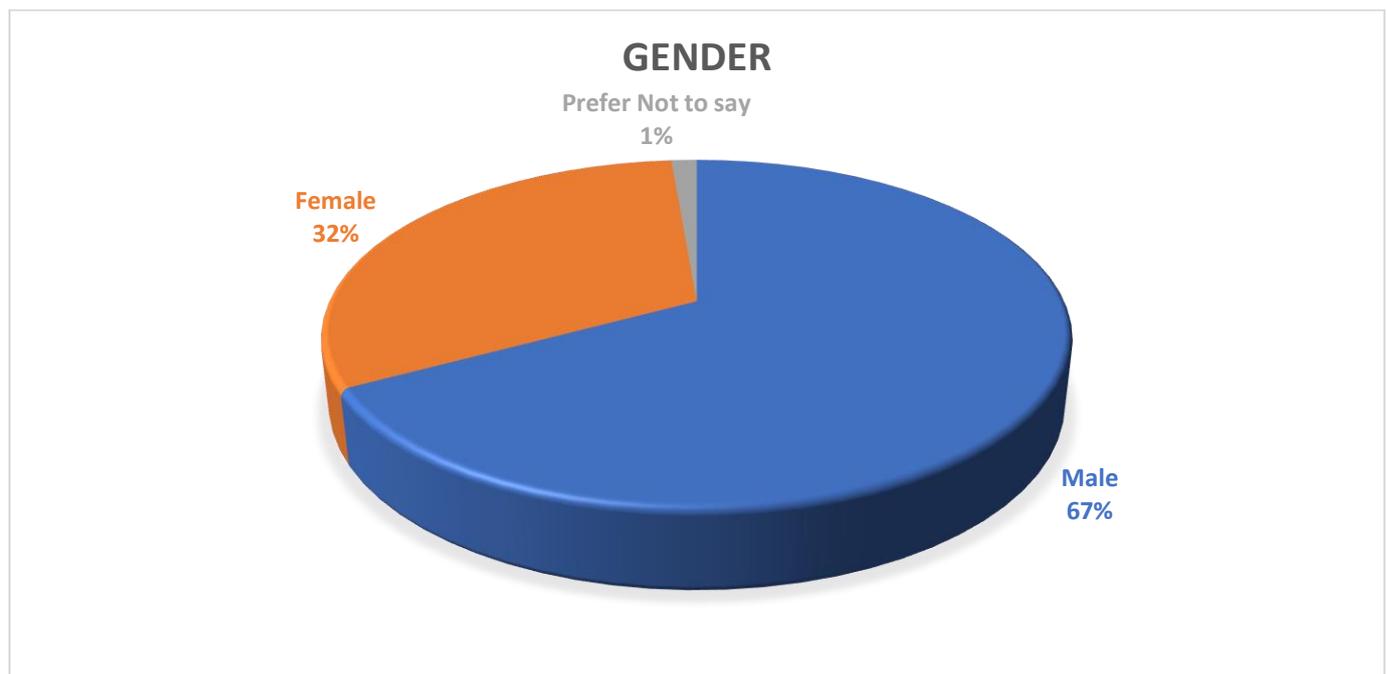


INTERPRETATION

Out of the total respondents, majority of the number of people belong to age group of 20-30, followed by 21 people who belongs to age group of 30-40. Around 10 people belong to age group of 40+.

Gender

	Responses	Percentage
Male	51	67
Female	24	32
Prefer Not to say	1	1
Total	76	100

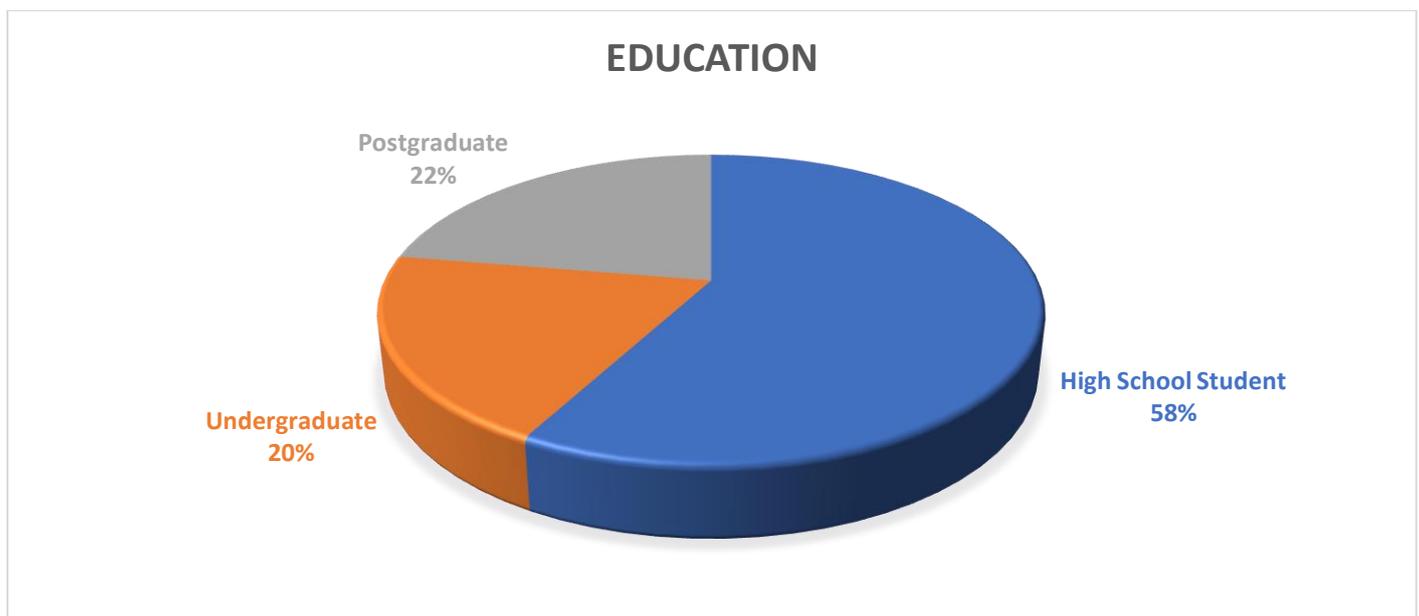


INTERPRETATION

Out of total respondents, majority were male, around 51.24 of them were female around 40%, and only 1 was there who preferred not to state their gender.

Education

	Responses	Percentage
High School Student	44	58
Undergraduate	15	20
Postgraduate	17	22
Total	76	100



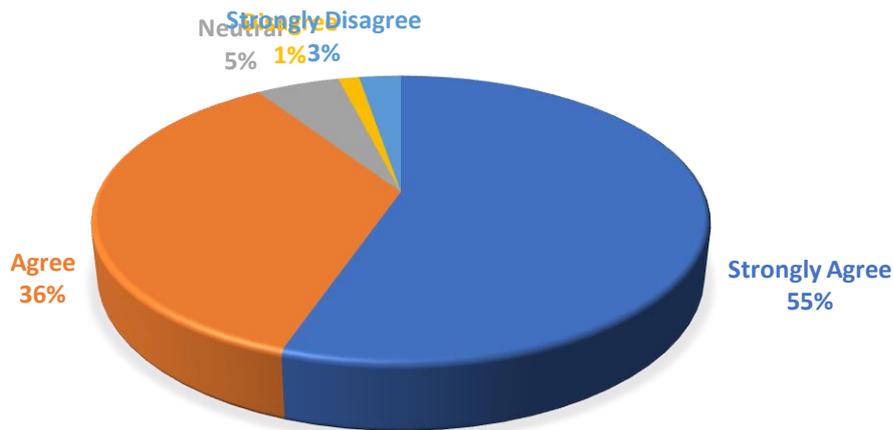
INTERPRETATION

Out of total respondents, majority were high school students around 44, followed by 15 people who were undergraduates and 17 people were pursuing their postgraduation.

The Indian economy is bolstered by the country's automobile industry, which accounts for a large portion of the country's GDP

	Responses	Percentage
Strongly Agree	42	55.3
Agree	27	35.5
Neutral	4	5.3
Disagree	1	1.3
Strongly Disagree	2	2.6
Total	76	100

THE INDIAN ECONOMY IS BOLSTERED BY THE COUNTRY'S AUTOMOBILE INDUSTRY, WHICH ACCOUNTS FOR A LARGE PORTION OF THE COUNTRY'S GDP



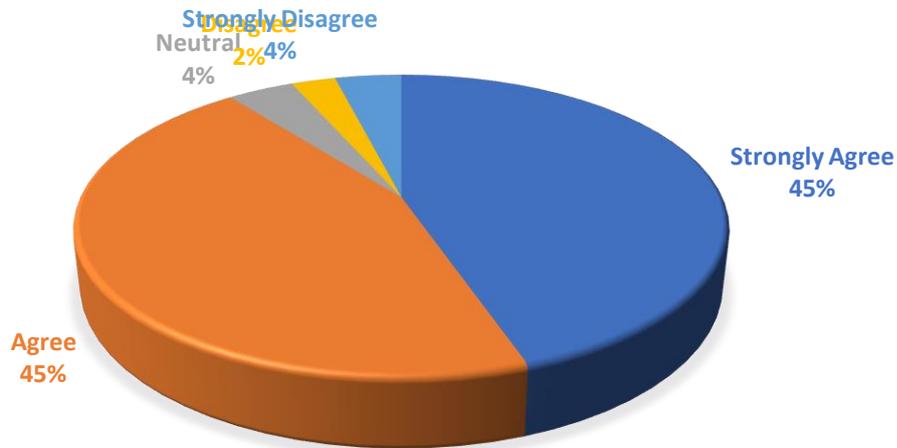
INTERPRETATION

Out of the total respondents, 42 people strongly agreed to the fact that The Indian economy is bolstered by the country's automobile industry, which accounts for a large portion of the country's GDP. 27 people agreed to the fact, only 4 people remained unbiased about fact, 1 person disagreed and 2 people were there who strongly disagreed to the fact.

The automobile sector in India was severely affected by pandemic-induced shutdowns

	Responses	Percentage
Strongly Agree	34	44.7
Agree	34	44.7
Neutral	3	3.9
Disagree	2	2.6
Strongly Disagree	3	3.9
Total	76	100

THE AUTOMOBILE SECTOR IN INDIA WAS SEVERELY AFFECTED BY PANDEMIC-INDUCED SHUTDOWNS RESPONSES



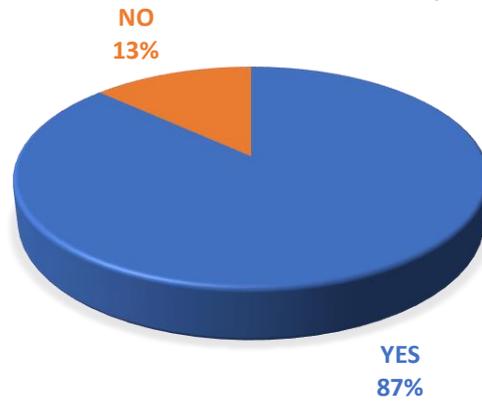
INTERPRETATION

Out of the total respondents, 34 people strongly agreed to the fact that the automobile sector in India was severely affected by pandemic-induced shutdowns. 34 people agreed to the fact, 3 people remained unbiased about fact, 2 people disagreed and 3 people were there who strongly disagreed to the fact.

Do you know that since 2015-16, the entire car industry's CAGR (compound annual growth rate) has been negative at 2%, compared to 5.7-percent increase in the prior five years (from 2011-16)

	Responses	Percentage
YES	66	86.8
NO	10	13.2
Total	76	100

DO YOU KNOW THAT SINCE 2015-16, THE ENTIRE CAR INDUSTRY'S CAGR (COMPOUND ANNUAL GROWTH RATE) HAS BEEN NEGATIVE AT 2%, COMPARED TO 5.7-PERCENT INCREASE IN THE PRIOR FIVE YEARS (FROM 2011-16)



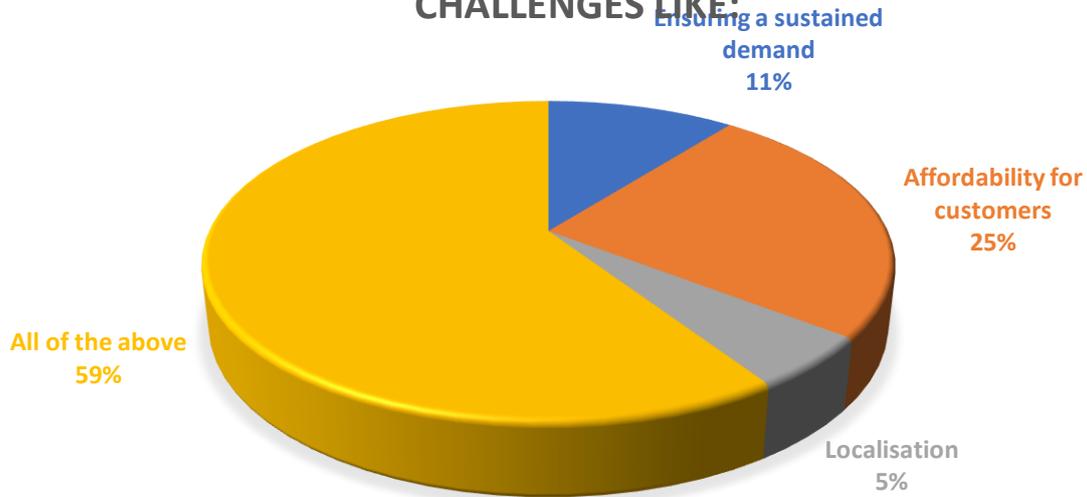
INTERPRETATION

Out of the whole respondents, 66 people stated yes that they know the entire car industry's CAGR (compound annual growth rate) has been negative at 2%, compared to 5.7-percent increase in the prior five years (from 2011-16), followed by the 10 people said who didn't about this fact.

Besides, the industry is also facing some medium-term challenges like

	Responses	Percentage
Ensuring a sustained demand	8	10.5
Affordability for customers	19	25
Localisation	4	5.3
All of the above	45	59.2
Total	76	100

BESIDES, THE INDUSTRY IS ALSO FACING SOME MEDIUM-TERM CHALLENGES LIKE:



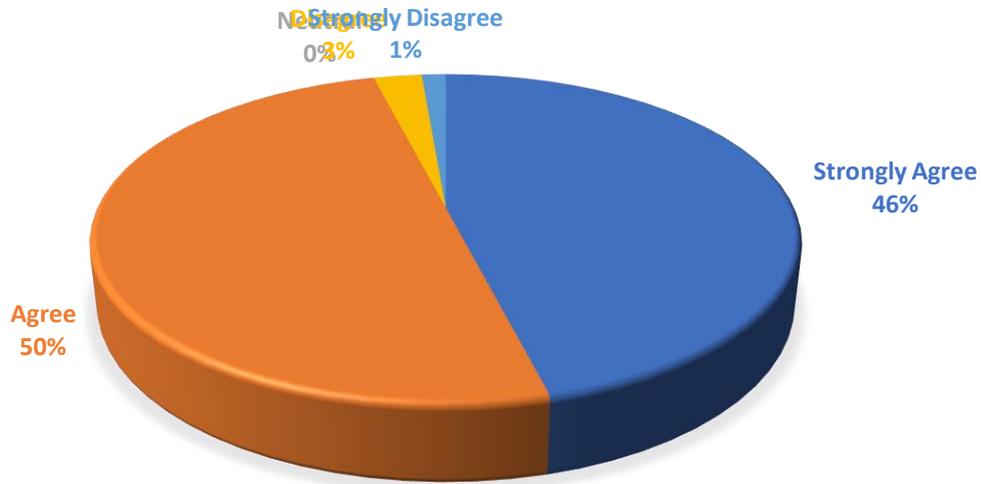
INTERPRETATION

Out of the total respondents, majority of the respondents chosen that all the options- ensuring a sustained demand, affordability for customers and localization are some of the challenges that automobile industry is facing.

The car industry's stakeholders turned to digitalisation in an effort to adapt to the new normal and better serve customers

	Responses	Percentage
Strongly Agree	35	46.1
Agree	38	50
Neutral	0	0
Disagree	2	2.6
Strongly Disagree	1	1.3
Total	76	100

THE CAR INDUSTRY'S STAKEHOLDERS TURNED TO DIGITALISATION IN AN EFFORT TO ADAPT TO THE NEW NORMAL AND BETTER SERVE CUSTOMERS



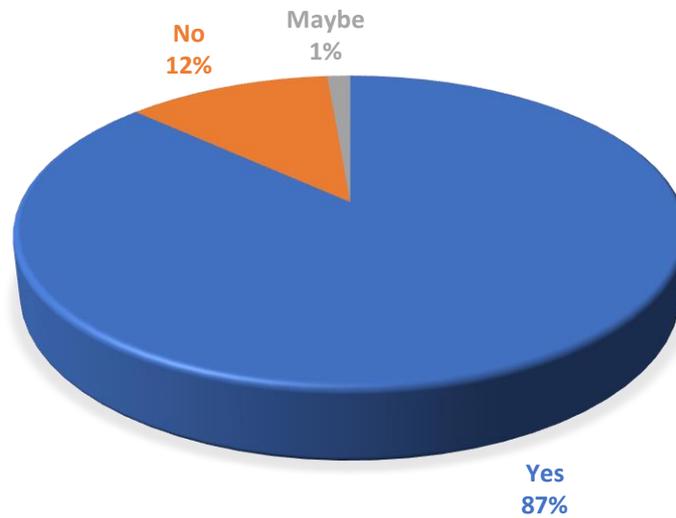
INTERPRETATION

Out of the total respondents, 35 people strongly agreed to the statement that the car industry's stakeholders turned to digitalization in an effort to adapt to the new normal and better serve customers. 38 people agreed to the fact, no one was neutral about this, 2 people disagreed and only 1 was there who strongly disagreed to the fact.

Certain obstacles, such as the availability of raw materials and the increase in the price of commodities, will continue to affect the industry

	Responses	Percentage
Yes	66	86.8
No	9	11.8
Maybe	1	1.3
Total	76	100

CERTAIN OBSTACLES, SUCH AS THE AVAILABILITY OF RAW MATERIALS AND THE INCREASE IN THE PRICE OF COMMODITIES, WILL CONTINUE TO AFFECT THE INDUSTRY



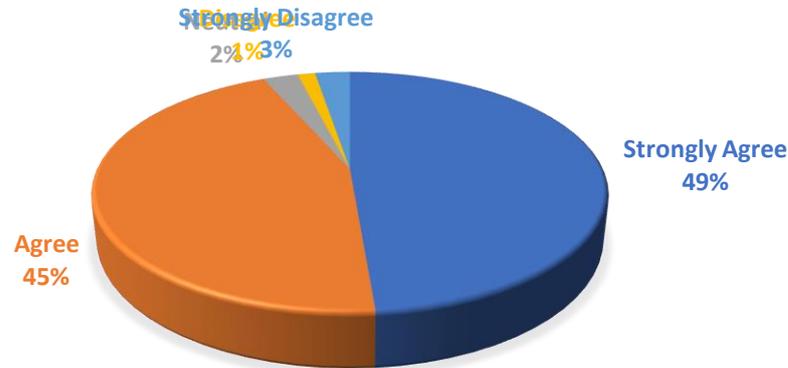
INTERPRETATION

Out of the whole respondents, 66 people stated yes about the fact that certain obstacles, such as the availability of raw materials and the increase in the price of commodities, will continue to affect the industry, followed by the 9 people said no for the fact and only one was unsure about it.

After initial supply and manufacturing disruptions, the industry is now experiencing a demand shock with uncertain recovery timeline due to shelter-in-place regulations

	Responses	Percentage
Strongly Agree	37	48.7
Agree	34	44.7
Neutral	2	2.6
Disagree	1	1.3
Strongly Disagree	2	2.6
Total	76	100

**AFTER INITIAL SUPPLY AND MANUFACTURING DISRUPTIONS,
THE INDUSTRY IS NOW EXPERIENCING A DEMAND SHOCK
WITH UNCERTAIN RECOVERY TIMELINE DUE TO SHELTER-IN-
PLACE REGULATIONS**



INTERPRETATION

Out of the total respondents, 37 people strongly agreed to the statement that After initial supply and manufacturing disruptions, the industry is now experiencing a demand shock with uncertain recovery timeline due to shelter-in-place regulations. 34 people agreed to the fact, 2 people neutral about this, only 1 disagreed and 2 were there who strongly disagreed to the fact.

FINDINGS

- Out of the total respondents, majority of the number of people belong to age group of 20-30.
- Out of total respondents, majority were male, around 51.
- Out of total respondents, majority were high school students around 44.
- Majority respondents, 42 people strongly agreed to the fact that The Indian economy is bolstered by the country's automobile industry, which accounts for a large portion of the country's GDP.
- Majority respondents, 34 people strongly agreed to the fact that the automobile sector in India was severely affected by pandemic-induced shutdowns.

- Majority people, 66 people stated yes that they know the entire car industry's CAGR (compound annual growth rate) has been negative at 2%, compared to 5.7-percent increase in the prior five years (from 2011-16).
- Out of the total respondents, majority of the respondents chosen that all the options- ensuring a sustained demand, affordability for customers and localization are some of the challenges that automobile industry is facing.
- Out of the total respondents, majority people agreed to the statement that the car industry's stakeholders turned to digitalization in an effort to adapt to the new normal and better serve customers.
- Majority people, 66 people stated yes about the fact that certain obstacles, such as the availability of raw materials and the increase in the price of commodities, will continue to affect the industry.
- Majority respondents, 37 people strongly agreed to the statement that After initial supply and manufacturing disruptions, the industry is now experiencing a demand shock with uncertain recovery timeline due to shelter-in-place regulations.

CHAPTER 5: RECOMMENDATION, LIMITATIONS AND CONCLUSION

SUGGESTIONS FOR INDIAN AUTO SECTOR

Employee Relations

The actual work is done by the employees of a corporation, but not all of them. When it comes to letting go of personnel, you have to be very selective about who you let go. Although the 80/20 rule is clearly valid, implementing it would have a significant negative effect on the company's image. An alternative to the 80/20 technique is the 4-4-2, in which the numbers are changed according to the situation. There will be no better combination than mechanizing certain plants and providing staff with training in the essential skills they will need.

Employers should develop incentive programs for high-volume workers and ensure their salary in exchange for top-level management's support. They could also provide them with stock options and other chemistry-enhancement programs as an added incentive. In order to improve employee confidence, this is a good moment to equalize pay between immediate cadres if the gap has been significant.

Research & Development (R&D) Facilities

In a recession, not all of a company's innovative ideas lead to success. The 4-4-2 strategy is outlined in the book "Managing in a Downturn," which was written by a group of well-known academics and professionals. This means that out of every ten projects, four are eliminated, four are maintained, and two are doubled up.

Because of the prevalence of "social separation," carpooling and two-wheeler use will decline for at least a year. In the wake of Tata Nano's clever move in 2009, tiny and inexpensive automobiles are sure to see a rise in demand. In addition, increasing the manufacture of electric vehicles may serve as a showcase for a company's environmental objectives. When it comes to charging electric cars, Nissan Motors got a patent in May 2019, followed by Tata Motors introducing its first electric vehicle in October 2019. (Tata Motors Electric Car, n.d.). There will be an increase in international orders for Indian suppliers because of the planned migration of several global corporations from China to India, according to a Mint storey (Global Firms Look to Shift from China to India, nd.). Self-sanitizing automobiles and microbe-resistant accessories will be in great demand.

M&A

After the recession, symbiotic relationships with companies of a similar cultural setting may provide great rewards. Humans and organisations alike form lifetime bonds with individuals who shine a light on our darkest hours. Automakers may save money and time by partnering with food delivery firms to assure the safety of the food and the people who deliver it, or with vehicle rental companies to save expenses. Many organizations in the transportation industry will be looking for more affordable and efficient vehicles, which will offer up a wide range of possibilities. The government's objective of reaching a GDP of US\$5 trillion and the 'Make in India' initiative are tangentially promoting M&As in abundance, given the downturn, making this a comparatively permissive moment for them.

It's important to keep a watch on acquisitions as well since many companies are going to declare liquidations, divestitures, and bankruptcies. Even small and medium-sized enterprises (SMEs) will be open to the possibility of purchase of suppliers, distributors, innovation laboratories, and transportation services. Another option is to reduce the supply chain as much as possible via market penetration or growth or by eliminating the unavoidable middlemen.

Customer Relations

Customer demand is the driving force behind every company. Customers will search for more cost-effective and safer choices during a recession like the COVID-19 pandemic. With lenient EMI repayment terms,

collaborating with microfinance institutions (MFIs), and offering maintenance services at modest prices to current clients, strong ties may be established.

The development of "smart automobiles" that can recognize COVID-19 victims who have come into touch with the vehicle is now possible because to advances in artificial intelligence as well as the Internet of Things (IoT). Customers of all income levels will benefit from the adoption of these new services.

Supply Chain

It might take anywhere from six to twelve months for the disrupted intra- and international supply chain to get back to normal. Many vendors may also make announcements about bankruptcy or shutdown. As a result, the need of expanding the industry's network becomes clear. In response to rising demand and new entrants into the market, numerous new distributors will emerge. As a result of the current economic climate, it is in everyone's best interest to begin forming relationships with the newcomers as soon as possible.

The firm's agility and supply chain's capacity to offer better outcomes will be enhanced by renewing previous contracts with dependable suppliers/distributors including a backup plan. Rather of risking a loss by depending on existing relationships, a win-win via new ones is a preferable alternative.

LIMITATION OF THE STUDY

The following were some of the obstacles we had to overcome in order to complete this research:

- This is due to the fact that the pandemic of COVID-19 is currently in full swing, which means that we cannot physically visit the company to collect more samples and ask them to fill out the responses, so internet access was used for distribution of the questionnaire, which resulted in a small sample size.
- In the midst of the epidemic, I had less opportunity to speak with folk's one-on-one.

CONCLUSION

Leading companies are distinguished from the others by their ability to learn from recessions. An economic downturn, which may or may not be horrible, may or may not have a long-lasting effect, but it is certain that the economy will be nudged by the recession at some point. The only way to get it through these terrible times is to learn to cope with their effects. This may be done by both companies who believe in regularly updating their strategic plans and those that don't. For businesses, it is essential that they have a ready range of tactics on hand, whether or not they want to establish strategic plans on a regular basis. A failure to do so results in

unexpected financial hardships that may or may not be manageable, and it also prevents a flexible approach to making the most of the possibilities that are now accessible.

A company may benefit from long-term planning, but it doesn't guarantee success in the short term. There are several possible explanations for this. In the first place, companies with an overtly "offensive" or "defensive" mentality are more likely to go out of business than others. To put it another way: If you don't know where things are going, you'll make bad judgments. A movement in customer demand, even if everything has been well planned and studied, might lead to disastrous effects even if the economy or any key contributor in corporate operations have not changed. For these reasons, the wisest course of action is to remain prepared for an unpredictable future without resorting to copying or replicating past effective techniques. It is possible for a company to succeed by copying its rivals' strategic ideas, but only if good fortune intervenes. In the same way, re-implementing techniques that have worked effectively in the past will likewise function because of good luck. And in this respect, it varies from the majority of previous studies on the Indian automobile industry. Rather of doing an industry-specific study, a critical review of each of the best practices of the industry's biggest players yields superior outcomes for them as well as the rest of the sector (major firms and MSMEs in this example). Additional solutions have been suggested in light of the COVID-19 outbreak in addition to those currently under consideration by the auto industry's key players.

However, a quantitative analytic approach for evaluating strategic plans may be devised to strengthen this investigation. Strategic plans are simpler to grasp when their influence can be quantified. A greater knowledge of the various elements that contribute to the performance of a company in difficult times may be gained by classifying 'Tilted' firms further using additional segregation criteria. This might lead to a better understanding of the best strategy for an Indian vehicle company to succeed in the face of future economic uncertainty. Corona has had some impact on the vehicle sector, but it is difficult to assess the whole degree of that impact since data for the entire year 2020 is not yet available. However, things are looking up as of April. Because purchasing a new vehicle will be out of reach for many people due to the effects of the last recession, there will be a rise in the market for used cars. Manufacturers of automobiles should focus their efforts in areas with lower GDP declines. Using image processing and deep learning, cars may become more intelligent and autonomous. The autonomous vehicle's application of visual processing presents a number of obstacles that need to be addressed.

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ANNEXURE

Age

- 20-30
- 30-40
- 40+

Gender

- Male
- Female
- Prefer not to say

Education

- High school pass out
- Undergraduate
- Postgraduate

The Indian economy is bolstered by the country's automobile industry, which accounts for a large portion of the country's GDP

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

The automobile sector in India was severely affected by pandemic-induced shutdowns

- Strongly Agree

- Agree
- Neutral
- Disagree
- Strongly Disagree

Do you know that since 2015-16, the entire car industry's CAGR (compound annual growth rate) has been negative at 2%, compared to 5.7-percent increase in the prior five years (from 2011-16)

- Yes
- No

Besides, the industry is also facing some medium-term challenges like:

- Ensuring a sustained demand
- Affordability for customers
- Localization
- All of the above

The car industry's stakeholders turned to digitalization in an effort to adapt to the new normal and better serve customers.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Certain obstacles, such as the availability of raw materials and the increase in the price of commodities, will continue to affect the industry

- Yes
- No
- Maybe

After initial supply and manufacturing disruptions, the industry is now experiencing a demand shock with uncertain recovery timeline due to shelter-in-place regulations.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree