

CHANGING SCENARIO OF AUTOMOBILE INDUSTRY IN INDIA IN THE POST TECHNOLOGICAL UPGRADATION ERA AND COVID-19

Dr. Rohit Kumar, Assistant Professor
University College, Ghanaur, Patiala, Punjab, India
rohitrjpl@gmail.com

Ms. Rishu Jain, Assistant Professor
Shree Atam Vallabh Jain College, Ludhiana, Punjab, India
rishujain.ldh@gmail.com

ABSTRACT

Automobile industry is a key driver of the economy and plays a significant role in the country's sustainable economic and industrial development. The present paper highlights the impact of major technological upgradation and covid19 with respect to the automobile industry. To assess the impact of technological upgradation and Covid on the growth of the automobile industry, a comparison has been made between these periods in terms of vehicles produced, domestic sales and exports for the period from 2012-2013 to 2020-2021. Compound Annual Growth Rate (CAGR) has been used to analyse the data of pre and post technological upgradation reform period and post covid periods. The findings of the study revealed that industry did not get affected before 2018-19 due to technological upgradation norms as industry implemented it in slow pace and public also responded positively like adoption of BS IV as industry shows positive growth rate in 2017-18 and 2018-19 but the order of the supreme court that only BS-VI compliant vehicle will be sold in India from April 2020, badly affected the industry and mainly cause to negative growth in 2019-20. Further, the impact of covid - 19 in the first year 2020-21 found to be more on the negative growth of Indian automobile industry than the technological upgradation norms. But in the second year responded positively and recovered as shown positive growth in all segments of the automobile industry.

Keywords: Automobile Industry, Financial Crisis, Regulatory Policies, Compound Annual Growth Rate (CAGR)

Introduction

The automobile industry in India has flourished after economic liberalization in 1990's like never before. It has been suddenly exposed to a vast international market as an opportunity and to global competition on a large scale. In the wave of economic liberalization, this dynamic industry has witnessed marvelous growth leading to the future expansion of its domestic automobile market by attracting investment by multinational automobile companies. With this tremendous growth over the years, it has emerged as a major contributor to India's Gross Domestic Product (GDP). This dynamic industry currently accounts for almost 7 percent of the country's GDP and employs about 37 million people both directly and indirectly. India is emerging as one of the world's fastest growing and largest two-wheeler markets, 2nd largest heavy bus maker, 3rd largest heavy truck maker, 4th largest car maker and 7th largest commercial vehicle maker in the world. India also has the largest base to export compact cars to Europe. Automotive Mission Plan (AMP) 2006-2016 achieved the target of incremental employment creation of 25 million jobs over the past decade. Also, significant investments have been attracted from global and local OEMs as well as component manufacturers, exceeding the target of Rs. 1,57,500 crores. As per data released by the Society of Indian Automobile Manufacturers (SIAM), the gross turnover of the automobile manufacturers in India has increased to 67,724 USD Million in 2016-2017 from 63,866 USD Million in 2015-2016 showing a growth of 6.04 per cent. The Vision of Automotive Mission Plan 2016-26 states that "By 2026, the Indian automotive industry will be among top three of the world in engineering, manufacture and export of vehicles and auto components, and will encompass safe, efficient and environment friendly conditions for affordable mobility of people and transportation of goods in India comparable with global standards, growing in value to over 12% of India's GDP, and generating an additional 65 million jobs." Therefore, the industry is recognized as one of the drivers of economic growth as it contributes significantly to the overall GDP of the nation.

In India since the early 1940s, when the auto industry rolled out the first passenger car, the Indian automobile industry has been on progressive wheels. But, the financial crisis in the US distressed the global auto industry and consequently, Indian automobile industry also felt the heat of the global recession, Ransariya (2013). The industry soon recovered from difficult phase of global recession and registered the remarkable growth across all the segments in 2009-10. But, presently, it has been a tough ride for the Indian Automobile industry, as it is facing declining trend in 2019-20 over 2018-19. The key technological upgradation norms like leapfrogging to BS-VI norms, 100% Electric Vehicles (EVs) by 2030 in public and 40% in private sector, End-of Life Value (ELV) policy, methanol economy, fuel efficiency norms, alternate fuels have posed several challenges in terms

of technology up-gradation, investment, affordability, implementation etc., before the Government, industry, regulatory bodies and financial institutions. (SIAM Annual Report, 2019-20). Additionally, Covid-19 also affected the automobile industry worldwide.

Literature Review

Haug, Chatal (2010), showed that the automobile industry is economically important and discussed the policy measures taken for car scrapping programmes to support the automobile industry at the time of crisis. It was found that rapid increases were foreseen in China and to a lesser extent in India. Medium-term projections suggested that capacity exceeds trend sales by around 20% in the five largest Western European markets and these countries would need to ensure significant growth in export volumes with the same capacity. Ray (2011), analysed the financial health of the automobile industry in India and found that global recession has negatively impacted the Indian economy in general and automobile industry in particular and the government must take regulatory measures for the sustainable growth of the automobile industry. Shinde, Dubey (2011), analysed the automobile industry and found that the Indian automobile industry has been able to sustain even at the tough times of recession and has growth potential in future by adopting technological changes. Pandya, Pandya (2013), carried out the fundamental analyses of two automobile companies and estimated their intrinsic value to assist investment decisions. The study revealed that the automobile industry is one of the core industries in India and is optimistic of posting good sales in the near future. Ransariya (2013), found that the last two years have been the toughest for the Indian Automobile industry with the continuous decline in the profitability and in the market of commercial vehicles. The study revealed that as compared to profitability of the automobile industry the liquidity performance is less affected by global crises. Tawiah, Bogeh (2014), found that the automobile industry registered a decline in profit after tax during the crisis but their dividend pattern was about the same as pre- and post-recession era. The IT industry, on the other hand, had growing profit at a decreasing rate during the recession but this dividend pattern fell during the crisis. It was found that though the IT industry enjoyed growing profit than the Automobile industry; the dividend payout ratio of the Automobile industry (40%) was higher than the IT industry of 30%. Varshney (2014), concluded that FDI has a direct and positive impact on the overall progress of the automobile industry of the country. Yadav, Manvani (2015), assessed the pre- and post-recession growth and performance of the automobile sector. It was found that during both periods, negative growth sales of all vehicles is two times more than negative growth of all produced vehicles. During the recession period, growth of automobiles is negative while other periods show extensive growth in both production and sales volume. Eugenio, Maria and Jeff (2018) examined the effect of national policies on the European automobile industry. The results depicted that the European automobile industry benefited from diesel fuel taxes and a lenient no emission policy. Wen, Yang and Gao (2021) analysed the impact of covid-19 on the electric vehicle industry. The study found that covid-19 badly affected the electric vehicle sales and production. The pandemic affected small brands more than the leading brands. Additionally, travelling restrictions during covid -19 have also interrupted electric vehicle material supply.

The review of existing literature revealed that the global financial crisis has badly affected the automobile industry for the short period and the industry was able to sustain even in the tough times. But now the industry is facing challenges due to the quick technological upgradation reforms and covid-19.

Objective of the Study

The present study comprises of the following objective:

1. To assess the impact of technological upgradation norms and covid on the growth of Automobile Industry in India.

Research Methodology

The Present study is descriptive in nature. The data was collected from secondary sources such as journals, magazines, published reports, various websites related to the automobile industry and by reviewing existing literature. To assess the impact of technological upgradation norms and covid on the growth of automobile industry, a comparison has been made between these periods in terms of no. of vehicles produced, domestic sales and exports for the period from 2012-2013 to 2020-2021. The pre-norms period includes the years from 2012-13 to 2015-16, and the post-norms period covers the years from 2016-17 to 2019-20 and post Covid period 2020-21. Compound Annual Growth Rate (CAGR) has been used to analyse the data of pre and post norms period.

Technological Upgradation Norms taken by the Government of India for Automobile Industry

The regulatory technological upgradation norms in the Indian automotive sector are rapidly evolving and changing fast mainly from 2016. Like the Information Technology and Telecommunication sectors, the future of the automobile industry is at the journey of complete transformation. Some of the major norm's initiatives are

Emission Norms, Promoting Electric vehicles, Fuel Efficiency Norms, Policy of End-of-Life (ELV) of Vehicle, Vehicles Safety Norm, Harmonization of Vehicle Regulations (UN-WP.29), Alternative Fuels, etc. So far, reforms under the automobile sector have been incremental and gradual, however, the recent decisions like leapfrogging to BS-VI emission norms, 100% electric vehicles by 2030 in public sector, methanol economy, fuel efficiency norms etc. are metamorphic with highly compressed transitional phases as compared to the transition time given to industry in other countries, and will have profound impact on entire automotive ecosystem.

Secondary Data Analysis

Secondary Data Analysis of Growth Rate of Automobile Industry in terms of Volume of Production, Domestic Sales and Export for Pre, Post-Technological Upgradation Era and Post-Covid Period

| Category | Automobile Production Trend | | | | No. of Vehicles | | | |
|---|-----------------------------|----------|--------------------|----------|-----------------|----------|--------------|----------|
| | Commercial Vehicles | Growth % | Passenger Vehicles | Growth % | Three wheelers | Growth % | Two Wheelers | Growth % |
| Growth for Pre-Norms Period for the year 2012-13 to 2015-16 | | | | | | | | |
| 2012- 13 | 831744 | (8.76) | 3233561 | 3.5 | 839742 | (4.33) | 15721180 | 1.73 |
| 2013-14 | 699,035 | (15.95) | 3,087,973 | (4.50) | 830,108 | (1.15) | 16,883,049 | 7.39 |
| 2014-15 | 698,298 | (0.11) | 3,221,419 | 4.32 | 949,019 | 14.32 | 18,489,311 | 9.51 |
| 2015-16 | 786,692 | 12.66 | 3,465,045 | 7.56 | 934,104 | (1.57) | 18,830,227 | 1.84 |
| CAGR | | (1.84) | | 2.3 | | 3.6 | | 6.20 |
| Growth for Post-Norms Era Period for the year 2016-17 to 2019-20 | | | | | | | | |
| 2016-17 | 810253 | 2.99 | 3801670 | 9.71 | 783721 | (16.10) | 19933739 | 5.86 |
| 2017-18 | 895448 | 10.51 | 4020267 | 5.75 | 1022181 | 30.43 | 23154838 | 15.81 |
| 2018-19 | 1112405 | 24.23 | 4028471 | 0.20 | 1268833 | 24.13 | 24499777 | 5.81 |
| 2019-20 | 752022 | (32.40) | 3434013 | (14.76) | 1133858 | (10.64) | 21036294 | (14.14) |
| CAGR | | (2.5) | | (3.3) | | 13.0 | | 1.8 |
| Growth for Post-Covid Period for the year 2020-21 | | | | | | | | |
| 2020-21 | 624939 | (16.90) | 3062221 | (10.82) | 611721 | (46.05) | 18349941 | (12.77) |

| | | | | | | | | |
|---------|--------|-------|---------|-------|--------|-------|----------|--------|
| 2021-22 | 805527 | 28.89 | 3650698 | 19.22 | 758088 | 23.93 | 17714856 | (3.46) |
|---------|--------|-------|---------|-------|--------|-------|----------|--------|

Source: www.siam.in

Table 1 Trend of Production in Indian Automobile Industry

Table 1 depicts the major decline in growth of production in the year 2013-14 for commercial vehicles, passenger vehicles and three-wheelers in pre technological upgradation period whereas in the post technological upgradation period, the major decline observed in all segments of automobile industry in the year 2019-20. The post covid 19 period 2020-21 also showed negative growth in all four segments of automobile industry. The results also revealed highest 46.05 per cent decline in growth of production in three wheelers in post covid period followed by 32.90 decline in commercial vehicle of post technological upgradation norms period in the year 2019-20. The study revealed that industry did not get affected before 2018-19 due to technological upgradation norms as industry implemented it in slow pace and public also responded positively like adoption of BS IV as industry shows positive growth rate in 2017-18 and 2018-19 but the order of the supreme court that only BS-VI compliant vehicle will be sold in India from April 2020, badly affected the industry and mainly cause of negative growth in 2019-20. Further the impact of covid -19 in the first year 2020-21 found to be more on the negative growth of Indian automobile industry than the technological upgradation norms. But the industry immediately recovered in the second year and showed positive high growth in all segments except two wheelers. It indicates the huge potential and demand of the automobile industry. Therefore, there is a need for the government to make policies favorable for the revival and significant growth of the automobile industry.

| Category | Automobile Domestic Sales Trend | | | | No. of Vehicles | | | |
|--|---------------------------------|----------|--------------------|----------|-----------------|----------|--------------|----------|
| | Commercial Vehicles | Growth % | Passenger Vehicles | Growth % | Three wheelers | Growth % | Two Wheelers | Growth % |
| Growth for Pre-Norm Period for the year 2011-12 to 2015-16 | | | | | | | | |
| 2012- 13 | 793150 | (2.02) | 2686429 | 2.6 | 538291 | 4.88 | 13797748 | 2.69 |
| 2013-14 | 632,851 | (20.21) | 2,503,509 | (6.81) | 480,085 | (10.81) | 14,806,778 | 7.31 |
| 2014-15 | 614,948 | (2.83) | 2,601,236 | 3.90 | 532,626 | 10.94 | 15,975,561 | 7.89 |
| 2015-16 | 685,704 | 11.51 | 2,789,208 | 7.23 | 538,208 | 1.05 | 16,455,851 | 3.01 |
| CAGR | | (4.74) | | 1.26 | | (.01) | | 6.05 |
| Growth for Post-Norm Era Period for the year 2016-17 to 2019-20 | | | | | | | | |
| 2016-17 | 714,082 | 4.14 | 3,047,582 | 9.26 | 511,879 | (4.89) | 17,589,738 | 6.89 |
| 2017-18 | 856,916 | 20.00 | 3,288,581 | 7.91 | 635,698 | 24.19 | 20,200,117 | 14.84 |
| 2018-19 | 10,07,311 | 17.55 | 3,377,389 | 2.70 | 7,01,005 | 10.27 | 21,179,847 | 4.85 |

| | | | | | | | | |
|-------------------------------------|---------|---------|-----------|---------|---------|---------|------------|---------|
| 2019-20 | 717,688 | (28.75) | 2,773,575 | (17.88) | 636,569 | (9.19) | 17,417,616 | (17.76) |
| CAGR | | .17 | | (3.09) | | 7.54 | | (.33) |
| Growth for Post-Covid Period | | | | | | | | |
| 2020-21 | 568559 | (20.77) | 2711457 | (2.24) | 216197 | (66.04) | 15119387 | (13.19) |
| 2021-22 | 716566 | 26.03 | 3069499 | 13.20 | 260995 | 20.72 | 13466412 | (10.93) |

Source: www.siam.in

Table 2 Trend of Domestic Sales in Indian Automobile Industry

Table 2 highlights CAGR of commercial vehicles was negative 4.74, positive 0.17 and negative 20.77 in pre, post technological upgradation period and post covid period respectively. It indicates the highest decline of 66.04 per cent in growth of sale of three-wheeler followed by 20.77 per cent in commercial vehicles in the first year 2020-21 of post covid period. The sale of all segments was declined in the first year of post covid period. But industry immediately recovered in the second year 2021-22 and showed positive high growth of sales in all segment except two wheelers. It indicates huge demand of automobile industry. The technological upgradation period 2019-20 showed higher decline than previous period in all four segments sale. In this period highest decline was 28.75 of commercial vehicle followed by 17.88 of passenger vehicle. The research concluded that both technological upgradation norms and covid badly affected sales of automobile sector. The lower performance of 2019-20 can be attributed to poor customer sentiments, liquidity crisis, higher cost of acquisition due to new safety and environment regulations, including BS IV to BS VI transition, higher upfront insurance premium, lower demand of CVs due to change in Axle weight norms, amongst others (SIAM annual report, 2019-20). Therefore, the automobile companies should really need to develop effective cost management strategies to transform the prospects in to the customers.

| Category | Automobile Export Trend (No. of Vehicles) | | | | | | | |
|--|---|----------|--------------------|----------|----------------|----------|--------------|----------|
| Period | Commercial Vehicles | Growth % | Passenger Vehicles | Growth % | Three wheelers | Growth % | Two wheelers | Growth % |
| Growth for Pre-Norm Period for the year 2012-13 to 2015-16 | | | | | | | | |
| 2012- 13 | 79944 | (13.73) | 554686 | 9.34 | 303088 | (16.48) | 1960941 | 0.71 |
| 2013-14 | 77,050 | (3.62) | 596,142 | 7.47 | 353,392 | 16.60 | 2,084,000 | 6.28 |
| 2014-15 | 86,939 | 12.83 | 6,21,341 | 4.23 | 4,07,600 | 15.34 | 24,57,466 | 17.92 |
| 2015-16 | 1,03,124 | 18.62 | 6,53,053 | 5.10 | 4,04,441 | (0.77) | 24,82,876 | 1.03 |
| CAGR | | 8.86 | | 5.59 | | 10.09 | | 8.18 |
| Growth for Post-Norm Era Period for the year 2016-17 to 2019-20 | | | | | | | | |

| | | | | | | | | |
|---|----------|---------|----------|---------|----------|---------|-----------|--------|
| 2016-17 | 1,08,271 | 4.99 | 7,58,727 | 16.18 | 2,71,894 | (32.77) | 23,40,277 | (5.74) |
| 2017-18 | 96,865 | (10.53) | 7,48,366 | (1.37) | 3,81,002 | 40.13 | 28,15,003 | 20.29 |
| 2018-19 | 99,933 | 3.17 | 6,76,192 | (9.64) | 5,67,683 | 49.00 | 32,80,841 | 16.55 |
| 2019-20 | 60,713 | (39.25) | 6,77,311 | 0.17 | 5,02,169 | (11.54) | 35,20,376 | 7.30 |
| CAGR | | (17.54) | | (3.71) | | 22.69 | | 14.58 |
| Growth for Pre-Covid Period for the year 2020-21 | | | | | | | | |
| 2020-21 | 50334 | (17.09) | 404400 | (40.29) | 392941 | (21.75) | 3277724 | (6.90) |
| 2021-22 | 92297 | 83.37 | 577875 | 42.89 | 499730 | 27.17 | 4443018 | 35.55 |

Source: www.siam.in

Table 3 Trend of Exports in Indian Automobile Industry

Table 3 reveals that covid 19 badly affected exports of all segments of the automobile industry in the first year 2020-21. The negative growth of covid 19 was 17.09, 40.29, 21.75 and 6.90 for commercial vehicle, passenger vehicle, three-wheeler and two-wheeler respectively. The highest negative growth was in passenger vehicles which indicates covid affected export of passenger vehicle more than other segments in the first year. But industry immediately recovered in the second year 2021-22 and showed positive high growth of export in all segments. It indicates the huge demand of the automobile industry of India in foreign countries. Even in the second year of post covid the growth rate of export is higher than in all previous year growth. The CAGR of commercial vehicles and passenger vehicles was negative in post technological upgradation norms period. Therefore, policies and strategies should be made in order to create offshore demand for the vehicles manufactured in India.

Findings

The findings of the study revealed that during the first year of covid, the automobile industry of India faced a tough time as performance got impacted by production, sale and export, but not demolished under covid and immediately recovered and bounced back on recovery and growth path. Since every coin has two sides, the technological upgradation norms in automotive sector, on the one hand, have opened a new vista of opportunities for developing new collaborations, partnerships, joint ventures, investments, transfer and development of cutting-edge technologies in automobile sector, but on the other hand, new norms have confronted the industry with challenges of rising input cost, low-capacity utilization, price sensitive consumers etc. Currently, the industry is facing a declining growth rate among all the segments. Therefore, such interventions impact not only in financial terms but also the growth of the sector, technology transfer including employment and rate of inflation. The short term, ad-hoc policy measures without a roadmap poses difficulty in implementation and achieving targets. The benefits of the recent decision of the Government about the BS-VI norms for all types of vehicles cannot be realized unless the inspection & maintenance of in-service vehicles, end of life vehicle, dismantling, recycling is implemented across the country. Moreover, the industry has already made a huge investment in efficient gasoline, diesel and hybrid vehicles and the government is promoting electric vehicles only. The over-dependence and reliance on a single option (viz. EVs) may hamper the spirit of bringing innovations and creative thinking. Hence, the new policy regime has impacted the industry more as shown by the current period. The order of the supreme court that only BS-VI compliant vehicles will be sold in India from April 2020, mainly affected the industry and caused negative growth in 2019-20.

Conclusions

The research concludes that the first year of Covid 19 2020-21 and technological upgradation norms one year 2019-20 badly affected the growth of the automobile sector in terms of production, sale and export. But the automobile industry of India has huge potential as it immediately recovered and bounced back again on a higher

growth path. Further, the Government of India had simplified and streamlined the regulatory policies framework for ease of doing business. Many multinational companies are making India as their manufacturing base due to the potential for growth and supporting infrastructure. The automobile manufacturers can achieve higher growth by utilizing the opportunity provided by the AMP 2016-2026 and schemes like Low Carbon Transport Scheme, Green Urban Transport Scheme, Make in India Initiatives and the Faster Adoption and Manufacturing of Electric and Hybrid under the National Electric Mobility Mission 2020 and 100% EVs by 2030. Additionally, harmonization of international technical regulations is required to promote the export of vehicles. The companies should bring innovation in designing new engine technology and alternative fuels. The regulatory policies and norms should be made which may be well-suited to Indian situations and keeping in view the ground realities. The future of the automobile industry seems to be promising enough as the government is constantly taking initiatives and bringing new policy regimes to support the industry in every manner. Initially, the automakers may find it difficult to adjust themselves and create the confidence among the customers to be fit in the new policy regime. But, in no time the situation will be much favorable for the industry and coming years will definitely see remarkable growth among all the segments of automobile industry.

References

- Annual Reports of SIAM 2012-2013, 2013-2014, 2014-2015, 2015-16, 2016-17 2017-18, 2018-19, 2019-20 and 2020-21, <https://www.siam.in/cpage.aspx?mpgid=42&pgidtrail=89>
- Automotive Mission Plan (2006-2016), Department of Heavy Industry, Ministry of Heavy Industries and Public Enterprises, Government of India, Accessed on: October 12, 2018, Available at: <http://www.siamindia.com/upload/AMP.pdf>
- Automotive Mission Plan (2016-2026), Department of Heavy Industry, Ministry of Heavy Industries and Public Enterprises, Government of India, Accessed on: October 12, 2018, Available at: <http://www.siamindia.com/upload/AMP.pdf>
- Eugenio, J.M. Maria, J.M. and Jeff, T. (2018), Fuel Taxation, Emission Policy and Competitive Advantage in the Diffusion of European Diesel Automobiles, *Rand Journal of Economics*, vol.49, no. 3, pp 504-540
- Haugh, D. M. A. , Chatal O. (2010), "The Automobile Industry in and Beyond the Crisis", OECD Economics Department Working Papers, No. 745, OECD Publishing.
- Pandya, H., Pandya, H. (2013), "Fundamental Analysis of Indian Automobile Industry", *International Journal of Current Research*, Vol. 5, Issue. 5, pp. 1273-1286
- Ransariya, S. N. (2013), "A Study of Global Crises and its Impacts on Indian Automobile Industry", *GJRIM*, Vol. 1, No. 1, pp. 123- 133
- Ray, S. (2011), "Assessing Corporate Financial Distress in Automobile Industry of India: An Application of Altman's Model Research *Journal of Finance and Accounting*, Vol. 2, No. 3, pp. 155-169
- Report of the Working Group on Automotive Sector for the 12th Five Year Plan (2012-2017), Department of Heavy Industry, Ministry of Heavy Industries and Public Enterprises, Government of India, Accessed on: October 11, 2013, Available at: <http://dhi.nic.in/Auto%20report%20final.pdf>
- Shinde, G. P., , Dubey, M. (2011), "Automobile Industry and Performance of Key Players", *Asian Journal of Technology & Management Research*, Vol. 1, Iss.02, pp. 1-18
- SIAM Annual Convention (2012), Accessed on: October 21, 2014, <http://118.67.250.203/Event/View-Eventhead.aspx?id=269>
- Tawiah, V. K. , Boge, C. K. (2014), "Dividend Pattern of Automobile and IT Industry of India; Pre and Post Global Crisis Analysis", *International Research Journal of Business Sciences*, Vol. 2, Iss.1, pp. 185-190
- Varshney, N. (2014), "Impact of Foreign Direct Investment on the growth of Automobile Industry in India since 1991, Ph.D. Thesis, Submitted to Faculty of Commerce, ChaudharyCharan Singh University, Meerut.
- Velu, S. K. (2013), "Indian Automotive Industry: Performance Analysis", *Political Economy Journal of India*, Vol. 21, No. 2, pp. 1-7
- Wen, W., Yang, S., Zhou, P., and Gao, S.Z. (2021), Impact of Covid-19 on the Electric Vehicle Industry : Evidence from China, *Renewable and Sustainable Energy Reviews*, 144 pp 1-20
- Yadav, K. S. , Manwani, D. T. (2015), "A Pre and Post Recessionary Study of Growth in Automobile Industry", *Paripex - Indian Journal of Research*, Vol. 4, pp. 4-6