

# Domestic Sales of Different Types of Automobiles in India — A Comparative Analysis

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## **Abstract**

*The Indian automobile industry is undergoing a variety of changes including the technological changes where each firm is engaged in making it adaptable to the changing market conditions. The automobile companies are changing their production and business processes and technologies in order to maintain the competitive advantage over the others and providing customers with the products and services customized as per their changing needs, tastes and preferences. In fact this industry has become more and more consumer-centric in the recent years. From passenger vehicles to commercial vehicles the Indian automobile industry has achieved splendid growth and development during the last few years. The Indian automobile sector can be broadly decomposed into four major sub-sectors, namely, passenger vehicles, commercial vehicles, three wheelers and two wheelers.*

*The major objective of this study is to analyze and compare the data with regard to the domestic sales of different types of automobiles in India during the period 2013-14 to 2018-19. The secondary data for this purpose have been retrieved from the website of Society of Indian Automobile Manufacturers ([www.siamindia.com](http://www.siamindia.com)). Moreover, the statistical tools and techniques like descriptive statistics, correlation analysis, ANOVA and F-test have been used for carrying out this research work.*

*Finally, the study concludes that though there are statistically significant differences among the average yearly domestic sales of different types of automobiles but it is also a truth that the domestic sales of all the four types of automobiles are increasing year by year and thus setting an upward trend. As category-wise and overall sales trends in automobile sector have been satisfactory during the period 2013-14 to 2018-19, so we can anticipate that Indian automobile sector will keep on growing in the coming years too.*

**Keywords:** *Indian Automobile Industry, Passenger Vehicles, Commercial Vehicles, Three Wheelers, Two Wheelers.*

### Introduction: -

The Indian automobile industry is one of the largest and the fastest growing industries of not only India but the world. During the last couple of years it has undergone sea changes and has also registered remarkable growth and development. As a result of 1991 economic reforms the Indian economy is presently operating as an open economy and thus the Indian automobile industry too. That is why this industry exhibits a good balance of domestic and foreign players. Further, the growth and development of a country's automobile industry is affected by its transport system up to a great extent. India's transport network is developing at a rapid pace and thus the Indian automobile industry. With many automobile companies now focusing on the needs, tastes and preferences of Indian consumers, there has been a sharp rise in the demand of automobiles in India during the recent years. Automobile sector can be broadly decomposed into four major sub-sectors, namely, passenger vehicles, commercial vehicles, three wheelers and two wheelers.

Again, the automobile industry plays an important role in the economic development of a country. It facilitates the basic industries like mining, fertilizers, refineries, shipping, textiles, plastics, glass, rubber, logistics, paper, cement, sugar etc. and various infrastructural facilities like power, rail and road transport etc. As this industry has strong forward and backward linkages with almost each and every segment of the economy, this industry has a strong and positive multiplier effect and thus facilitates the economic progress of a country. It includes passenger cars; light, medium and heavy commercial vehicles; multi-utility vehicles, sports utility vehicles, tractors, scooters, motor cycles, mopeds, three wheelers etc; In India, automobiles is one of the largest and fastest growing industries. It has shown very impressive growth during last couple of decades. It also contributes significantly to the overall industrial development of the country. Moreover, the Indian automobile sector has shown great advances in terms of the absorption of latest technologies, practicality, flexibility and adaptability to the changing market conditions. It is also got good recognition and reputation across the globe.

At present, India is the largest two wheeler manufacturer and the largest two wheeler market of the World. It is the fifth largest manufacturer of commercial vehicles and the largest manufacturer of the tractors. It is also the fourth largest passenger car market in Asia. The Indian automobile industry also provides employment to a large section of the country's workforce. Therefore, the significance of the contribution of automobile industry to the overall economy of the country cannot be overlooked. A wide variety of vehicles are produced by Indian automobile industry. It includes the manufacturing of buses, trucks, passenger cars, sports vehicles, defense vehicles, two wheelers, three wheelers etc. All these vehicles can be categorized into four major categories— passenger vehicles, commercial vehicles, three wheelers and two wheelers.

### Objective of the Study:-

The major objective of this study is to analyze and compare the data with regard to the domestic sales of different types of automobiles in India during the period 2013-14 to 2018-19 in order to draw certain useful inferences.

### Research Methodology:-

This research study is an analytical kind of research study based on secondary data. The present study is related to the statistical analysis of the secondary data related to the domestic sales of different types of automobiles in India during the period 2013-14 to 2018-19. The said secondary data have been retrieved from the website of Society of Indian Automobile Manufacturers ([www.siamindia.com](http://www.siamindia.com)). Moreover, the statistical tools and techniques like descriptive statistics, correlation analysis, ANOVA and F-test have been used for carrying out this research work.

### Results & Discussion: -

The data with regard to the domestic sales of different types of vehicles in India from 2013-14 to 2018-19 is presented in a tabular form as below (Table-01)—

**Table-01 : Domestic Sales of Automobiles**

Financial Year	Types of Vehicles				Total Sales (In Units)
	Passenger Vehicles (Sales in Units)	Commercial Vehicles (Sales in Units)	Three Wheelers (Sales in Units)	Two Wheelers (Sales in Units)	
2013-14	2503509	632851	480085	14806778	1,84,23,223
2014-15	2601236	614948	532626	15975561	1,97,24,371
2015-16	2789208	685704	538208	16455851	2,04,68,971
2016-17	3047582	714082	511879	17589738	2,18,63,281
2017-18	3288581	856916	635698	20200117	2,49,81,312
2018-19	3377436	1007319	701011	21181390	2,62,67,156

*Source: Society of Indian Automobile Manufacturers (www.siam.com)*

On the basis of the data presented in the above table (Table-01), the various useful descriptive statistics have been calculated and presented below in Table-02.

**Table-02 : Descriptive Statistics**

Column 1		Column 2		Column 3		Column 4	
Mean	2934592	Mean	751970	Mean	566584.5	Mean	17701572.5
Standard Error	147454.0656	Standard Error	61916.02449	Standard Error	34293.06076	Standard Error	1021031.086
Standard Deviation	361187.2212	Standard Deviation	151662.6669	Standard Deviation	84000.50058	Standard Deviation	2501005.172
Coeff. of Variation	12.31%	Coeff. of Variation	20.17%	Coeff. of Variation	14.83%	Coeff. of Variation	14.13%
Kurtosis	2.06887171	Kurtosis	0.296462965	Kurtosis	0.39735567	Kurtosis	1.47112019
Skewness	0.07907606	Skewness	1.134924836	Skewness	0.954770574	Skewness	0.506285611
Count	6	Count	6	Count	6	Count	6

Source: MS Excel Output

It can be easily observed from the above table that the average yearly sales for column 4 (i.e. Two Wheelers) are highest, followed by column 1 (i.e. Passenger Vehicles), column 2 (i.e. Commercial Vehicles) and column 3 (i.e. Three Wheelers). Again, as far as the consistency in the data with regard to domestic sales is concerned, Passenger Vehicles tops the list (as coeff. of variation is the least i.e. 12.31 %), followed by Two wheelers, Three Wheelers and Commercial Vehicles.

**Table-03 : Correlation Matrix**

	Column 1	Column 2	Column 3	Column 4
Column 1	1			
Column 2	0.922294	1		
Column 3	0.860572	0.949607	1	
Column 4	0.977984	0.959056	0.943368	1

Source: MS Excel Output

The above Correlation Matrix reveals that the value of correlation coefficient between Column 1 (Passenger Vehicles) and Column 2 (Commercial Vehicles) is  $r_{12} = +0.922294$ , that between Column 2 (Commercial Vehicles) and Column 3 (Three Wheelers) is  $r_{23} = +0.949607$ , that between Column 3 (Three Wheelers) and Column 4 (Two Wheelers) is  $r_{34} = +0.943368$  and that between Column 4 (Two Wheelers) and Column 1 (Passenger Vehicles) is  $r_{41} = +0.977984$ . Here, all the values are positive and greater than 0.50, so we can fairly interpret that all the four variables strongly and positively correlated to one another. Again the highest value is  $r_{41} = +0.977984$ , this value implies that there is almost perfectly positive correlation between the Domestic Sales of Two Wheelers and that of Passenger Vehicles. As both types of vehicles are purchased by the personal consumers for their own use, so we can say that the domestic sales of both types of vehicles are setting a positive and upward trend. Moreover, these two categories can be clubbed as Vehicles Sold to Personal Consumers.

Now, for testing the equality of population means (i.e. equality of average yearly domestic sales of different types of automobiles) during the period 2013-14 to 2018-19, we are using the technique of Analysis of Variance (ANOVA) and F-test. The null and alternative hypotheses in this case are—

Null hypothesis,  $H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$  i.e. There is no significant difference among the average yearly domestic sales of different types of automobiles during the period 2013-14 to 2018-19.

Alternative Hypothesis,  $H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4$  i.e. There is a significant difference among the average yearly domestic sales of different types of automobiles during the period 2013-14 to 2018-19.

**Table-04 : Analysis of Variance (ANOVA)**

Anova: Single Factor					
SUMMARY					
Groups	Count	Sum	Average	Variance	
Column 1	6	17607552	2934592	1.30456E+11	
Column 2	6	4511820	751970	23001564532	
Column 3	6	3399507	566584.5	7056084098	
Column 4	6	1.06E+08	17701573	6.25503E+12	

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F critical
Between Groups	1.21405E+15	3	4.05E+14	252.3142638	4.67E-16	3.098391224
Within Groups	3.20777E+13	20	1.6E+12			
Total	1.24613E+15	23				

*Source: MS Excel Output*

Now, it is evident from the above ANOVA table (Table-04), the F-statistic is calculated to be 252.3142 i.e.  $F_{\text{calculated}} = 252.3142$

Again, at 5 % level of significance, for 3 and 20 d.f., the critical value or the tabulated value of F is 3.0983 i.e.  $F_{\text{tabulated}} = 3.0983$

Now, since  $F_{\text{calculated}} > F_{\text{tabulated}}$ , so we reject the null hypothesis and conclude that there is a significant difference among the average yearly domestic sales of different types of automobiles during the period 2013-14 to 2018-19.

### Conclusion:-

The present study is an attempt to draw certain useful inferences by statistically analyzing the secondary data with regard to the yearly domestic sales of different types of automobiles during the period 2013-14 to 2018-19. Table-01 deals with the year-wise domestic sales figures of different types of automobiles and the overall year-wise domestic sales figures. As far as the overall automobile sector is concerned, it registered a domestic sales of 1,84,23,223 units, 1,97,24,371 units, 2,04,68,971 units, 2,18,63,281 units, 2,49,81,312 units and 2,62,67,156 units during the financial years 2013-14, 2014-15, 2015-16, 2016-17, 2017-18 and 2018-19 respectively. These figures imply that the overall automobile sector in India is doing well.

Again, the descriptive statistics presented in Table-02 indicate that in terms of the average yearly domestic sales, the Two Wheelers are at the top but if we talk about the consistency in sales figures, the Passenger Vehicles tops the list. Again, as far as the results of correlation analysis are concerned (Table-03), we can fairly interpret that the domestic sales of all the four types of automobiles are strongly and positively correlated to one another. Further, the highest value of correlation coefficient is  $r_{41} = +0.977984$ . This value implies that there is almost perfectly positive correlation between the Domestic Sales of Two Wheelers and that of Passenger Vehicles. As both types of automobiles are purchased by the personal consumers for their own use, so we can say that the domestic sales of both types of automobiles are setting a positive and

upward trend. Moreover, these two categories of automobiles can be clubbed as Automobiles Sold to Personal Consumers. Moreover, the results of ANOVA and F-test (Table-04) reveal that there is a significant difference among the average yearly domestic sales of different types of automobiles during the period 2013-14 to 2018-19.

Finally, we can conclude that though there are statistically significant differences among the average yearly domestic sales of different types of automobiles but it is also a truth that the domestic sales of all the four types of automobiles are increasing year by year and thus setting an upward trend. As category-wise and overall sales trends in automobile sector have been satisfactory during the period 2013-14 to 2018-19, so we can anticipate that Indian automobile sector will keep on growing in the coming years too.

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