

**The Need and Effectiveness of Research and Development in Indian Automobile Industry:
A Comparative Study of Maruti Suzuki and Tata Motors**

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Abstract

Indian Automobile industry is the sixth largest industry of the world in the production of vehicles (OICA 2013). After the policy of liberalization, many global players have entered or are planning to enter in the Indian automobile industry. The major attractions for these players are cost effectiveness, favorable demographic factors, increasing aspirations of the consumers and very less vehicle penetration. The competition in the Industry is increasing and key of competition is to improve the vehicle according to the need of the consumer. So the importance of the research and development has increased in the recent years in the industry. The present paper analyses the need of the research and development expenditure in the Indian automobile industry and compares the effectiveness of the research and development expenditure of the two major firms in the industry i.e. Maruti Suzuki and Tata Motors with the help linear regression model.

Key Words

Automobile, Research & Development, Effectiveness.

Introduction

The first motorcar on the roads of India was seen in 1897 in Mumbai (Ministry of Statistics & Programme Implementation yearly statistics year book 2013). Thereafter the Indian automobile market was mainly dependent on imports. In 1903, Simpson and Company, Madras produced India's first steam car and after two years the same company produced steam bus which ran between Vijay Wada and Machilipatnam. During the time period of 1910-1920, assembly plants were set up in Mumbai, Calcutta and Chennai. Ford Motor Company started assembling automobiles in its Madras unit and in the year 1936, Addison & Company started assembling

cars and trucks in Madras. The import of vehicles increased consistently after twenties and reached up to 30,000 mark in 1930 (India Info line 2007). After independence, the industry made a significant progress towards indigenization in the production process of vehicles and final products became almost 100 percent indigenous up to 1970. Indian automobile industry had been operating under the conditions of protectionism. The barriers were not only restricting the new entrants but also restricting the diversification and expansion of capacity. After India adopted new economic policy in 1991, the important changes in the automobile industry occurred in the form of deregulation and liberalization of control on foreign collaborations, imports and foreign technology, that led to the entry of some global players and later they captured a significant market share with their quality vehicles. So the need for research and development has become more important in the highly competitive Indian automobile industry. The present paper analyses the need and effectiveness of the research and development in the industry and compares the two major Indian automobile firms on the basis of the effectiveness of their research and development expenditure.

Objective of the Study

- 1) To analyze the need of research and development expenditure in the Indian automobile industry.
- 2) To find out the expenditure on research and development of the selected firms
- 3) To find out the effectiveness of the research and development expenditure of the firms under study.

Research Methodology

The relevant data is collected through the various annual reports of the firms and through different publications of Society of Indian Automobile Manufacturers. With the help of linear regression model the effectiveness of the expenditure on research and development has been analyzed.

Literature Review

McKinsey (2005) predicts the growth potential of India-based automotive component manufacturing at around 500 per cent, from 2005 to 2015. The report describes the initiatives required from industry players, the Government and the ACMA to capture this potential. The study has been based on interviews and workshops with 20 suppliers and 7 OEMs and survey with ACMA members. Increase in cost pressures on OEMs in developed countries, coupled with the emergence of skilled, cost-competitive suppliers in low cost countries (LCCs), is likely to facilitate further acceleration of sourcing of automotive components from LCCs. The analysis further identifies strong engineering skills and an emerging culture of cost-competitiveness as the major strengths of the Indian auto-component sector, while its weaknesses includes slow growth in domestic demand and structural disadvantages.

Narayanan (2004) analyses the determinants of export intensity of Indian automobile firms using a Tobit model. The study is based on the premises that there is a systematic difference in the characteristics and performance between the firms that export and those which sell in the domestic market, mainly in terms of technology acquisition, which in turn depends on the policy regime. Technology acquisition, firm size, vertical integration, capital intensity, imports of components and policy regime are found to be the main determinants of export competitiveness, by this analysis.

Nag Biswajit, Saikat Banerjee, Rittwik Chatterjee (2007) examine the growth patterns, changes in ownership structures, trade patterns and role of governments of selected Asian countries (viz. China, India, Indonesia and Thailand) in the automobile sector. The study pinpoints the fact that the developing countries are making efforts to develop their automobile sector through different paths with direct and indirect influence of Government through innovative policies and trade liberalization programmes. Government policies towards investment liberalization have brought significant benefits to the selected countries. Protection in component sector did not work well in general as most of the critical components still being imported. Thailand has aimed to plug the gaps in the component sector through a focused investment promotion scheme. India is also making an effort to develop indigenous component sector through giving focus in R&D and

tightening the IPR regime and thereby inviting big players to step in the critical component sector leaving the basic components in the hands of SMEs.

P.Janaki Ramudu and S.Durga Rao (2007) in their study ‘Receivables Management in the Commercial Vehicles Industry in India’ examine the efficiency of receivables management of the Indian commercial vehicles industry. This study reveals that the industry as a whole had managed receivables efficiently, where as a few individual companies had for less satisfactory scores in this respect. The study reveals that the level of investment in receivables as a percentage of sales across the industry was reasonable less. When benchmarked against the industry average, Ashok Leyland and Swaraj Mazda had recorded poor performance in the receivables management, where as a Tata Motors, Bajaj Tempo, and Eicher Motors, did well.

Kale D. (2011) has tried to examine the development in the Indian auto industry and seeks to understand the factors, both internal and external to firms that have shaped innovative capabilities. It points out that the Indian Government’s industrial policy has secured the development of basic capabilities but restricted innovative capability development in auto manufacturing. This paper reveals that key attributes of firm ownership such as managerial vision and diversified nature of business, helped Indian firms in the development of the innovative capabilities.

Lokhande and Rana (2013) explain that globalization has opened the doors of opportunities, but the market is still crowded with some unknown risks and lot of competition. Because of this competition, a marketing strategy must aim at being unique, differential-creating and advantage-creating. Today, due to innovative marketing strategies Maruti Suzuki has become the leading & largest seller of passenger cars in India. The company has adopted various brand positioning, advertising, distribution strategies to capture the market. The objective of this paper is to focus on various marketing strategies of Maruti Suzuki India Ltd.

Need for Research and Development in the Indian Automobile Industry

Research and development is a key factor for the development of any industry. In the world of cut throat competition, every firm is trying to put new and updated features in their vehicles and with the entry of global players this race has become more violent in the Indian automobile

industry. The expenditure on the research and development was only Rs. 890 million in the year 1991-92 and that has increased to Rs. 44120 million in the year 2012-13 with the tremendous growth of 4857.30 percent (SIAM).

With lots of potential in the Indian automobile industry and due to underfed market the major global players are coming in the market and competition has increased. The quality and innovation are the vital factors for the growth and survival of the firms in the automobile industry and that is directly dependent on the research and development initiatives.

The growth of automobile industry in India is directly related to the fuel prices. Since July 1991 the petrol prices have been increased by 324.1 percent and this is the main reason that the people are looking for the fuel alternatives or high mileage of the vehicles. These consumer aspirations lead the manufacturers to produce fuel efficient vehicles.

India is a developing country and is approaching towards the implementation of different international regulations in the automobile industry such as safety norms, environment norms, quality norms etc. Different agencies are tracking these norms in India. So vehicles are required to be improved with the improvement of these norms and that is possible only with the help of research and development.

Consumer aspiration is continuously changing regarding the quality, design, comfort etc. in the Indian automobile market. To meet the fast changing consumer requirements, research and development expenditure is very important

The Effectiveness of Research and Development

The competition in the Indian automobile industry has increased in the recent and the consumer's perception about the vehicles has also changed. Now consumers are more aware about the features of the vehicles. So it is important for the firms to change the vehicles according to the changing requirement of the consumers and that is not possible without research and development. So expenditure on research and development has become important for the survival of the firms in the market. The present paper analyses the effectiveness of research and development of Maruti Suzuki and Tata Motors by measuring its impact on the domestic sale of

the respective firms. With the help of regression analysis the paper analyses how important the expenditure on research and development is for the firms under study.

Maruti Suzuki

The following table shows the research and development expenditure and domestic sale of Maruti Suzuki during 2004-05 to 2012-13.

Table 1
Research and Development Expenditure and Domestic Sale (Maruti Suzuki)

Year	Expenditure on R&D(Rs. Million)	Domestic sale (Nos.)
2004-05	368	487402
2005-06	396	527038
2006-07	536	635629
2007-08	646	711824
2008-09	910	722144
2009-10	1733	870790
2010-11	4163	1132739
2011-12	3717	1006316
2012-13	5146	1051046

Source: SIAM & Annual Reports

Statistical Analysis

The domestic sale of Maruti Suzuki has been regressed against the expenditure on research and development from the time period 2004-05 to 2012-13.

Table 2
Regression Statistics

Multiple R	0.928384856
R Square	0.86189844
Adjusted R Square	0.842169646
Standard Error	92539.07663
Observations	9

Source: Calculated

In the above table the high value of R square shows that the 86 percent variation in the dependent variable is explained by the independent variable. In other words, eighty six percent variations in the domestic sale is explained by research and development expenditure.

Table 3

ANOVA								
	<i>Df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	3.74116E+11	3.74E+11	43.68733	0.000301593			
Residual	7	59944364929	8.56E+09					
Total	8	4.3406E+11						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	567561.7956	46086.08933	12.31525	5.34E-06	458585.5111	676538.1	458585.5	676538.1
X Variable 1	115.6328038	17.49457036	6.60964	0.000302	74.2647185	157.0009	74.26472	157.0009

Source: Calculated

The ANOVA table depicts F value is 43.68 that reveals that the data is statistically significant. The p-values depicts that the intercepts and slope of the regression equation both are significant. The slope of the regression equation shows that with the one unit variation in the research and development expenditure the domestic sale increases by 116 units approximately.

Tata Motors

The domestic sale of Tata Motors has been regressed against the expenditure on research and development from the time period 2004-05 to 2012-13.

Table 4

Research and Development Expenditure and Domestic Sale (Tata Motors)

Year	Expenditure on R&D (Rs. Million)	Domestic sale (Nos.)
2004-05	3933.4	369069
2005-06	4761.2	403806
2006-07	7968.6	526187
2007-08	11960	528125
2008-09	14766	464791
2009-10	12530	609467
2010-11	14340	745325
2011-12	15486.9	844528
2012-13	17593.1	759255

Source: SIAM & Annual Reports

Statistical Analysis

The domestic sale of Tata Motors has been regressed against the expenditure on research and development from the time period 2004-05 to 2012-13.

Table 5

Regression Statistics

Multiple R	0.803061
R Square	0.644907
Adjusted R Square	0.59418
Standard Error	106740
Observations	9

Source: Calculated

In the above table the value of R square is 0.64 that shows that the 64 percent variation in the in the domestic sale is explained by research and development expenditure.

Table 6

ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	1.45E+11	1.45E+11	12.71317	0.009151186			
Residual	7	7.98E+10	1.14E+10					
Total	8	2.25E+11						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	264817.853	96172.22	2.753579	0.028357	37406.68158	492229.0246	37406.68158	492229.0246
X Variable 1	27.7454472	7.781527	3.565553	0.009151	9.345059438	46.14583506	9.345059438	46.14583506

Source: Calculated

The ANOVA table shows F value is 12.71 that shows the data is statistically significant. The p-values depicts that the intercepts and slope of the regression equation both are significant. The slope of the regression equation depicts that with the one unit variation in the research and development expenditure the domestic sale increases by 28 units approximately.

Conclusion

That statistical analysis shows that the expenditure on research and development causes the variations in the domestic sale to a considerable level. So the research and development is the key to success for the firms in the Indian automobile industry. When we compare the effectiveness of the research and development expenditure of the two firms, Maruti Suzuki's research and development is more effective as with the one unit increase in the research & development expenditure the domestic sale increases by 116 units approximately and on the other hand it is only 28 units in case Tata Motors.

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