



Foreign Direct Investment (FDI) in Indian Automobile Industry: Impact on Employment Generation

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Abstract

Indian Automobile Industry is globally one of the largest industries and a key sector of the Economy. Indian Government policies resulting in the Foreign Direct Investment (FDI) infusion in Auto Sector has had a significant impact on job creation. It is therefore most important to see how various policies enunciated at various times have created employment opportunities directly and indirectly in this fast changing Automobile sector. This research paper attempts to understand the inventory of policy responses of the government especially related to FDI in automobile sector. Foreign Direct Investment (FDI) has been considered as a major catalyst in promoting sustainable development in developing countries. FDI has the potential to generate employment, raise productivity, transfer skills and technology, increase incomes, enhance exports and contributes to the long-term economic development of the world's developing countries. Evidence presented in the form of (available) empirical data with its interpretation suggests there has been significant impact of FDI in Auto Sector in Employment Generation – both in quantity and quality. It can be construed that with further infusion of FDI in this sector as envisaged in Automotive Mission Plan (2006-16) and 12th five year plan (2012-17) of the Government of India; the potential for employment generation is expected to show the same CARG estimated for the Automobile Industry – Automobile manufacturers (OEMs), Auto Component sector and in related enabling services.

Keywords: Employment, FDI, Auto Policy 2002, Indian Economy, CARG, Automotive Mission Plan 2006-16, Automobile (OEMs) and Auto Component Industry, Automotive Sector 12th Five year Plan (2012-17).

Introduction

The Automobile Industry occupies a leading place in Indian economy contributing ~ 7%¹ of GDP. Foreign Direct Investment (FDI) impact on the growth of Automobile Industry is visible across the spectrum of this sector – direct employment in manufacturing, auto component suppliers and auto service segments. In the growth aspect it is distinctly discernible in the passenger vehicle segment. The cumulative Foreign Direct Investment (FDI) equity inflows² from January 2000 to December 2010 in this sector is Rs. 25,972.59 crores (5.74 USD in billions) which is 4.52% of the total FDI inflows; the portion of Passenger Vehicle segment is Rs.13,516.25 crores (3.008 USD in billions) which accounts close to 52% of the total inflows in Automobile Industry Sector. This has opened a challenging avenue for training and development centers and employment gateway for aspiring and talented individuals across all levels.

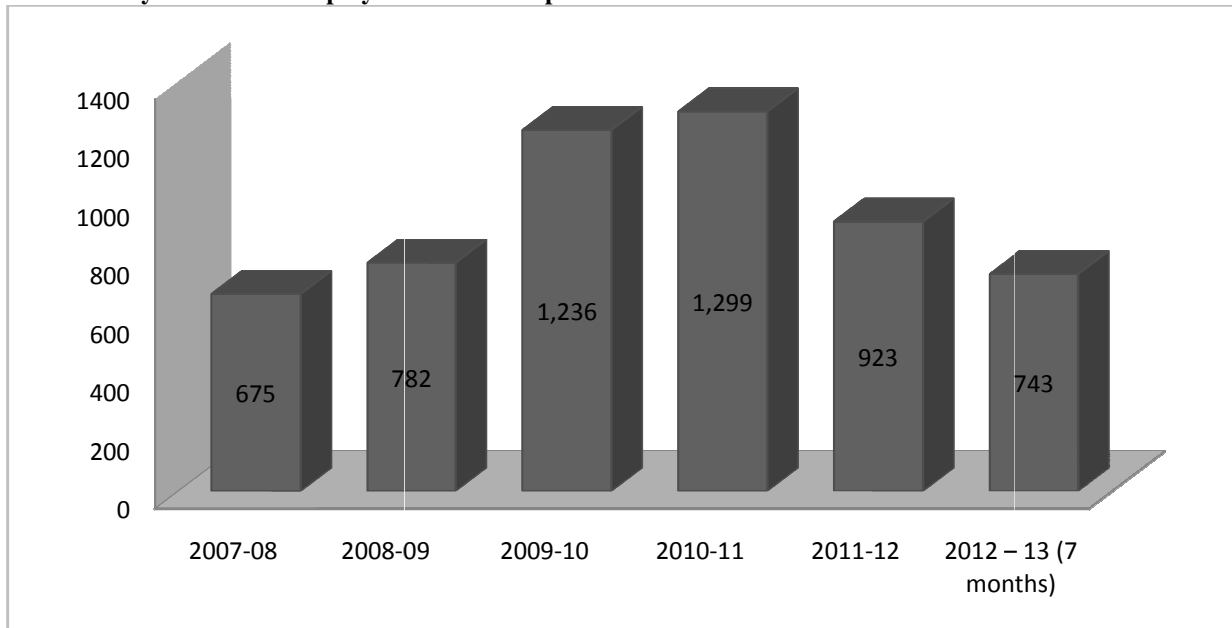
The impact of the various government interventions in FDI in Automobile sector (more importantly auto policy 2002 with its vision 2010) towards employment generation - though not practical to quantify but attempt can be made to study and interpret the data available. This facilitates to estimate the employment generation and potential impact of these unique policy initiatives. A database with an inventory of policies

enacted during the years 1998–2010, offers a tremendous analytic tool to learn more about which policies the Government relied on, what interventions appear to be more effective vis-à-vis employment generation and what are the implications for the design of policy packages to deal with future such initiatives (FDI) in other sectors.

The Indian Automobile industry being 'industry of industries' has profound forward and backward linkages with many segments with its multiplier effect contributing to GDP; leading to requirement of Human Resources at various levels from Research and Development to general employment, that is, education levels from PhD to ITI grades.

Economists theoretically conclude that trade (including free trade) can affect wage rates and the distribution of employment across various sectors in the economy, but it has no effect on the overall level of employment. However, the empirical study presented in this research paper emphatically indicates the Foreign Direct Investment (FDI) as per Government of India's New Industrial Policy in 1991 in aspects relating to de-licensing, Passenger car segment in 1993 (more specifically), decrease in customs and excise duties, making vehicle purchase affordable and thereafter policy modifications (welcoming FDI) has lead to employment generation significantly in India.

Automotive Industry Growth in Employment – FDI Impact



Source³ - DIPP's FDI database – Fact Sheet on Foreign Direct Investment in SIA news letter for all the years

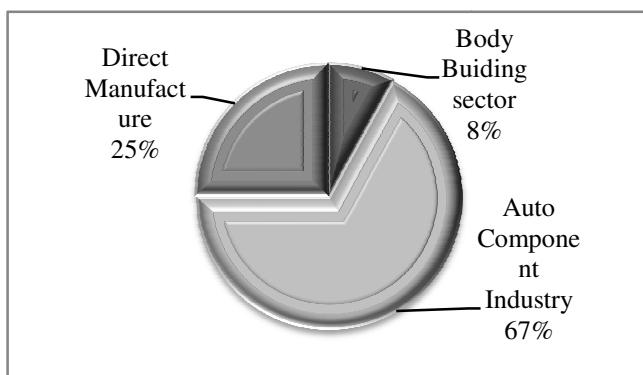
Figure 1

FDI Inflows in Automobile Industry in India (USD in million)–From 2007-08 to 2012-13 (till October 2012)³

The development of employment generation in automobile sector can be emphasized in the following three perspectives; excluding the employment generated in enabler segments such as, auto finance, auto insurance which contributes as complementary services. i. Automobile manufacturing – OEMs, ii. Auto components industry – to OEMs and after-market, iii. Auto service [authorized service centers and dealer network] of the above, the last two, though dependant on automobile manufacturing domain, have contributed significantly and extensively in job creation especially in two-three tier cities/towns.

Apparently, FDI in automobile manufacturing contributes appreciably to employment generation in all segments of the sector and also generates demand in skill development to match with the technology upgrading and productivity of labor.

This analysis of FDI with its employment impact in Indian Automobile Industry is divided in to i. Automobile Manufacturing ii. Auto Components and iii. Service sector. According to Maruti Suzuki⁵ - “The industry association strongly feels that all three segments in the auto industry — original equipment manufacturers (OEMs), suppliers and service providers — will be hiring in a big way in the next few years”.



Source⁴ – Annual Survey of Industries 04/05 and IMaCS analysis

Figure 2

Employment Distribution across manufacture of motor vehicles, bodies and auto components⁴

Automobile Manufacturing – Original Equipment manufacturers (OEMs)

The Original Equipment Manufacturers (OEMs) are on the top of the Automobile Industry; there are few OEMs in India supplying some components to other OEMs in India or abroad. They are the members of the Society of Indian Automobile Manufacturers – SIAM. The Indian automobile industry after de-licensing in July 1991 has grown at a spectacular rate with a significant CAGR. The automobile manufacturing industry has attained a total production of 20,366,432 vehicles in the FY 2011-12 as compared to 5,316,302 in the FY 2001-02 with a CAGR of 14.6%. In this duration of more than a decade the cumulative FDI (in equity inflows only) from April 2000 to March 2012 is Rs. 30,785 crores (USD 6,758 millions) which is an approximately 60% of total investment in this sector –

portraying a significant development as compared to prior to 1991; when this sector was a controlled and regulated industry in Indian economy.

data indicates that its impact is significant in the Passenger Vehicle Segment: both in domestic sales and export.

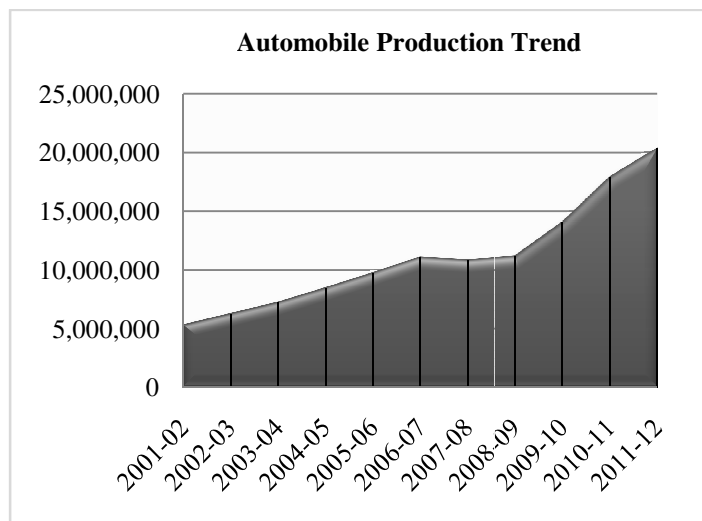


Figure 3

Growth Trajectory of Indian Automobile Industry – Vehicle Production⁷

To emphasize, FDI equity inflows⁶ received during April 2000 to Oct 2012 in the Automobile sector is Rs. 34,875 Crores (USD 7.5 billion), which is ~ 4.00% of total FDI inflows. Its influence can be authenticated by the growth – exhibited in figure 3 - in the total vehicle production (includes all categories) from FY 02 to FY 12 with a CAGR of 14.4%.

The foreign direct investment (FDI) though visible in all sub sectors of the Automobile Industry - the analysis with available

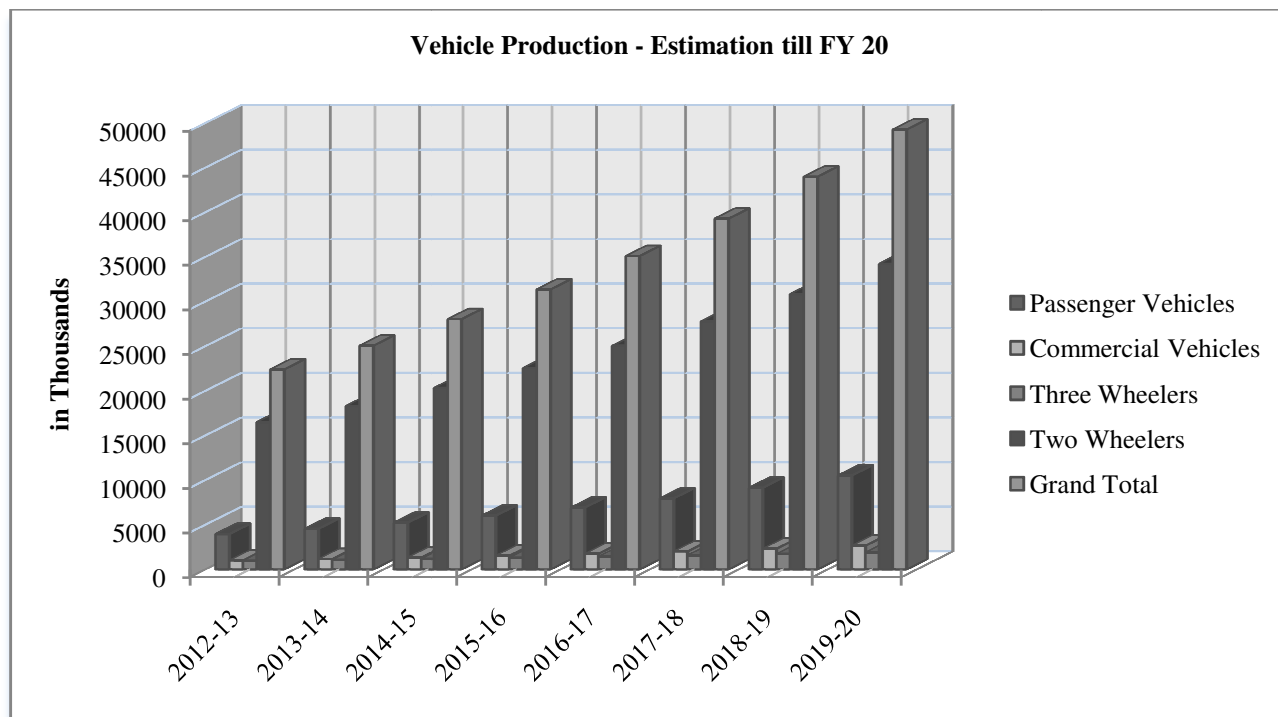
The Auto Policy 2002 has impacted considerably the Indian Automobile Industry and positively – OEM’s and Auto Component sub-sector directly; which provided a direction to the growth and development of the Automobile Industry in India. This policy document⁸ and thereafter several policy changes resulted in reduction of duties in the auto-component sector to a large extent and the automobile sector to some extent and extension of R and D incentives to the auto sector – Essentially the Policy changes are i. No Restriction in FDI, ii. No requirements of local content (major attraction to invest), iii. No export obligation, iv. No Foreign Exchange neutralization, v. No minimum R and D expenditure. The major infusion of FDI (after 1991) related to passenger car manufacturers, that is, Hyundai, Honda, GM, Ford, Mitsubishi, and Toyota etc., contribute to average of about 35% of the domestic passenger vehicle market share as indicated in table 1

Observations: From FY 2001-02 to FY 2011-12 the Passenger Vehicle production¹⁰ has grown with a CAGR of 16.6% (~ 17%) as compared with two-wheeler with a CAGR of 13.7% (~ 14%) ; though quantity wise two-wheeler production is far more than four wheelers. In the FY 2011-12 the Passenger Vehicle production is 31, 23,528 and as per the Auto Mission Plan (2006-16) this is expected to increase to 6.9 million by the year 2016-2017 and its vision statement¹¹

“To emerge as the destination of choice in the world for the design and manufacture of automobiles and auto components with output reaching a level of USD 145 billion accounting for more than 10% of GDP and providing additional employment to 25 million people by 2016”

**Table 1
 Automobile Manufacturers (OEMs) - Passenger Vehicle share⁹**

Financial Year	Indian Owned manufacturers without/with Foreign Investment (Specific to Maruti) - Pre 1993			Foreign Direct Investment (FDI) Manufacturers – Post 1993		
	Maruti Suzuki	TATA Motors	M and M	Hyundai	GM	Others
2001-2002	48.40%	12.80%	6.10%	12.80%	1.20%	18.70%
2002-2003	46.50%	13.70%	6.70%	14.40%	1.10%	17.50%
2003-2004	45.80%	14.60%	6.80%	16.70%	1.70%	14.40%
2004-2005	43.70%	15.50%	6.60%	18.30%	2.40%	13.60%
2005-2006	42.60%	15.80%	6.60%	19.80%	2.30%	12.90%
2006-2007	42.80%	15.50%	5.80%	19.70%	2.50%	13.70%
2007-2008	43.30%	13.70%	7.50%	20.40%	3.80%	11.30%
2008-2009	42.00%	12.60%	6.60%	26.40%	3.30%	9.30%
2009-2010	42.80%	11.70%	6.80%	25.90%	3.10%	9.70%
2010-2011	45.00%	14%	7.00%	14.00%	4%	16.00%
2011-2012	40.00%	13.12%	7.89%	13.88%	3.75%	21.36%
Average		64.5%			35.50%	



Source¹²: Automotive Sector - 12th five year plan (2012-17) and self constructed
Figure 4

Total Vehicle productions with split in individual segments¹²

Table 2
Employment potential of Indian Automobile Industry – OEMs (Automobile Manufacturers)

Financial Year	Turnover Estimation (CAGR 15%) in Crore	Total Production Employee strength – 67% [turnover (in ` Crore) per employee 1.21 ¹³]	Potential Estimation - Incremental Growth in Direct Employment across all OEMs	Total Direct Employment at all OEMs - Estimation
2011-12	309,904	256,119	--	382,268
2012-13	356,390	294,537	38,418	439,607
2013-14	409,848	338,717	44,180	505,548
2014-15	471,326	389,526	50,809	581,382
2015-16	542,025	447,955	58,429	667,651
2016-17	623,329	515,148	67,193	768,878
2017-18	716,828	592,420	77,272	884,421
2018-19	824,352	681,282	88,862	1,016,839
2019-20	948,005	783,475	102,193	1,169,366

Source¹³: ICRIER

In the table 1 the manufacturers (OEMs) post 1993 share in passenger vehicle production segment from FY 2001 -02 to 2011-12 is hovering around 30-38% and average being ~ 35% which indicates the impact of Foreign Direct Investment (FDI) in India.

Analysis: On the basis of deduction, FDI impact on employment in the Auto manufacturing sector is estimated to increase in the same proportion, that is, 35% of the total Passenger Vehicle production.

In the figure 4 the total vehicle production projection is from 2012-13 to till 2019-20 is on the basis of CAGR of 12% taking the base of FY 2011-12. Similarly the CAGR in individual segments, passenger vehicles, commercial vehicles, three wheelers and two wheelers is 15%, 15%, 10% and 11% respectively. This authenticates there is a definite scope for direct and indirect employment with appropriate Technical and management skills across the organization reporting structure. The indirect employment generation will be essentially in the enabling areas.

The CAGR in turnover from 2000-01 till 2010-11 is 16.7% app. On a realistic basis considering the Indian economy influencing factors, such as inflation rate, dollar exchange rate affecting the fuel prices, increase in input material prices (major being metals and alloys), individuals purchasing power, shortfall in availability of skilled manpower, rise in interest rates (affecting across all layers from OEM level to end user), political stability, policy decisions of Government of India and respective State Governments influencing factors; the turnover expectations of OEMs till FY 2019-20 is considered on the basis of CAGR as 15%. As per the sample survey done by Indian Council for Research on International Economic Relations (ICRIER)¹³ representing 14 OEMs resulted in finding a relation between the turnover (in crores) and number of production workers requirement. The production employment strength is estimated on the basis of a multiplying factor 1.21, which is the average of North India, West India and Chennai locations turnover (in crores) per employee and represents 67% of the total workforce and the balance is distributed as 3.5% to R and D and 29.5% to Sales and Marketing, Finance and Accounts Department, HR Department and various other administrative and support functions of the organizations. The direct employment strength at the Automobile Manufacturers (OEMs) level relating with Plant operations of the industry (67%) estimated to be 294,537 and 783,475 for the Financial Year 2012-13 and 2019-20 respectively. Extending this to the total direct employment (100%), it would be 0.44 million and 1.17 million respectively.

Auto - Component Industry

The Auto- Component Industry relates to supplies to OEMs and after-market services comprising of Tier 1, Tier 2, and Tier 3. Tier 1 auto-component manufacturers are the members of the Automobile Component Manufacturers Association – ACMA. Majority of the manufacturers in Tier 1 are in the organized sector and supply directly to OEMs or Tier 1 players abroad. The major players within this Auto-Component Industry are related to manufacture and supply of i. Engine and Engine parts ii. Transmission and Steering parts iii. Electrical iv. Suspension and Braking parts and v. Equipments such as, Dash Boards, Head lights, Sheet Metal parts etc.,

Observations: The FDI in automobile industry has infused investment in auto component industry as well and leading to scope of employment and the skill development in human resources; a big plus factor. More over the growth of this sector displays greatly inter-twined with the automobile manufacturers (OEMs). The sample survey undertaken by ICRIER¹⁴ resulted in relationship exist between turnover and number of production workers and R and D employees. To enlighten further findings of this survey – OEMs employ less percentage of production employees and more in R and D employees as a fraction of total number of employees, compared to auto-component firms – depicted in table 3.

The auto-component sector gained immensely in relation with Foreign Direct Investment (FDI) essentially being assured supplies to automobile manufacturing sector (OEM's) in India, who are more fastidious in terms of quality which is the influence of FDI infusion. This sub sect of Indian Automobile Industry also gained substantially in Export as the skills and machinery lead to improvements - this is the influence of latest technology and quality control methods adopted by the foreign manufacturers established in India in Tier 1 of this sub sect. Also, few of them are established suppliers to OEMs in their home country and in India they have established as auto-component manufacturers to ensure quality supplies to their own OEMs who had invested in India and exporting to other countries as well to increase the market base.

Table 3
Distribution of work force in OEMs and Auto-Component Industry

Industry Type	Turnover / employee in Crore	Production workers as a % of Total	R and D Employees as a % of Total
Auto-Component	0.274	73%	2.30%
OEM	1.21	67%	3.50%

The 'Made in India' brand is rapidly getting associated with quality. As per ACMA Indian Auto Components¹⁵ overview there are significant number of organizations with Quality Certifications and recognition, notably, ISO 9001:532, TS16949: 438, QS 9000:33, ISO 14001:204, OHSAS18001: 95, JIPM: 3, Deming Award:11, TPM Award: 15, Japan Quality Medal:1 and Shingo Silver Medallion: 1; Largest number of Deming award winning outside Japan (a record) and this lead to quality consciousness resulting in increase in exports over the years.

The auto component revenue as OEMs to domestic (India) is expected to reach US\$ 212 million by 2020¹⁶, which would account for 11 per cent of the global component market. This is mainly in skill and technology development which is the by-product of FDI in auto sector.

Analysis: Indian auto component industry is quite comprehensive with around 651¹⁸ in Tier 1 in the organized sector and more than 10000 firms in small unorganized sector; Tier 2 and Tier 3. The auto component sector has been one of the fastest growing segments of the Indian automobile industry.

Out of the total, about 77% of the production (by value) of Auto Components is by players in the organized sector while the remaining 23% is by the SSI and unorganized sector. In the organized Auto Component Industry group the turnover in the period 2007 to 2012 CAGR is 13% and as per ACMA¹⁹ estimation during the period 2012 to 2021 the CAGR would be 11%. The table 5 provides the estimated turnover on the basis of 11% CAGR year-wise.

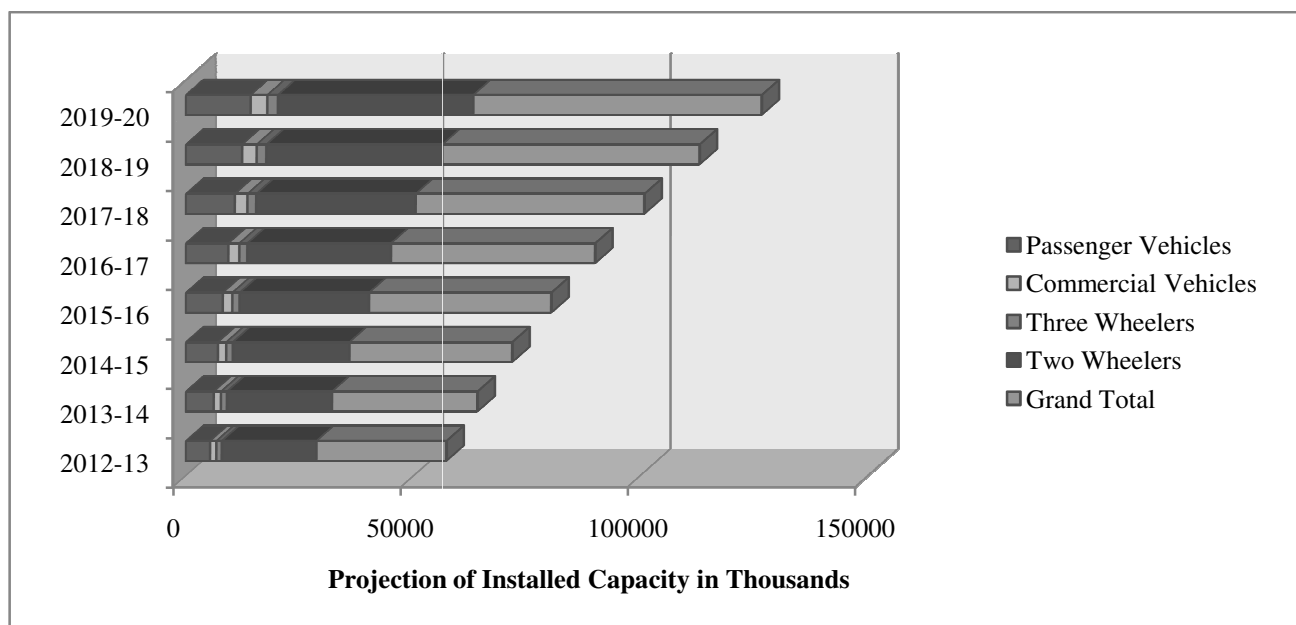
Table-4
Auto – Component Industry Statistics [Value in USD Billions]¹⁷

Category	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12 (E)
Turnover	8.7	12.00	15.00	18.00	18.40	22.00	39.9	43.5
Growth rate %	29%	38%	25%	20%	2%	20%	53%	9%
Export	1.69	2.47	2.67	3.52	3.80	3.8	5.2	6.8
Growth rate %	34%	46%	8%	32%	8%	Nil	37%	31%
Import	1.9	2.48	3.6	5.22	6.80	8.16	8.62	10.1
Growth rate %	33%	30%	45%	45%	30%	20%	6%	17%
Investment	3.75	4.40	5.4	7.20	7.30	9.0	NA	
growth rate %	21%	17%	23%	33%	1%	23%		
Imports as a % of turnover	22	21	24	29	37	37	22	23%
Exports as % of turnover	20	21	18	20	21	13	18	16%

Source¹⁷ ACMA – Auto Component Industry - Statistics

Table-5
Employment potential of Indian Auto-Component Industry – Tier 1 [in Organized Sector]

Financial Year	Turnover Estimation (CAGR 11%) in Crores	Total Production Employee strength – 73% [turnover(in Crore) per employee 0.274 ¹³]	Incremental Growth in Employment across all the Tier 1 auto-component manufacturers	Total Direct Employment at Auto Component Manufacturers - Estimation
2011-12	208,800	762,044	--	1,043,896
2012-13	231,768	845,869	83,825	1,158,725
2013-14	257,263	938,916	93,047	1,286,187
2014-15	285,562	1,042,197	103,281	1,427,667
2015-16	316,974	1,156,840	114,643	1,584,712
2016-17	351,841	1,284,091	127,251	1,759,029
2017-18	390,544	1,425,343	141,252	1,952,525
2018-19	433,504	1,582,132	156,789	2,167,292
2019-20	481,190	1,756,168	174,036	2,405,710



Source²⁰: Report of Automotive Sector for 12th Five year plan (2012-17) and self constructed

Figure-5
Projection of Installed capacity²⁰ till FY 20 at OEMs – Automobile assemblers

The figure 4.0 predicts the automobile production in all segments and to make it a reality there has to be proportionate increase in installed capacity. The figure 5.0 displays the installed capacity requirement hypothetically to match with the total requirement. The figures are derived from CAGR of 15%, 15%, 10%, and 11% in passenger vehicle, commercial vehicle, Three wheelers and two wheelers respectively.

As the installed capacity increase at the OEMs that has to be paralleled with the auto-component manufacturers in Tier 1, Tier 2 and Tier 3. In reality the employment potential is significantly more in this sub sector of automobile industry, that is, auto component manufacturers. This has an influence in the employment generation in this domain and it leads to more of indirect employment generation for which there is no established relation or equation to quantify (in organized and unorganized manufacturers) to estimate but it can be a manifold increase in the manpower requirements – skilled, semi-skilled and unskilled.

As per the survey done by Indian Council for Research on International Economic Relations (ICRIER) ¹³ representing 31 auto-component firms; resulted in finding a relation between the turnover and number of production workers requirement. In these findings the production employment strength is estimated on the basis of a multiplying factor 0.274 which is the All India average turnover (in crores) per employee representing 73% of production workers on the shop floors at the manufacturing centres and the balance is distributed as 2.3% for R and D and 24.7% to customer support, sales and marketing, HR, finance and accounts, other support and administrative functions.

In table 5, the direct employment at the auto – component Manufacturers (Tier 1) level arrived at 845,869 and 1,756,168 for the financial Year 2012-13 and 2019-20 respectively. This is relating with production plant operations of the Auto – Component industry representing 73% of production workforce and total direct employment (100%) for the Financial Years 2012-13 and 2019-20 estimated to be 1.16million and 2.40 million respectively. There would be an impact and significant increase in the direct employment generation at the unorganized operations of this sub sector in Tier 2 and Tier 3(which is more than 10,000) as well, but it is not practical to obtain.

Auto Service

The employment required in this category will be mostly of highly skilled workmen like in the production centers at OEMs and auto –component manufacturers. In India the service centers are directly managed by the authorized dealers or on the road side make shift arrangement, which is mostly for two wheelers. It is not practical to relate the employment generated by comparing with production/sales increase as there is no proven data to authenticate the relationship. The main reason being this comes under SSI or privately managed by a single man operating in unorganized operations. But, the overall

employment generation will be phenomenal in semi-skilled and unskilled domain.

Observation: The report compiled in 2010²¹ the Auto Sector service centers employs an estimated 787,770 persons across all skill levels and service segment – 58% (460,503) of the required manpower are in the passenger car segment (mainly due to significant number of dealership and authorized service center established by all OEMs), 26% (202,073) in Two – Wheeler segment and 16% (125,194) in commercial vehicles.

Analysis: By 2015, the employment at Auto Service sector is expected to grow by 65% to 1.3 million. In the similar lines extending the growth to 2020 by the same percentage, it would be ~ 2.2 million. For justified reasons the majority of the requirement is projected in Technical skills being a service center.

Findings on Employment Generation

As per the report compiled in 2010²¹, there are many unauthorized auto service centers across India, numbering 51,257 in Two-wheeler, 10,645 in passenger Car and 6,840 in commercial vehicles. In 2009, the direct and indirect employment in Indian automobile Industry is indicated as over 13million and of these 8 to 9 million are in unorganized sector and indirect employment.

The Indian automobile industry provides direct and indirect employment to over 17 million¹ people as on 2012. Direct employment includes personnel working with automobile OEM's and TIER 1 manufacturer (which accounts about 30%). The balance ~70% are employed in Tier 2, Tier 3 of auto – component manufacturers comprising of over 10,000 in unorganized sector and indirect employment includes essentially in Manpower serving in the industry and market side enablers, which is a wide area, to name a few, infrastructure supporting industry and export - import facilitation in industry enablers and in market side enablers it is relating with trained drivers, traffic management, road infrastructure etc., etc.,

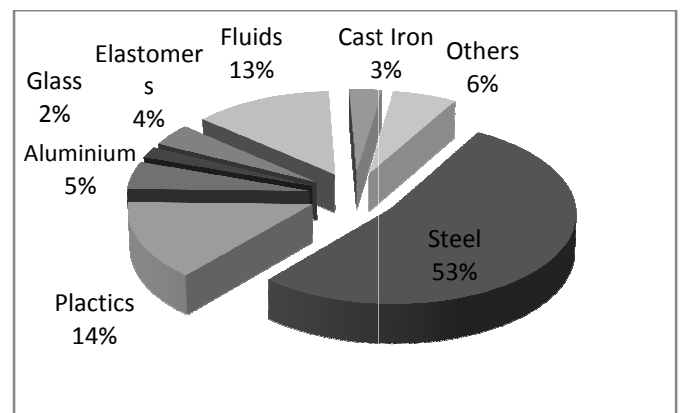


Figure 6
 Various Raw-material used (%) in a Normal Car²²

Between these three years, that is, 2009 to 2012, there is an increase of over 4million in direct and indirect employment in Indian Automobile Industry.

The various raw material highlighted in figure 6 is required generally in a production of a standard car signifying the employment potential for growth in other related industrial segments (to Automobile Industry) of Indian Economy, may not be in the same proportion and at the same time not practical to quantify but there will be a definite and considerable impact in Industries like, Tyres and Tubes (in all categories of vehicle type), Paint Industry, Aluminium, Iron and Alloy Steel, Fiberglass, Instrumentation (Gauges), Glass and Plastic Industry, Inside Furnishings etc.,

To sum up the findings, there is every possibility of additional employment generation of 25 million (Direct, Indirect Employment in Automobile Sector and related industrial segments) as per AMP 2016 in the Indian Automobile Industry and also ACMA vision 2020. Foreign Direct Investment (FDI) contribution to this growth in employment generation expected to be 35%, that is, ~ 9millions in Direct and Indirect employment, which is in proportion to the growth in Passenger Vehicle Segment as indicated in table 1.

Limitations

It is essential to highlight certain limitations in findings arrived at: i. It does not represent the quantum and skill requirements at various levels in specific numbers as this research paper is only in employment generation prima facie ii. It pre-supposes that employment generation is absolutely directly proportional to production increase iii. Foreign Direct Investment (FDI)

maintains the same proportion of investment – China threat is not considered as the productivity of labor is much higher there than in India as per ACMA report findings iv. Industrial unrest and any other unexpected happenings are not considered v. Assuming there is no economy slow down in Europe and USA or in other parts of exporting countries influencing the production and export of Cars, two-wheelers and auto-components and import requirements.

Conclusion

This research paper is aimed on the employment generating potential in Indian Automobile Industry as such, in quantum only. Foreign Direct Investment (FDI) contribution to the growth in this sector assumed to be existing in the same proportion from 2001-02 to till 2011-12 (October) – after 1991 new industrial policy. The total employed figure is arrived on a factor basis (turnover per employee) for OEMs and Auto-Component manufacturers separately as per survey finding relation between turnover and number of production workers employed - ICRIER. In the annual report of ACMA for the FY 2011-12 (ending) the estimated imports indicated as 51,441 crores; In the figure 7 the import estimation of Auto – Components is projected and it is two times in 2020-21 of 2015-16 estimated, may be as per the projected sales during that period. It will be worth to explore this in the 12th five year plan 2012-17 and in anticipated Automotive Mission Plan of 2017-27 to manufacture within the country by employing R and D facilities and/or upgrading the technology, can lead to further improvement in employment generation in this sector and other domain of the Indian economy. If necessary revisiting auto policy 2002 taking in to consideration vision 2020.

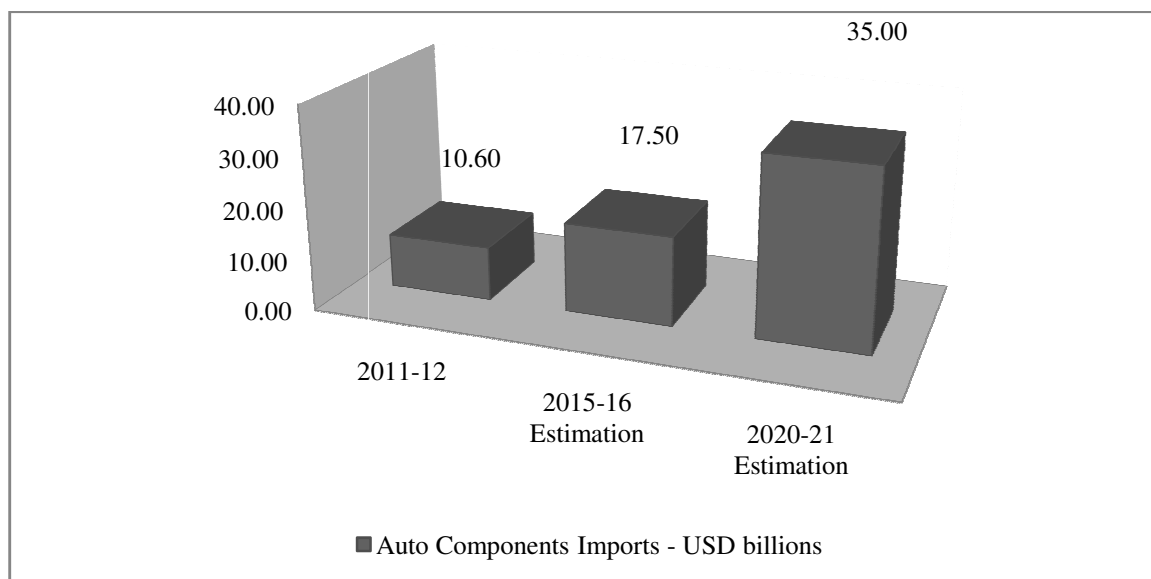


Figure 7
 Auto – Component Imports²³ [Actual and Estimation] in USD billions

There will be an emerging need, considering the growth of Automobile Industry... to have a management and technical Training Institute exclusively in Automobile Managerial and Skill Development, like Indian Institute of Packaging Management and Indian Institute of Banking and Finance which caters to developing skills in specific spectrum.

Lastly but not the least, employment statistics for the industry is not practical to obtain as there is no statutory regulation or stipulation or binding laws enacted to engage the manpower in proportion to increase in production or installed capacity and also no compulsion to report or basis of manpower employed in any official publication of the organizations, hence no equation can be derived to authenticate the findings, like, in Micro Economics the total cost relating factors such as, direct and indirect cost, material cost, and total output to ascertain the marginal increase in output or in total cost by differentiating.

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