

# PERFORMANCE EVALUATION OF AUTOMOBILE INDUSTRIES THROUGH TECHNO-MANAGEMENT

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**Abstract** Automobile industry in India is a developing sector and can possibly enhance it. The auto component industry in India has developed as one with the industry and is changing itself from being a "Job order fulfiller" to being a "Coordinated association". With the advancement procedure having begun in 1991, most auto component manufacturers in India have picked the simple way of endeavoring to advance on operational or manufacturing capabilities. Automobile unique gear manufacturers (OEMs) are extending their production bases to grow their market reach and use the current limit with respect to auto-component manufacturing and giving chances to fabricate novel capabilities prompting better execution. Alongside the automobile OEMs, auto component industry has changed itself from a customary job fulfiller part to a coordinated association part in India. In this examination paper we will attempt to analyze the impacts of Indian automobile strategy changes on domestic firms in the cluster and inspected innovative capabilities advancement in the improvement phases of the cluster. Consequently, our examination endeavored to investigate asymmetry among firms as far as appropriation of technology advancement way and clarify technology variables between firm variation in intensity.

**Index Terms-** Evaluation, Performance, Management, Technology, Automobile, Pune, Cluster

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## 1. INTRODUCTION

Numerous vital co operations appeared over an assortment of ventures to influence Indian firms to contend in domestic as well as in global market. The ventures which could pull in coordinate foreign investments and most extreme number of JVs incorporate hardware, correspondence, data technology, and automobile. A few Indian associations have procured condition of-craftsmanship technology from their foreign colleagues and JV accomplices. Despite the fact that technology has been the reason for such developing coordinated efforts and JVs, the technology management function does not de-accentuate finance, marketing, work force and other conventional functions of an association.

Car industry is in a particular period of its development. It is conceivable to watch the prevailing plan of auto among the contributions of different manufacturers. There exist minor contrasts among the vehicles of a similar classification. Ealey and Bermudez propose systems that can be utilized to fabricate mark picture and saw esteem and to stay away from the change of automobiles into an item. Cost is the key premise of rivalry in the dominant part of market segments. The ongoing mergers in the industry prompt a decrease in the quantity of manufacturers. This pattern is relied upon to proceed. A large portion of the manufacturers begin to create worldwide manufacturing and dissemination procedures. One such system is to devote a specific plant to the manufacturing of a specific model. This makes the chance to expand the profitability and effectiveness of these plants through particular gear and long production runs [1].

## 2. AUTOMOBILE INDUSTRY IN INDIA

Each significant move in policies made by the Indian government, the automotive industry has turned out more grounded and better. While the move in policies appears to have for the most part been brought by chance occasions, the Indian government has in any event to be credited for making the correct decisions and actualizing them effectively. It is confusing that the Indian white collar class, the most appealing component for foreign interest in the progression stage, was a result of the statist belief systems in the administrative stage. The item innovations of domestic firms like Tata Motors and Bajaj Auto today are the products of indigenization and insurance policies of the administrative stages. Purchaser decision forms are the decision making forms attempted by consumers with respect to a potential market exchange previously, amid, and after the buy of an item or administration. Consumers need to settle on various types of decisions regular as per their diverse needs [2].

De-licensing in 1991 put the Indian automobile industry on another development direction, which pulled in foreign auto mammoths to set up their production offices in the nation to exploit the different advantages it offers. Substantial working class populace, developing gaining power and solid technological capability have been boosting automobile interest for as long as couple of years. In spite of financial lull, the Indian automobile sector has recorded extraordinary development, particularly in passenger cars fragment. The passenger vehicle market, which constitutes around 80% of automobile deals, has huge development potential. Envisioning the future market potential, the production of passenger vehicle is estimated to develop around 10% till

2012-13. Goodbye Nano has realized another upheaval in the nation's little car fragment. Seeing the great starting reaction from consumers, numerous different players in the industry are chalking out their plans to dispatch cars in this portion in the following couple of years. A CAGR examination indicates development of around 14.5% in domestic volume offers of passenger vehicles amid the coming years. Different segments, for example, bikes, multi-reason vehicle and light business vehicle, are likewise anticipated that would witness quick development in coming years.

### 2.1 Market Share of Commercial Vehicles Industry

Commercial vehicle portion has overwhelmed by the Tata gathering of engines in India and stood first in automobile industry. It has a share or 63.94 percent. Ashok Leyland has its image name in market and known for the quality product. The value area of Ashok Leyland is higher than the other automobile organizations yet it has second position in commercial vehicle fragment and has garbed 16.47 percent share of the market. Third biggest market share is caught by the Mahindra and Mahindra automobiles it has 9 percent share in market. The other Automobile organizations have demonstrated their essence in market however it isn't critical in nature.

Their share is in the middle of 6 percent to one percent. There are such a significant number of reasons why these organizations have not performed in market. It might be the value war, quality of the product, sturdiness of the product and execution of the product. The customers of this fragment dependably consider the administration gave by the organization after sales. Consequently it is most imperative to enhance quality, sturdiness and after sales benefit alongside aggressive cost of the Product.

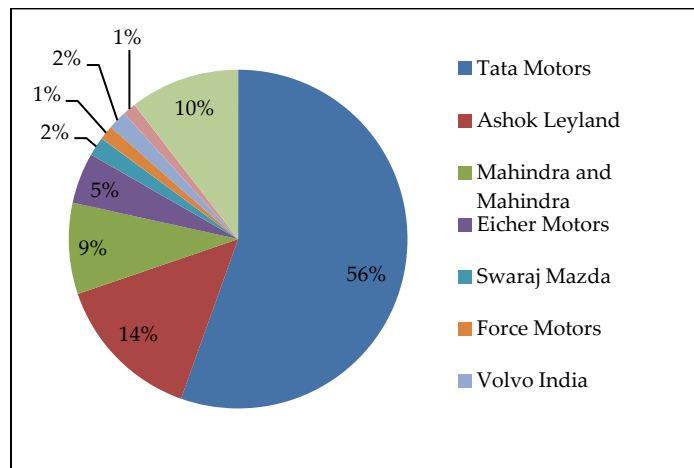


Fig no 1- market share of commercial vehicles

### 2.2 Market Share of Two Wheeler Industry

Hero Honda has a noteworthy share in the market of the two wheeler industry of India. It has recorded in excess of 24 percent share in the fragment amid the period. Where Bajaj the neighborhood manufacturer of two wheelers has recorded second position sales rate 26.70 yet it is a critical development amid the period. Third place has gotten by the TVS motors in the fragment which has a share of 10%

Rest of the two wheeler manufacturer has a share of fewer than 10 percent and it is because of the quality of the product and the administrations gave by them to the customers. Every one of the parameters like cost, quality, after sales administrations, marketing system of the organization prompts the expansion of sales. According to the survey of the industry, Motorcycle sales will perform decidedly in future, which will surpass 10 Million units by 2012-13.

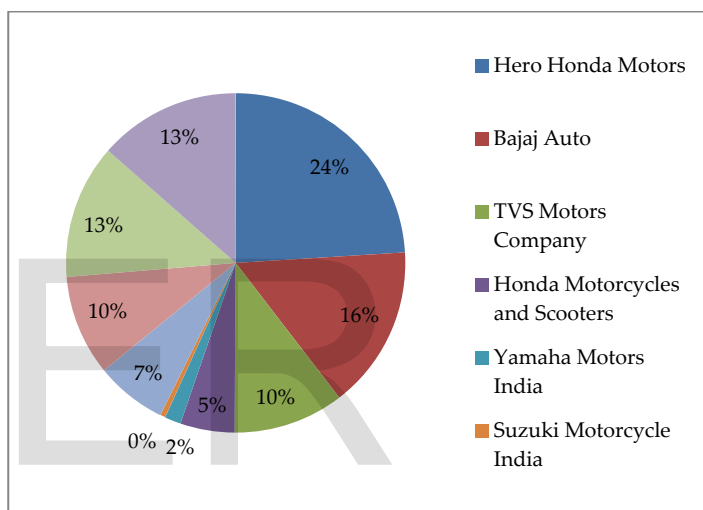


Fig no- 2- market share of two wheelers

### 2.3 Market Share of Three Wheeler Industry:

This exploration breaks down the Indian market for Motorcycles, Scooters and Mopeds in Thousand Units by the accompanying product segments: Motorcycles, Scooters, and Mopeds. Annual gauges and figures are accommodated the period 2007 through 2015. The examination investigation demonstrates that Bajaj auto overwhelms the three wheelers market share (58.6%) trailed by the Piaggio Vehicles. In this manner the potential for the contenders is there in the three wheelers automobile portion. They have to focus on the marketing and valuing methodology as indicated by the land section of the nation.

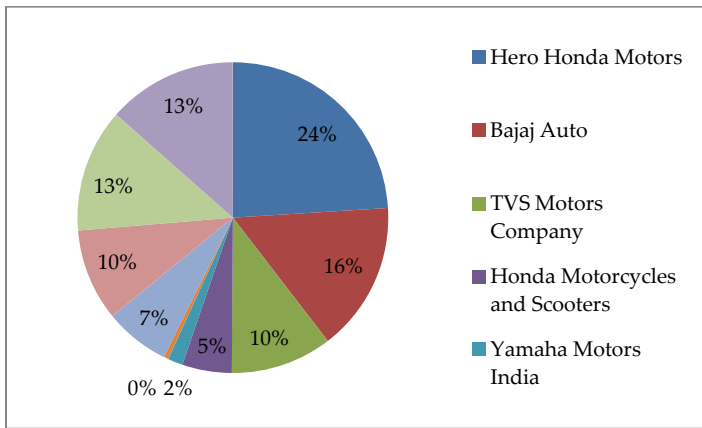


Fig no 3- market share of three wheeler

### 3. TECHNOLOGY AND INDUSTRIALIZATION

The dynamic development of similar favorable position inside rising economies includes successful technology acquisition and enhancing into more mind boggling advancements. Technology is a considerably more perplexing heap of learning, with a lot of it epitomized in an extensive variety of various artifacts, individuals, methods and authoritative game plans. India embraced local cluster improvement course for industrialization and technology advancement. Firms in clusters have visit cooperation's, which are predominantly reflected in the acquisition of information, and in addition in sharing, diffusing and making it. A large group of linkages among cluster part's outcomes in learning through networking and by associating is viewed as the vital power maneuvering firms into clusters and the basic element for the on-going accomplishment of an inventive cluster.

After advancement amid 1990s, technological change isn't just something which firms pick and import from outside. In actuality, it is established in a particular arrangement of progress producing assets or capabilities which are situated inside the structure of technology utilizing firms. Subsequently, the learning forms which add to building and fortifying those capabilities are viewed as assuming a vital part in the long haul dynamism and sustainability of mechanical production. The nearness of worldwide OEMs in Indian automotive clusters made new technological learning and dynamism. This implies for those intrigued by understanding mechanical technological dynamism in developing economies, there is after all comment i.e. aside from the acquisition of remotely sourced basic components and technology. Besides, these procedures of technological change and capability amassing display wide contrasts between firms, enterprises and economies, with a portion of these distinctions clearly connected with various long haul ways of financial execution [3].

### 3.1 Some good practices for developing and executing technology strategy

Business technique gives the premise to the improvement of functional strategies. These strategies should all help and add to the business technique of the organization in order for a firm to contend effectively. Serious rivalry and technological advances make technology a basic component of strategic management. Improvement of a technology system is the initial step of the joining of technological viewpoint into the business procedure. It is recognized that organizations that prevailing with regards to utilizing technology for strategic preferred standpoint show predictable and stable strategic management. Among the Indian suppliers that were surveyed, 48% unequivocally accentuated that they have steady and stable strategic management. The extent of organizations announcing that they have an efficient process for technology arranging and technique improvement is even lower, just 33%. This reality represents a noteworthy shortcoming. Having a deliberate strategic arranging process is found as significantly affecting the organization execution.

The fruitful management of technology requires an ability to take a long haul see for technology amassing inside the organization. The advancement and dissemination of product and process innovations may require years. This reality makes long haul technology arranging an essential for an effective technology procedure. The organizations that partook to the survey were requested to express the general arranging skyline of their organization. The normal arranging skyline is observed to be 3.3 years. This is a significant short arranging skyline.

### 4. REVIEW OF LITERATURE

Probert and Gregory 2015 various methodologies for the management of technology are talked about. These models expect to give a structure situating technology methodology into the general system of competitive procedure. He proposes a process model for arranging technology management exercises. It is for sure speaking to utilize a process model since it is normal that later on, process-based associations will wind up across the board. The model considers technology management as a process including the sub-processes of distinguishing, choosing, acquiring, securing, and misusing advancements [4].

Lall, (2011) in his investigation expressed Strategic technology management is fundamental for cluster firms to accomplish long haul competitiveness. The economy has been experiencing a progression of major developments, driven by fast technological advance and change in the industrialized

economies. The examiners portray these progressions as the rise of new technological "paradigm". This new paradigm includes new innovations as well as new management techniques, diverse types of big business linkages, more tightly connections amongst industry and science, and strengthening of information/knowledge streams between financial specialists. In this technological paradigm, technology insurgencies have frequently assumed a strategic part in making unforeseen open doors for firms in the clusters and have turned into a wellspring of competitive favorable position [5].

Joshi et. al. (2013) expressed that the setting up of manufacturing offices in India by huge automakers, for example, Hyundai, Ford, Toyota and so on has additionally guaranteed quick foundation and development of a powerful auto subordinate/component sector. Plan, advancement and simulation capabilities have expanded significantly and worldwide organizations like Bosch, Goetze-Werke and Johnson Control have set up offices in the nation. The multi-tiered auto component industry by and by contributes altogether to the general development of the automobile Industry and real piece of fares go to the Original Equipment Manufacturers (OEMs) and Tier I suppliers and just 30% to worldwide aftermarkets, characteristic of the progressions in this sector. Automakers are progressively looking towards country markets and the young fragment in India because of upgraded buying limit of this portion [6].

Bonnier (2011) in his investigation said that in the soonest long periods of the automobile, proprietorship was confined to the high societies and to associations that could manage the cost of costly claim to fame assembled chassis and coaches. At the point when the auto came extremely close to average citizens, it profoundly affected the financial aspects of family units and networks. For most families an automobile remains the second most costly bit of individual property, after a living arrangement. Private property law had developed over hundreds of years and was settled by the automobile time. No comparable advancement had occurred to manage cars. There was no settled registry of possession, and given their exceptional robbery potential (both significant and made to be headed out), it ended up vital ahead of schedule to build up an official enrollment framework with the goal that hoodlums could be arraigned and stolen property distinguished and reestablished to legitimate proprietors [7].

Sahoo et al (2010) in his examination researched on Indian automobile industry includes the auto and the auto-component enterprises. The automobile industry in India has seen changing technological scene in the worldwide automotive industry and working as far as the elements of an

open market. India is as of now world's second biggest market for 2-wheelers (2W), ninth in passenger cars (PV) and eighth in commercial vehicle (CV) production universally (SIAM 2012). Promote the Indian automobile cluster life cycle has been affected by policy system of the government and has extensive effect on development of industry cultivating innovations and worldwide competitiveness. In all clusters automobile manufacturing businesses are very few yet cluster commands via auto-component firms [8].

Kumaraswamy et al (2012) in his examination has given consideration towards assessing technological capability issues and strategies of domestic firms in Indian automobile industry to make a space in worldwide esteem chain and enhance firm execution. These all examinations have performed in particular timeframe and reflect character of automobile industry in India along the policy changes. He endeavored to dissect the impact of de-direction policy on technology acquisition and competitiveness in the Indian automobile industry and found that variables catching technology paradigm (plan and arrangement which gives structure to production or task) and directions shifts (critical thinking strategies utilized by firm in the process of dissemination and foundation of the manufacturing framework) are risen as essential assurance of between firm contrasts in competitiveness [9].

Okada et al (2007) dissected firm execution inside and outside the three noteworthy Indian automobile clusters and assessed relative significance of capability variables. They have demonstrated that inflow of FDI has changed this industry. In addition, it demonstrates that how auto and auto-component firms performed activities in the given condition and changed over the timeframe. The future pointers of industry condition change will be overwhelmed by half breed cars, refined open transport, fuel proficient vehicles, wellbeing and emanation standards and so forth. This requires strategic reasoning and supporting greatness practices to assemble ability among firms [10].

## 5. METHODOLOGY-

In the examination we have utilized the blended technique (mix of subjective and quantitative research approach) is embraced for the exploration. Methodological points of view

and writing distributed on clusters are shown to developing consideration regarding use mix of „theory and empirical“ investigation to give sound reason for inquire about. In Pune automobile cluster, the auto and auto-component firms (SIAM and ACMA individuals) were chosen for this examination. Add up to 20 auto firms, 180 auto-component firms and 7 particular organizations are accessible inside the Pune automobile cluster.

Population	Sample	Measurement	Analysis	Sample	Measurement	Analyses
Sp. Inst. (6)	5 (80%)	Data transcription	Content Analysis (MS Excel 2010)	CMIE Prowess Data pooled from year 2001 to 2011		
Auto (19)	5 (26%)			12 (64%)	Hypothesis testing	GLS Estimation (STATA)
Auto-component (170)	32 (19%)			27 (16%)		

**5.1 Qualitative research methodology:**

The interviews and survey is directed and gotten 70 % reaction from shortlisted firms/administrators. The dialog guide and survey questionnaire is pretested and changed by proposals of senior chiefs. The aggregate 57 interviews were led amid October 2015 to September 2017.

**5.2 Quantitative research methodology**

Quantitative research methodology was utilized to think about the between firm contrasts in light of technological capability fabricating and to assess the advancement execution of firms inside the cluster. The investigation variables are recognized in light of literature review and bits of knowledge from subjective period of study.

**5.3 Data Collection**

The secondary data was gathered from Center for Monitoring India Economy (CMIE) Prowess database and individual association annual reports. The 13 auto firms and 28 auto-component firms chose for the investigation and 393 dataset gathered. The board data from the year 2005 to 2017 was broke down through Generalized Least Square (GLS) technique and STATA programming utilized. The example chose has discovered acceptable.

**6. ANALYSIS AND INTERPRETATION**

Generalized Least Square (GLS) estimation is utilized. GLS permits little example sizes to complete a satisfactory examination for hypothetical and observational fit. The above all, it considers interaction impacts and board data precisely when contrasted with OLS. Our research has three interaction terms, so we have connected this Feasible GLS estimation. The outcomes are checked for heteroscedasticity, utilizing Cooke-Wiesberg test for heteroscedasticity. This arrangements with the difference of the blunder in the cross section data; we discovered solid match for our model.

Table no- 2- Empirical Results – Dependent variable as Market

Variables	Auto Firms in Pune Cluster		Large Auto-component firms	
	Coefficient	t values	Coefficient	t values
Constant	3.2462	0.7431	4.1248	2.069
SIZE	14.7930	2.2401	5.7031	0.6673
FE	- 0.08813	- 1.0482	-0.01842	- 1.2083
RDI	7.4164	2.8911	2.4451	1.8962
MKI	11.237	1.863	1.1596	1.078
MCI	3.7746	0.6875	10.774	2.281
SKILL	9.60013	3.21	4.0179	2.013
ADI	11.774	0.9978	-3.4410	-0.42
FER	- 0.0971	- 0.42	-0.2273	-0.6312
MKR	33.9301	2.445	9.9410	1.072
Dauto	7.1943	0.8846	--	--
Dauto-comp	--	--		
R- Squared	0.8255		0.8597	
Adjusted R2	0.7632		0.7798	
Observations	126		266	

Share

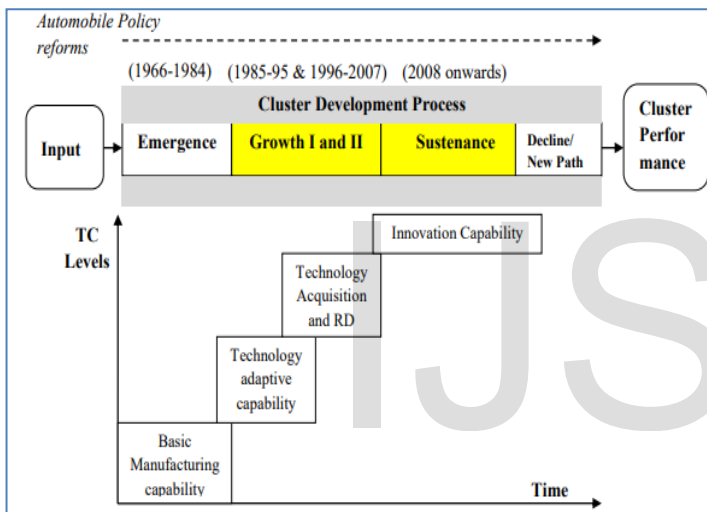
Table no- 1- data collection –methodology

	Qualitative Research Methodology	Quantitative Research Methodology
	Interview Based (57)	Secondary data based (393 )

**Fig no- 3** Technology capability building matrix through absorptive capacity

Proximity to advanced technology path	H	Technological Capability	Assimilation Capability	Firm loose competitive advantage
	M	Transformation Capability	Acquisition Capability	Firm loose Technological Capability
	L	Greater Manufacturing Capability	Basic Manufacturing Capability	X
		H	M	L
Firm Absorptive Capacity				

**Fig no 4-** Technology building blocks in the Indian (Pune) auto-cluster



Thinking about the closeness to propel technology way and absorptive limit of the firm, we propose 3x3 matrix demonstrating the technology capability advancement appeared in figure 1. The firms can examine technology life cycle situating of their center advances to comprehend vicinity to cutting edge technological way and guide with absorptive capability to comprehend exhibit position in the matrix. In this way firms would create different strategies to accomplish competitive favorable position through technological capability building. The technological capability interpreted in this research as in-house R&D or related endeavors, and concentrated aptitudes expected to execute R&D exercises, joint effort networks, linkages and adaption's adequately. The figure 2 investigated the capability levels (TC levels) in rise, development and sustenance period of the cluster improvement.

This current research has endeavored to investigate the appropriate responses of above questions, as appeared in figure (1) and found that different technological capabilities have solid impact on development execution of firms inside Pune automobile cluster. The few research thinks about (Narayanan, 1998) has given consideration towards assessing technological capability issues. Naraynan (1998) endeavored to dissect the impact of de-regulation policy on technology acquisition and competitiveness in the Indian automobile industry. The correlation of technology variables comes about with this momentum research comes about are appeared in Table 3.

In pre-deregulation period, the interaction of free technology imports and R&D, and encapsulated technology imports and R&D were overwhelming to bring technology paradigm shift, while singular firm R&D endeavors were having inconsequential. The in-house R&D endeavors were deficient to bring direction shifts. Likewise foreign trade (FDI) was irrelevant demonstrating more liberal administration would urge firms to import advancements to achieve technology affect. In post-deregulation period, the variables catching technology imports developed critical and now foreign Exchange (FDI) rose as noteworthy towards technology paradigm shift. Shockingly, Skill component has not given hugeness amid these periods.

**Table no-3-** Comparison of results from two studies in continuum period for technology variables

Variables	Narayanan (1998) results		This current research results	
	Model Analysis: OLS Panel data		Model Analysis: GLS Panel Data	
	1991-1996		2005-2017	
	Pre-deregulation	Post-deregulation	Auto firms in Pune cluster	Large auto-comp firms in Pune cluster
LRI	- 76.682	+25.563	-	-
MKI	-15.177	+29.061	+ 11.237	+1.1596
MCI	+10.842	+1.6877	+3.7746	+10.774
FER	-1.0015	+1.129	+ 2.005	-0.2273
MKR	+2562.8	-36945	+33.9301	+9.9410
LRR	+8703.7	-37380	-	-
SKILL	-	-	+9.006	+4.0179
SIZE	-0.3358	-0.3030	+14.7930	+5.7031

## 7. RESULTS

The research discoveries for both auto and auto-component firm show that technological variables are risen critical in the assurance of between firm contrasts in technological capability building, As estimated, the distinction in the pretended by technology variables inside cluster is likewise very much featured by comes about. Further, technology acquisition, the interaction between imported technology and in-house R&D exertion is by all accounts the most vital determinant. In both in-house R&D endeavors and skills are developed as predominant components relative to technological capability. The firm size concocts positive sign and noteworthy in auto portion, which recommend that hierarchical capability to put into R&D endeavors and get specific skills is fundamental. In particular, in auto-component cluster import of plans and components has noteworthy effect on technology capability upgrade. This might be a direct result of worldwide and domestic OEMs help to subcontractors to viable in-time conveyance of quality products and administrations. Domestic firms inside the cluster has impacted by technology acquisition and product separation qualities because of a safe distance buys, dynamic technology exchange from MNEs and hostage sourcing of components.

The discoveries obviously demonstrate that Auto Policy 2002 appears to have assumed urgent part to upgrade competitiveness of automobile firms and auto-component firms.

### 7.1 Contribution to Policy and Practice

In view of our research result, we might want to exhibit commitment towards policy and practice.

The firms can support/enhance/improve following development and brilliance practices to auto-component firms inside Pune automobile cluster:

The capacity of in-house R&D/related endeavors towards products and processes by authorizing advancement biological systems.

The compelling R&D technique can be sustained to adjust R&D goals, budget, programs, resources and guides with business procedure.

Cognizant endeavors towards particular skills portion to R&D endeavors and plan and improvement exercises. Improve endeavors towards worldwide ability reach.

Propelled manufacturing rehearses with an emphasis on creating complex/discrete components and upgrade incremental innovations in the process.

Create hierarchical schedules to sustain advancement culture and reinforce development process with abnormal state joining and control on real functions.

Sustain skills sets like taking ownership, auspicious decision making, set out to attempt (resistance for disappointment) and administration skills among rising and senior pioneers in the association.

The Indian National Innovation Council (NInC) has been attempted measures to fortify and maintain industry clusters by proposed Cluster Innovation Centers (CICs). This nodal collection of government can drive followings:

Improve between firm linkages/synergistic connections, and develop component and frameworks to increment absorptive limit of firms inside cluster.

Builds up a stage for successful strategic technology management, institutional learning, and knowledge management and cross fertilization of thoughts and information.

Build up stable biological systems for product advancement, process change, productivity enhancement, development and institutionalization, and authoritative and social issues

For the most part, the way development yield get estimated, it was obvious from our research that it may not appropriate to Tier II and Tier III firms. Along these lines esteem creation model for such firms ought to rotate around nature of development, perceivability of advancement and effect of development. This drive from CIC will improve the lesson of SMEs and will configuration better plans of action in light of nearby conditions.

## 8. CONCLUSION

This paper has effectively dissected the impact of Indian automobile industry policy administration and demonstrated that adjusting of policies has helped Pune automobile cluster

firms to coordinate in the worldwide esteem chain and improve their execution. The auto-component firms inside the cluster are progressively progressing on manufacturing greatness techniques and practices. This is apparent from expanded fare force has gone-up from US\$ 5.2 billion out of 2015-16 to US \$ 6.9 billion of every 2016-17 with real push on quality and dependability of components. Likewise industry saw that technology improvement cycle and product advancement cycle are contracting speedier and firms are keeping up adaptability and lead times.

The discoveries proposed that the competitiveness in the cluster and policy administration relies upon the capacity of the firm to bring out technological capability level shifts. Technology variables are raised vital in the assurance of between firm contrasts and rely upon technological acquisition and product differentiation qualities. The policy administration affected profoundly and firms picked up advancement capabilities over the timeframe to accomplish competitive advantage

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