CHAPTER I

INTRODUCTION

Production clusters are non-random 1 geographical agglomerations of firms with similar or highly complementary capabilities; specialized suppliers and service providers; related industries and associated institutions that not only compete but also co-operate in the production process 2 . Today industrial clusters have become the new mantra for economic development. This thesis is an attempt to analyse the processes involved in the emergence and functioning of a production cluster with special reference to the automobile clusters in India. In the present chapter, we state the objectives of this study; enumerate the research questions that emanate from these objectives; identify the data sources as well as the methodology to be used to analyse this data; and, review the related literature.

1.1 The Problem Stated

Clusters have become a key focus of discussion and analysis in contemporary debates on urban and regional economic development 3 . The cluster concept has attracted particular interest from academicians, consultants and policy-makers concerned with promoting urban and regional growth in an increasingly global economy 4 . Inducted clusters have become an object of desire for many cities and regions, resting on the widely accepted assumption that increased specialization will lead to increased levels of productivity, growth and employment.

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Virtually no systematic studies exist on the spatial dimension of the automobile clusters and its historical development in India. This study focuses on the automobile clusters in India for several reasons. First, the automobile industry, because of its large backward and forward linkages, greatly influences the pattern of economic development in almost every country and every region that produces automobiles. Second, the automobile sector has grown rapidly since the 1980's to become one of India’s leading manufacturing sectors. Third, different automobile clusters, while operating in the same industry in the same country, exhibit very different patterns of agglomeration and thus allow us to examine and contrast the factors that have led to the differential growth of these clusters.

Empirical studies on agglomeration economies have primarily focused on the nature and sources of agglomeration as well as on the performance of firms, industries, and mechanisms that connect agglomeration to innovation and regional growth. These studies also focus on localised industries and their contribution to continued growth of the host town and identify some key factors viz., increasing returns to scale, labour market, capital, infrastructure, regulation (i.e., the system of incentives and disincentives), geography (i.e., spatial characteristics such as coastal or metropolitan location) and knowledge spillovers. Some scholars have identified other resources such as knowledge, skills, local institutions, industrial and corporate structures and networks as important determinants of growth enhancing effects of agglomerations. Urban and regional studies tend to support localization economies rather than urbanization economies and suggest that there are variations across industries in agglomeration effects. Cluster development is attributed to several factors including technology and

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knowledge transfer, development of skilled work force in related industries agglomeration economies, competition and social infrastructure.

In theory factors that influence location of the automobile industry are market access, infrastructure availability and agglomeration economies. Localization economies have also been developed from knowledge spillovers and intra-industry linkages. State regulations on environmental and pollution standards, incentives in lagging regions or for emerging technologies and the general level of political support are some of the other factor which decide the location of an industry or firm. An expanding automobile industry sets the pace of progress and prosperity for a multitude of other industries by multiplying the general demand for goods and services thereby accelerating the tempo of economic activity. Before an automobile rolls off the assembly line, it utilizes diverse types of goods and services (backward linkages) and when it starts its life on the road, it generates still greater demand for other goods and services (forward linkages).

1.2 Aims and Objectives of the Study

This study has the following aims and objectives:

1. To analyse the structure, growth trends and changes in the exports and imports in the various segments of the automobile industry and auto-components.

2. To compare and contrast the factors which have led to different patterns of development in the automobile clusters in India (Mumbai-Pune region, the National Capital Region and Bangalore-Chennai region).

3. To analyse individual and comparative performance of the firms within the clusters as well as of the firms outside the clusters.
4. To find out the backward and forward linkages developed by the automobile industry.

1.3 Research Questions

1. What are the geographical, historical, political and economic factors that cause structural changes in the automobile industries in India?

2. What is the role of public policy in shaping the development of the automobile clusters in India?

3. What are the observed patterns of industrial cluster formation and development in India in general and in the three major automobile clusters in particular?

4. What are the structural changes experienced by the three major automobile clusters after opening up of the Indian economy?

5. Are firms within the clusters performing better than those that are outside them and are their growth patterns determined by sets of variables which are different?

6. What are the key forward and backward linkages that are developed by the automobile clusters in India?

1.4 The Data Sources and Methodology Used

An overview of the data used in this analysis is given in Figure 1.1. The statistical and analytical tools used to analyse this data have been discussed in detail in the relevant chapters.
Fig. 1.1: Summary of Chapter wise Data Sources Used

Chapter wise Data Sources Used

Chapter Two
Data at the National Level (Society of Indian Automobile Manufacturers, SIAM)
The Automobile Component Manufacturing (Automobile Component Manufacturers Association of India, ACMA)

Chapter Three
Unit level and Digit level data (Annual Survey of Industries, ASI)

Chapter Four
Input-Output Table (Central Statistical Organisation, CSO)

Chapter Five
Unit level and Digit level data (Annual Survey of Industries, ASI)

Miscellaneous
India Trade data of Centre for Monitoring Indian Economy (CMIE)
Director General of Foreign Trade (DGFT), OICA, International Organization of Motor Vehicle Manufacturers.

Internet website:
www.indiastat.com,
www.mospi.gov.in,
www.dhi.nic.in,
www.economywatch.com
www.wardsauto.com,
www.acmainfo.com
www.automobileindia.co
1.5 The Automobile Industry in India

India holds a huge potential in the automobile sector including the automobile component sector owing to its technological advancement, cost effectiveness and workforce advantage. Further, India has a well-developed globally competitive auto ancillary industry and established automobile testing, research and development centers. The country enjoys natural advantage and is among the lowest cost steel producers in the world.\(^{10}\)

1.5.1 The Historical Evolution of Automobile Clusters in India

The automobile industry started in India in the mid 1950s. Earlier India, had imported its cars and motor spare parts. Large family owned conglomerates locally known as business houses took the lead in the import of cars and spare parts. The main importers of spare parts were the TVS group and the Amalgamations group in Chennai, Anand and Nandas (Escorts) in Delhi and Doshi in Mumbai. In 1957, the Indian Tariff Commission decided to discourage imports and encourage the manufacturing of automobiles and spare parts in India as a part of India’s inward-looking import substitution industrialization strategy. Consequently, the main importers entered into manufacturing i.e., Birla group (Hindustan Motors setting up a plant in Calcutta to produce the Ambassador); Doshi (Premier Auto in Bombay); Standard Motors (Standard Herald in Madras), the Tata Engineering and Locomotive Co. Ltd. (TELCO) recently renamed as Tata Motors in Jamshedpur); and, Ashok Leyland in Madras, to assemble Leyland trucks and chassis. Thus, auto clusters had started to emerge in Mumbai and Chennai regions.

Out of these ventures, except TELCO and Ashok Leyland, the rest have ceased to be important players or have gone out of business. This is partly because the government through the implementation of its 1963 Monopolies and Restrictive Trade Practices (MRTP) policy introduced an extensive licensing regime and restricted the activities of large private business houses in order to control monopolies and the growth of private

\(^{10}\) Ibid.
firms. The aim was to promote public-sector enterprises\textsuperscript{11}. The government also restricted the inflow of FDI after the early 1970s in equity share and promoted the localization of the domestic industries. FDI was only limited to the sectors that accorded with the government priority\textsuperscript{12}. These policies have resulted in a stagnation of the automobile industry in terms of both output growth and technological development for more than two decades until the mid-1980s, when the government gradually started lifting these inward-looking and restrictive policies and entered into a joint venture with Suzuki Motors to establish Maruti Udyog Limited.

With the introduction of government’s new economic and industrial policy in 1991 the Indian automobile industry has experienced rapid transformations with many entrants forming joint ventures with foreign car manufacturers that led to change in the structure of the automobile industry. By the mid-1990s, the Indian automobile industry comprised of about two dozen assemblers of different vehicle types as well as of the component manufacturing industry, which in turn consisted of about 350 large and medium-scale firms in the organized sector and approximately 6,000 small firms in the unorganized sector\textsuperscript{13}.

\textbf{1.6 The Automobile Industry Today}

The Automobile sector is one of the core industries of the Indian economy and reflects the economic resilience of the country. With 5 percent contribution to the GDP and nearly 5-6 percent of the total industrial output, the automobile sector has become a significant contributor to the economic development of the country. Along with the domestic automobile companies, multinational investment has led to an increase in overall growth of the automobile industry. Following the economic reforms of 1991, the Indian automobile industry has demonstrated a sustained growth because of increased competitiveness and reduced restrictions.

Continuous economic liberalization over the years by the government of India has resulted in making India as one of the prime business destination for many global automobile players. The automobile industry witnessed a growth of 19.35 percent between 2005 and 2006\(^{14}\). This industry has a mix of large domestic private players Tata, Mahindra, Ashok Leyland, Bajaj, Hero Honda as well as major international players General Motors, Ford, Daimler Chrysler, Toyota, Suzuki, Honda, Hyundai, and Volvo.

### 1.7 Review of Related Literature

In recent years, the role of production clusters and cluster-based policy approaches have become increasingly important in both the analysis of urban and regional economies and in public and private economic development initiatives. The cluster evolution is an interplay of several factors i.e., the size and composition of the actual or potential cluster, the history of the cluster development, the nature of relationships between firms and research infrastructure, the geographical structure of these relationships, the role of finance capital, the role of local associative behaviour and of other forces contributing to the growth of the cluster\(^{15}\).

The literature focusing on cluster development in India and across the world is enormous. For convenience, it has been grouped under the following themes for this survey:

- Conceptual, historical and theoretical approaches for clustering.
- Policy environment and evolution of the Indian automobile industry.
- Agglomeration and specialization of different types of clusters.
- Productivity, efficiency, competitive and comparative advantages of clusters.
- Globalization and supply chain networks of the automobile industry in India.
- Global comparisons of the Indian automobile industry.
- Technology and other related aspects.

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\(^{14}\)Society of Indian Automobile Manufacturers (SIAM), "Data and Report of 2007-2008".

1.7.1 Conceptual, Historical and Theoretical Approaches for clustering

The theoretical literature on industrial location and location theory in general began with Weber\textsuperscript{16} and continued through the writings of Hotelling\textsuperscript{17}, Isard\textsuperscript{18}, Alonso\textsuperscript{19} and others. Later, the thrust of the discussion shifted to firm location within urban systems. Richardson\textsuperscript{20} and Henderson\textsuperscript{21} focused on the effects of the centripetal and centrifugal forces of agglomeration economies and diseconomies. More recently, Paul Krugman\textsuperscript{22} and his associates have argued that the firm locations are primarily based on transport cost. They observed industries are geographically dispersed when transport cost is high and concentrated when costs decline to some point.

Clusters are treated as part of the broader phenomena of the agglomeration of economic activity. A cluster was intended as a way of decomposing national economies. Porter\textsuperscript{23} has posited that clusters are highly generic in character and create multiplier effects. He attributes cluster development and growth to competition\textsuperscript{24}. They are sufficiently indeterminate and according to Krugman\textsuperscript{25} demand a very wide spectrum of demand-supply linkages, factor conditions, institutional set-up and so on. Small accidental events start a cumulative process in which the presence of a large number of firms and workers acts as an incentive for still more firms and workers to congregate at a particular location. Underlying resources may determine the resulting pattern and technology at some aggregate level but at the ground level there is a striking role for history and accident.

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Geographical clustering of economic activities remain an enduring feature of the industrial landscape and a perennial source of theoretical and empirical interest. The concept of industrial clusters has attracted much attention during the past decade both as a description of an increasingly important phenomenon and as a basis for effective public intervention in the economies of lagging city-regions. Krugman has distinguished three ideal-typical models of processes, which may underlie spatial concentrations of related activities. They are the model of pure agglomeration, the industrial complex model and social network model.

Phelps has analysed the changes in the spatial form and potential causes of agglomerations over time. According to Peter and Lorenzen a cluster is a specific spatial configuration of the economy and is suitable for the creation, transfer and usage of knowledge. They investigate how the modern exchange-economy becomes organized as rent-seeking firms build network relations to create knowledge and obtain resource efficiency while keeping transaction costs at bay. Further, they move on to consider the cluster as an emerging, self-organising, attractive alternative for inter-firm relationship in cases where global network formation becomes a less feasible strategy. Benneworth and Henry on the other hand have argued that clusters should not be over endowed as a singular ‘brand’ but recognized as an emergent set of multiple perspectives in dialogue.

1.7.2 Policy Environment and Evolution of the Indian Automobile Industry

Kathuria has studied the policy environment of the automobile industry. According to him, the time-bound indigenization programme for commercial vehicles in the 1980s facilitated the upgradation of vendor skills and modified vehicles to suit local conditions. He posited that vertical integration within a firm may not be cost competitive

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to compete with the firms, which are horizontally integrated. However, vertical integration could score over subcontracting in a liberal regime. The effect of deregulation policy on technology acquisition and competitiveness in the Indian automobile industry during the 1980s has been dependent on the ability to build technological advantages even in an era of capacity licensing according to Narayanan\(^3\). In a liberalised regime, this depends on the firms’ ability to bring about technological changes as inferred from the behaviour of new firms in the sample considered. This is because of the entry of new foreign firms that produce technologically superior and guaranteed quality vehicles and choose to produce most of the components in-house.

While the ties between bureaucrats and the managers of state-owned enterprises have played a positive role in the growth of the automobile industry especially since the late 1980s, ties between politicians and industrialists and between politicians and labour leaders have impeded the growth of the industry. The first phase between the 1940s and the 1950s was characterized by a socialist ideology and vested interests resulting in protection to the domestic automobile industry and entry barriers for foreign firms. There was a good relationship between politicians and industrialists in this phase whereas bureaucrats played little role. Development of ancillaries segment as recommended by the L. K. Jha Committee report in 1960 was a major breakthrough that took place towards the end of this phase. During the second phase i.e., between 1960s and the 1970s, rules, regulations, many political developments and economic problems affected the automobile industry especially the passenger cars segment. Politicians picked winners and losers mainly by licensing production, this situation changed with the oil crisis and other related political and macro-economic constraints.

The third phase starting in the early 1980s was characterized by delicensing, liberalization and opening up of FDI in the automobile industry. These policies facilitated the establishment both of new light commercial vehicles (LCVs) as well as car manufacturing. All these developments led to structural changes in the Indian automobile

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industry. Pingle argued that state intervention and ownership need not imply poor results and performance as demonstrated by Maruti Udyog Limited (MUL). Further, the non-contractual relations between bureaucrats and MUL dictated most of the policies in the 1980s, which were biased towards passenger cars and MUL in particular.

D'Costa has criticized Pingle's "Rethinking the Developmental State: India's Industry in Comparative Perspective". The major shortcomings of Pingle's study according to him are that it ignores the issue related to sector specific technologies and regional differences across the country. The factors which determined the growth of the Indian automobile firms during the three different policy regimes were licensing (between 1980-81 and 1984-85), deregulation (between 1985-86 and 1990-91) and liberalisation (1991-92 onwards). Unlike the prediction of Pingle, Narayanan concludes that vertical integration is detrimental for growth in a liberalised regime because it potentially limits the diversification.

Intense competition had led to price wars and aggressive cost-cutting measures including layoffs and large-scale retrenchment. While Indian companies started focusing on the price-sensitive commercially used vehicles, foreign companies continued utilizing their expertise on technology-intensive vehicles for individual and corporate uses. Piplai therefore concludes that the vehicle industry has not gained much from the reforms other than being thrust upon a high degree of unsustainable competition.

It was expected that the growth potential of the Indian automobile component manufacturing will be around 500 percent, between 2005 and 2015. Vision 2015 for the Indian automobile components industry was prepared by based on interviews and workshops with twenty suppliers, seven original equipment manufacturers (OEMs) and from a survey of ACMA members. This vision paper highlighted to increase in input cost

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32V. Pingle, Rethinking the Developmental State: India's Industry in Comparative Perspective, Oxford University Press, Delhi, 2000, pp. 85-121.
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 automobile components from LCCs. The analysis identifies strong engineering skills and an emerging culture of cost-competitiveness as the major strengths of the Indian auto component sector, while its weaknesses include slow growth in domestic demand and structural disadvantages such as power tariffs and indirect taxes\textsuperscript{36}.

The policy recommendations of this study include VAT implementation, lower indirect taxes, tax benefits linked to export earnings, duty-cut for raw material imports, research and development incentives for a longer period, establishment of auto parks, benefits for export-seeking investments, human resources development and modernisation fund for new investments in automobile clusters. The automobile industry players have been advised to improve their operational performance, determine their strategic posture as one among those identified in the study, improve capabilities in line with their posture and invest very rapidly in a planned manner. ACMA needs to promote India as a brand, enable sourcing from India by global customers and promote the quality and productivity efforts of the automobile component firms in India\textsuperscript{37}.

1.7.3 Agglomeration and Specialization of Different Types of Clusters

Several types of clusters have been studied in recent years. Piore and Sable's\textsuperscript{38} study of Italian industrial districts showed that cluster of small craft-oriented industrial firms were profitable in the global market by producing distinctive, high-quality products in a diverse area for example furniture to textiles and apparel. These industrial cluster or industrial districts achieved their success through flexible specialization and their ability to respond to the demand for quality products. Tewari\textsuperscript{39} examined the case of adjustment in a labour-intensive export industry i.e., woolen knitwear industry to understand how traditional sectors in developing regions cope with external crisis. After an unusually


\textsuperscript{37}Ibid.


short downturn, the cluster not only recovered rapidly but also is increasingly diversified into more demanding and competitive external markets. Tewari’s\textsuperscript{40} study of Ludhiana’s manufacturing industry is an example of localized knitwear and garment industry, which includes knitting firms, cloth-finishing, dyeing and printing units, garment producers, merchant buyers and exporters, producers of specialized inputs such as threads, buttons, up to textile machine suppliers within a small geographical area.

The mobilization of physical and human capital and expected output of resources breaks down the investment in small risk taking steps. It means the enterprise of one creates a foothold for the other. In brief, “It is a process in which enterprises create linkages for each other often unwillingly and some time intentionally. Nadvi\textsuperscript{41} found that in the Mexican and Pakistani clusters, large and medium sized firms improved their performance more than small ones. However, in the Indian scenario the distinction is not so much. Richard\textsuperscript{42} emphasized that relatively little attention has been given to the role of entrepreneurial dynamics in the origin and growth of technology clusters. The emphasis is on the locally embedded nature of the process, the characteristics of the incubator organization, the immediate employer or the entrepreneur and their role as the source of entrepreneurial know how and the technological ideas upon which the new business is based. He concludes that the entrepreneurial dynamics underlying cluster development are best understood through analysis of the role of magnet organizations and the development of a ‘talent pool’ in supporting the localization of economic activity in particular spaces over time.


Philip\textsuperscript{43} analysed the manner in which research and development led to clustering in life sciences. A cluster concentrates key resources such as basic research funding, research infrastructure and innovative businesses.

1.7.4 Productivity, Efficiency, Comparative and Competitive Advantages of Clusters

Porter\textsuperscript{44} posits that an industry cluster is the outcome of several factors such as demand conditions, related and supporting industries, factor conditions, firm strategy, structure and rivalry. Porter's work shows how a company's location affects its strategy and performance. The cluster is the manifestation of the demand at work. Factors which innovate and upgrade the cluster depend on the proximity arising from the co-location of companies, customers, suppliers, and other institutions. David and Gertler\textsuperscript{45} have surveyed some of the current methodologies employed to analyse cluster development as well as some of the key themes emerging from both the analytical and prescriptive literature. The central question in their study was about the role of local institutions and actors in fostering the cluster. How important is interaction with non-local actors in this process? How dependent are local firms on unique local knowledge assets? What is the relative importance of local versus non-local knowledge flows between economic actors? How did each local industrial concentration evolve over time to reach its present state and what key events and decisions shaped its path? Finally, to what extent do these processes, relationships and local capabilities constitute a true cluster? At the end, what are the key relationships, linkages and processes that ground the cluster in its existing location?

Sharma\textsuperscript{46} devised the method of Divisia-Tornquist Index to analyse the performance of the Indian automobile industry with respect to productivity growth and partial and total factor productivity between 1990-91 and 2003-04. It has been observed that the domestic auto industry has registered a negative and insignificant productivity growth.

growth. Among the partial factor productivity indices only labour productivity has seen a significant improvement while the productivity of other three inputs i.e., capital, energy and materials have not shown any significant improvement. Labour productivity has increased mainly due to the increase in the capital intensity, which has grown at a rate of 0.14 percent per annum between 1990-91 and 2003-04.

1.7.5 Globalization and Supply Chain Networks of the Automobile Industry in India

The small and medium-sized enterprises (SMEs) play a key role in generating employment promoting innovation, engendering competition, and creating economic wealth. The long tradition of promoting small-scale enterprises in India is being re-examined in the light of its success in creating a sector with the potential of performing all the above roles. A study by Mitra and Venugopal of the pre-1990s period concludes that small firms experienced a decline relative to large-scale industries in terms of five important parameters i.e., number of factories, fixed capital, number of employees, supply of outputs and value added. In the post-liberalization era, these parameters have assumed greater importance. The government can assist in generating additional employment by indigenizing technology, leveraging cheap labour and flexibility of operations to create competitive advantage for Indian industry.\(^\text{47}\)

The impact of globalization on supply chain networks in the auto industry in Brazil and India have been tested and verified by Humphrey. According to him global automobile industry hubs were situated in three regions, namely, North America, Western Europe and Japan. Brazil and India are examples of countries which could develop the indigenous automobile industry despite not being situated very close to any of these regions. Humphrey\(^\text{48}\) compared the automobile industries in these two countries and concluded that automobile industry is a producer-driven commodity chain, wherein global auto assemblers control the entire supply chain from components to dealerships.


Sutton\textsuperscript{49} has shown that the supply chain has developed very rapidly at the level of carmakers and Tier-1 suppliers, with quality levels close to world standards largely driven by the entry of multinational carmakers. Nevertheless, the Tier-2 suppliers are still not up to the global standards. The domestic content requirements based on the infant industry argument, have helped the international carmakers in enhancing the production capabilities of the domestic players effectively as shown by increase in auto-component exports from India and China. Out of the top ten exporting firms in India and China, five and six respectively are domestic ones. Enhanced supply-chain capabilities have benefitted the domestic automakers such as Mahindra and Mahindra in India, who have been able to capture a sizeable market share with their indigenously designed and assembled multi utility vehicles (MUV). Despite the low wages, leading component producers in China and India strategically use highly capital intensive techniques such as robotics, mainly on account of their concerns to achieve high levels of quality. This, in combination with employing high-quality workforce even at the shop floor, is another strategic choice of a few leading firms in India to promote exports. Many Tier-1 firms follow the standard Japanese work practices to improve quality and to minimise cost. Interactions between carmakers and component suppliers have also helped the latter to improve quality.

Entry of global automobile majors in India and Brazil has impeded domestic firms, because of ‘follow source’ according to Tewari\textsuperscript{50}. Shifting strategic focus is evidence of the fact that medium-sized firms, which entered in the mid-1990s in Tamil Nadu have formed networks with smaller domestic suppliers and helped them upgrade their technologies. These medium-sized suppliers require more support from the government since they play a crucial role in facilitating the development of the domestic automobile industry. Joint ventures and technical tie-ups with overseas suppliers have been the strategies that were followed by well-performing auto component manufacturers, long before the global automobile majors entered in India. These

relationships and the entry of foreign Original Equipment Manufacturers (OEMs) not only promote employment and income, but also promote diffusion of technologies and knowledge in the entire supply chain including smaller firms. Piplai\textsuperscript{51} critically examines the effects of liberalization especially on the Indian automobile industry particularly in the spheres of production, marketing, export, technology tie-up, product upgradation and profitability together with the structural changes in the corporate focus to meet the fierce competition in the market and to cater to the needs and aspirations of consumers.

Veloso and Kumar\textsuperscript{52} have identified five companies for detailed case studies, have compared, and analysed their experiences in the manufacturing strategy process. Although the companies represented diversity in terms of sales volume, product range and geographical location, they shared several commonalties including use of advanced manufacturing technologies and other improvement activities. The automobile supply chain global trends and Asian perspective represents an overview of the major trends taking place in the global automobile industry. Consumer preferences, government regulations and intense competition have been driving the firms towards adopting new technologies, modernisation, research and production changes in design. Market saturation in Triad regions (the United States, Western Europe and Japan) and rapid emergence of markets in Asia have led to increased diversity in market needs. As a result, there are many models and segments coming up rapidly\textsuperscript{53}.

The automobile industries of emerging markets were transformed in the 1990s by trade liberalization and large investments by global assemblers. The impact of these investments was decisively influenced by government policies aimed at promoting local production, assembly of vehicles and by changing assembler supplier relationships in the global automobile industry according to Humphrey\textsuperscript{54}. The automobile industry of Brazil and India show how the assemblers created new linkages between operations in emerging

markets and their global operations through the adoption of follow design and follow sourcing policies. Innovation is the key driver of competitiveness and productivity. According to James,\textsuperscript{55} innovation is an internationally distributed system of activities and therefore geographically localized and clustered firms are likely to form only a limited set of total actors engaged in such a system.

While the global auto assembly majors produced 60-70 percent of the value in house until the 1980s, various phenomenal developments have started taking place since the 1980s such as the emergence of independent dealers and rise of catalogue suppliers who supply their standard and indigenously designed components/modules to many assemblers. Brazil and India have liberalised the auto investments and tariff structure since the 1990s. Until 1991, India had a much more protectionist regime than Brazil in terms of licensing and quantitative restrictions on both imports and domestic production. Inflow of automobile FDI occurred in both the countries in the mid-1990s. Further, Brazil and India have emerged as preferred suppliers for global auto assemblers. When the global auto assemblers entered India and Brazil, the phenomenon of ‘follow-source’ was also happening. Now there are parallel global networks of both assemblers and Tier-1 suppliers. Even Indian component suppliers have opportunities to enter the global auto supply chains, mainly in low technology products made to detailed structure but the space for domestic industry is diminishing. With the global centralization of product engineering, skill requirements are likely to increase in process engineering particularly in assemblers and Tier-1 component manufacturers.

1.7.6 Global Comparisons of the Indian Automobile Industry

The competitiveness of the Indian automobile industry has been analysed by Investment Information and Credit Rating Agency of India (ICRA) in a detailed account of the evolution of the global auto industry. United States has been the first major player from 1900 to 1960, after which Japan took its place as the cost-efficient leader. Cost efficiency is the only real means to mature an industry like automobiles. To retain or improve their market share, global auto manufacturers have been sourcing from the

\textsuperscript{55}Simmie James, “Innovation and Clustering in the Globalised International Economy”, \textit{Urban Studies}, Vol. 41, No. 5&6, May 2004, pp. 1095-1112.
developing countries. India and China have emerged as favourite destinations for the first-tier OEMs since the late 1980s. There are only a few dominant Indian OEMs, while the number of OEMs is very large in China (122 car manufacturers and 120 motorcycle manufacturers)\textsuperscript{56}.

Based on comparisons of cost composition to pinpoint the areas in which the Indian automobile industry is at a disadvantage, another study recommends a VAT regime, speedy procedures, import duty cuts on raw materials, labour reforms, common testing, upgradation of design, engineering capabilities and brand building\textsuperscript{57}.

The implications of the India-ASEAN Free Trade Agreements on the Indian Automobile industry are major determinant for the growth of the industry. According to this study, ASEAN economies are globally more integrated than India. The current automobile market in India and ASEAN nations is more or less the same but the Indian market has a larger growth potential than the ASEAN market due to its low level of penetration. The labour cost is low in India but the stringent labour regulations erode this advantage. The level of infrastructure is better in India than Indonesia and the Philippines but worse than that of other ASEAN countries. The financial and banking sector is much better in India if we compare with the ASEAN countries. The study reveals that there is an excess capacity in ASEAN countries in comparison to India, which will help them to tackle the excess demand that may arise in future. The study also finds a 20-30 percent cost disadvantage for Indian companies because of taxation and infrastructure and 5-20 percent labour cost advantage over ASEAN-member-based companies. Similar findings were also noted in a study by the Automobile Component Manufacturers Association of India (ACMA, 2004), particularly in comparison with Thailand\textsuperscript{58}.

The impact of Preferential Trade Agreement (PTA) with Mercado Comun Del Sur (MERCOSUR) on the automobile sector in India and resultant expected outcomes are


\textsuperscript{57}ICRA, "The Thailand and ASEAN India Free Trade Agreement: Implications for the Indian Auto Industry", Automotive Component Manufacturers Association of India and Investment Information and Credit Rating Agency of India, 2004a.

\textsuperscript{58}\textit{Ibid.}
dealt in the ICRA document. This study finds a significant threat of imports in subcompact, compact cars and certain auto-components. There is an excess capacity and intense competition within MERCOSUR countries propelling them to look for export opportunities. This is true especially for Brazil, which has a well-developed auto-component sector with huge economies of scale. Further, weak currency in all MERCOSUR countries provides a natural tariff barrier. In addition, MERCOSUR countries have an arrangement within themselves to have a fair and balanced trade. The Indian auto industry could gain from this PTA with MERCOSUR if it is assured of the balanced trade as MERCOSUR countries practice among them\textsuperscript{59}.

The possible impact of free trade agreement (FTA) with South Africa may affect the Indian automobile industry. The study finds that unlike India there are few policies in South Africa that indirectly provide subsidies to the automobile industry in terms of financial incentives. Hence, it is suggested that India could minimise losses only if it goes for inclusion of certain auto components, which involve huge logistic costs of imports, creating a natural protection e.g., stampings, glass, seats, plastics and tyres and those in which India enjoys economies of scale and is cost-competitive e.g., castings and forgings. If South Africa is ready to discontinue the schemes such as Motor Industry Development Programme (MIDP), India could include all automobile components in this FTA. There should be a minimum local content of 60 percent and the agreement should not be trade balancing as India will not gain much from this\textsuperscript{60}.

1.7.7 Technology and Other Related Aspects

In an overview of the global auto industry, Kathuria\textsuperscript{61} traces the technological development in the Indian auto industry between 1950 and 1991. To evaluate the competitiveness of Indian commercial vehicle manufacturers in the domestic market, he analysed the growth trends, structural trends, market shares, profitability, productivity


\textsuperscript{60}ICRA, “Implications of an FTA with South Africa for the Indian Auto Industry”, Automotive Component Manufacturers Association of India and Investment Information and Credit Rating Agency of India, 2005.

\textsuperscript{61}S. Kathuria, Competing through Technology and Manufacturing: A Study of the Indian Commercial Vehicles Industry, Oxford University Press, Delhi, 1996.
ratios, prices, quality, dealer network and performance. Macro and micro performance of India’s vehicle exports vehicle characteristics together with an analysis of global demand patterns was also outlined. Domestic resource costs and global comparison of prices, credit and service are the other international trade-related aspects that have been analysed in this study. On vertical integration, the analysis leads to the conclusion that the Indian commercial vehicles (CVs) industry needs to learn from the international experience to get into subcontracting and buying-in. Lack of scales and high inventories had impeded the competitiveness of Indian commercial vehicle firms in the 1980s. Research and Development capabilities and new product ranges were the result of the challenges arising from time-bound indigenization programme but the Indian technology frontier remained far below global levels. Further, different firms have followed different strategies. Hence, the impact on their technological capabilities was very different. However, success of Indian firms, despite a wide range of strategies, is partly due to the protection available to them in the domestic market. Kathuria concludes that the Indian auto industry in general and commercial vehicle industry in particular have a lot to learn from the global auto industry in terms of best-practice technology and vertical integration and supplier relationship. Kathuria has rightly predicted that the industry would see heightened activity and recommended that the government should ensure that the domestic firms do not lose out because of the unrestricted entry of highly competitive foreign firms.

Based on an econometric analysis which considers technology acquisition, skill intensity, component imports, firm size, product differentiation, age and vertical integration as the determinants of competitiveness, Narayanan\textsuperscript{62} finds that competitiveness has depended on the ability to build technological advantages even in an era of capacity licensing. This is facilitated by complementing imported technology with in-house Research and Development efforts.

Narayanan\textsuperscript{63} has used a two-way fixed effects estimation of the firm growth as a function of variables capturing technology such as Research and Development expenditure as a proportion of sales, foreign equity participation and import of capital goods for assessing technological advancement and growth of firms. Role of technology depends on the technological regime in which the firm operates. In a licensed regime, firms with foreign equity grow faster because of better access to resources and technology. In a deregulated regime, import of capital goods has been the technology-related variable that triggered growth. In a liberal regime, growth is positively influenced by the intra-firm technology transfer.

An analysis reveals that technology acquisition, firm size, vertical integration, capital intensity, imports of components and policy regime are found to be the main determinants of export competitiveness. The determinants of export intensity of Indian automobile firms using a Tobit model, taking the variables discussed in Narayanan in his two time period analysis (1998) and (2004) as the determinants for export competitiveness. Narayanan\textsuperscript{64} relied 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.

1.8 Chapter Scheme

The present study has been divided into six chapters:

In Chapter 1, a general introduction to the theme of the study has been given under which the conceptual framework and statement of the research problem have been stated. The aims and objectives, research questions, the data sources and methodology to analyse the data sources are outlined and related literature is reviewed. The scheme of chapterisation is also presented.


Chapter II, deals with the analysis and overview of the structure, growth trends, change in the exports and imports in the automobile industry and auto-components (two wheelers, three wheelers, four wheelers, light commercial vehicle and heavy vehicles).

Chapter III, compares the factors that have led to different patterns of the automobile cluster development in India i.e., in the National Capital Region (NCR), Mumbai-Pune region and in the Bangalore-Chennai region.

Chapter IV presents an intra cluster and inter cluster the analysis of performance indicators. Performance of firms, which are outside the clusters is also analysed.

Chapter V exclusively deals with the key forward and backward linkages that have been developed by the automobile industry with the other segments of the Indian economy.

In Chapter VI the summary of conclusions of the study have been presented.