THE INDIAN AUTOMOBILE INDUSTRY

A Primer Describing its Evolution and Current State

by

V. Sumantran Ph.D.
Ann Arbor, Michigan, U.S.A.

K. Ramchand
Operations Research Group
Baroda, India

David J. Andrea
Office for the Study of Automotive Transportation
University of Michigan Transportation Research Institute
Ann Arbor, Michigan, U.S.A.

August 1993

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTRI-93-38		

4. Title and Subtitle	5. Report Date
The Indian Automobile Industry A primer describing its evolution and current state.	August, 1993
	6. Performing Organization Code UMTRI-93-38
7. Author(s) Sumantran, V*.; Ramchaud, K.**; Andrea, D.	8. Performing Organization Report No.
9. Performing Organizations Name and Address University of Michigan Transportation Research Institute Office for the Study of Automotive Transportation 2901 Baxter Road Ann Arbor, MI 48109-2150	10. Work Unit No. (TRAIS) 11. Contract or Grant No.
12. Sponsoring Agency Name and Address N/A	13. Type of Report and Period Covered 14. Sponsoring Agency Code

15. Supplementary Notes

* V. Sumantran Ph.D., Ann Arbor, MI

** K. Ramchand, Operations Research Group, Baroda, India

16. Abstract

This report is intended to serve as a primer, describing the evolution of the Indian automobile industry and its current status. The potential for the Indian auto industry can be better assessed after examining the local economic, legislative and business environment.

The Indian auto industry, today, comprises both independent manufacturers and joint ventures (most involving foreign partners). Both classes offer examples of success and failures pointing to the need to carefully implement strategies.

This report present the opportunities and constraints awaiting manufactures wanting to do business in India.

17. Key Works	18. Distribution Statement
India, international automotive industry	Available through OSAT

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
		57	$50.00

Table Of Contents

SUMMARY

This report is intended to serve as a primer, describing the evolution of the Indian automobile industry and its current status. The globalization of the auto industry increasingly fosters the formation of new alliances and the entry of new manufacturers. In the context of developing countries, India offers a potentially large market and a growing manufacturing base. The potential for the Indian auto industry can be better assessed after examining the local economic, legislative, and business environment. This report offers some elaboration on these conditions.

Purely from a transportation aspect, the significant and increasingly urban population in India has created a large demand for the Indian auto industry. This demand is growing rapidly for both public and private transportation. In 1989, India's output of motorcycles, scooters, and two-wheelers ranked first in the world, exceeding the output of Japan.

At the same time, there are many constraints to such continued growth. First, the explosive growth of the urban motor vehicle population has outstripped infrastructure investment and expenditure. Limited availability of funding will require examination of more efficient transportation modes. The persistent shortage of hard-currency reserves, a situation common in most developing countries, will require continued constraints on imports. In particular, the large bill for oil importation has predicated the steps to control growth of domestic sales.

However, the potential benefits from the auto industry have been recognized by the government planners. Among other factors, the industry has demonstrated the feasibility of export sales. Generation of employment for the readily available technical and nontechnical workforce has been achieved not only through the core industry, but also through the growing ancillary and supplier industries. New changes to the industrial policy reflect this understanding and are coordinated with the government's liberalization of economic policy. In particular, the rules relating to foreign investment in Indian industries have been modified to encourage growth.

The Indian auto industry, today, is comprised of independent manufacturers and joint ventures (most involving foreign partners). That both classes offer examples of success and failure points to the need to carefully implement strategies. Nevertheless, there is an overall expectation of strong auto industry growth. There has been increasing interest from foreign manufacturers in the Indian auto industry, in spite of minor and random setbacks to expansion. We hope that this report will contribute to the increased Indian participation in the global auto industry.

INTRODUCTION

This report describes the evolution of the industry and discusses the main factors that have shaped its development. In the process, a detailed account of the current status of the industry, as well as its main players, is provided. A second report, which is planned, will analyze critical factors that have hindered further success, and will identify some components of potential strategies for the future.

We have undertaken this study for several reasons. Most importantly, the images of Third World poverty have masked the state of industrial development and potential in India. To be fair, the two images must exist side by side—the one showing a nation with the third largest pool of technically-trained people in the world and its own satellite launching capability, the other showing a nation that is home to the largest population of the world's poor. We are told we live in an "information age" where globalization is accepted as a pattern of evolution. The failure to project both images would be a glaring omission.

In the context of the auto industry, globalization has never proceeded at a faster pace—not only in terms of sourcing of complete products and components, but also in terms of markets. As a result, the cast of players in the world auto industry is ever increasing. The origins of autos and components are increasingly transnational. A sports car, designed in Japan with a Japanese engine, may be made in Australia and sold in the U.S. under a Big Three label.

Global thinking has had a fundamental effect on the auto industry—the migration of manufacturing to developing countries. Global strategies are forced to take into account the availability of cheaper labor with the requisite skills and training. To be competitive worldwide, such strategies must be optimally deployed. For example, Fiat has, for the first time, designed a vehicle, the Cinquecento, that will not be produced in Italy, but rather in Poland.

Another aspect to globalization has to do with national economic and trade policies. The Japanese transplants in the United States thwarted some of the criticism that would have been directed at Japan for having a lopsided trade balance. As a consequence, they contributed to the growth of Japanese market share in the United States. Europe's enforcement of local content will cause many more Japanese manufacturers to locate there, as part of their global strategy. In many of these cases, presence in the second country may be through a subsidiary (such as Honda America) or with a local partner (e.g., NUMMI, involving GM and Toyota, in the United States and the Volvo-Mitsubishi partnership in Europe).

Formulating global strategies and identifying global opportunities requires more detailed information on different national economies and industries. In each case, the pattern of evolution can be traced to a unique set of conditions. This is particularly true for the economies of developing countries, where constraints to growth are more numerous. This concept, in the context of the Indian auto industry, will be addressed directly in this report.

It is our hope that greater awareness of the Indian auto industry will further its participation in the global industry. We would like to acknowledge the support of the Operations Research Group and the University of Michigan's Office for the Study of Automotive Transportation (OSAT). We are also grateful to Michael S. Flynn, Associate Director, OSAT, and Wendy Barhydt, OSAT, for the time they spent reviewing and editing this document.

V. Sumantran
K. Ramchand
D. J. Andrea

POPULATION ASPECTS

Population and Transportation Needs

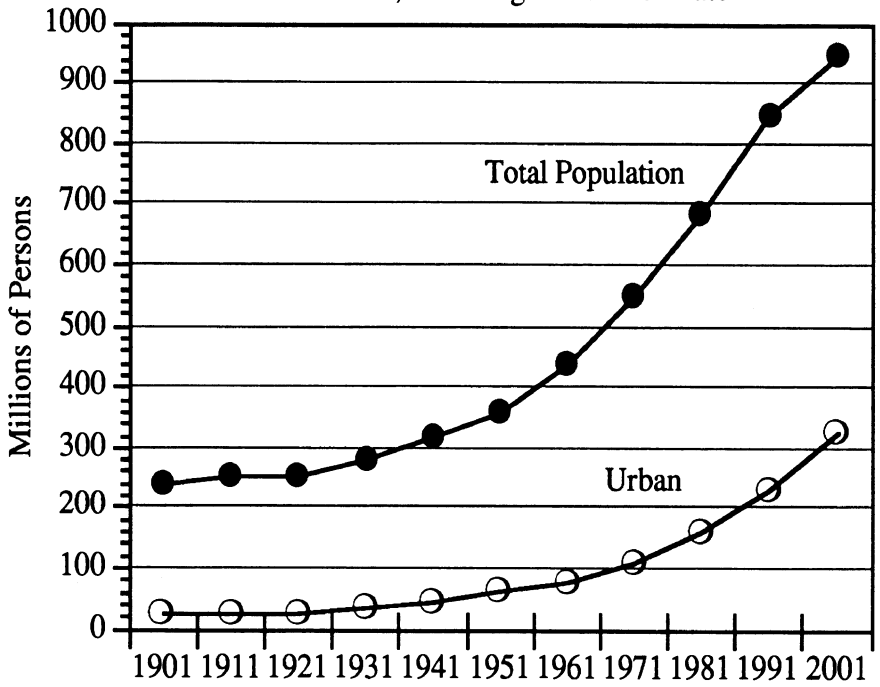
The growth of India's population is a well documented problem. The population in 1991 was estimated to be about 844 million [1]; by the turn of the century, India's population could exceed one billion. This compares with China's population of 1.11 billion (1989), although the density of population in India (267 per square km) is over twice that of China (116 per square km). Serving the transportation needs of this large population in India is an immense challenge. Annual per capita travel in India is estimated to be about 900 km compared to 500 km in China [2] and, while India's level of population mobility may be low compared to western societies, it is among the highest for developing countries.

A secondary aspect of the population problem is its increasing concentration in urban areas. In 1901, just over 10 percent of India's population was concentrated in the urban areas; by 1981, the urban areas accounted for about 23 percent. Estimates for 1991 indicate that over 26 percent of the population was urban (a figure that is similar to China's urban population fraction of 27 percent in 1988). By 2001, that figure in India [3] is likely to be over 34 percent (figure 1). The number of cities of more than one million population increased from nine in 1971 to twelve by 1981, and twenty three in 1991. During this period, the percentage of urban population resident in these cities increased from 56 percent in 1971 to 65 percent in 1991. This increasing population concentration has made the problem of urban transportation more acute. The Central Institute of Road Transport estimates that travel demand will increase from 35 million daily trips in 1986 to 60 million by the year 2000 in the four metropolitan cities of Bombay, Calcutta, Delhi, and Madras alone [4].

Population and Demographics

By world standards, a large fraction of India's population belongs to the world's "absolute" poor. Data from the Indian Planning Commission classify 37 percent of the population below the poverty line. However, that figure represents a vast improvement from the 48 percent figure of 1977-1978. Per capita GNP grew four-fold between 1971 and 1988, and the growth sustained by the economy through the 1980s has given rise to an increasing middle-class population and a corresponding increasing demand for consumer goods. However, in 1991, approximately 60 percent of total household income was generated by low income families—those earning less than 12,500 rupees (table 1). Between 1970-1971 and 1988-1989, expenditure for transport and communications of personal final consumption rose from 3 percent to 8 percent [5].

Figure 1
Population Trends in India
Significant Increase in Urban Population Fraction
1901-1991, Including a 2001 Estimate



Source: Observers Statistical Handbook, 1991

Another important aspect of demographic change is the increasing pool of highly qualified manpower. Current estimates include about 2 million engineers and scientists, 10 million degreed graduates, and over 50 million educated through higher secondary level. The government has continually made strides in education, and the available workforce is capable of supporting the growing economy.

Table 1
Household Income Distribution by Class
(in millions of rupees)

Annual Income*	Urban	Rural	Total
Below Rs. 12,500	14.9	68.9	83.8
Rs. 12,500-25,000	13.9	24.4	38.4
Rs. 25,000-40,000	7.2	7.2	14.4
Rs. 40,000-56,000	2.6	1.2	3.8
Above Rs. 56,000	1.5	0.5	2.1

*February 1993 : Rs. 31.2 = $1
Source: Economist Intelligence Unit, 1991

THE INDIAN ECONOMY

Introduction

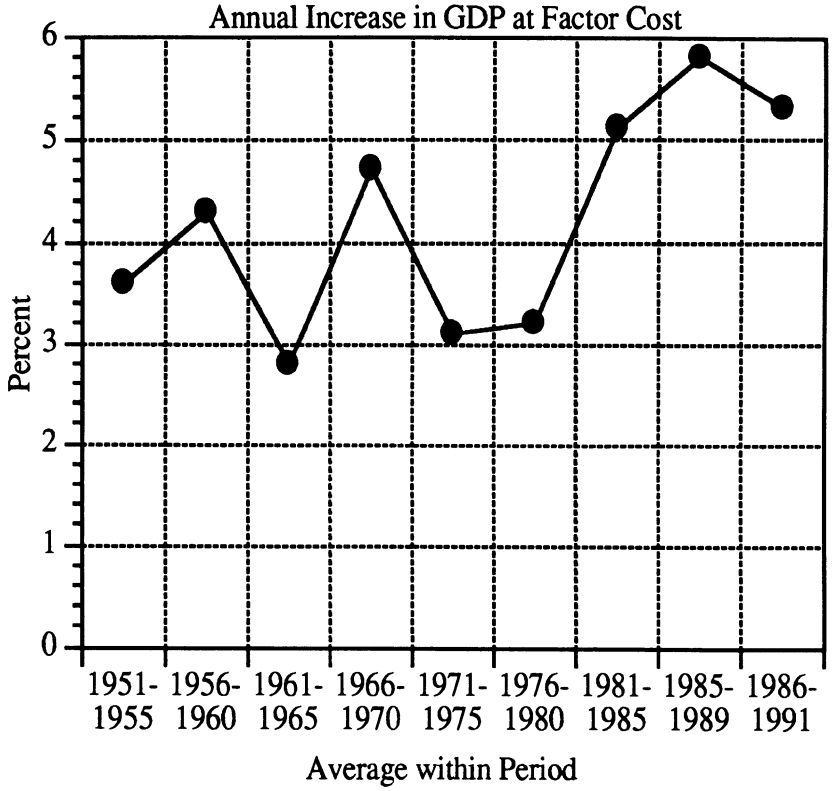
Economic planning is an integral component of the functioning of the Indian economy. Reflecting its goals of social democracy, much of the effort at planning by the central government is aimed at allocating public sector investments, managing the trade balance, and selectively nurturing sectors of private enterprise. Although the economy has sustained an average growth rate of over 5 percent annually over the period 1986-1990, most economists would agree that this pace has been overshadowed by the growth rate of many of India's Asian neighbors, including China (figure 2). Nevertheless, it would be a gross simplification to attribute this lackluster performance purely to the philosophy of a managed economy.

The goals identified for the nation by Prime Minister Nehru, in 1947, remain essentially unaltered today. Current industrial policy continues to focus on:

- agricultural and industrial development,
- expansion of opportunities for gainful employment,
- progressive reduction of social and economic disparities in the population, and
- removal of poverty.

These central objectives have been retained, in principle, by every succeeding government since Nehru.

Figure 2
Growth of the Economy



Source: Central Statisical Organization

Finance

The key instrument of this central planning is the Five-Year Plan. Through these plans, broad guidelines for the direction of the economy and outlays for public sector investment are established. The initial focus of the first plan (1951-1955) was the agricultural sector. Through the years, considerable, if not complete, success was attained in the production of food grains. India, today, is a net exporter of food grains. Subsequent plans have focused on heavy industry and transportation. The seventh plan (1985-1990) had targeted an overall growth rate of 5 percent annually, based on estimates of 4 percent in the agricultural sector and 8 percent in the industrial sector. These targets were exceeded and, for the industrial sector, the growth rates for the last three years of the plan were 7.3 percent, 8.7 percent, and 8.3 percent, respectively (see table 2). The Eighth Plan (1991-1995) postulated a growth rate of 5.5 percent, but faced an inauspicious start, due to the Gulf War [6] and the worldwide recession that followed (figure 3).

The Constitution of India specifies separately the Union List (applying to the central government) and the State List (for the levy of taxes and duties). Accordingly, the government of

India imposes excise and customs duties on automobiles and equipment through the former list while the state governments are entitled to levy a motor-vehicle tax in addition to commodity taxes (including local sales taxes). The latter can vary considerably from state to state.

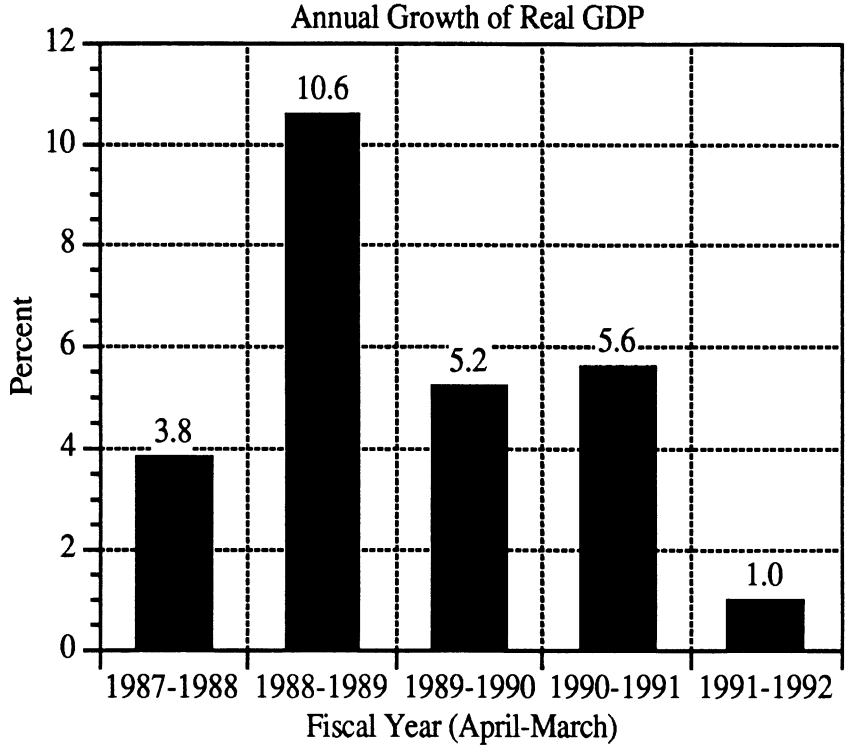
Table 2
Sector Growth Patterns in Seventh and Eighth Plans
(in percent)

Sector	7th Plan (1986-1990) Target	Actual	8th Plan (1991-1995) Target
Power Generation	7.9%	9.4%	9.0%
Manufacturing	5.5	7.5	8.0
Mining	11.7	7.4	7.8
Transport and Communication	7.1	7.7	6.0
Construction	4.8	3.5	4.5
Agriculture	2.5	3.3	3.1
Other services	6.1	6.7	5.7

Source: The Hindu Survey of the Indian Industry, 1990.

Recent developments in the Indian political scene have resulted in a major shift in the direction for the country. The present government has considerably accelerated the reforms that were initially launched by its predecessor inorder to free much of the economy and reduce the role of central planning. Fundamentally, greater reliance will be placed on the market and the private sector. This would be achieved by reducing direct taxes and tariffs, liberalization of rules governing domestic and foreign investment, and moving the rupee towards full convertibility.

Figure 3



Source: Economist Intelligence Unit, February 1992

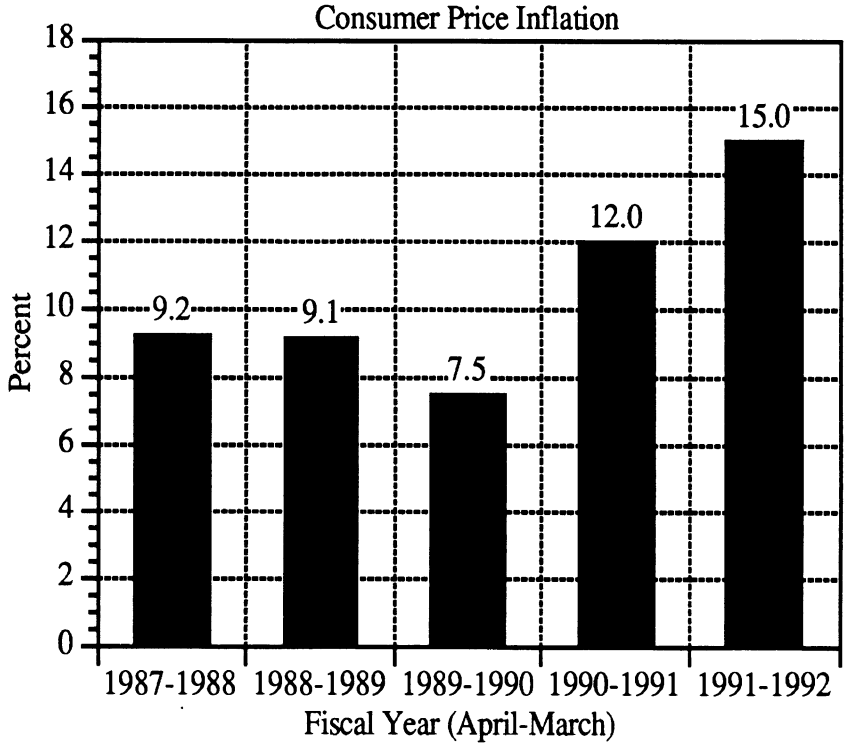
Appropriate changes to the outlays for the public sector were made to reflect the new mood of a liberalized economy. The focus of government participation was to be the infrastructure (power generation, transportation, communications, and agriculture) and the social sector (education and health care). The size of the plan was estimated at Rs. 7.2 trillion with the public sector outlays accounting for Rs. 4.0 trillion.

While the early eighties saw a period of stable prices with inflation hovering between 6.0 percent and 8.5 percent, the country has more recently experienced some years of double digit inflation. The wholesale price index (1981-1982 = 100) rose from 107.2 in 1982-1983, to 132.7 in 1986-1987, and to 185.8 by December 1990. The consumer price index (1981-1982 = 100) rose from 137 in 1986-1987, to 193 for 1990-1991 [8] (figure 4). The higher inflation figures have been fueled primarily by the cost of energy and the devaluation of the rupee.

Data from the Economic Survey of India (1992) indicate that the plan's estimates of growth and inflation were not met for 1991-1992. Based on the wholesale index, inflation was placed at 11.8 percent and real economic growth was not expected to exceed 2.5 percent [7]. One positive aspect among the indicators is that the current account deficit is expected to fall to less than 2

percent of GDP. Furthermore, by July 1992 the annual inflation rate had dropped back to about 9.3 percent. This seemed to justify the target of an annual inflation rate of 8 percent by the end of the fiscal year.

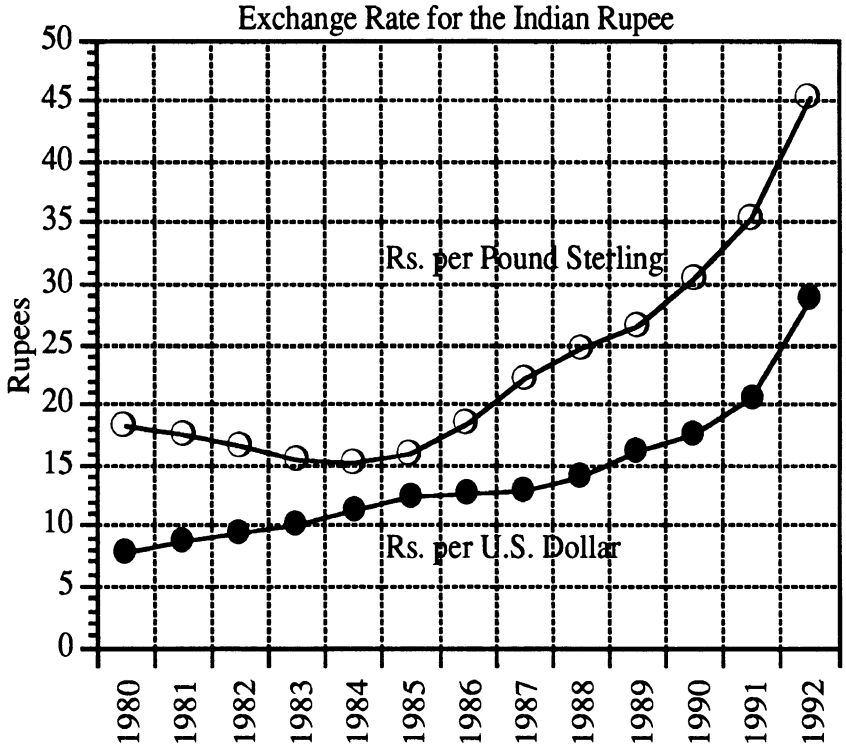
Figure 4
Consumer Price Inflation



Source: Economist Intelligence Unit, February 1992

For all practical purposes, the rupee has traditionally been a nonconvertible currency. However, a significant component of the new policies of the current government is the changing of its status to a convertible currency. The rupee had already seen a recent devaluation late in 1991 that coincided with a loan from the International Monetary Fund. The further adjustment to its convertible status has caused the exchange rate against the U.S. dollar (which has itself been losing ground recently) to change from Rs. 20.50 (per U.S. dollar) in May 1991 to Rs. 31.2 by February 1993 (figure 5). This change is expected to bring more of the large volume of transactions with the Indian community resident overseas through legal channels and reconcile the official exchange rate with the market rate.

Figure 5



Source: International Monetary Fund International Financial Statistics

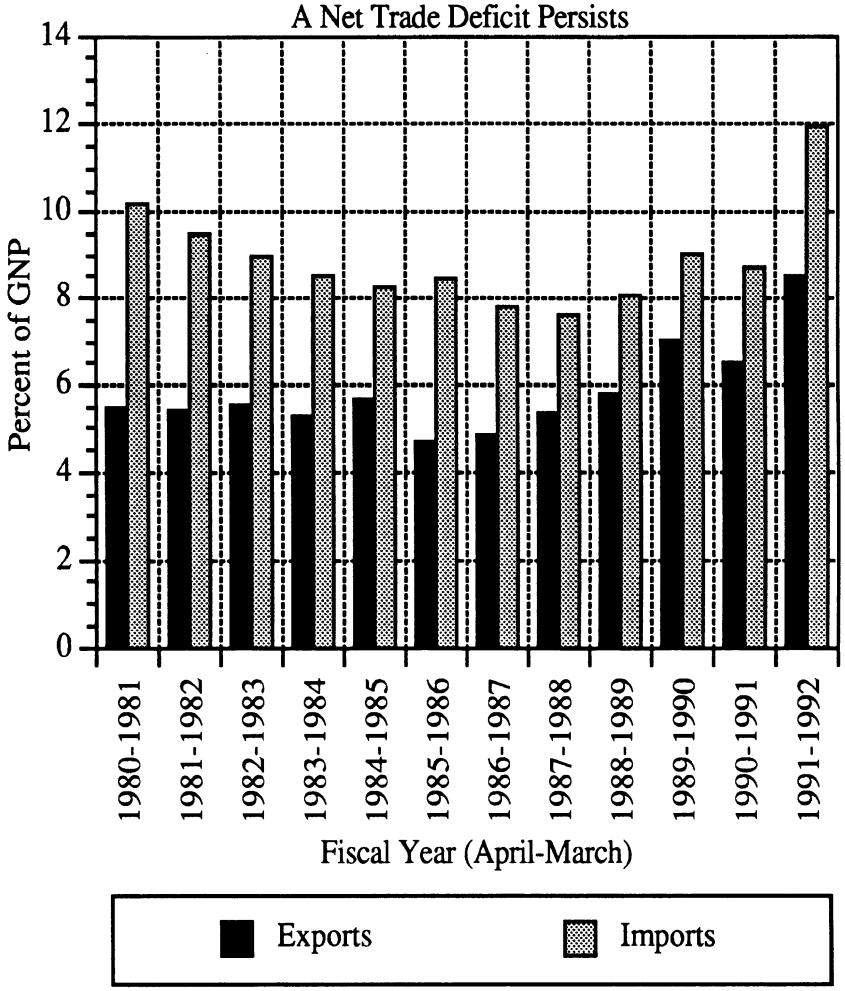
Commerce and Trade

Apart from inflation, the second major cause for concern in the Indian economy is the persisting trade deficit. On a positive note, between 1986 and 1989, imports grew at an annual rate of about 10 percent, while exports increased by 17 percent in dollar value. For 1989-1990, the deficit amounted to about 2 percent of GNP and almost 22 percent of total imports (figure 6). For 1990-1991, the deficit further increased from Rs. 77 billion to Rs. 106 billion [9]. This fact emphasizes the importance of import substitution and the need to conserve hard currency reserves for the economy. At the same time, India's share of world exports has shrunk to 0.5 percent. Every effort to boost export performance is essential if the growth of the economy is to be sustained.

As a comparative indicator, for 1989-1990 India's trade deficit was $0.69 billion, while China had a trade surplus of $1.95 billion [10]. Furthermore, the volume of China's exports is almost four times that of India's. Many opportunities have been lost, and further improvements in exports will be harder to achieve in view of growing protectionism in the west, particularly relating to textiles, which constitute one of India's major export commodities. At the same time, the

former USSR, which had maintained a large reciprocal trade arrangement with India, has ceased to exist. As a consequence, a market that absorbed almost a sixth of India's exports is very much at risk, since Russia is faced with an urgent need to look to other markets for hard currency.

Figure 6
Foreign Trade
A Net Trade Deficit Persists



Source: Economic Survey of India, 1991

The Organization for Economic Cooperation and Development (OECD) countries, as a group, is India's largest trading partner, accounting for almost 57 percent of all imports into India and 53 percent of its exports. Of the imports, the European Economic Community (EEC), United States, and Japan account for 33 percent, 12 percent, and 8 percent respectively. Of India's exports, 25 percent are directed to the EEC with a further 16 percent going to the U.S. and 10 percent to Japan [9].

The latest figures for 1991-1992 indicate that the short-term squeeze on imports imposed

by the government in 1991 succeeded in reducing the trade deficit by about a third, in dollar terms, compared to the previous year. However, even though the government has expressed a willingness to relax import constraints, its ability to do so will be governed by improvement in the export picture. Hence, in the development of its industrial policy, relative to foreign investment, export potential will need to be considered.

Industrial Policy

With the new economic policies, greater efforts are being undertaken to divest some government ownership in large, public-sector enterprises. Simultaneously, rules governing foreign ownership of industries are also being relaxed to encourage investment in the Indian economy. These measures constitute components of a policy that has targeted increased productivity. Progressive opening of the domestic market to international competition is being pursued to spur industries to improve their global competitiveness.

Initially, the oil and gas sector was singled out for urgent infusion of foreign capital and technology. Foreign companies were to be given contracts for developing the fields and would have access to refining and distribution. The urgency that was accorded this sector is another indication of the expected growth in the oil import bill under the current scenario. Subsequently, a list of high-priority industries was compiled in which companies were allowed to raise foreign capital up to 51 percent of equity. Expansion plans that depended on foreign capital expenditure were expected to be funded by the foreign equity.

Significantly, in the automobile sector, Suzuki was allowed to increase its holding in the highly successful Maruti venture to 50 percent in anticipation of a new model designed for export to European markets. Likewise General Motors' proposal, together with Hindustan Motors, was approved. Much of the investment was expected to be geared for export of components to GM's operations worldwide [11].

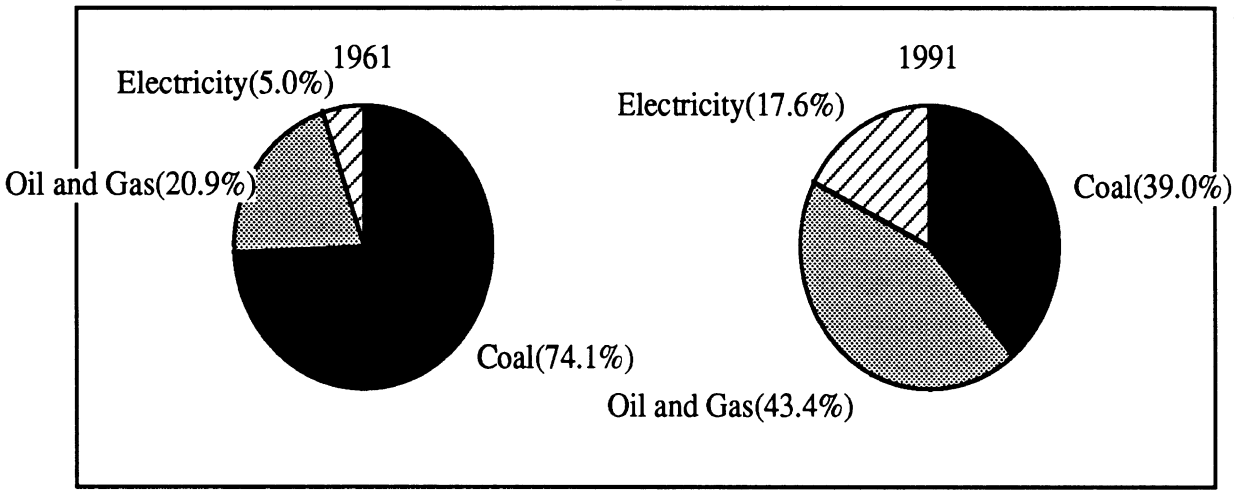
Another aspect of the liberalization involves the government's divestment of much of its equity in the many large, public-sector industries. However, a major issue that is yet to be fully addressed is the so-called "exit-policy" involving the reduction in the workforce that is expected with massive restructuring. In essence, a plan that is acceptable to the labor unions and yet provides the necessary scaling down of the workforce for economic viability is still developing. Labor unions are well established in most major industries. As is true worldwide, labor relations are a key factor in determining the success of ventures.

ENERGY

By international standards, per capita consumption of commercial energy in India is among the lowest in the world. Nevertheless, any analysis of transportation needs in India must consider the energy issues that constitute an important part of India's economy.

Like China, coal is a major source of commercial fuel in India. With large coal deposits in the country, coal has been seen as an inexpensive, locally available fuel. However, large inefficiencies are associated with the utilization of coal. Coal movement accounts for almost 40 percent of all railway freight. Furthermore, the patterns of coal consumption have changed, driven by the increased transport of passengers and freight by road rather than rail. Coal, as a source of commercial fuel, has dropped from 74 percent to 39 percent between 1961 and 1990. In that same period, oil has grown from 21 percent to 43 percent [12] (figure 7). When one considers the transport sector, between the periods of 1960-1961 and 1990-1991, oil rose from 38 percent to 89 percent of commercial energy consumption [12].

Figure 7
Sources of Primary Commercial Energy
Increase in Dependence on Oil

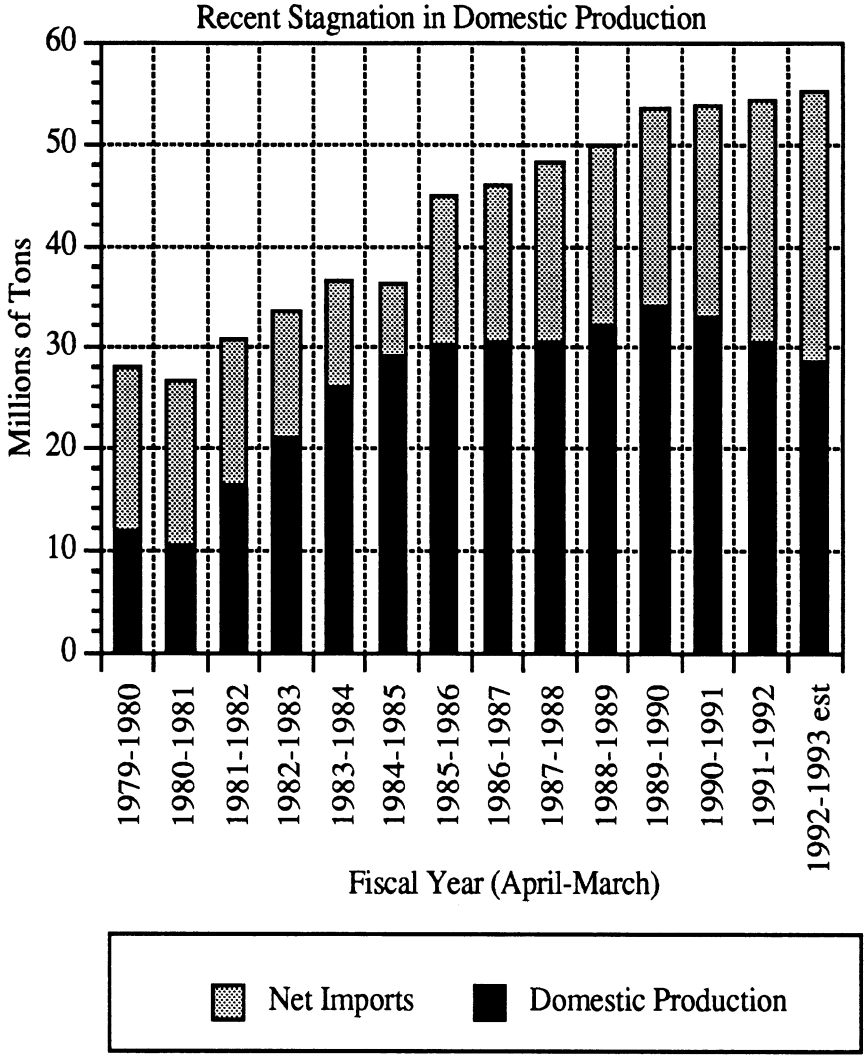


Source: Hindu Economic Survey of India, 1991

The consumption of petroleum products increased from 30.9 million tons in 1980-1981 to 54.1 million tons in 1989-1990 [9]. Since then, consumption has further increased, to an estimated 56.8 million tons in 1991-1992. The forecast for 1992-1993 is a consumption level of 60 million tons; by the year 2000, total demand is expected to exceed 100 million tons. The early years of the past decade saw domestic production of crude oil increase from 10.5 million tons

annually in 1980-1981 to 29 million tons in 1984-1985. Since that period, most of the increases in consumption have been fueled by imports, which rose from 7.2 million tons in 1984-1985, to 19.5 million tons in 1989-1990, to 23.5 million tons for 1991-1992 [9]. Current estimates indicate imports of 27 million tons of crude oil for 1992-1993 in addition to a further 12 million tons of petroleum products (compared to 9.5 million tons for 1991-1992) [14] (figure 8).

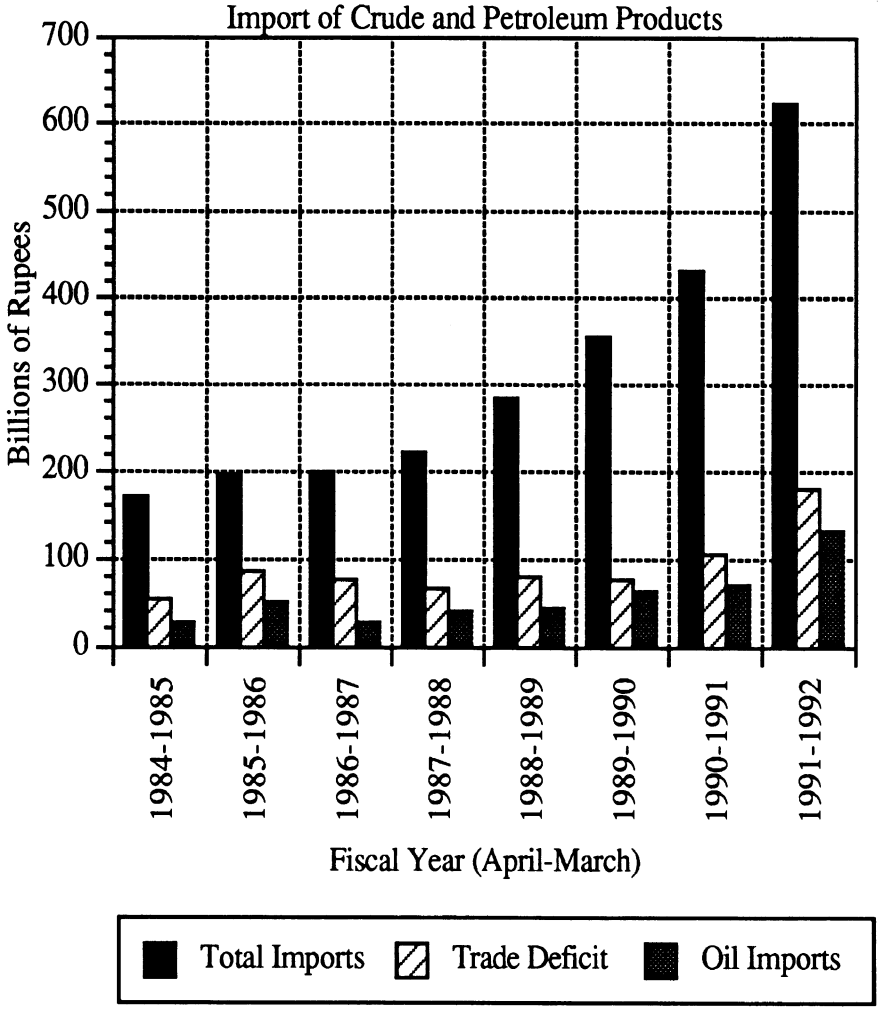
Figure 8
Crude Oil Production and Imports
Recent Stagnation in Domestic Production



Source: Economic Survey of India, 1990-1991

Through the eighties, India incurred a net deficit in international trade. Since the mid-eighties, although the deficit as a fraction of total imports has been gradually declining, crude oil imports have become an increasingly larger fraction of the total imports. India, which has frequently confronted crises in foreign exchange reserves, can ill afford a large oil import bill (figure 9).

Figure 9
Impact of Oil Importation
Import of Crude and Petroleum Products



Source: Economic Survey of India 1990-1991

The Gulf War had a very severe effect on the whole economy. The temporary rise in the world crude-oil price, the interruption of deliveries from Iraq and Kuwait, and the reduced inflow of foreign exchange remitted by expatriates in the Gulf region all contributed to this problem. In particular, between 1990 and 1991, the cost of crude-oil imports rose from 11.4 percent to 14.2 percent of the total import bill. As a result, the deficit rose from 21.8 percent of total imports to 24.7 percent. The temporary move by the government of imposing a 25 percent surcharge on petroleum products, to slow the rate of consumption, had a severe effect on the auto industry in India.

The estimates of crude-oil reserves in India (6.3 billion barrels) are similar to those of Canada (6.8 billion barrels) and the U.K. (5.2 billion barrels) [15]. Annual production in India,

at 0.6 million barrels per day, is small compared to that in Canada (1.6 million barrels/day) or the U.K. (2.1 million barrels/day). India's figures are very similar to Brazil's, where reserves are estimated at about 8 billion barrels and production at 0.6 million barrels per day (1989).

Oil exploration and production have received considerable encouragement from the government. Indian Oil Corporation and the Oil and Natural Gas Commission (ONGC) rank first and third among the large public sector enterprises in the country. Oil refinery capacity has been increased and the throughput is practically capable of meeting all domestic needs.

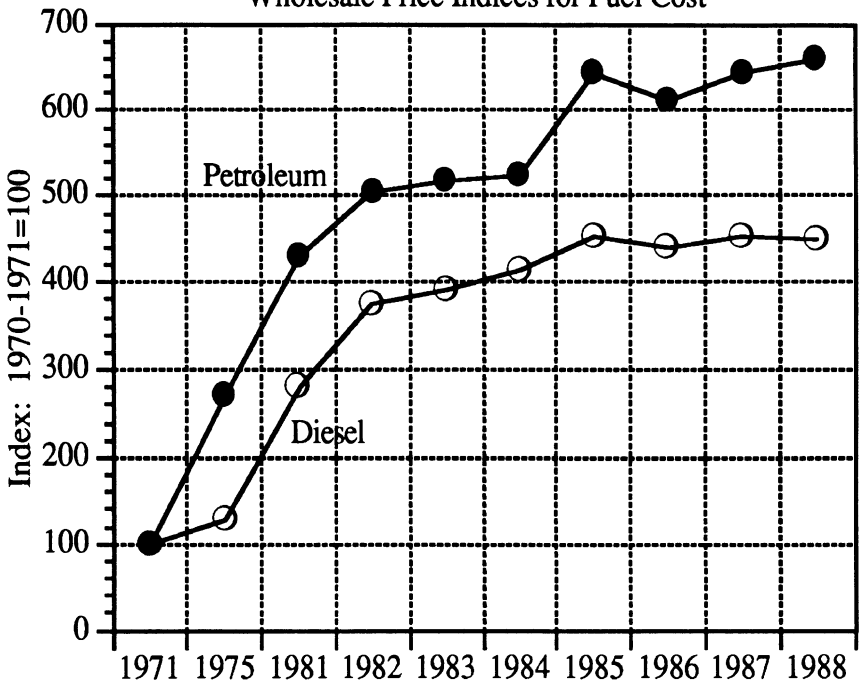
The patterns of commercial energy consumption by sector show a slight decline in industrial use and increases in household and transportation-sector use, reflecting the growing consumer society. The transport sector accounts for the consumption of 33 percent of all commercial energy and 47 percent of the total consumption of petroleum products.

The oil-import scenario underscores the importance of transportation systems planning, mass transit, alternative fuels, and fuel efficiency for the Indian environment. The government has long pursued a policy of discouraging consumption of petroleum products. In particular, gasoline as a fuel is heavily taxed, while diesel is less heavily taxed, in view of its use in agriculture, mass transit, and public and commercial transportation (figure 10). In a further effort to encourage conservation, a heavy excise duty is imposed on the selling price of automobiles. Diesel fuel constitutes 38.5 percent of petroleum product consumption, while only 6.5 percent is accounted for by gasoline. In turn, the railways have vigorously pursued a program of switching to electric traction from diesel-electric locomotives.

A new issue that will gain importance is the utilization of natural gas. Large reserves have been identified and total consumption has increased from 4.5 billion cubic meters (cu. m.) per year in 1984-1985 to 14.6 billion cu. m.. in 1989-1990 [3]. Tests have been performed for the use of compressed natural gas (CNG) in buses and diesel locomotives. Based on local availability of this fuel, it could play an important role in transportation. At this time, sample fleets of buses fueled by CNG gas are in operation in some cities and further growth of this mode is anticipated. Also, through the efforts of Gas Authority of India Ltd. (GAIL), models of the three major passenger car manufacturers are also being converted for tests. Proposed plans call for the conversion of up to 5,000 cars, in addition to infrastructure development, including refueling and service stations in three major cities.

Figure 10

Wholesale Price Indices for Fuel Cost



Source: AIAM Automan, 1991

TRANSPORTATION INFRASTRUCTURE

Central Planning—Part success and part failure

Facing the challenge that most developing countries face—the need to husband scarce resources—it is no surprise that much of the evolution of the infrastructure of the transportation sector has been the result of direct government planning. On the other hand, the failure to adhere to a consistent policy has led to many unplanned developments causing further setbacks to serving transportation needs efficiently.

Railways

Railways have always played a major role in India; the network is widespread and extensive (table 3). Railways are estimated to carry over 67 percent of all freight and over 40 percent of all passenger traffic [3]. For 1990-1991, railways recorded over 280 billion passenger-km carrying over 3.5 billion passengers and 237 billion ton-km of freight [2]. The completely state-owned railway system is operated through a separate ministry and is the single largest employer in the country.

Table 3
Comparison of the Indian Railway Network with China and Brazil

Country	Total Length km (millions)	Density km/100 sq. km	Density km/million population
India	0.62	18.0	66
China	0.53	5.0	45
Brazil	0.30	0.35	247

Source: Economist Intelligence Unit Country Reports, 1991.

Based on the extensive network, railways have offered transport at very low cost—among the lowest in the world. For 1989-1990, the cost was estimated to be Rs 0.095 per passenger-km and Rs. 0.325 per ton-km [5]. From an energy consumption point of view, transport by road is estimated to cost six times that of rail. The focus of railway development in recent years has been further electrification of long-distance sectors. The change from diesel traction to electric traction is expected to contribute to cost reductions, since the latter is expected to save a further 66 percent of energy. Indeed, the 1980 report by the National Transport Policy Committee recommended

further increases in railway use and decreases in road use. Comparing the allocation of budget (within the transport sector) between railway and road transport (table 4) one sees the importance that is accorded railways at government levels (figure 11).

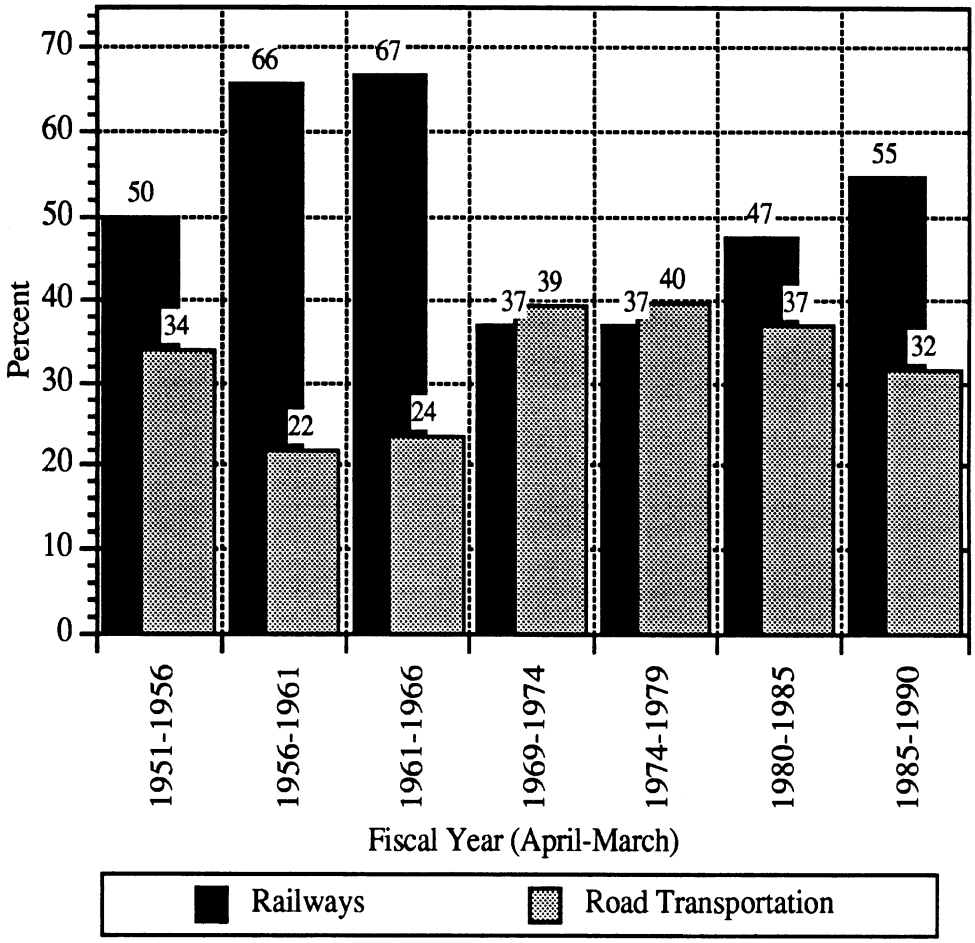
Table 4
Central Government Allocation of the Transportation Budget
(in percent)

Central Plan	Railways	Road
1st Plan (1951-1956)	50.0%	33.9%
2nd Plan (1956-1961)	65.7%	22.0%
3rd Plan (1961-1966)	66.9%	23.6%
4th Plan (1969-1974)	37.0%	39.3%
5th Plan (1974-1979)	37.2%	39.8%
6th Plan (1980-1985)	47.4%	37.2%
7th Plan (1985-1990)	54.5%	31.7%

Source: AIAM Automan, 1991.

Railways have a prominent role in urban transport, particularly in selected metropolitan cities. In Greater Bombay, suburban railways served 39 percent of all daily person trips in 1968 [16]. However, although 55 percent of all railway passengers are carried on suburban sectors, they account for only 11 percent of the earnings [17]. Consequently, to the railway management, the suburban service is not attractive.

Figure 11
Public Expenditure on Transport Sector
Percentage of Budget Allocations



Source: AIAM Automan, 1990

Further expansion of urban and suburban railway service has proved to be very expensive, and the high capital expenditure has slowed most major projects. Calcutta inaugurated the most recent underground line, while Madras will have a new surface light-rail system in addition to its existing suburban (surface) line. However, even the ongoing mass transit projects will need an additional Rs. 8.0 billion for Madras, Bombay, and Calcutta alone. A further Rs. 90 billion will be needed for planned systems in Delhi, Hyderabad, Ahmedabad, and Bangalore.

Airlines

The airline system has been exclusively government-owned until recently. The service was provided by three separate lines: Air-India for international routes, Indian Airlines for domestic routes, and Vayudoot for short-haul and low-density routes.

Indian Airlines is the second largest domestic airline outside the United States and has a modern fleet of over 60 aircraft (almost exclusively Airbus A-300/320 and Boeing 737). The large distances between the major cities and the growth of business traffic has helped Indian Airlines operate at a favorable load factor on most of the trunk routes. However, inefficient operations have prevented it from being consistently profitable. The less economical feeder routes that Indian Airlines formerly carried were transferred to Vayudoot, which operates predominantly turbo-prop aircraft to over 100 destinations. Air-India is the designated national flag carrier and operates a fleet of 21 aircraft (exclusively Boeing 747 and A-300/310).

Domestic capacity increased from 6.46 billion seat-km in 1981 to 10.4 billion seat-km in 1987, and the load factor increased from 69 percent to 78 percent in that period [5]. In many ways, domestic air travel constitutes competition for road travel, particularly for business use. The low average speeds that may be achieved on the national highways increase travel time between cities. Air is therefore the preferred transportation means for the growing business segment of trips greater than 300 km.

Encouraged by the liberalization of the economy in the 1990s, new private airlines have been founded to augment capacity offered by Indian Airlines and Vayudoot on many domestic sectors. To date, these operations remain poorly funded and operate limited routes. Their viability, in the long term, remains an open question.

Roadways

The total length of roadways in India was estimated at 1.84 million km in March 1988 (table 5). That figure compares with 1.55 million km in 1983. However, only 48 percent of these roadways are surfaced [18].

Table 5
Comparison of the Roadway Network in India with Other Countries

Country	Total Length km (millions)	Density km/sq. km	Density km/million population
India (1988)	1.84	0.56	2,180
China (1988)	0.95	0.10	854
Brazil (1988)	1.67	0.20	13,842
USA (1990)	6.24	0.67	25,060

Source : Economist Intelligence Unit Country Reports, 1991. MVMA Facts and Figures, 1991.

A visit to any of the metro cities will make it evident that the growth of the infrastructure has not kept up with the rapid increase in the number of registered motor vehicles. The funds allocated for the upkeep and the growth of the infrastructure have barely stayed even, compared to those of earlier budgets, even though the auto industry has seen explosive growth in the 1980s.

The national highway system accounts for about 33,600 km of highways that are comparable in quality to state routes in the United States. These highways are administered by the Ministry of Surface Transport. Although they comprise less than 2 percent of the total roadway length, they carry nearly 45 percent of the road traffic. State, district, and rural roads are administered by the local state governments.

The industrial progress that India has witnessed in the past decade has also led to the simultaneous increase in the population of motor vehicles, particularly in these urban cities. In many cities, the motor vehicle population grew by over 300 percent between 1980 and 1989.

Motorized two-wheelers (including motorcycles, scooters, and mopeds) typically account for between 45 percent and 70 percent of these vehicles. The percentage of households owning motor vehicles (including two-wheelers), for selected cities, is shown in Table 6.

Table 6
Indian Households Owning Motor Vehicles
(1985)

City	Population (millions)	Percentage
Delhi	5.7	48%
Ahmedabad	2.5	65
Lucknow	1.0	60
Madurai	0.8	49
Cochin	0.5	49

Source: A.C. Sarna, "Importance of Nonmotorized Transport in India," *Transportation Research Record*, Number 1294.

The sustained growth in the auto industry during the latter part of the last decade, when two-wheelers recorded an annual growth of 16.6 percent, cars of 6.9 percent and buses of 5.7 percent, have further added to these numbers. As a consequence, by 2000, the motor vehicle population throughout India is expected to be over 40 million units, with over 30 percent concentrated in twelve major metropolitan cities.

The impact of this growth on traffic congestion is inevitable. Here, there are valuable lessons from other rapidly developing economies in Asia. South Korea, which has made great strides in the development of its domestic auto industry over the past decade, has seen the motor vehicle population increase by 1000 percent between 1980 and 1991. The resulting traffic flow problems in Seoul have shown the dangers of increased vehicle sales without a parallel development program for infrastructure.

Delays caused by inefficient traffic flow are an increasing problem in Indian cities. The problem is compounded by the need to account for mixed modes on most roads and arteries. Apart from motorized modes (including buses, passenger cars, and motorcycles/scooters), non-motorized modes (including bicycles and rickshaws) can account for as much as 25 to 50 percent of traffic flow in some cities. The mixed traffic modes also increase the risk of accidents. In 1985, 29 percent of all traffic accidents occurred in the 12 major cities. The cost to the nation attributable to decreased productivity because of inefficient traffic flow cannot be overemphasized.

Suburban rail transport, where available (Bombay, Calcutta, and Madras), plays a major role. Suburban railways, together with the well developed city bus system, account for over 80 percent of daily commuter trips in Bombay [20]. Those cities that offer better public transport

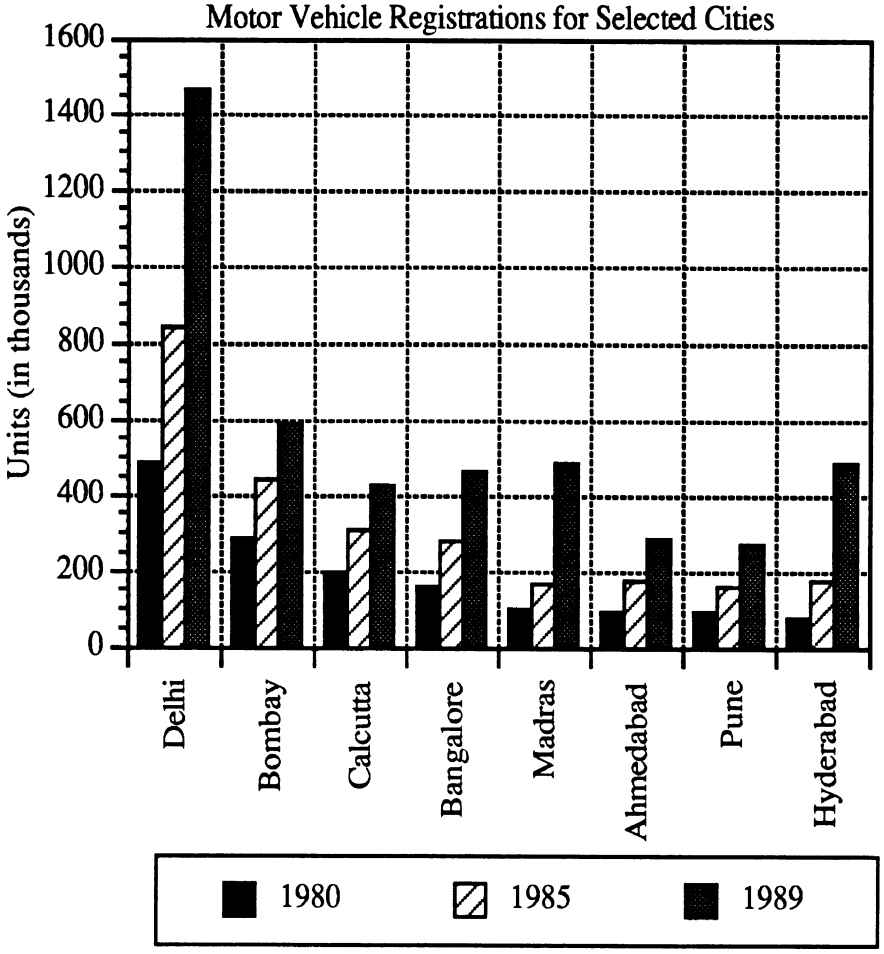
systems also show reduced levels of ownership of personal transportation (table 7). A point to be made therefore, is that the trend toward increased ownership of cars and two-wheelers is not only fueled by increased affordability and availability, but also by the relative inadequacy of public transportation (figure 12). Unlike U.S. cities, the levels of ridership on public bus systems is very high. The high cost of urban railway construction (underground or ground-level), particularly through very densely populated cities, has inhibited its greater spread. However, based on the ready acceptance of this mode by commuters, there is clearly a demand in most cities for a relatively quick public mode.

Table 7
1986 Modal Split for Trips in Selected Corridors of Cities
(in percent)

City	Public Transport	Cars	Two-Wheelers	Taxis	Other
Ahmedabad	34%	8%	24%	13%	21%
Coimbatore	72	5	8	2	13
Pune	59	5	13	7	16

Source : Traffic and Transport Flows for Selected Cities in India, CRRI

Figure 12



Source: AIAM Automan, 1991

AUTOMOTIVE SEGMENT

Industry Segments

Based on vehicle registration data, the 1989 population of cars and trucks in India was about 4 million compared to 5.3 million in China and 13 million in Brazil. The population of motorized two-wheelers greatly outstrips this number, as is also the case in China. The Indian automobile industry is best segmented as follows:

- Medium and heavy commercial vehicles (M/HCV)
- Light commercial vehicles (LCV)
- Light utility vehicles (LUV)
- Passenger cars
- Two-wheelers

Overall, the recent history in each segment has been marked by an almost steady increase in performance throughout the 1980s. In some cases, as with two-wheelers, the performance over this period was dramatic. However, the start of the 1990s saw the entire economy face a setback triggered by many factors. Chief among them was the steep hike in fuel prices, increases in excise duties, the devaluation of the rupee, and changes in rules relating to depreciation.

The simultaneous effects of increases in excise duties, the price of fuel, and overall increased levels of inflation led to a sharp drop in sales for each segment in 1991. In August 1990, the excise duty for cars was increased from 42 percent to 53 percent, and in July 1991, this was further raised to 66 percent.

These government measures were largely motivated by the urgent need to reign in the trade deficit and by the increasing gap between oil consumption and local production. The squeeze on imports was expected to be relieved somewhat for 1992-1993, as the foreign exchange reserves situation recovered. Thus, while these constraints were expected to remain long-term issues, a lessening of the severity of the situation was expected in the shortterm. This transpired in June 1992, after considerable pressure from the industry and the Industry Ministry on the Finance Ministry. Excise duty on cars was lowered from 66 percent to 55 percent, and on LCVs from 15 percent to 10 percent. However, the credit squeeze imposed to curb inflation remains, and continues to adversely affect consumer credit and market demand for motor vehicles.

A brief history of the evolution of each segment is described in the following sections.

Medium and Heavy Commercial Vehicles (M/HCV)

This segment is defined as commercial vehicles with ratings of gross vehicle weight (GVW) greater than six tons. Two manufacturers have traditionally dominated this segment— TELCO (Tata Engineering & Locomotive Company, a member of the Tata Group of companies) and Ashok-Leyland. Both had their origins in license agreements with European makers— Daimler-Benz and Leyland, respectively. For a period of time in the 1960s and 1970s, two other manufacturers, Hindustan Motors (with GM-Bedford license) and Premier Automobiles (in collaboration with Dodge-Fargo) were also players in the HCV field, in addition to their range of passenger cars. Since then, they have ceased to play any significant role. Two other ventures, in the 1980s, have also failed to make an impact on the segment— Simpson (with collaboration of Ford and Perkins) and Kirloskar-Cummins (with collaboration of Neoplan).

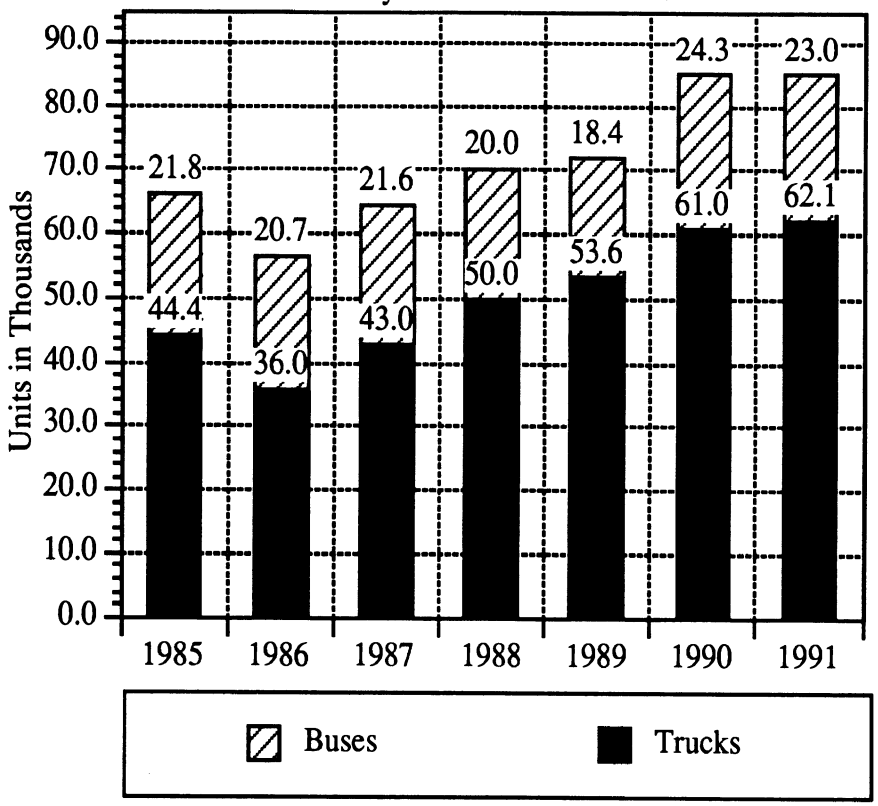
TELCO, in particular, offers an example of possibilities for large volume manufacture in India. For the financial year 1990-1991, it ranked first among all private sector corporations in the country, based on sales, and second on the basis of profits. TELCO's association with Daimler-Benz dates back to 1954. Since that time, Daimler-Benz has maintained a minor equity ownership in TELCO. However, most Daimler-Benz licenses expired in the early 1970s, and since then TELCO has relied primarily on its own engineering expertise. It has achieved a substantial level of M/HCV market domination, as well as a modicum of success in exports.

In the 1980s, this segment was infused with renewed vigor. This occurred at the same time that the passenger car industry was also witnessing major change, as described below. The Japanese industry provided the new technology. Links were made with Hino (Ashok Leyland) and Isuzu (Hindustan Motors). In the case of TELCO, greater investments were made in internal R&D capability. Ashok Leyland also saw the effect of a major change in the ownership of the company (to the Hinduja Group) with IVECO replacing Leyland as the major foreign shareholder. While local content in the late 1970s was typically over 95 percent, these changes implied more import content, at least in the short term for Ashok Leyland and Hindustan.

Trucks have typically accounted for about two thirds of this segment, and buses for about one third (figure 13). The product line-up (almost exclusively diesel powered) has also seen major changes in the wake of these corporate realignments. With a focus on fuel efficiency, new engine (and truck) lines have been introduced. The new Ashok Leyland products feature Hino and IVECO diesel engines; the products from Hindustan Motors are based on Isuzu models. TELCO

has invested in a new line of turbo-charged diesel engines for its heaviest trucks. The engines are made by the M/HCV manufacturers themselves, rather than from various independent engine manufacturers.

Figure 13
Unit Sales for Medium and
Heavy Commercial Vehicles



Source: AIAM Automan

The Gulf War had adverse consequences on this segment. In the short term, the severe shortage of diesel fuel in the country, as a consequence of the war, stifled sales at a crucial period. The 25 percent surcharge imposed by the government on petroleum products affected production costs of a host of components. Moreover, the effect of the war on the economy and the foreign exchange reserves will have a longer term effect. The devaluation of the rupee and the increase in the auxiliary customs duty resulted in increased cost of production for newer import-dependent components. Delays were also experienced in the phased manufacturing program with the foreign collaborators due to the 15 percent cuts in foreign exchange outflow imposed by the government in reaction to the acute crisis in foreign exchange reserves. This in turn led to a slower increase in the level of local content than had been originally anticipated.

TELCO enjoyed greater immunity from these problems in view of its dependence on domestic designs and components. Ashok Leyland's plans for its Hino engines had called for increasing indigenous content from 66 percent to 80 percent, including local manufacture of cylinder blocks, heads, and crankshafts.

The industry recovered and, by 1991, sales had increased by a third over the levels of 1989-1990. Late in 1991, the recession in the Indian economy and price increases led to a slow-down of the growth rate of the M/HCV segment. The price of a standard Ashok-Leylend truck increased by almost 50 percent. TELCO, notwithstanding such price increases, continued to register gains in sales volume (figure 14). For the future, both Ashok Leyland and TELCO have made aggressive plans for modernization and growth. TELCO will achieve an additional 9,000 unit production capacity out of its new plant at Lucknow by 1993.

Early 1992 reports indicated that TELCO was interested in an agreement with Daimler-Benz for the manufacture of the OM-366 series of truck engines for use by TELCO and for export back to D-B. This was expected to improve the competitive position of the TELCO models against the Hino-engined Ashok Leyland vehicles. Ashok Leyland's plans call for an increase in capacity from 24,000 to 38,000 over the next eight years. The production of Hino engines at the Hosur plant is expected to double to 1000 units per month as part of an overall investment plan of Rs. 110 million.

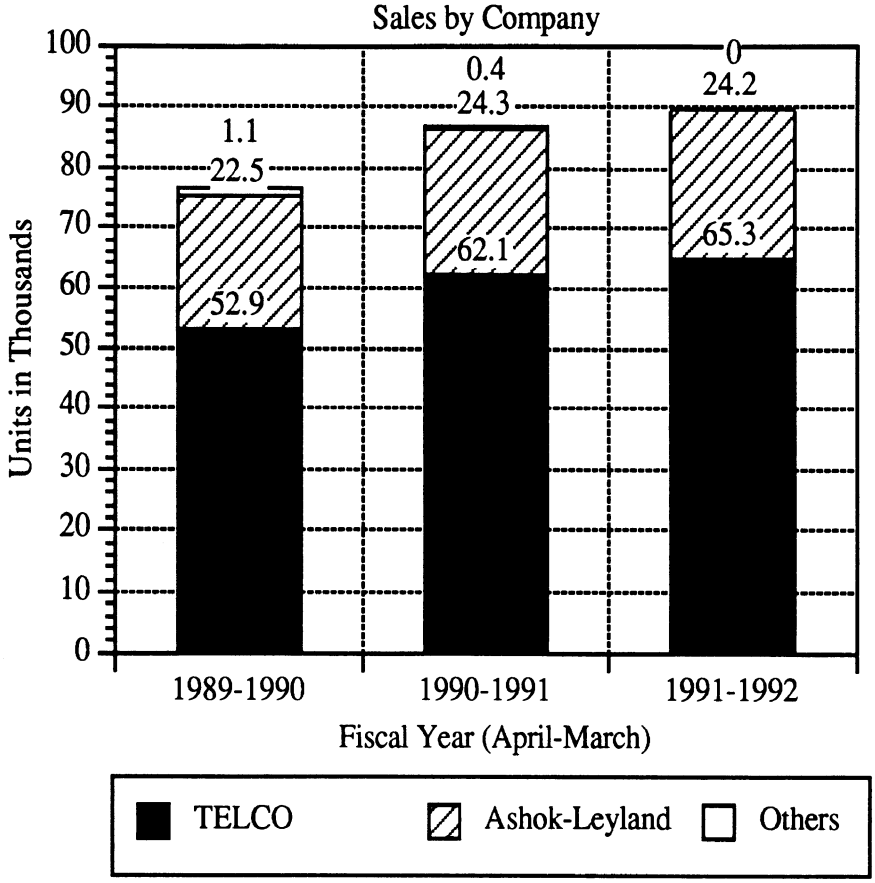
Demand estimates for this class of vehicles anticipate a volume increasing to 125,000 units by the end of the decade. This is related to an anticipated increase in the percentage of freight transported by trucks rather than railway. The Motor Vehicles Act of 1989 calls for limitations on a vehicle's Registered Laden Weight (RLW); its stricter enforcement will further stimulate the growth of this segment.

TELCO and Ashok-Leyland also figure in supplying intercity and city bus transport carriers. The city bus transport systems are almost entirely run by state-owned corporations. Conversely, the intercity routes are plied by both private and state-owned lines. The total bus fleet strength of the various nationalized transport corporations stood at about 100,000 in 1990. While fuel conservation is of major concern, a new factor being stressed concerns exhaust emissions, particularly for metropolitan bus transport systems.

TELCO has also been successful in its efforts to achieve export sales. For 1990, TELCO exported over 3,000 trucks and buses, mainly to other Third World nations, making TELCO the largest net earner of foreign exchange for the industry that year. Ashok Leyland, with its new

alliance with IVECO, has also improved export performance, exporting over 600 trucks and buses, mainly to regional neighbors. Hindustan's poor performance had led to termination of production of its Isuzu-based HCVs.

Figure 14
Medium and Heavy Commercial Vehicle Segment
Sales by Company



Source: AIAM Automan, 1991

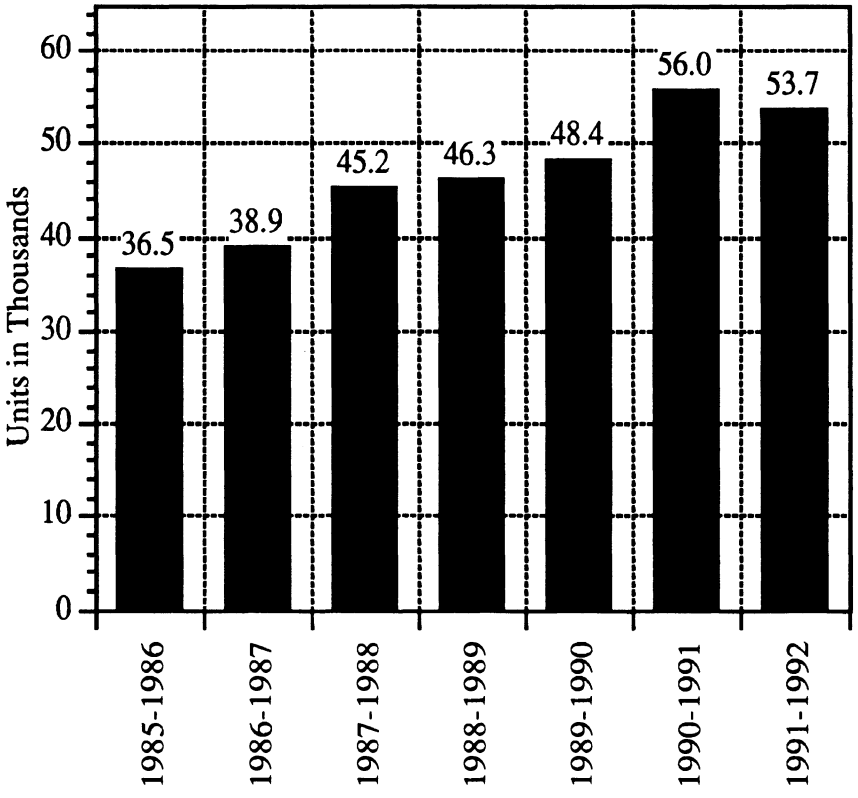
Light Commercial Vehicles (LCV)

The LCV field has seen an influx of six significant new players over the last decade. This segment comprises vehicles in the 3,000-6,000 kg GVW weight class (figure 15). The vehicles tend to find a wide range of applications from light commercial transport to minibuses and ambulances. Again, as for the HCV field, the predominant type of powerplant is the diesel engine.

Traditionally, this field was served by the products of Bajaj-Tempo (based on German designs of the 1950s and 1960s), Standard Motors (making a version of the British Leyland 20)

and Mahindra & Mahindra (licensees of the U.S. Jeep, making the Forward-Control two-wheel-drive [WD] and four-WD vans). The eighties saw the entry of four Japanese joint-venture products from Allwyn-Nissan, DCM-Toyota, Swaraj-Mazda and Eicher-Mitsubishi. These vehicles, typified by the Mitsubishi Canter range, are comparable to the range of forward cab models also sold in the United States. They were joined by a new product line from Bajaj-Tempo (making the Daimler-Benz Traveller under license) and a range of indigenously designed and produced vehicles from TELCO (Model 407 and 608). Mahindra & Mahindra subsequently took over controlling interest in the Allwyn-Nissan undertaking, after that joint-venture had faced considerable financial trouble. Standard Motors had ceased operation by the late 1980s, although attempts are being made for its revival.

Figure 15
Unit Sales of Light Commercial Vehicles



Source: AIAM Automan, 1991

It is significant to note that Bajaj-Tempo and TELCO have the largest shares of the LCV market. Of the Bajaj-Tempo share, a large fraction of sales comes from the older (now indigenous) vehicle and not the Traveller (based on the newer Daimler-Benz design). The Japanese joint-venture undertakings have been adversely affected by delays in the phased

manufacture program, as well as by their dependence, to a greater extent, on imported components and their susceptibility to the devaluation of the rupee. In contrast, TELCO rebounded from the effects of a strike in 1989-1990 to increase sales by over 47 percent for 1990-1991. For 1990-1991 TELCO's sales in this segment (19,800 units) were more than that of all four Japanese joint ventures combined (16,100). By 1991-1992 TELCO's volume had increased to 23,900 units while the Japanese joint ventures dropped to 11,300 units. These four manufacturers even suspended manufacture temporarily in 1992 to adjust to demand. TELCO's performance had been closely watched since its LCV was the product of in-house design, engineering, and manufacturing, and competed with modern Japanese designs (table 8).

Table 8
Profiles of the Major LCV Manufacturers
1990-1991

Company	Sales (million Rs.)	Net Profit (million Rs.)	Production (x 1000)
Ashok-Leyland	9,270	262.0	24.3
Bajaj-Tempo	2,480	67.0	16.3
DCM-Toyota	978	65.6	4.3
Eicher-Mitsubishi	1,136	32.1	4.8
Hindustan Motors	6,325	2.5	25.2
Mahindra & Mahindra*	10,900	70.0	7.2
Maruti Udyog	6,760	NA	112.8
Premier Automobiles	5,510	149.6	42.9
Swaraj-Mazda	908	18.6	3.8
TELCO	25,950	1,421.0	81.9

*Includes Mahindra-Nissan
Source: Capital Market, September 1991 and AIAM Automan, 1991.

By 1991, the original joint-venture agreements called for a level of indigenous content of approximately 95 percent. However, for many reasons, including optimistic proposals and currency rate variations, the level has not exceeded 80 percent for the Japanese joint-ventures with the exception of Eicher-Mitsubishi. Consequently, these manufacturers imposed frequent price increases (eight times between 1986 and 1991 for Swaraj-Mazda and twelve times for DCM-Toyota) mainly due to the adverse changes in the yen-rupee rate. Between 1987 and 1990, the price of the DCM-Toyota LCV increased by almost 45 percent and the increase for the Swaraj-Mazda was even more. (In comparison, the average price of HCVs increased by about 15 percent.) Even TELCO, notwithstanding its indigenous LCV design, increased prices by about 33

percent. This increase was attributed to increases in the price of raw materials and components. At these price levels, the larger HCV models are potential competition. In response to this situation, Eicher-Mitsubishi, which had achieved 90 percent indigenization on schedule, introduced a low-cost version of its Canter line (C-ECO) with a shorter wheelbase and lower content. This model was priced directly against TELCO's model 407.

The level of production capacity utilization in this segment has been historically low (about 55 percent in 1991). Furthermore, at the current levels of sales, few manufacturers are capable of achieving significant economies of scale. Bajaj-Tempo has an installed capacity of about 50,000 units. Telco and DCM-Toyota have half of that, and Mahindra & Mahindra, a third of that figure.

Although the recession in late 1991 slowed the rate of sales increase, the LCV segment is expected to overtake the volume of the HCV segment by the end of the decade. Demand is expected to increase from current levels of about 50,000 units annually to 175,000 by 2000. This would no doubt be assisted by the recent reduction in the excise duty for this segment.

Light Utility Vehicles (LUV)

Light utility vehicles have has traditionally been solely served by the products of Mahindra & Mahindra, which are based on older Jeep designs (2WD and 4WD models of the CJ3A and CJ4) but powered by more modern Peugeot diesel engines. A very small number of Hindustan Trekker vehicles were also sold in this class. This vehicle, not dissimilar to the Mini-Moke concept though somewhat larger, is based on the running gear of the Hindustan Ambassador passenger car.

The LUV segment was changed by two significant new products in the 1980s. The state-owned Maruti Udyog Ltd. started manufacture of the Maruti Gypsy, a long-wheelbase version of the Suzuki Samurai/Jimmy. This vehicle ushered contemporary engineering into this segment. The Gypsy is powered by a four-cylinder 1.0 liter petrol engine and offers four-wheel drive. The second significant product is the TELCO Tatamobile pick-up truck, TELCO's first venture into this smaller class. This product was designed and engineered in India (by TELCO) with a new four-cylinder 2.0-liter diesel engine. It is also significant that this was the first serious attempt to offer a pick-up-type vehicle in the Indian market. Until this time, light-load-carrying needs were met by open-load platforms mounted behind van-type vehicles (similar to the VW bus). Subsequently, in 1992, TELCO introduced a variation of the Tatamobile platform—the TATA Sierra, a two-door sports-utility vehicle with styling similar to the Ford Bronco II.

An additional product offered in this class is the Bajaj-Tempo Trax, a vehicle similar in appearance to the VW Iltis and Mercedes-Benz G-Wagons, but using components common to the Bajaj-Tempo vans and powered by the Daimler-Benz OM616 2.4-liter diesel engine. While the Trax and the Trekker play relatively insignificant roles in this segment, the Gypsy has achieved larger sales volumes. This has in turn led Mahindra to revise the versions of their Jeep-based models. The MM540 offers greater creature comforts to compete with the refined Gypsy and Tatamobile models.

The market in this segment is dominated by fleet, governmental agency, and industrial enterprise sales. Annual sales for this segment run to about 50,000 unit. Mahindra dominates this segment with over 80 percent of the market share. Maruti holds about 15 percent of the segment. Tatamobile, being a new product, is only beginning to establish its own market.

Procurements by the defense industry also account for a large share of Mahindra's production, although in 1991 a significant order had also been received by Maruti for 1,500 Gypsy vehicles from the defense services. The Gypsy, which quickly gained a reputation for reliability, also made a dent in the growing urban personal transport market. In a sense, this parallels the trend in the United States and other western markets where sports-utility vehicles find increasing use in urban areas. It is this niche that TELCO targets with the Tata Sierra. Mahindra has also targeted this urban market with versions of the CJ340 and the MM540. Given the price difference between petrol and diesel fuel, there is further incentive for the urban user to consider the diesel engine products of TELCO, Mahindra, and Bajaj-Tempo as alternatives to passenger cars.

Mahindra and Maruti have both made small gains in export sales. The former has launched a distribution network in Europe and surveyed the U.S. market. Their targeted "retro-vehicle" segment is unlikely to offer significant growth prospects. However, an export order from Iran for almost 11,000 vehicles was received by Mahindra in 1991. TELCO's Tatamobile and Sierra, being newer vehicles, are just beginning to establish their sales. These vehicles and the Gypsy represent better prospects for sustained export growth.

Since 1990, increases in the excise duty have resulted in significant price increases (almost 25 percent in a ten-month period). The change in taxation laws reducing the allowed rate of depreciation from 33 percent to 20 percent was additional discouragement for the market. Finally, the shortage of diesel fuel during and after the Gulf war severely impacted the sales performance of Mahindra.

Maruti's sales and service network are relatively concentrated in the urban areas. The lack of easy service and the relative greater cost of parts has limited Gypsy sales in rural areas in comparison with urban areas. The rural segment offers opportunities for Bajaj-Tempo and their Trax, because of the service network that already exists.

For the future, Mahindra has announced a potential cooperative effort with Peugeot (which owns a minor stake in Mahindra & Mahindra) to make a pick-up based on the older 504 model. At the same time, based on their links with Jeep, Mahindra is reported to be interested in the Cherokee for local manufacture.

Passenger Cars

The passenger car field in India may practically be divided into the pre- and post-Maruti periods. In the 1950s, numerous British and U.S. manufacturers had established operations in India for the assembly of kits. By the 1960s, the drive to curtail imports of passenger cars led to the emergence of three companies engaged in manufacture and assembly. Hindustan Motors produced the Ambassador, a version of the Morris Oxford of the 1950s. Premier Automobiles made license-built Fiat 1100 models (Padmini), while Standard Motors, in collaboration with Standard-Triumph of the United Kingdom, produced the Herald. This phase saw gradually increasing local content and, by 1970, all three products were almost entirely produced in India.

The 1970s saw little change except for the gradual erosion of the market share experienced by Standard Motors. By 1980, it ceased to be a player in the passenger car field. The Premier and Hindustan cars changed little except for cosmetic revisions. The Ambassador, a larger five-seater car, was popular with fleet operators such as tourist taxi companies and government agencies. A diesel engine option was offered by Hindustan by the end of the 1970s. The Premier was more popular with private owners. Both cars reflected outdated engineering, but were essentially inexpensive to produce and operate. Long product cycles with few design changes also meant easy availability of service and parts throughout the country.

The launch of the Maruti 800, in the early 1980s, marked the beginning of major change in the industry. The original product was intended to be an indigenously designed, rear-engined, economy car for the masses. Political considerations and engineering difficulties delayed the project until the end of the seventies. Maruti Ltd. filed for bankruptcy at the end of the decade, but the proposal was revived by the government soon thereafter. The assets of Maruti Ltd. were nationalized and the state-owned Maruti Udyog Ltd. was launched in 1981.

This time, the plan for indigenous development was abandoned in favor of approaching the major automakers of the world for collaboration. The results of a detailed market survey had indicated, among other things, the market preference for a four-door economy car, mainly intended for urban use. Many of the traditional European small cars (VW Polo, Fiat Uno, etc.) lacked the four-door option. The Japanese market, on the other hand, included many models in the popular "kei" class, including the Suzuki Alto, Mitsubishi Minica, and Daihatsu Cuore. Suzuki was chosen, not only because of the range of similar products that could be launched (the Alto 4-door, the minivan and the Jimmy/Samurai), but also because of attractive terms. Suzuki acquired a 26 percent stake in the undertaking. The agreement was notable for requiring a phased program to increase local content, export of vehicles and components, and permission for Suzuki to increase its stake to 50 percent.

The Maruti endeavor initiated the first systematic attempt to plan a range of products and to achieve economies of scale. Plans called for the gradual increase of production to 100,000 units annually. To put this figure into perspective, in 1980-1981, the annual production of all cars and Jeep-type vehicles in the country amounted to fewer than 50,000 units. By 1988, Maruti had achieved that figure for car production alone.

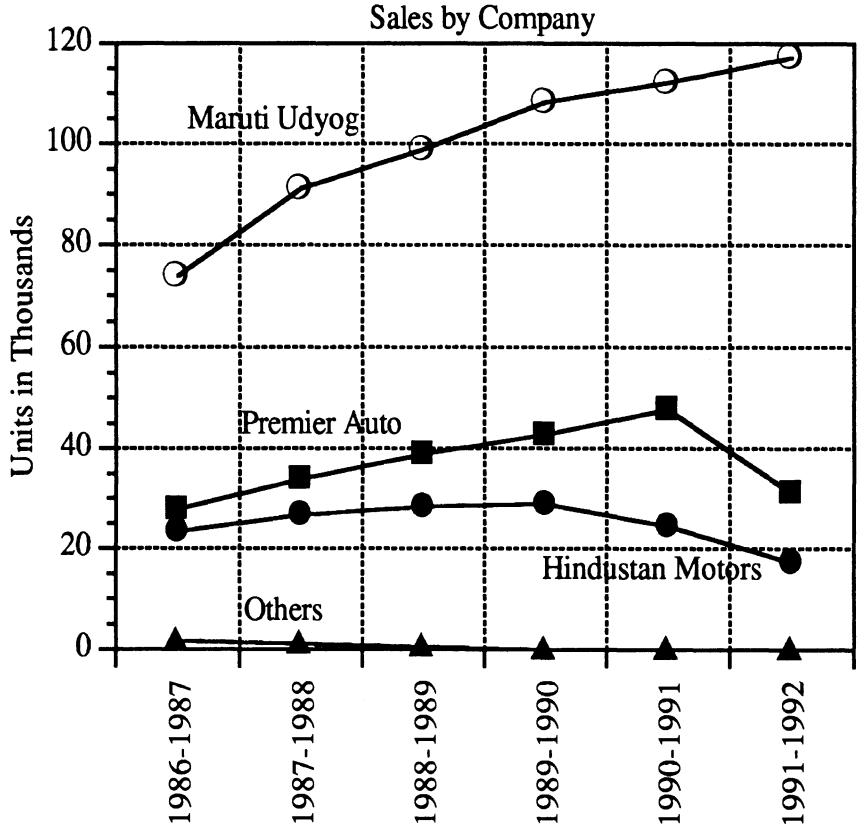
Having enjoyed a successful launch of its products, in a market that absorbed all production, Maruti Udyog continued to keep pace with international model changes. By 1986, the successor Alto body-style replaced the original model. However, Maruti had failed to make significant inroads into the fleet market where a larger car was needed. To address this need, as well as improve prospects for exports, the Maruti 1000 model, based on the Suzuki Cultus/Swift four-door sedan, was launched in 1989. The production of this model greatly added to the cost of the program and the net outflow of foreign exchange. Much of this was to be paid for by export earnings. As with any new model, local content for the 1000 was relatively low compared to the existing 800 model. In 1992, it was about 75 percent compared to 95 percent for the 800 and the Omni van models. The latter model belongs to the class of "micro-vans" using the same 800 cc engine of the Alto-based Maruti 800 car. It fills a useful niche for urban users because of its compact exterior dimensions combined with a large usable interior volume.

For the first half of 1990-1991, Maruti enjoyed a market share of over 58 percent among passenger cars (figure 16). The slowdown of the economy and the devaluation of the rupee in 1991 resulted in steep increases in the price of the 1000 model, well beyond initial expectations.

The shake-up of the Indian auto industry by Maruti caused repercussions among the other

manufacturers, as well. Premier Automobiles, renewing its association with Fiat, purchased the tooling for the production of the SEAT version of the Fiat 124. However, recognizing the acute importance of fuel efficiency due to the price of petroleum, the car (NE118) was reengineered to accept a Nissan 1.2 liter, four-cylinder engine, produced under license. Likewise, Hindustan Motors acquired the rights to make the Vauxhall Victor model (which had been phased out in the United Kingdom) as the Contessa. In this case, a modern four-cylinder Isuzu engine replaced the older GM engine. Standard Motors attempted a revival with the production of the Standard 2000, based on the Rover 3500 (SD1) but powered by its own four-cylinder, 2.0 liter engine. This car was marketed as a luxury automobile with numerous standard accessories such as electric windows and air-conditioning. At the other end of the scale, Sipani, a small manufacturer in Bangalore had obtained the license to manufacture the British Reliant Kitten. This car was offered as an economy model against the Maruti, seeking sales from customers who did not wish to wait for the delivery of a Maruti, for which demand greatly exceed supply.

Figure 16
Passenger Car Segment
Sales by Company



Source: AIAM Automan, 1991

While the Premier NE118 and the Hindustan Contessa quickly established themselves in the upper segments, they nevertheless represented less than 30 percent of each manufacturer's total volume. Premier had also contracted AVL of Austria for modifications to the engine design for the older Padmini model.

Significantly, while Maruti had planned for significant investment and production levels, the privately owned manufacturers attempted to economize by buying older designs that were discarded by western manufacturers—and at lower prices. Thus, while Maruti achieved large sales volumes and export prospects with a contemporary model line, Hindustan and Premier were content to achieve modest sales in a protected market. TELCO, which could also sustain these high investment levels, had applied for a license from the Indian government to undertake the manufacture of the Honda Accord, but was turned down.

This decision was both unfortunate and controversial. Indeed, TELCO, representing one private enterprise that could sustain the necessary investments and possessing the expertise (together with Honda), would have contributed significantly to the state of the Indian passenger car industry. Nevertheless, their delayed proposal came at a time when the flurry of foreign collaborations had already eaten into the exchange reserves maintained by the government. These further proposals caused more alarm about continued erosion. The lack of approval from the Indian government for this venture also gave the impression that the government was intent on protecting the market for its own enterprise—Maruti.

TELCO's efforts were redirected to its Tatamobile pick-up, which then served as the basis for a range of vehicles. Among them was the Tata Estate, a four-door station-wagon with styling inspired by the Mercedes-Benz 300D wagon model. Again, this vehicle was diesel powered and was priced at the higher end of the passenger car market. This model, in turn, was to serve as the basis of a TELCO designed mini-van, which was announced in 1992 and would share the drivetrain of the Estate.

Under the new economic climate in the country, Maruti will cease to function as a public sector undertaking. Suzuki has been allowed to increase its stake in the venture to 50 percent and plans are firmly in place to coordinate Maruti's strategy with that of Suzuki in the global market.

Export of passenger cars from India has, in recent years, been mainly due to the efforts of Maruti. Initially, batches of orders were received, mainly from Eastern Europe, including a significant order from Hungary. Growth in western Europe came mostly through some sales in France, where a distributor network was established. The products were mainly the Alto-based

Maruti 800 model. For 1990-1991, Maruti's exports accounted for 22,818 units. Maruti is also embarking on a Rs. 6 billion expansion to include production of a third model (YE2) aimed at the European market, meeting the post-1992 vehicle standards. However, negotiations between Suzuki and Hungary for local production in that country had been announced by this time, and another venture between Suzuki and Volkswagen in Spain was also aimed at the lower market segments in Europe. Further political and industrial development in Eastern Europe would likely bring other competition for Maruti within the European markets.

In the face of the 1991 recession, passenger car sales in India experienced a steep decline. This decrease was attributed not only to the effect of the recession, but also to the increase in the excise duty levied on car sales. A direct consequence of the excise duty increase was a large increase in the price of automobiles. The price of the Maruti 800 model increased by almost 25 percent to about Rs 170,000. No manufacturer was immune from the effects of these price increases. Total sales in this segment were expected to drop from 178,000 units in 1990-1991 to about 165,000 in 1991-1992. Maruti, which had seen a continuous growth in their annual sales each year expected sales in 1991-1992 to fall for the first time. Hindustan Motors cut production by about 40 percent and Premier was faced with a large inventory of unsold cars. New marketing promotions were used to try to stimulate sales, including rebates and offers of lengthened warranties.

In June 1992, a decrease in excise duty for passenger cars from 66 percent to 55 percent promised some relief for this segment. Also, this past year, Hindustan Motors' proposal with General Motors was approved by the government. The existing facilities of HM in Baroda were to be used for the production of Isuzu-based commercial vehicles and Opel cars. A probable scenario for this venture would involve local assembly of the Opel Astra from imported kits. The cost would be offset by credits earned through export of auto components.

It is also known that many European manufacturers, in addition to Ford, are also interested in exploring new options for passenger car manufacture in India. Premier Automobiles has reported interest in Indian production of the Fiat Uno and the Peugeot 205.

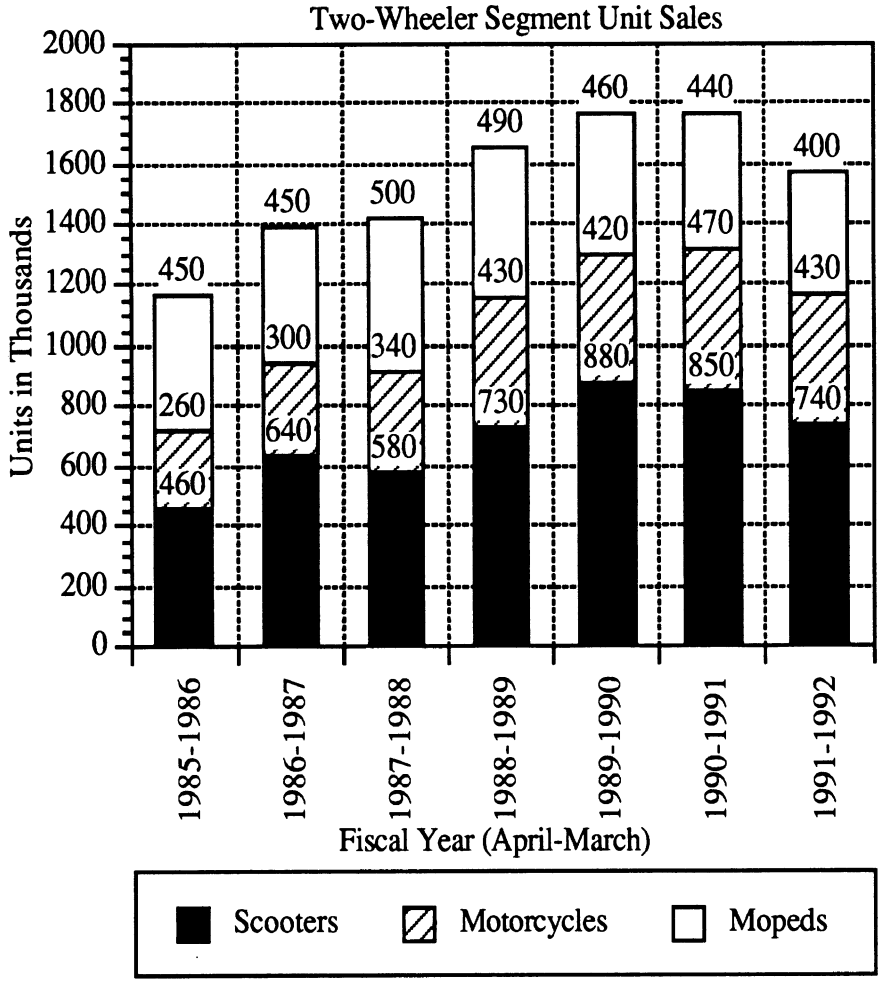
Two-Wheelers

In calendar year 1989, India became simultaneously the largest manufacturer and the largest market for two-wheelers in the world. For that year, production amounted to 1.73 million units compared to 1.69 million in Japan. For the first of half of 1990-1991, sales increased to 1.21 million compared to 1.12 million for the previous year. This scenario could hardly have been

anticipated ten years ago.

The two-wheeler segment in India may be divided into three subsegments: motorcycles, scooters and mopeds. Scooters account for about 40 percent of this total market, with motorcycles and mopeds each accounting for about 30 percent (figure 17).

Figure 17
Two-Wheeler Segment Unit Sales



Source: AIAM Automan, 1991

The two-wheeler industry in India began in the 1950s with local assembly of European products. Royal Enfield, of the United Kingdom, began production of the four-stroke 350 cc Bullet in Madras by 1955. Piaggio, the makers of Vespa scooters in association with Bajaj Auto, and Innocenti, the makers of Lambretta scooters with API, both launched their 150 cc scooters. Two other entrants were Ideal Jawa, making the Jawa 250 cc model (under license from the Czechoslovakian maker), and Escorts, making the Rajdoot 175 (based on the product of WFM of

Poland).

Paralleling the trend in the passenger car industry, the two-wheeler industry also saw a period of continued growth and increasing local content through the 1960s. The following decade saw the Indian participants going their own way. Bajaj consolidated its position as the major player, discontinued its connection with Piaggio, and marketed the scooters under the Bajaj brand-name. Likewise the Jawa 250 became the Yezdi 250.

By the mid-1970s, the government adopted a policy of promoting the growth of the two-wheeler industry. This was viewed as an attempt to provide mobility for the large middle-class population without incurring the larger consumption of petroleum products for cars. By this time, it was clear that scooters were the preferred form of two-wheelers, since they were used as basic transport rather than recreation. The enclosed wheels and drive system permitted greater comfort for two-up travel in urban areas. When Innocenti, in Italy, suffered through poor sales and ultimately exited the scooter business, its entire line was bought by a new public-sector undertaking, Scooters India Ltd. The plan involved large scale manufacture of scooters and powerplants at the central facility in the state of Uttar Pradesh. Numerous affiliates were established in various states to assemble these scooters with powerplants purchased from the central facility. The government thus attempted to spread the growth of infrastructure throughout the country and to provide more balanced employment opportunities.

While the exercise was initially successful, the longterm prospects were doomed from the start. No single assembly venture could achieve the economies of scale necessary for success. The lack of coordinated strategy and planning further complicated prospects. In contrast, Bajaj Auto had compiled an enviable reputation with a long waiting list for its well regarded product. Its annual production exceeded that of all the affiliates of Scooters India Ltd.

Moped production was also encouraged about this time. Through the 1970s, moped production increased from a trickle to exceed that of motorcycles by 1980. Mopeds India Ltd. was a market leader with their Suvega models, based on a design of Motobecane of France. Kinetic Engineering in Pune introduced its Luna moped based loosely on the Piaggio Ciao model from Italy. Later, Kelvinator of India started production of the Avanti-Garelli. In contrast, Majestic Auto's line of mopeds was indigenously designed and produced. TVS locally designed and built the TVS-50 model. While Mopeds India was the initial market leaders by the mid 1980s, Kinetic, TVS, and Hero Majestic were the major players. For a brief period between 1983 and 1986, moped production in the country even exceeded scooter production. In 1986, the Majestic group acquired all the manufacturing rights for the entire line of Puch mopeds from Austria when

Steyr-Daimler-Puch decided to get out of the moped segment.

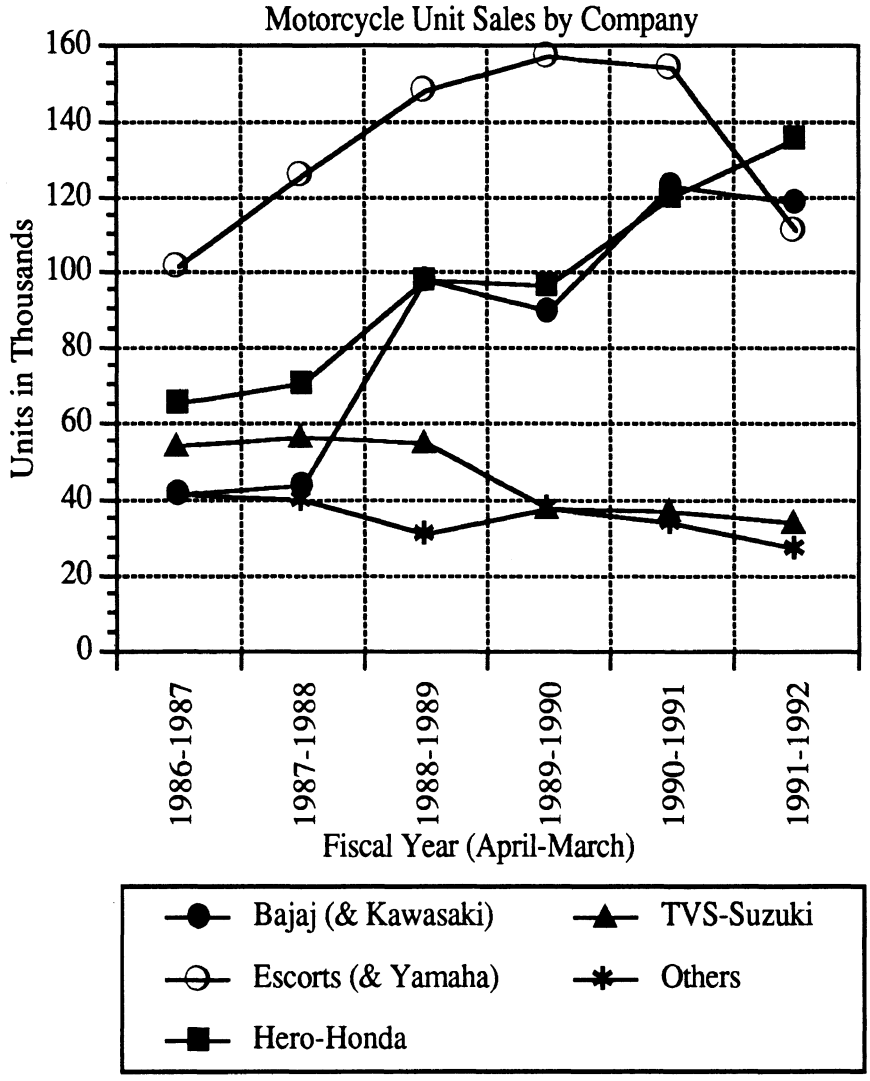
Motorcycles

The motorcycle industry witnessed a thorough shake-up in the 1980s following the arrival of the Japanese manufacturers. This coincided with the arrival of Suzuki's passenger car venture with Maruti. In a few years, all four of the major Japanese motorcycle makers were in India. In each case, a joint venture with a local industry was established. In all cases, existing manufacturers of two-wheelers in India were involved. Thus TVS joined with Suzuki, Bajaj with Kawasaki, Escorts with Yamaha, and Hero with Honda. The products were very similar in the 100 cc two-stroke class, with the exception of the Hero-Honda CB-100 four-stroke model.

Enfield, who used to have a strong position in the motorcycle segment, had also forged links with external partners. It had bought designs and tooling from Zundapp when that German manufacturer was closing operations. Two models, the Explorer (a 50cc motorcycle) and the sporty Fury (a 175 cc model), were offered as alternatives to the Japanese designs. Enfield also persisted with the older four-stroke Bullet and expanded that range with a 500 cc model. These older designs, though expensive, have gained a reputation not unlike that of Harley-Davidson in the face of Japanese competition.

By the end of the 1980s, Escorts, offering the older and less expensive design (Rajdoot 175), as well as the newer Yamaha RD100 model, continued to hold the largest market share. Hero-Honda had made the most impressive gains in terms of acquiring new market share, and their four-stroke model had gained a reputation for remarkable fuel efficiency and reliability. The model range was expanded by the launch of the Sleek, a sporty version of the base model (figure 18). Production for 1991-1992 stood at 135,000 units, representing a 15.5 percent increase over 1990-1991. A net profit of Rs. 160 million was reported on sales of Rs. 2.75 billion. Bajaj, whose Kawasaki-based KB100 did not reach the expected sales levels, was forced to launch a new Kawasaki-based four-stroke model, the 4S, to counter the success of Hero-Honda.

Figure 18



Source: AIAM Automan, 1991

Mopeds

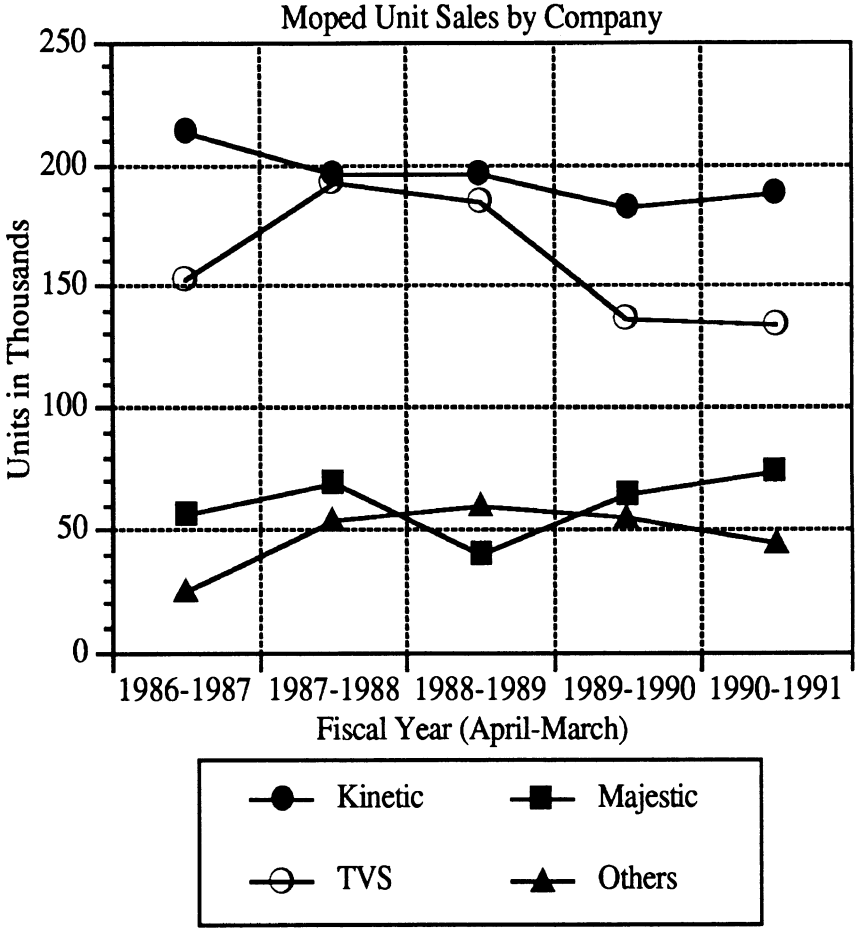
TVS and Kinetic Engineering have strengthened their domination of the moped segment. The range of models has increased rapidly and now includes low-cost sub-50 cc models that are exempt from registration requirements with the motor-vehicle authorities and can be operated without a drivers license. On the other end of the scale, many step-through models (typically 60 cc) with seating for two are also offered by TVS, Kinetic, and Majestic (figure 19).

Mopeds have played a significant role in filling the transportation requirements of many urban commuters. This is particularly linked to the lack of adequate public transportation in many of the growing cities. Since they cost less than half as much as scooters and even less when

compared to motorcycles, they are more affordable.

Figure 19

Moped Unit Sales by Company



Source: AIAM Automan, 1991

The dependence of the manufacturers on old designs from the West is noteworthy. In the moped segment, the level of technology exists to encourage indigenous design and development. TVS had achieved a measure of success following this route. On the other hand, Kinetic, having obtained the original design, has invested in product engineering and development for further adaptation to the Indian operating conditions. It is unclear if buying further technology and manufacturing rights for foreign designs is economically justified, particularly in view of the scarce foreign exchange it requires.

Scooters

Scooters are by far the most popular types of two-wheelers in the Indian market, reflecting the role of the scooter as urban commuter transport rather than as a recreation vehicle.

The domination of the scooter segment by Bajaj continued through the 1980s, with a

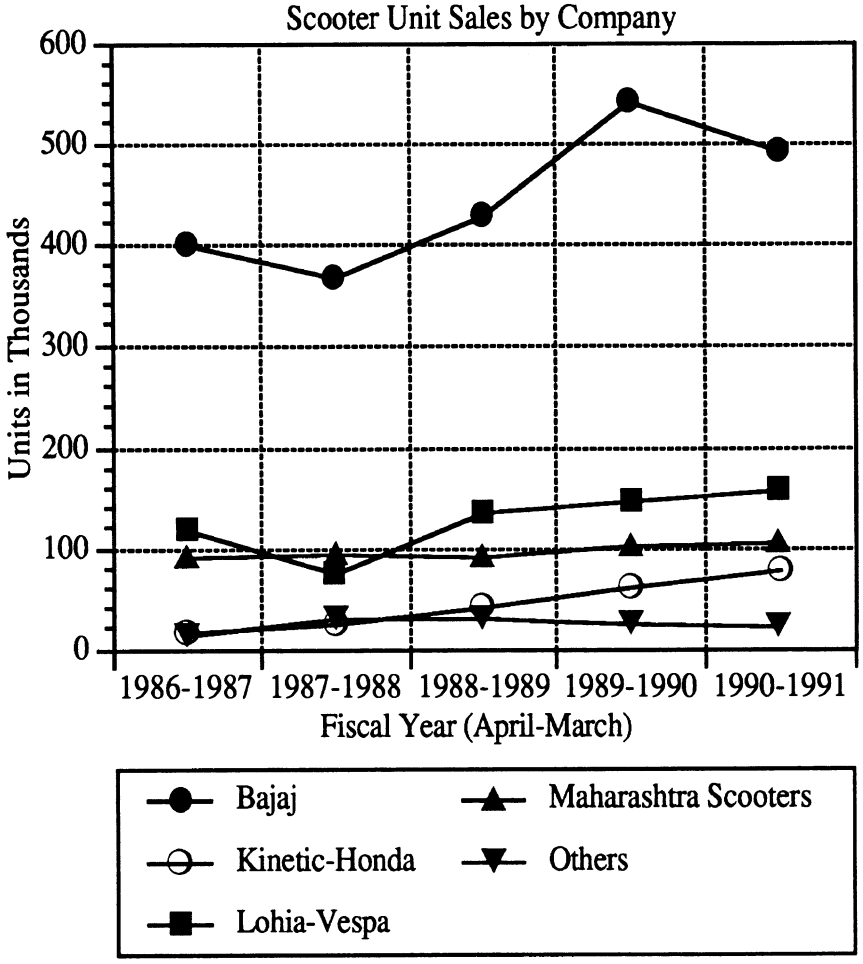
market share of over 60 percent, even in the face of competition from Lohia-Vespa and Kinetic-Honda. Bajaj had for many years refined the basic design of the Super and Chetak models. However, anticipating newer models from the competition, it has recently launched new designs—the Stride and the Legend. Initial reports indicate that Bajaj had researched the market very well. The new products also contain improvements learned from the association with Kawasaki. In addition, a new class of vehicles for the Indian market was launched with the Sunny, a 50cc scooterette that is similar to the Honda Spree and Yamaha Razz models. The Sunny is a product of Bajaj's own design and engineering and is an attempt to bring the popular scooter class of vehicles to a lower price segment.

Nevertheless, among scooter manufacturers, Kinetic-Honda has displaced Bajaj as the success story. Although still trailing Bajaj in sales volume, it has achieved a significant increase in market share and exports. Here, the key to success has been the modern design of its product (based on the Honda Elite) and its many user-friendly features, including automatic transmission and electric start. This is backed by Honda's reputation for reliability (figure 20).

Piaggio's return to the Indian market came through a joint venture with Lohia Machines Ltd. (LML) for a model based on the newer Vespa design. Although, LML had reached second in sales behind Bajaj by 1990 (145,000 units), performance since then has declined. Sales for the first six months of 1992 were 43 percent lower than those for 1991.

Figure 20

Scooter Unit Sales by Company



Source: AIAM Automan, 1991

In addition to these major players, two other licensees of Bajaj (Maharastra Scooters and Gujarat Narmada Auto Ltd.) also offer models based on Bajaj designs. These models compete mainly on the basis of price. Automotive Products, pioneers in this field in India, have ceased to play any role in this segment.

The excise duty increases imposed in 1991 saw two-wheeler prices go up very sharply. Between 1989 and 1992, the price increase for a Kinetic-Honda was 44 percent. Almost at the same time, the price of fuel also increased. Faced with the consequent drop in overall consumer demand in 1991, Bajaj saw sales decline from 540,000 in 1989-1990 to 492,000 in 1991-1992. In comparison, Kinetic-Honda increased sales from 60,500 to 87,500 over that same period and expected to reach 100,000 units for 1991-1992.

As the total domestic production of two-wheelers grew to meet local demands, manufacturers have been forced to look to exports for continued growth. The recession of 1991 provided further incentive to this effort, since local demand decreased for the first time in many years, and the devaluation of the rupee made Indian products less expensive in the export markets. However, in the process, some manufacturers have done better than others for many reasons (table 9).

Table 9
Profiles of the Major Manufacturers of Two-Wheelers
1990-1991

Company	Sales (million Rs.)	Net Profit (million Rs.)	Production (x 1000)
Bajaj Auto	12,199	563.4	693.0
Enfield India	723	(69.9)	9.0
Escorts	9,760	333.9	154.3
Hero-Honda	1,510	(3.2)	120.1
Kinetic Engineering	1,240	32.3	163.3
Kinetic-Honda	1,320	43.9	105.2
Lohia Machines Ltd.	1,724	22.9	153.6
Majestic Auto	412	(48.3)	76.4
TVS-Suzuki	1,422	(64.9)	162.8

Source : Capital Market, September 1991 and AIAM Automan, 1991.

Hero-Honda's 100cc motorcycle has been very successful in the domestic market and also in several export markets. Consequently, an expansion of capacity is planned to 160,000 units in 1993-1994 and up to 300,000 units by 1995-1996. These plans include introduction of a new

model and addition of emission controls to the vehicle. This has been possible only through the close participation of Honda Motors in Japan and a coordinated strategy. In contrast, numerous difficulties have been reported in Escorts' initiatives for export because of conflicts with Yamaha's plans. This has led to Escorts seeking a new partnership with BMW. This venture has been recently granted approval by the government.

Export growth is also the target for many of the moped manufacturers. Majestic Auto expects export revenues to increase from Rs. 75 million in 1991-1992 to Rs. 200 million in 1992-1993. The line of Hero-Puch mopeds has found favorable acceptance in these export markets even in the face of Japanese and European competition—primarily by virtue of being lower priced. Majestic Auto will start an assembly operation in Mauritius in 1992. Likewise, Kinetic Engineering (Luna) has made some inroads into European markets for mopeds, as well as for small displacement engines.

In contrast, Bajaj's record has been discouraging. Their exports declined from Rs. 200 million in 1990-1991 to Rs. 149 million for 1991-1992. A fresh start will have to be made with the new line of scooters. Unlike the moped segment, where price is the critical differentiator, the scooter segment relies to a greater extent on model design and technology. Bajaj has shown that it has applied lessons learned from its association with Kawasaki on its new in-house scooter designs. It will continue to face challenges to innovate, to compete with Honda and other worldwide scooter manufacturers. Toward this goal, Bajaj has signed a license agreement with Orbital for its modern two-stroke engine design.

Escorts, in its efforts to acquire new technology, has contracted Riccardo in the U.K. for improvements to its engine designs. In addition, a new range of motorcycles is expected as the result of its new association with BMW.

Bajaj Auto also produces a significant volume of three-wheelers, derived from its range of two-wheelers. Very popular as "auto-rickshaws," these are widely used as inexpensive city cabs and can trace their origin to the similar range of vehicles made by Piaggio. For the year 1991-1992, Bajaj sold 69,600 three-wheelers out of a total market of 76,700 units. The powerplant for the rear-engined model is based on the 150 cc two-stroke scooter engine. This vehicle, in many ways, represents the kind of low-cost and maneuverable "taxi" that is imminently suitable to third world cities.

With public transport failing to keep pace with the growing demand of urban commuters, there is little doubt that this segment will continue to grow. Current estimates forecast growth at about 15 to 20 percent for the next three years.

AUTOMOTIVE COMPONENT INDUSTRY

The evolution of the automotive component industry predictably followed the evolution of the auto industry itself. With the start up of local production of cars, trucks, and two-wheelers in the 1950s, many of the associated component manufacturers (mainly from Europe) started operations in India. Over a period of time, many of the major manufacturers had established plants for manufacture or assembly of parts. These included companies like Bosch (fuel injection systems and spark plugs) and Mahle (pistons) from Germany; Lucas (auto electricals), Girling (brakes), and Lockheed (clutches) from the United Kingdom; and Champion (spark plugs), Armstrong (shock absorbers), and Union Carbide-Exide (batteries) from the United States. From the Indian perspective, these units were primarily intended to aid import substitution. In the process, there was gradual transfer of technology from the parent company.

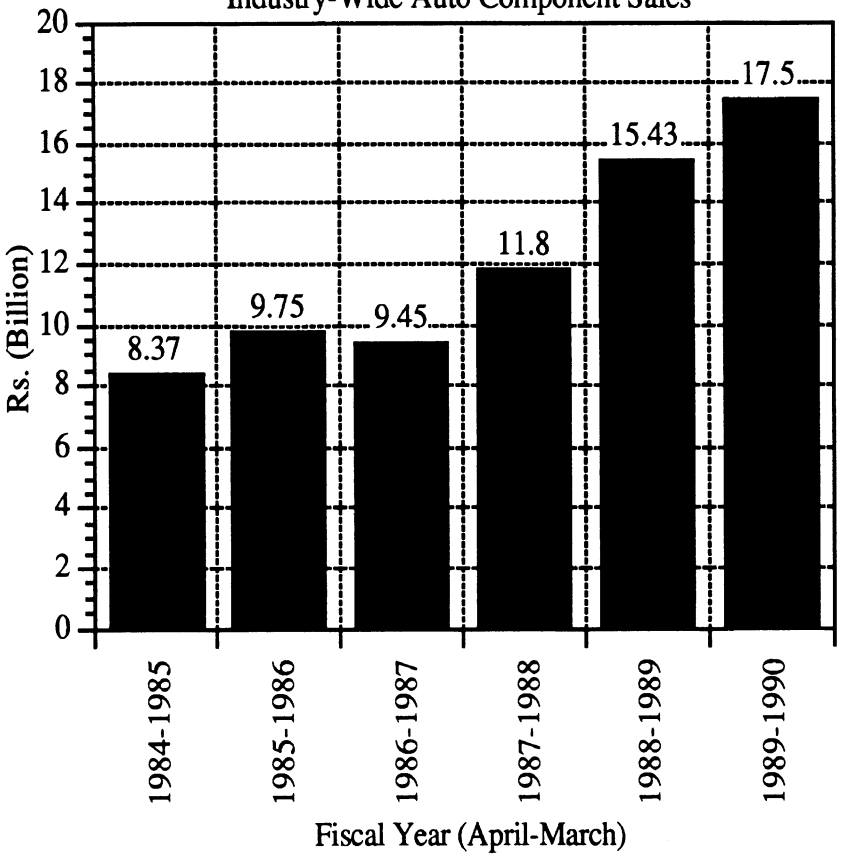
A second phase in the evolution saw many established Indian companies tie up with western manufacturers for technical collaboration. Examples include Modi Tyres, which linked with Continental Tyres in Germany ,and Yenkay, which obtained licenses from VDO for dashboard instruments. In some cases, efforts at export were initiated, usually with the help of the foreign collaborator.

The auto component industry received a major boost along with the auto industry in the 1980s. Annual growth was usually over ten percent and industry-wide sales more than doubled between 1984-1985 and 1989-1990 (figure 21). Industry sales figures from 1988-1989 included 39 percent related to engine components, 24 percent for transmission and steering parts, 17 percent for suspensions and brake parts, and about 8 percent for auto electrical parts.

The arrival of the Japanese in the Indian auto industry (for cars, trucks and two-wheelers) saw a major new source of joint-ventures emerge in the 1980s. Companies such as Nippondenso and NGK followed the Japanese automakers into India with joint-ventures or technical collaborations. In 1990, the United Kingdom still led with the most joint-ventures (104) followed by Germany (74), the United States (70), Japan (67), Italy (30), and France (28).

Figure 21

Industry-Wide Auto Component Sales



Source: Hindu Economic Survey, 1990

The arrival of the Japanese into the auto component industry also provided a new boost to quality control. During the 1970s, the Indian auto industry had lost direct relevance to the global industry, since its products were obsolete. As a consequence, prospects for exports were severely restricted, except for those cases where technology had been upgraded for the component manufacture with help from the foreign collaborator. Even in these cases, exports were directly related to some form of buy-back arrangement with the foreign partner providing distribution and marketing. With the arrival of the Maruti and the Japanese joint-venture LCVs, a range of products that were contemporary by global standards was again produced. Furthermore, a renewed discipline for quality control had been instilled for these new products. All this has led to an improved outlook for export prospects for auto components from India (table 10).

Export of components (excluding tires) doubled between 1986-1987 and 1990-1991 (figure 22). For the year 2000, a target of Rs. 9.4 billion has been set by the government, a six-fold increase from 1990-1991. While this figure is aggressive, it will still represent only 0.2 percent of the global component market forecast for 2000. While much of the exports have been

to the replacement market in western countries, there has been some growth, in recent years, for OEM markets. MICO, one of the largest component manufacturers in India, with a license from Bosch, achieved over Rs. 30 billion in export sales for 1990-1991—more than ten percent of its total sales for that year. MICO has been selected as one of the global sources for Bosch for some its component lines. In 1992 MICO announced plans to expand capacity from 7.2 million spark plugs to 30 million units. Of this, 12 million units were to be exported. At the same time MICO was also to serve as a purchasing agent for Bosch in India, to identify local suppliers that could meet specific needs for Bosch in Germany.

Table 10
Installed Capacity for Selected Auto Components
1989

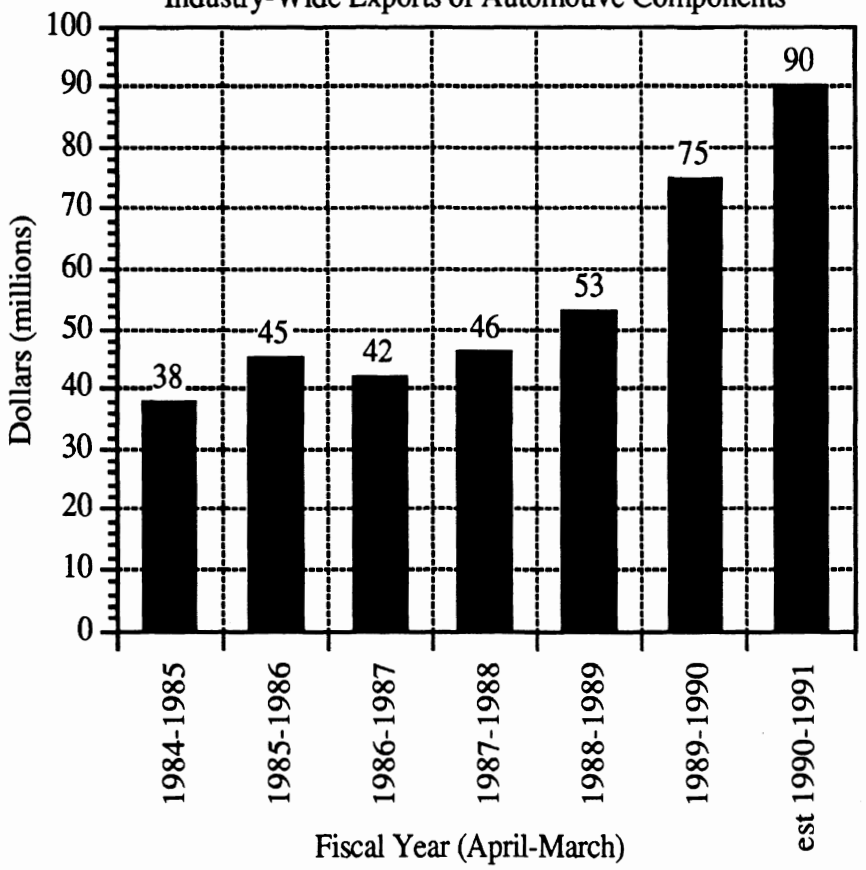
Components	Units
Pistons	9.1 million
Fuel pumps	1.5 million
Radiators	0.4 million
Spark-plugs	15.0 million
Wheels	2.7 million
Shock absorbers	7.0 million
Headlamps	3.6 million

Source: ACAM

More recently, Ford has announced a joint venture with Maruti for the manufacture of aluminum automotive radiators, an undertaking that also included minority participation of Sumitomo of Japan. The new company, Climate Control (India) will be capitalized at Rs. 240 million and have an annually planned capacity of 300,000 radiators per shift. Export sales will account for some of this output. Likewise, in reaction to the new initiatives of the Indian government at inviting foreign capital and industry, GM has announced participation with Hindustan Motors for making auto components for export to GM subsidiaries worldwide. GM is expected to own 30 percent of the venture that will be capitalized at about Rs. 8.0 billion. Volkswagen was also reporting interest in India for component sourcing.

Figure 22

Industry-Wide Exports of Automotive Components



Source: Hindu Economic Survey, 1990

Automotive Tires

The Indian automotive tire industry is large enough that it requires special mention (table 11). In marked contrast to the auto industry, there has been excess capacity for many years, resulting from a diverse group of manufacturers. Five of the six major global manufacturers are represented in India through subsidiaries or licensees: Pirelli, Sumitomo (Dunlop), Goodyear, Continental, and Michelin (Goodrich). More recently, a new wave of local manufacturers has joined the fray, backed, in some cases, by large industrial houses such as Birlas and JK.

Table 11
Production of Automotive Tires by Sector
1989

Tire Sector	Units
Passenger cars and LUVs	2.9 million
MCVs and HCVs	5.1 million
Two-wheelers	5.7 million

Source: AIAM, 1991.

The major manufacturers are MRF (Michelin-Goodrich) with installed capacity of 2.9 million tires annually, Dunlop India with 2.0 million, Ceat with 2.7 million, and Modi (Continental) with 1.9 million. However, it is inevitable that there will be a shake out, as excess capacity has resulted in keen competition. As a result, cost increases (mainly through cost of raw materials) are not fully passed on to the market. The load regulations for commercial vehicles are being more strictly enforced and more passenger cars are switching to radial tires—both factors contributing to increased tire life. At the same time, many of the players are planning large investments for modernization and increased production of radial tires.

Exports are one potential source of growth. For 1990-1991, exports amounted to about Rs. 1.5 billion. Currently, much of the export is directed to the replacement market or for use with industrial equipment and vehicle trailers. These are almost exclusively the cross-ply type of tires, which are being abandoned by foreign manufacturers. Nevertheless, it is likely to remain a small market for the foreseeable future. On the other hand, for environmental reasons there seems to be a gradual migration of tire production away from many OECD nations. These factors will have a bearing on the further evolution of the Indian tire industry.

FUTURE WORK

As stated at the outset, we intend this report to serve as a primer, with documentation of the evolution and current state of the Indian auto industry. An analysis of this industry, its prospects and potential future strategies, will be the subject of a following report, addressing many of the questions that derive from this current primer. A brief list of some of the more critical questions follows.

1. To many observers, the growth of the Indian auto industry in the 1980s was proof of its potential. Modern technology was successfully absorbed and domestic as well as export markets expanded. However, the downturn in 1991 and 1992, as a result of the economy and government policies, made a strong impression. The key question is whether that setback was temporary or part of a structural adjustment of domestic market potential.

2. The first question will have to be answered in the context of government policy. In other words, will the government restrict growth of domestic sales, and should it?

3. Most of the successful vehicles lines are those where local content is very high. To a certain extent, this is understandable in view of their greater insulation from rupee devaluations. The lessons from these successes with respect to indigenization require analysis.

4. With domestic constraints, export strategies will have to be properly linked with the foreign partners (in the case of joint ventures). Suzuki (cars) and Honda (motorcycles and scooters) seem to have achieved this coordination, while others have failed. What are the key elements of proposals for joint ventures that address these linkage issues?

5. What are the development levers deriving from government policies that can properly balance automobile sales, usage, and mass transportation?

6. The constraints of energy, congestion, and urban pollution by vehicles are all global problems, but are witnessed in much greater severity in India. What are the potential opportunities to deploy new technology in these areas in advance of other countries? The severity of these constraints alters many of the standard assumptions that are valid for other countries.

REFERENCES

1. Census of India, *Provisional Population*, 1991.

2. Garg, Y.M., "Chinese Railways—Delivering the Goods," *Economic Times of India*, 23 September, 1991.

3. Economist Intelligence Unit, *India*, country profiles, 1991-1992.

4. Sivaramakrishnan, K.C., "Move from Private to Public Transport," *Economic Times of India*, 4 October 1991.

5. India: 1991, *Observer Statistical Handbook*, Observer Research Foundation.

6. Seshan, P.A., *Hard Choices for Planners*, The Hindu Survey of Indian Industry, 1990.

7. Chandra Mohan, N., "Economic Survey—Valuable Pointers," *Business India*, 2 March 1992.

8. Bharadwaj, R., *Strategy for Sustainable Growth*, The Hindu Survey of Indian Industry, 1990.

9. Economic Survey of India 1990-1991, Government of India.

10. *Far Eastern Economic Review*, 3 October 1992.

11. *Automotive News*, 20 January, 1992.

12. Eighth Five-Year Plan, 1992-1997, Planning Commission, Government of India.

13. *TERI Energy Data Directory and Year Book, 1987.*

14. Economist Intelligence Unit, Country Report (India), 02-1992.

15. *National Petroleum News, Factbook, 1990.*

16. Agarwal, K.C., "Urban Mass Transportation in India," *Proceedings of the World Conference on Transport Research*, Rotterdam, 1977.

17. "Infrastructure and Transport", *Economic Times of India*, August 1991.

18. *Automan, 1991.* Association of Indian Automobile Manufacturers.

19. Sarna, A.C., "Importance of Nonmotorized Transport in India," *Transportation Research Record,* No. 1294.

20. *Planning of Road System for Bombay Metropolitan Region*, Volume V, Central Road Research Institute, New Delhi, 1991.