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MANAGING THE SUPPLY CHAIN FOR GLOBAL SUCCESS A CASE STUDY OF INDIAN AUTO COMPONENT INDUSTRY

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Introduction

From a country that sold just a few hundred thousand cars annually a decade ago, over a million cars roll out of Indian factories every year to fuel a vibrant component industry with global quality and technology standards.

McKinsey and Company has predicted that the Indian automobile component industry would grow to a whopping $33-40 billion by 2015, out of which the global outsourcing of components could be to the tune of $20-25 billion! The Indian auto component manufacturers would see an exponential growth in output over the next decade. The industry is growing at a compounded rate of 20-25%, much faster than that of the domestic market (10-14 %). Many consider this growth in exports as just the tip of the iceberg similar to that witnessed by the information technology industry in the early 1990s. The sustained growth of Indian auto component industry can be attributed to many factors, but primarily to efficient management of the supply chain.

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Auto Ancillary industry ± post liberalisation

In 1993, the Indian government deregulated entry into the auto industry, jettisoned the use of licenses to control output levels and significantly reduced the import tariffs on auto components. These changes led to an influx of globally competitive auto assemblers into the passenger car market.

Specifically, 12 world-class auto firms including Ford, General Motors, Hyundai, Daewoo, Honda, Toyota, Fiat and Mercedes Benz entered this market segment. Previously, there were only four car assemblers in the country with Maruti-Suzuki, India's leading car assembler, holding a 62% market share. As a result of this influx of assemblers the planned production capacity exceeds the estimated demand for cars in the country. Competition among auto assemblers is intense and firms are restructuring to cut costs, enhance quality and enhance their responsiveness to demand. To achieve these goals in a globally b-competitive economy, enterprises must pay continuous attention to increasing responsiveness to changes in customer demand and to maintenance of competitive advantage over their rivals. As a part of this constant review and search for improvement, supply chain management is a critical area. Literature on industrial competitiveness also emphasis, efficient and well management supply chain as critical for competitive success in global industry (Gereffi & Korzenierwicz, 1994; Porter, 1990)

Managing the supply chain ± key to Global success

In any supply chain process improvement is achieved through collaborative working between buyers and suppliers. This may involve joint product development, common system design and shared information. Such collaboration across each partner's core business processes may involve a range of partnerships covering buyer- supplier relations, vendor managed inventory and information sharing. In the context of supply chain management, investments in shared or compatible high technology and manufacturing systems (such as MRPII systems) and common approaches to cycle time reduction are the kind of routes that may be taken to improve performance. (Mason- Jones and Towill, 1999)

There are a number of papers that have used empirical approaches to understand industry supply chains. Randall and Ulrich (2001) study product

variety and supply chain structure in the US bicycle industry. Terweisch and Loch (1999) measure the effectiveness of overlapping development activities by studying development projects in global electronic industries.

Raman, DeHoratius and Tonn (2001) discuss the impact of execution in retail operations. Rajagopalan and Malhotra (2001) study if the US manufacturing inventories have really decreased. Corbett (2003) and Corbett et al (2002) study the impact of ISO 9000 on firms and supply chains. Gaur, Fisher and Raman (2004) study inventory turnover in retail stores. The empirical analysis of the quality improvements and supply chain of the Indian auto industry suggests that the Indian industry has been forced to change its production frontier through the adoption of quality improvement techniques and lead manufacturing techniques. While the auto industry has not seen improved margins, it has set the stage for entry of OEMs into the Indian market. Evolution for the Indian auto ancillary sector has been driven by changes in the do mestic market particularly by the agenda set by the OEMs. OEMs have responded to price and heightened competition by undertaking initiatives such as TQM and TPM to protect their brands. They are trying to increase exports by capitalizing in their low volume, high variety, and low cost manufacturing capability. The cost structure is shown below in table I. It is clear that any analysis should focus on material cost, labor costs and other manufacturing costs.

Table I

Cost Item	%
Material Costs	51.3
Power & Fuel	3.8
Employee Costs	12.5
Other manufacturing Expenses	6.9

The auto ancillary industry caters to three broad categories of the market:

1. Original equipment manufacturers (OEM) or vehicle manufacturers, those compromises of 25 % total demand
1. Replacement market that compromises 65% of the total demand.
2. Export Market, that compromises primarily of international Tier I suppliers and constitutes 10% of the total demand

Tracing the growth of auto industry post liberalisation

The implementation of lean production involves three management led transformations: transformation of design, restructuring of assembler-supplier relations and reorganization of production along the lines of JIT and TQM (Humprey, 1995).

Many lean assemblers require their suppliers to deliver several times a day, and the deliveries tend to be tightly scheduled. In the leanest firms, such as Toyota, deliveries may require to arrive within a narrow, two hour window.

Parts are delivered directly to the assembly line to be fitted into the vehicle; they are neither tested nor warehoused at the assembly plant. As there are minimal buffer inventories at the assembly plant, a few hours delay in delivery can stop the entire assembly line the costs of such a delay are prohibitive. This system is incredibly fragile particularly because in a truly lean system every system in the chain is lean. The lean paradigm thus requires all participants and systems to be synchronized like the clockwork and to perform unfailingly.

Restructuring the auto industry

In order to meet the demands of the Global industry, out beat the competition and effectively manage the supply chain, Indian auto ancillary units embraced the concept of tiersation. Tiersation helped to reduce costs substantially by reducing the number of direct suppliers (i.e. purchase cost), providing economies of scale to suppliers through large volumes, sharing design and development costs of components, reducing time for vendor development, reducing capital investment for assembling subsystem etc.

The process of tiersation entailed a greater interdependence between the tow levels of the industry. The infrastructural problems in India made proximity crucial to implementing just in time production in the Indian auto industry. Assemblers in India selected locations with a significant existing supplier base, clattering with other assemblers and pushing suppliers to relocate in close proximity to their own assembly plants. Transportation combined with the logic of lean production determines the geography of production in the Indian auto industry.

Supply Chain Performance the India Auto Component Industry

Delivery parameters are linked to the Supply Chain metrics of an organization. From being a shoddy performer a couple of years back, auto ancillary units have managed the supply chain well and scaled new peaks of efficiency. Today all the automobile OEMs demand JIT supplies and daily milk runs and the use of third party logistics (3PL) for component supplies.

The result is that OEMs no longer maintain large stock of components / raw materials but instead leave it to their suppliers to ensure that there is smooth flow of parts in the logistics pipeline. Table below illustrates the improved delivery performance of the auto component industry.

2001	2005
Component suppliers used "push" systems minimum batch quantity	Component suppliers use Kanban bin systems "pull" systems
Functionally oriented delivery systems	Integrated supply chain systems
OEMs maintained raw material and components inventory at their end	Stocks maintained by suppliers to service their OES JIT systems
Key Delivery Metrics : On Time Delivery OEMs 70 to 80% JIT adherence 80 to 90 % Milk Van Residence Time 60 min	On Time Delivery OEMs 90 to 100% JIT adherence > 95% Milk Van Residence Time 30 to 45min

Source: Customer Satisfaction Tracking Surveys

Localization & Clustering in the Indian auto Industry

Several of the major car assemblers in India are implementing localization or a "clustering" strategy. Many of the entrants into the industry have chosen to locate their assembly plants in the vicinity of other new or existing plants and near a significant supply base.

Thus Daewoo and Honda have located relatively close to each other and within 80 Kms of Maruti's plant. This location allows them to exploit the significant supply base Maruti has developed in and around Delhi area.

Similarly Hyundai and Mitsubishi have followed Ford to Chennai which has the largest auto component supply bases outside Delhi and the three plants are located within 50 kms radius from each other. Assemblers are also implementing strategies to establish a manufacturing facility in close proximity to their own assembly plants. Daewoo is emulation Maruti's supplier park strategy while Hyundai and Ford are using new supplier selection criteria to achieve the same goal. The fact that the assemblers have chosen to cluster near each other makes it easier to convince suppliers to invest in a new facility in their vicinity. For instance, both Hyundai and Ford negotiate with suppliers arguing that it is neither risky nor uneconomical from suppliers to invest in a new facility in the area precisely because the new plant can be used to serve the deed of all three assemblers in that area.

The emergence and expansion of these clusters is being driven by a mechanisistic concern, that is, the desire to offset infrastructure constraints. By clustering, assemblers reduce their vulnerability to and demand for transportation services and therefore, reduce both the direct costs and external diseconomies associated with poor transportation systems. In addition, the clustering strategy potentially (and also in the long run) offers many of the benefits that the literature traditionally associates with proximity - in particular, the collaboration benefits that the literature emphasis and the benefits associated with the emergence of Marshallian external economies (i.e., technical spillovers and improving access to specialized inputs.

Ford: Tailoring SCM to the Indian Context

Ford's first integrated assembly facility in India was located in Chennai and started production in mid 1999, with an annual production of 25,000. But by Jan 2000, it had an effective logistics plan to minimize the adverse impacts of poor transporting systems on its supply chain.

Ford's Logistics Plan

About 45 of Ford's domestic suppliers were located in distant parts of the country such as Delhi, Pune and Mumbai area. These non-local suppliers

would account for about 30 % of its total domestic purchases of components and materials. Based on its analysis of Indian freight transportation situation, Ford concluded that its non local suppliers would not be able to meet the delivery benchmarks of its US and Europe suppliers were working with. So it recruited logistics companies to move materials and components to its Chennai plant in a manner that almost emulates a pure JIT system.

Ford and its logistics partner took change of the materials at the supplier's gate or at a common deliver point. Ford consolidated shipments form different suppliers in to a full truck loads, a system referred to as "cross-docking", the full truck would then be dispatched to Chennai. To facilitate cross-docking, Ford logistics department envisaged a system of "regional hubs" in Delhi, Bangalore and Pune. Thus Ford's logistics plan reduced the problems associated with poor transportation and distance by adopting state of art transportation planning and services. The logistics plan was one aspect of Ford's strategy for offsetting infrastructure problems. The more significant component of Ford's transport solution was the localization strategy, discussed below.

Ford Localized by using co-location as a supplier selection criterion

Ford encouraged its suppliers to locate in close proximity to its plants. Ford altered its supplier selection criteria, telling potential component suppliers that they need to be located in Chennai if they were serious about working with the company. Ford thus moved form its traditional supplier selection criteria of "price, quality & JIT delivery" to "price, quality and co-location".

To enhance localization of its supply chain, Ford developed a supplier-park within its own site (about 1 km from the assembly building) and hosted six firms to produce parts that were difficult to procure.

Conclusion

Indian auto component industry has been forced to change its production frontier through the adoption of quality improvement programmers and lean manufacturing techniques. While the industry has not seen improved margins, it has set the stage for entry of OEMs into the Indian market, who, through the use of the quality components available locally, has

managed to create cars with high local content at competitive domestic prices. The auto supply chains however are not properly consolidated and tierized. The Indian auto industry is small in size compared to the world market ($6.73 billion as compared to world market of $737 billion). But it is experiencing a growth rate of 20 - 25% in the past few years and is expected to remain that way. The auto industry trend points to the effective strategies adopted by the industry to become competitive and sustain in the Global market.

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