

Strategies for High Volume Supply Chains in India

by

Don J. Palathinkal

Bachelor of Science, Chemistry (December 2003)
University of North Carolina at Chapel Hill

Submitted to the
Department of Engineering Systems Division in partial fulfillment of the requirements for the degree of

Master of Engineering in Logistics

at the

Massachusetts Institute of Technology

June 2008

© 2008

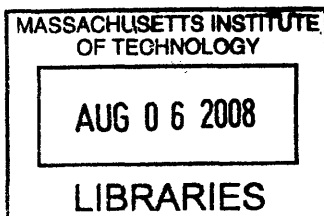
Don J. Palathinkal.
All rights reserved.

The author hereby grants to MIT permission to reproduce and to distribute publicly paper and electronic copies of this document in whole or in part

Signature of Author
Master of Engineering in Logistics Program, Engineering Systems Division
May 9, 2008

Certified by
Executive Director, Center for Latin-American Logistics Innovation (CLI) Partnership
Thesis Supervisor
Dr. Edgar Blanco

Accepted by
Prof. Yossi Sheffi
Professor, Engineering Systems Division
Professor, Civil and Environmental Engineering Department
Director, Center for Transportation and Logistics
Director, Engineering Systems Division



ARCHIVES

Strategies for High Volume Supply Chains in India

by

Don J. Palathinkal

Submitted to the
Department of Engineering Systems Division in partial fulfillment of the requirements for the
degree of
Master of Engineering in Logistics

Abstract

There are a lot of growth opportunities for multinational companies in emerging markets. These markets have a large consumer base but the market conditions in these regions are novel to these multinational companies. Various strategies evaluating government regulations, sales, marketing and supply chain have to be analyzed, isolated and implemented so that companies can quickly adapt to new market conditions. The purpose of this thesis is to review successful supply chain strategies adopted by multinationals catering to a large number of consumers in India. Based on the review, the thesis recommends insights for developing supply chains in emerging markets. To accomplish this, various strategies and literature on supplier, manufacturer and distributor partnerships were evaluated, compared and contrasted. Interviews with key management personnel across the supplier-manufacturer horizon were also conducted to gain insider perspective and information pertaining to supply chain issues. Current literature and public documents available have shown that successful supply chain strategies involved unique partnerships between local competitors and entering multinationals and also partnerships between local governments and direct source. Examples that stand out are the partnerships between PepsiCo and farmers in the state of Punjab, India or those of Project Shakti between women entrepreneurs from rural India and Hindustan Lever. This thesis recommends that such partnerships may hold the key to entering new markets in order to merge together different professional cultures without the risk of losing substantial investments in infrastructure. In addition, it also recommends the advantages of vertical integration for emerging markets like India. In addition, the findings on fragmentation within the echelons of supply chains propose opportunities for understanding developmental barriers.

Thesis Advisor: **Dr. Edgar Blanco**
Title: **Executive Director, Center for Latin-American Logistics Innovation**
 (CLI) Partnership

Acknowledgements

I would like to express my sincerest gratitude to my thesis advisor Dr. Edgar Blanco for his guidance and support during the duration of my thesis research.

I would also like to thank Dr. Christopher Caplice for his support as the Executive Director of the Master of Engineering in Logistics program and for giving me the opportunity to be a part of the Center of Transportation and Logistics at the Massachusetts Institute of Technology.

My sincere thanks also reach out to all participants in my thesis project especially the representatives of the various multinational firms that were interviewed and all those who were involved in a supporting role for the same. My appreciation also extends to my classmates and staff within the Master of Engineering in Logistics Program. I would like to thank Ms. Saskia Michl for her administrative support. I would also like to specially thank Mr. Roberto Perez Franco, MLOG alum and PhD candidate at MIT for his guidance.

Finally, I would like to thank my parents Cecily and Joy Palathinkal for their constant encouragement and guidance.

Table of Contents

Abstract	2
Acknowledgements	3
1. Introduction	6
2. Literature Review	7
2.1 Emerging Market Focus: India	7
2.2 The Consumer Products Industry	12
2.3 The Automotive Industry	16
2.4 Strategies of MNCs in the Indian Rural Sector	19
3. Methodology	23
3.1 Sample Selection	24
3.1.1 Sample Selection for the Consumer Products Industry	24
3.1.2 Sample Selection for the Automotive Industry.....	25
3.2 Data Collection and Analysis	26
3.2.1 Interviewee Selection	26
3.2.2 Interview Protocol	27
3.3 Data Analysis	28
3.4 Summary and Future Research	29
4. Case Studies: Discussion and Analysis	30
4.1 Case Study 1: PepsiCo India	30
4.1.1 PepsiCo India's Supply Chain	32
4.1.1.1 Procurement	
4.1.1.2 Manufacturing	
4.1.1.3 Distribution	
4.1.2 Challenges and Successes of PepsiCo India's Supply Chain	37
4.1.2.1 Challenges of PepsiCo India's supply chain	
4.1.2.2 Successful strategies of PepsiCo India	
4.1.3 Analysis of PepsiCo India's supply chain	43
4.1.3.1 Fragmentation within PepsiCo India	
4.1.3.2 Partnerships of PepsiCo India	
4.2 Case Study 2: Tata Motors and the Tata Nano Supply Chain	50
4.2.1 The Tata Nano Supply Chain	52
4.2.1.1 Suppliers	
4.2.1.2 The Auto-manufacturer; Tata Motors	
4.2.1.3 Distribution	
4.2.2 Challenges and Successes of Tata Motor's Supply Chain	61
4.2.2.1 Challenges of the automotive industry	
4.2.2.2 Successful strategies for Tata Nano's supply chain	
4.2.3 Analysis of Tata Nano's Supply Chain	68
4.2.3.1 Adoption of U.S. and Japanese practices	
4.2.3.2 Vertical Integration within the Tata Group	

4.3	Cross analysis of PepsiCo India and Tata Motors	72
4.3.1	Inefficiencies of Indian Market Conditions	73
4.3.1.1	Bad transportation infrastructure	
4.3.1.2	Obsolete practices, and blue collar skilled labor shortage	
4.3.2	Partnerships or Collaborations Customize Supply Chains	75
4.3.3	Advantages of Vertical Integration	78
5.	Conclusion	79
5.1	Summary	79
5.2	Future Research	80
5.2.1	Fragmentation within Supply Chain Echelons.....	82
5.2.2	Partnerships and Collaborations	86
	References	87

1. Introduction

Multinationals are seeking to pursue growth opportunities in emerging markets due to increased globalization and competition. India is one such emerging market that not only provides multinational companies with a large consumer base but also welcomes western products. Having a presence in India means sourcing, moving and processing up to one billion or more units. In addition, the cost expectations and the larger size of the consumer market will have implications on supply chains. Excellent supply chain strategies for India will involve adopting efficient processes enabling products to smoothly change hands from the supplier to the consumer while adapting to the constraints of cost, infrastructure availability and market size of this economy. Other constraints associated with political, religious or cultural barriers may also need to be considered. The initial part of the thesis explores existing literature on emerging markets and various industry segments in order to identify industry segments of interest. Later in the thesis, a case study methodology is applied to study multinationals from the consumer product goods and automotive industries operating in India, to understand the drawbacks and successes of adopted supply chain practices. For this purpose the practices of the operations in India were compared to the same practices in the U.S as well by affiliate multinational companies. The greater scope of the thesis is to isolate and identify the successful strategies that were adopted to overcome the challenges and utilize the findings to recommend additional research that could forecast trends or definitive characteristics of emerging markets. This is elaborated further through the analyses of the case studies and the conclusion of this thesis.

2. Literature Review

While the scope of academic research on “strategies for high volume supply chains in emerging markets” is severely limited, literature on the topic is mostly seen in the format of quarterly earnings statements, analyst reports and articles in trade journals or magazines on supply chain strategies adopted by multinationals. There are a smaller number of papers dealing with some aspect of the issue in research publications, but none solely dedicated to the topic. However, the review of these resources and the general business strategies adopted by existing players in emerging markets has given insights for this thesis. The literature review is structured to give a perspective on India and its market conditions, followed by information on various industry segments and companies within those segments. Special focus is placed on the consumer product goods industry and the automotive industry as they were the main industrial segments of focus for this country.

2.1 Emerging Market Focus: India

Emerging markets such as India, China and Brazil are characterized by their large and growing populations and their fast pace of developmental changes compared to the rest of the world. India, the country of focus in this thesis has a population of a billion plus (Census India, 2007) and an economy that is growing at an annual rate greater than 8% of GDP (United Nations, 2008). When compared with a developed nation like the U.S. (Table 1), India may seem far behind in terms of socio economic conditions. Part of this is because India is still recovering from turmoil since its independence from the British rule. Foreign trade restrictions were put in place during the 1970s by the then Indian government (Huang, 2008). The Indian economy had

deteriorated to a point where they were almost out of cash. Economic woes led to the liberalization of India in 1991 under the pressure of the U.S in what was infamously called “The Washington Consensus.” In spite of the contrasting differences between the Indian and U.S regions, it is common knowledge that investment opportunities abound in India. However, the greatest opportunity for multinationals seeking to expand in India depend on adapting to the large consumer base of the rural sector and more importantly to the rugged market conditions marked by lack of proper transportation or financial infrastructure that is essential for businesses to thrive. Making it more complex, such conditions are contrastingly different from the developed nations of Western Europe and the Americas, where most multinationals are based out of. Hence, supply chain strategies should account for the various characteristics that are reflective of the Indian region.

Characteristics	India	U.S.A
Population	1,151,751,462	302,841,222
Rural population (%)	71.3	19.2
Political Capital	New Delhi	Washington D.C.
Major Financial District	Mumbai	New York
Literacy Rate	64.8%	>90%
Per Capita GDP	\$3452 ¹	\$41,890
Unemployment Rate (%)	5	5
Expenditure on R&D as a % of GDP	0.6	2.7
Annual growth rate of GDP (%) in 2007	8.5	2.2
Annual CPI inflation rate (%) in 2007	5.2	2.7

Table 1: Comparison of economic and social statistics between India and U.S.A (un.org)

¹ UN estimate of \$784 is also present

For instance, India’s urban population (figure 1 shows India’s major urban regions) is expected to represent only 30% of its total population in 2010 mention Pingali and Khwaja (2004). This alone shows the potential of the rural sector as most of the growth currently seen in India is from the urban sector. While the spending power of the rural sector may be significantly less than that of the urban sectors, there is a large population concentration in rural regions for multinationals to target consumers at the bottom of the economic pyramid (Pralhad and Hammond, 2002).



Figure 1: Map of India showing major cities

Pingali and Khwaja also state that the adoption of different consumer norms that no longer conform to the traditional local habits will be observable as globalization further exerts its influence. For instance, they acknowledge that there is high potential for Indian suppliers to develop new production systems in order to meet the demands of large food outlets. Indian consumers are traditionally used to small scale food outlets. However, companies such as

Reliance and Tata are now entering the retail segment to bring about large scale outlets like those seen in the developed nations.

This brings up issues such as fragmentation, as for large scale retailers to flourish there is the need to have consolidated supply of agricultural produce. Indian farmlands have long been characterized by small scale farmers and fragmented land holdings among the rural agricultural sector due to which the benefits of large scale farming are not dominant when compared to Western farming practices. Several parts of rural India still suffer from discrimination based on caste system, due to which there is extreme poverty and illiteracy in these regions. As a result issues such as fragmented land ownership among farmers, inefficient farming and farm goods trading practices go through vicious cycles. Gandhi, Kumar, and Marsh (2001) cite the use of obsolete technology in agro-industry processing. They also note that processed and packaged goods are considered as luxury items and hence production is heavily taxed. This is perhaps why glass bottles are still common for the beverage industry when these were phased long before in markets like the U.S. Such obsolete technology and practices create problems for multinationals seeking to partner with local firms in underrepresented businesses or markets. Vertically integrated food supply chains can bring about the necessary transformation say Pingali and Khwaja. Attention should also be drawn to issues such as the commitment to tradition over innovation in India. Perhaps this is why obsolete practices are still predominant. After all, when local companies offer resistance to paradigmatic change and adequate change management practices are not implemented, profitability and growth are slowed down (Byrnes, 2008).

However, changes should incorporate adaptations to local conditions as well; such as “road conditions for transportation, income levels and idiosyncratic local preferences” (Humphrey and Salerno, 2000). For instance, the auto parts industry has to make suspensions

and brakes that adapt to Indian roads which are notorious for their treacherous conditions. The first logistics performance index and indicators places India at rank of thirty nine for Logistics Performance index while it is listed in positions 47, 42 and 39 for customs, infrastructure and international shipping rankings respectively, among countries worldwide (Arvis et al, 2007). However, there will always be high barriers to entry associated with doing business in an emerging market as each nation poses its own set of issues that may slow or halt progress. If it is China's authoritarian government or security issues, or potential currency fluctuations concerning Brazil, India is infamous for its weak infrastructure and its inability to support the current rate of economic development. In 2007, *Business Week* published its cover-story titled "The Trouble with India" that detailed how the pothole-filled roads, overcrowded airports and power failures that are a common theme across India, and could slow the nation's growth (Hamm and Lakshman, 2007). Maruti Suzuki, India's popular car manufacturer says that transferring cars a mere 900 miles from its Gurgaon factory to the Mumbai port could take as long as 10 days, a logistic hurdle that for an equivalent distance in the West would have taken less than 48 hours. Factors such as weather only compound congested facilities, report Hamm and Lakshman. For instance, Nokia lost thousands of cellular phones when monsoon rains soaked its shipment that could not be stored due to lack of storage space near the local airport in Chennai.

But there are a lot of reasons why multinationals should invest in emerging markets like India. Dr. Yasheng Huang at the Sloan School of Business at the Massachusetts Institute of Technology (MIT) states: "India is at least 10 years ahead of China when it comes to financial liberalization favoring businesses". Urban regions in India have and are still witnessing the advancements in social and economic conditions that foreign direct investment has brought

about. Raj and Selvaraj (2007) explain, “Rural India has a much larger market potential than urban India.” This is important, considering that entrepreneurial and consumer changes in urban India are what are responsible for the current economic prosperity that is sweeping across the nation. Multinational Corporations (MNCs) in the auto industry have seen rapid expansion thanks to liberalization in India (IBID). MNCs within the consumer product goods industry and the wireless telecom sector are the other industries that have seen rapid expansion as well. But these MNCs have also taken several innovative approaches in adapting to some of the conditions mentioned above. The next sections discuss some of the literature available on the various industries.

2.2 The Consumer Products Industry

In order to review multinationals that require high volume supply chains, A.C. Nielson’s list of billion dollar brands within consumer goods industry was referenced (Unknown, 2001). This list (Table 2) spans several different brands ranging from cigarettes or diapers to carbonated beverages. The carbonated beverage industry was decided to be focused on due to the impact that it has made on the Indian consumers since the re-entry of foreign MNCs such as PepsiCo and Coca Cola to the Indian market in the 1990s². Table 2 lists Coca-Cola and PepsiCo as the major players in the carbonated beverages industry, achieving sales in excess of \$15 Billion and in between \$5-\$15Billion annually for the Coke and Pepsi brands respectively. A popular commodity item, these products easily ship well over billion units in a year. However, this is

² In the 1970s, the Indian government imposed restrictions on several foreign MNCs due to which a lot of them pulled out of the nation. The P.V. Narasimha Rao government liberalized the economy under the influence of the “Washington Consensus” in 1991, re-opening the Indian economy to Foreign Direct Investment (FDI) and MNCs (Huang).

more on a global level. In emerging markets, there is the potential for these products to ship over a billion units in regions within a single country such as India itself.

Nevertheless, in order to ship supply chains of high volume or to be successful in an emerging market like India where the population exceeds one billion, a multinational should rely on highly customized supply chain strategies spanning sourcing, procurement and distribution. Consider sourcing for e.g., PepsiCo launched a program in conjunction with the state government of Punjab in India, to form partnerships with local farmers that benefited both parties (Dagar and Bajaj, 2007). PepsiCo provided the farmers with the seeds and agricultural know how to cultivate citrus plants for its Tropicana Brand. It also provided a rental income to the farmer to provide support for the period when there is no produce. Subsequently, when the plant bears fruit, the citrus joint venture and the farmer split the profits and PepsiCo could also target the region as a sourcing base for its Asia Pacific operations.

Another instance where PepsiCo used its expertise was in a program it established in 1994 to promote backward integration (Gandhi, Kumar, and Marsh). PepsiCo had a tomato processing plant for which it decided to utilize local farmers for raw material needs. Here PepsiCo made use of its marketing strength and resources to educate the farmers on farming technology and even provided the seedlings for the plants. "The farming was scheduled and programmed using computers. It then used its marketing power to sell the quality products. The model resulted in an initial 40 million rupee loss for Pepsi for three years but became substantially profitable after," quote Gandhi et al. According to local Indian sources, this project had a dual advantage. It helped to mitigate an inherent problem for PepsiCo that came with India's agricultural practices. First, it showed the farmers the advantages of the more modern Western agricultural practices and provided better farming resources such as high quality seeds.

Next it showed an alternative to overcome the problem of fragmentation of landholdings. This was because in addition to the individual farmers, they also encouraged certain farmers to consolidate land together and farm on it as a single unit thereby enabling to providing the small scale farmer glimpses of economies of scale. This was one of the first significant efforts from a multinational that took a step at earning profits through educating the masses, a move which was welcomed by the government as well. Prahalad and Hammond also recommend the need for educating the BOP consumers by MNCs in their article published by the Harvard Business Review: “Serving the World’s Poor, Profitably.”

Dagar and Bajaj also mention an interesting situation where an enterprising farmer from Punjab used his own land and leased additional farmland from others to form one big piece of farmland approximating 50 acres. “He has been associated with PepsiCo for the last seven years. The association spans the entire gamut of functions – sourcing planting material and taking cropping advice from agronomists and sometimes even selling the produce to the company” quotes Dagar and Bajaj.

Strategic alliances like those with the enterprising farmer to control supply can also be seen as an attempt to ease sourcing, manufacturing and distribution issues. However, the most interesting strategic alliances noticed in emerging markets are instances of partnerships with competition. A notable example is the case of Coca-Cola India and the Goodricke Group. The Goodricke Group owns several tea plantations in Assam and markets its own tea products. Coca-Cola India is utilizing this partnership to source its tea requirements for the Georgia line of tea and Coffee in the domestic market and for the Georgia Gold brand in the neighboring South-east Asian markets (Anonymous 1).

While these are findings most notable from the supply side of the chain, there are interesting details from the distribution aspect as well. The same author discusses Wal-Mart's interest in partnering with Reliance Industries Ltd (RIL). Wal-Mart would use RIL's existing reach transportation needs across the nation besides utilizing RIL's existing logistics platform to source fresh produce as well. Reliance was also one of the major industries from India to pioneer vertical integration according to the Reliance Industries Limited website (2008) when it started backwardly integrating its textile mills.

If Wal-Mart tried to partner with a vertically integrated Indian conglomerate to improve its operations, Coca-Cola India launched its ingenious strategy to target and reach across rural India (Raj and Selvaraj). For this purpose Coca-Cola India initially identified a list of high potential villages from India's various states. It supplied these distributors from its depots in the larger cities and the distributors appointed their own smaller distributors in their allocated regions. This enabled Coca-Cola to supply full truck loads to the distributors twice a week and not worry about logistics costs associated with reaching the deeper rural regions. Other innovative strategies promoting entrepreneurship have also been spearheaded by multinationals. Raj and Selvaraj mention the efforts of Hindustan Lever Limited (Unilever's Indian arm) to improve its distribution networks through "Project Shakti" which utilizes the efforts of self help groups for women in villages. Project Shakti promotes rural women to distribute products such as soaps and shampoos etc. The Harvard Business School has also provided an extensive case study on Project Shakti (Rangan and Rajan, 2005).

Beside the developments in the consumer product goods industry, equally interesting are the advances that have been seen in the automobile market. The next section discusses literature

sources on trends and practices of the automobile industry in both India and other markets, especially developed markets such as the U.S. and Japan.

2.3 The Automotive Industry

The automotive industry is one of the fastest growing segments in India. With the recent launch of the Tata Nano targeting the innumerable motorcycle and scooter users in India, one can expect a boom for automotive parts as well as the auto industry in India. While the number of finished cars shipped, may not hit one billion units soon, it can easily be inferred that automotive parts supply chains could be categorized under “high volume supply chains”. Mukherjee and Sastry (1996) even refer India along with China as an “emerging manufacturer” and not just an emerging market.

Humphrey and Salerno discuss about liberalization in India. Before liberalization, the automotive industry was limited to high tariffs and restrictions due to which the local component industry thrived. Eighty percent of all domestic production was local while component imports and car imports were just 20% and 0.2% of domestic production. This is relevant with respect to Humphrey and Salerno’s findings, mainly because they also reveal that liberalization of the auto industry has allowed MNCs to expand without the constraints of licensing. This is further supported by Mukherjee and Sastry (1996) as they mention the Indian government’s decision to allow free entry to foreign manufacturers in a policy instated in 1991. However, MNCs entered the Indian market through joint ventures. Assemblers are also encouraging their component suppliers to enter the market by forming joint ventures (Mukherjee and Sastry). However, they also argue that the component industry could prove to be a bottle neck for the automobile

industry. This is due to the obsolete practices and technology that prevail in the Indian manufacturing segments. Manufacturing in India is also marred by a lack of skilled blue collar workforce. This is why India also lags behind in manufacturing when compared with China, the other most commonly talked about emerging market from Asia says Huang.

Mukherjee and Sastry also compare Korea and India with respect to the automotive industry. The Korean automobile industry has enjoyed immense success over India as an automobile exporter, partly thanks to the closely knit assembler-supplier structure. In Korea most component manufacturers are owned by large conglomerates and they invest heavily in learning from both foreign assemblers and suppliers. This later relationship is neither seen in India nor China and is one reason why they are lagging behind in the component sector and as a major automobile exporter in spite of high growth rates in both sectors. Another factor that dampens assembler-supplier relationships is the distance factor. In India, suppliers tend to be further away from manufacturers and since suppliers are in a smaller number compared to assemblers and due to higher tariffs on imported components, they have a higher bargaining power. "Suppliers only accept large orders due to which lean manufacturing for the automobile industry is not as efficient" concludes Mukherjee and Sastry.

Comparisons have been made between the manufacturing practices and vertical integration among U.S and Japanese auto-manufacturers. Contrast is seen in the realm of vertical integration within the autoindustry. The current trend is leaning away from vertical integration with the U.S. autmakers inclining more toward Japanese-style supplier-assembler relationships (McMillan). Traditionally Toyota was used to buying almost 70% of the value of its output thereby depending on the expertise of its suppliers for most of its components and itself concentrating on its core competencies. On the other hand U.S. automakers were traditionally

more vertically integrated. "GM was making almost 65 to 70 percent of the parts used in its cars compared with 50 percent for Ford in 1993" quotes McMillan. Only Chrysler had a comparable situation with Toyota.

However, the inclination of the U.S. automakers to move toward the traditional Japanese practice of leaning away from vertical integration is very much associated with the cost factor. Costs increase with advancement in technology and economy. McMillan discusses Cremer's model, which states that vertical integration is tied toward the costs of monitoring. This is perhaps why automakers in India can afford to encourage vertical integration. India has high skilled labor pool consisting of engineers and is ranked only second to Germany in terms of skilled labor (Saripalle, 2005). Labor costs are also low as indicated by the wage costs as percentage of sales in the forging industry; India has 9.4% compared with 38.8% for the U.S states Saripalle. However in a contrasting report, automakers also claim shortage of trained skilled labor in India according to a source from GM. But coincidentally, there is also the presence of skilled labor from India in foreign countries due to migration in search of better paying opportunities (Huang).

In manufacturing, a relevant component of the automotive industry is Just in Time manufacturing (JIT). Humphrey and Salerno note the increasing importance of Just in Time (JIT) Manufacturing. Toyota implements a pull system using kanban, the concept based on lean and JIT (Tommelein and Yi Li, 1999). This implies that assemblers and suppliers have to be in close proximity of each other. The Japanese manufacturers have always had fluid supplier-assembler relationships by keeping close ties with selective suppliers. "Toyota has only about 170 tier one suppliers, 5000 second tier suppliers and 32,000 third tier suppliers. On the other hand GM had

5000 first tier suppliers alone,” quotes McMillan (1995). The next section of the literature review discusses scenarios adopted by other industries in India to penetrate the rural market.

2.4 Strategies of MNCs in the Indian Rural Sector

Rural India’s 600 million plus population definitely seems a great prospectus for any MNC but at the same time the question that arises is the one about costs associated with operating in or for the rural sector. This section gives important information on industries that have improvised enterprising operating strategies to lower costs, thereby enabling smoother rural operations.

Cellular service providers such as Reliance and Bharti Airtel have made significant profits, thanks to their expansion in the rural sector which is home to more than 70% of India’s billion plus population, especially now that big cities and suburbs are quickly reaching saturation level (Bellman, 2007). To tap into a cellular phone market where the average bill \$10 a month compared to \$50 in the U.S., only companies that can drastically reduce costs can pursue the untapped rural consumer market states Bellman. To note is the fact that this untapped market consists of individuals who live on less than \$2 a day. The most interesting method to achieve this is not surprisingly cost reduction of operating expenditure.

Bellman, mentions how Don Price the director of networks for Bharti Airtel³ focused on transmission towers referred to as the backbone of the cellular network. To operate, these towers require power supply as well as air-conditioning to withstand the hot climate in India. They used innovative tactics such as installing big back up batteries instead of more expensive generators to

³ India’s largest cellular phone service operator

protect against power outages and chemical-gel cooling packs to replace electric air-conditioning. Don Price also worked with his suppliers to procure energy efficient equipment and is contemplating alternative energy sources as well. Competitors are looking at this approach as well, such as contemplating frying oil for generating energy. Other innovations include using “expanders” to increase range for a tower and using lighter material to install towers. This is also similar to some of the innovations in product design that the Tata Nano brought about to reduce costs, only that the design in Bharti Airtel’s case refers to operating machinery as opposed to a finished product like the Nano. The telephone industry which would be a relevant comparison for the cellular service industry has adopted strategies comparable to the consumer goods industry mentioned earlier. Bharti Telnet, a subsidiary of the Bharti group that owns Bharti Airtel and Tata Teleservices are huge rivals but both of them are common users of an optical fiber network in the congested capitol of India, New Delhi (Anonymous 1). This has enabled them to reduce infrastructure costs and thereby adopting a non-zero sum competition atmosphere⁴, since they would be competing at the subscriber level alone in the highly populated rural regions.

Another particular strategy that targeted the rural market is the Indian Tobacco Company’s (ITC) e-Choupal system. The e-Choupal system was an IT system put in place in the Indian villages with large concentrations of soybean farmers (Upton and Fuller, 2003). It was a user friendly system that could be operated by illiterate rural farmers and was initially intended to provide awareness of good farming practices to improve ITC’s quality and output of soybean produce from the numerous small scale farmers⁵.

⁴ Dr. Jonathan Byrnes defines non-zero sum competition as a scenario where all competitors get a chance to win. There is no destructive competition. In the case of the telephone providers, the competition is the scenario of “reducing costs”.

⁵ The presence of numerous small scale farmers reduced quality of produce and made demand forecasting uncertain due to obsolete farming methods.

The system was implemented for free in spite of the high capital investment required upfront, but the system worked so well, that ITC was able to market other products such as farming resources like seedlings and finished soybean oil to the farmers besides being able to more reliably predict, and to a certain extent control the supply from a fragmented network of farmers. This resulted in a more efficient two way channel than the previous situation for ITC. Such strategies are the key to tapping a rural market like India which has great potential but very reluctant to change due to which obsolescence persists. The next chapters of the thesis lead to the case studies of some of the companies mentioned in this chapter.

Table 2: Billion Dollar Brands

Global Sales for 12 months ending Q1 2001 (US\$)	Brand	Segment
> \$15 B	Total Coca-Cola - Coca-Cola (Regular)* - Diet Coke/Coca-Cola Light*	Carbonated Beverages
	Marlboro - Marlboro (Regular)* - Marlboro Lights*	Tobacco
\$5-15 B	Total Pepsi - Pepsi (Regular)* - Diet Pepsi/Pepsi Light*	Carbonated Beverages
\$3-5 B	Budweiser	Beer
	Campbell's	Soup
	Kellogg's	Cereal
	Pampers	Diapers
\$2-3 B	Benson and Hedges Camel	Tobacco
	Sprite Fanta	Carbonated Beverages
	Friskies	Pet Food
	Gillette	Blades and Razors
	Huggies	Diapers
	Nescafe	Coffee
	Danone	Yogurt
	Tide	Laundry Detergent
	Tropicana Wrigley's	Still Beverages Chewing Gum
\$1.5-2 B	Colgate	Toothpaste
	Duracell	Batteries
	Heineken	Beer
	Kodak	Consumer Films
	LandM	Tobacco
	Lay's	Chips and Snacks
	Pedigree	Pet Food
\$1-1.5 B	Always North	Sanitary Protection
	Doritos Pringles	Chips and Snacks Chips and Snacks
	Gatorade	Sports Beverages
	Guinness	Beer
	Kinder	Chocolate
	Kleenex	Facial Tissue
	L'Oreal	Colorants
	Maxwell House	Coffee
	Energizer	Batteries
	Nivea	Moisturizers/Cleansers
	Pantene	Shampoo/Conditioners
	Philadelphia	Cheese
	Minute Maid	Still Beverages
	Seven-Up/7-Up	Carbonated Beverages
	Tylenol	OTC Pain Remedies
	Whiskas	Cat Food

3. Methodology

The primary method used to develop this thesis is the case study approach. Since, the purpose of the thesis is to understand successful strategies in emerging markets; the literature review was descriptive of existing practices in various industry segments across India. To isolate successful strategies and provide a description of these strategies, case study methods can be used (Huberman and Miles, 2002). The literature review of this thesis can be classified as an example of practice oriented research. So, practice oriented case studies (Dul and Hak, 2008) were developed as they could be used to validate the descriptions of practice oriented research.

Chapter 4 of this thesis details the individual case studies, each of which follow the common outline given below in exhibit 1:

- **4.X Case Study #: Company name**
A brief introduction of the company(ies) and the general scenario in India
- **4.X.1 “Company name’s” supply chain**
A description of the company(ies)’s supply chain(s). Contrasted with affiliate company as needed
- **4.X.2 Challenges and Successes of “company name’s” supply chain**
Issues and successful Supply Chain strategies of the company(ies). Contrasted with affiliate company.
- **4.X.3 Analysis: Strategies that defined “company name”**
Internal analysis of significant strategies adopted by “company name”. Comparisons, trends etc.

X refers to subsection number of chapter 4

Exhibit 1: Thesis outline

Based on concepts from Dul and Hak’s descriptive practice oriented approach, two case studies were developed once the samples for the cases were selected. After sample selection, data were collected to build the case studies. The data was then analyzed and the analyses were used to develop the conclusions from the case studies. The next sections of this chapter elaborate on the philosophy behind the sample selection and how data was collected for the cases for analysis.

3.1 Sample Selection

Companies from two different industry segments were samples for this thesis's case studies. PepsiCo India and Tata Motors were the companies selected as the principal samples to represent the consumer product goods industry and the automotive industry respectively. The Pepsi Bottling Group (PBG) and General Motors (GM) were the companies selected as affiliate companies, respectively.

3.1.1 Sample selection for the Consumer Product Goods Industry

The consumer product goods industry requires high volume supply chains irrespective of region or market. Due to the presence of such supply chains in developed (Western) markets, the selection of such a segment would serve as an excellent platform to compare and contrast the differences between developed and emerging markets. In addition, it would also serve to realize what strategies are transferable or not between established and developing markets. Based on A.C. Nielson's list of billion dollar brands, several consumer product goods and their respective manufacturers were reviewed.

Very few brands have made significant impacts in India like Pepsi or Coca Cola have due to which these companies are likely to have huge supply chains before the others. However, PepsiCo India's beverage division was selected to be the principal sample company to represent the consumer products industry. Since India liberalized its economy, PepsiCo and Coca Cola have made significant progress in a market where beverages especially carbonated drinks used to be considered luxury items. However, PepsiCo dominated the market for most of the time since its initial foray, due to which it was selected.

The Pepsi Bottling Group, PepsiCo's largest bottler in the U.S was selected as the affiliate company. The U.S. operating model of PepsiCo is considered the most advanced but is yet different from PepsiCo's operations in India. Since PBG influences PepsiCo's North American operations significantly particularly the U.S., and since it does not operate in India, PBG's U.S division served as an ideal company to represent the affiliate company for valuable comparisons.

3.1.2 Sample Selection for the Automotive Industry

The automotive industry is one of the high technology dependent industries that attain significant growth in an emerging market. The rapid increase in passenger cars and consumer spending on vehicles are a characteristic of emerging markets.

Tata Motors was selected as a representative of this segment because of the impact that it has made in the Indian and international passenger car industry within the last few years. While Tata Motors is not the leading automotive company in India in terms of market share, it is the most talked about company since the launch of its innovative line of passenger cars such as the Indica and the recent \$2500 Nano in addition to the \$5000 truck, the Acer. The impact of such low priced vehicles in an emerging market like India is unfathomable at this point because of the sheer size of the market it could potentially capture. For this reason, the Tata Nano's supply chain was specifically focused on for the case study. In addition, the support of Tata Motor's parent company, the Tata group which is a conglomerate of successfully established companies spanning from Tea to Steel also makes it an interesting company to understand its strategic advantages in India.

GM the largest automaker in the world is also the biggest player in an emerging market like China. However, it is yet to make as much of an impact in India even though it had

indirectly been involved in operations of Indian brands such as the Maruti-Suzuki. For this purpose GM was selected as the affiliate company of the automotive industry even though it is a competitor to Tata Motors. How the data was collected and analyzed once all the sample companies were selected follows this sub-chapter.

3.2 Data Collection and Analysis

Data for this thesis is descriptive and qualitative information on strategic approaches and practices of the sample companies and their affiliates. Data was mostly gathered from interviews with people associated with the selected companies. Additional information was also obtained through the form of analyst and annual reports as well as literature and internet resources suggested by the interviewees.

Literature and internet resources were used to a lesser extent compared to the data directly obtained from the interviews.

The next two sections, describe in greater detail the interviewee selection process and the interview protocol used to collect the data. The last section in this chapter describes how the analyses of the cases were done.

3.2.1 Interviewee Selection

The interviewees were employed or previously employed at the selected companies and affiliates. They belonged to supply, manufacturing and production, global strategy, or distribution and marketing divisions within the firms.

These operations divisions were selected because of their relevance to providing data specific to supply chain strategies. Marketing is also significant because of its ability to influence

supply chain divisions and since both companies are predominantly marketing driven companies as opposed to sales driven companies. The personnel were from positions ranging from non-C level upper management to assistant managers. Management positions were selected to understand the strategic decisions made in the company at macro as well as micro levels. This is based on the assumption that most management decisions at the macro level are made by the upper management where as the micro level decisions are mostly directed from the middle through lower management officials within a multinational.

3.2.2 Interview Protocol

Semi-structured interview protocols were used to collect data from the interviewees. In the semi-structured approach a certain set of questions were prepared to direct the session to focus on key supply chain strategies that were adopted. Depending on the answer to the pre-defined questions, probing questions followed to elicit additional details specific to the subject or to gather detail on a matter that is not relevant from the literature.

Exhibit 2 shows the prepared questions that were used in the semi-structured format for the interviews. The questions in exhibit 2 were prepared and selected to address strategies pertaining to supply, manufacturing and production and distribution strategies of the sample companies.

Probing questions were used to cover specific aspects such as nature of contracts, selection criteria for suppliers etc.

Once the responses were collected from the sample companies, interviews were then conducted with the personnel or ex-personnel from the affiliate companies. The individuals from the affiliates were interviewed using semi structured questions that followed upon information obtained from the interviewees from the principal sample companies. The open interview

protocol utilizes questions that are meant to probe based on given or researched information. Since they were interviewed after the personnel from the sample company, the individuals associated with the affiliates companies' could be probed without a pre-defined set of questions. These questions were such that, their responses enabled me to compare the strategies across the affiliates or regions. In addition, it also confirmed common practices through out the industry and if prominent practices were cross utilized. All the responses collected were then categorized under sections 4.X.1 and 4.X.2 (exhibit 1) of each case study and then analyzed.

DJ is the interviewer "Don J. Palathinkal". CA is the company affiliate. Sample Company refers to the company of the affiliate being interviewed at that moment (either PepsiCo India or Tata Motors). Each question is usually followed by probing questions. Interviews ran from 30 minutes to an hour in length. Some interviewees were interviewed multiple times using probing questions!

DJ: Good morning/evening CA! How are you today?

CA: Response from interviewee.

(DJ engages in small talk with CA about subjects not related to interview. Not exceeding one to two minutes)

DJ: Thank you very much CA for giving this opportunity to interview you! Today's discussion is intended to develop my thesis at MIT to understand the challenges and strategies of multinationals in emerging markets. I also hope that it could open discussion regarding strategies in emerging markets and research possibilities that could aid multinationals like "company of affiliate". I will keep your identity and referrals in confidence and will not disclose any information that should be considered proprietary. Shall I go ahead into the interview sir/madam?

DJ: Could you briefly describe the supply chain or operations divisions within "sample company"?

DJ: Could you describe in detail how your division operates?

DJ: From a supply chain perspective what do you think are your advantages and disadvantages?

DJ: How would you characterize the supplier-customer relationship for the company (or for division)

DJ: How many suppliers do you have or do you have a core list for suppliers?

DJ: How many units do you usually procure in a year for a region or the nation?

DJ: Who incurs transportation costs? What is main mode of transportation?

DJ: How many plants do you have? How do you base plant locations?

DJ: What are your biggest challenges in production?

DJ: How was manufacturing and production begun? From scratch or acquisitions?

DJ: How could you characterize your current distribution network?

DJ: What are biggest challenges for distribution?

DJ: What is your current demand? How do you see it growing over the years?

DJ: That was my last question. Thank you very much for your time Mr. CA. I shall forward you a copy of the thesis once it is complete.

Exhibit 2: Sample interview protocol

3.3 Data Analysis

The data collected were analyzed in two distinct approaches; individual case analysis (4.X.3 from exhibit 1) and cross-case analysis (section 4.3).

The first approach isolated strategies based on individual case data and identified the strategies that yielded successful results. It also identified those strategies that were responsible for the challenges facing the companies currently.

This approach also compares and contrasts the strategies of the affiliate companies with their respective sample companies and may include details of trends within the industry.

In the second approach data from both the cases were used to compare and contrast the selected industry segments. In addition this section also compares the sample companies with other companies from their respective industry segments based on the findings in the literature review. The purpose of this analysis is to isolate interchangeable and non-interchangeable strategies in supply chains across regions and industries. In particular, the differences between the supply chain practices of the companies in India and the U.S. are evaluated to understand how strategies in emerging markets may or may not be different from developed markets based on industry segment.

3.4 Summary and Future Research

The final chapter of the thesis summarizes the data and the results. It also proposes recommendations for additional research as well as suggestions on Indian market benefits based on the analyses of the case studies and literature review. The next chapter describes the case studies.

4. Case Studies: Discussion and Analysis

This chapter details the case studies that were built from the data collected from interviews and literature. The case studies cover the consumer product industry and the automotive industry.

The first case study is based on the consumer product goods industry for which PepsiCo India was selected as the sample company. Data collected from Pepsi Bottling Group (PBG) was used in the preparation of this case as well.

Information from Tata Motors along with data from General Motors (GM) was used to develop the second case study for the automotive industry. Each case study has its analysis as sub-sections at the end of the individual case studies, while the last section of this chapter describes the cross-case analysis.

4.1 Case Study 1: PepsiCo India

PepsiCo is the second largest non-alcoholic beverage provider in the world with net revenue in excess of \$39 billion (PepsiCo, 2007). PepsiCo was first launched in India in 1990. Since, the Indian government's decision to liberalize foreign business interests, PepsiCo has come a long way. PepsiCo's success in India had long been attributed to clever marketing campaigns. PepsiCo's major products include Pepsi, Seven Up and fruit juices mainly Mango juice under the Slice brand. However, equal share of credit should be given to its supply chain practices, notably partnership initiatives. These initiatives were responsible for enabling PepsiCo products to reach the Indian consumer despite the inconsistencies of fragmented supply and poor transportation infrastructure.

However, in spite of the high single digit growth that PepsiCo India has been achieving in the beverage market, it still represents a significantly small portion of PepsiCo's world wide sales (PepsiCo annual report, 2007). According to PepsiCo's annual reports, its Middle-East/Asia/Africa divisions of which PepsiCo India is a part of contribute only 12% to PepsiCo's worldwide net revenue (See figure 2).

If PepsiCo India were to be compared with another emerging market, then the most notable should be Russia, where PepsiCo beverage brands attained \$1billion in sales in 2007 (PepsiCo Annual Report). This indicates the potential revenues that can be generated in an emerging market. However, the key to gaining such revenues in India is to gain market share in India's rural markets. Even though India is one of the major regions where PepsiCo had long held a greater market share than its arch rival Coca Cola; Coca Cola took the lead from PepsiCo in 2007, through several key acquisitions and strategic initiatives. Hence, supply chain practices, specifically those catering to the rural network will be crucial in order to recapture the dominant position in this highly competitive but lucrative market.

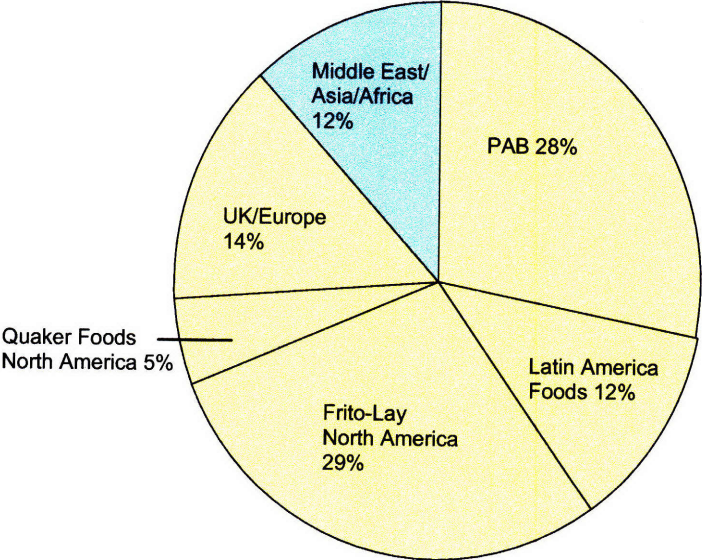


Figure 2: PepsiCo's worldwide Net Revenue: \$39,474 in millions (PepsiCo annual report) Subsidiary contributions as percentage of net revenue

As a benchmark for PepsiCo India's practices against the U.S. backdrop, The Pepsi Bottling Group (PBG) was selected as the affiliate company for this case study. PBG is the world's largest manufacturer, seller and distributor of PepsiCo's beverages (PBG, Press Room: Fast Facts, 2007). It was spun off from PepsiCo in January, 1999. According to PBG's annual report (2007), it accounts for more than one-half of the PepsiCo beverages sold in North America and has revenues in excess of \$13 billion. Greece, Russia and Turkey are some of the emerging markets that PBG operates in. PepsiCo holds a 35% stake in PBG and 9% of PepsiCo's revenues attribute from PBG.

However, PBG is yet to be operational in India. When compared with the marketing oriented PepsiCo, PBG's revenues are driven by its strong and large sales force that specializes in Direct Store Delivery (DSD). This it manages with the help of its large distribution network spanning 530 distribution facilities (PBG, Portrait of a Leader: Annual Report 2007, 2007). The next section elaborates on the supply chain framework of PepsiCo India and briefly discusses the PBG supply chain models in the U.S as needed for comparison.

4.1.1 PepsiCo India's Supply Chain

The main divisions of PepsiCo India's supply chain, responsible for its operational strategies are:

1. Procurement
2. Manufacturing
3. Distribution.

PepsiCo India directly handles over 50% of operations associated with bottling beverages. Unlike the U.S. where an affiliate like PBG has exclusive rights to manufacture, sell and distribute Pepsi products, PepsiCo India does not have a major partner that could handle such

large scale operations. PepsiCo India instead relies on small independent bottlers for the other half of its bottling operations. None of these bottlers though, are large enough to be considered as major affiliate partners even though they do have important roles in manufacturing and distribution.

PepsiCo India’s supply chain at the macro level is illustrated in figure 3 below. It is to be noted that “Shipping and Handling” is a division of the overall supply chain not elaborated in this thesis. This is because shipping and handling’s strategic decisions are indirectly stemming from the decisions made by the key divisions mentioned above. However, aspects of shipping and handling such as logistics providers are discussed as needed within the other divisions. Likewise, “Planning” is another division of the supply chain which is not elaborated separately. This is because the Planning division is separate from strategic operations planning and its major function involves utilizing SAP software for operational functions. However, the descriptions of the major operations divisions are elaborated next; starting with procurement.

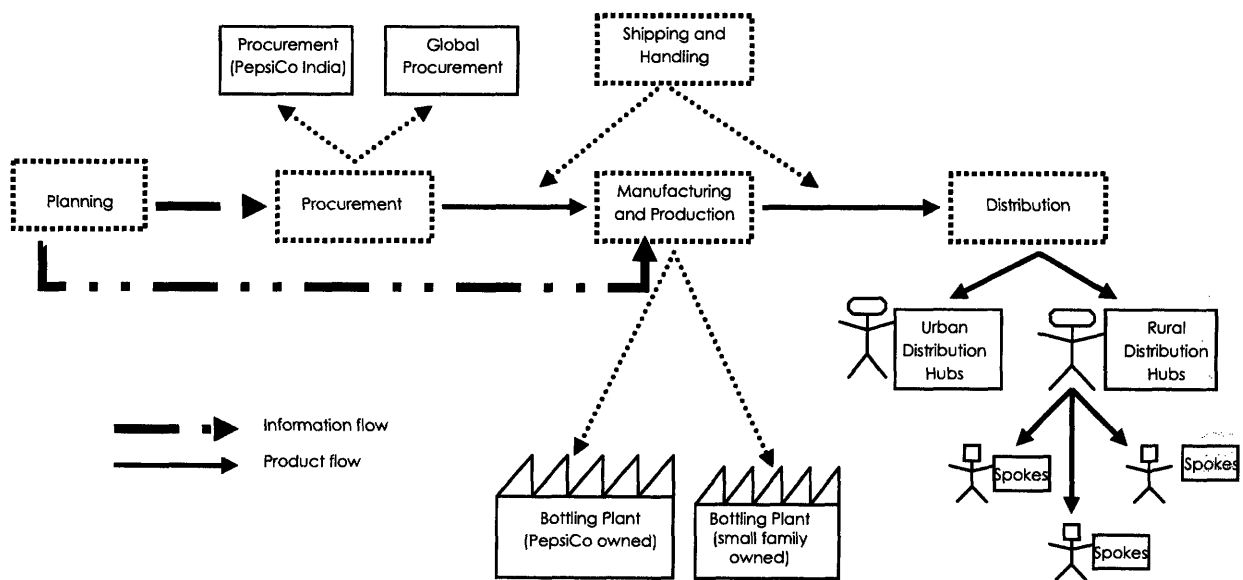


Figure 3: PepsiCo India's Supply Chain

4.1.1.1 Procurement

The major functions of PepsiCo India's procurement division are

1. Developing supplier core list
2. Negotiating pricing contracts
3. Coordinating with global procurement

PepsiCo India's corporate procurement identifies suppliers and determines all the pricing for procurement done locally. Imported raw materials are arranged through PepsiCo's global network. The major raw materials that PepsiCo India and its subsidiaries buy include sugar, mango pulp and PET (Polyethylene Terephthalate) bottle resins. PepsiCo has a core list of suppliers. For instance, for its mango pulp requirements, it has only one supplier. Key raw material suppliers like the mango pulp supplier and suppliers of certain other products are required by PepsiCo to not service competitors. However, bottling raw materials (resins, crowns⁶) and government regulated products like sugar are sourced from suppliers who provide for competition as well. However, no details of pricing are shared. Certain products like the PET resins are sourced locally and internationally while products like orange juice, coolers and fountain drink machines are imported.

Raw materials are sent directly to PepsiCo's plants by the supplier and if sourced locally they are usually held at the suppliers end. For instance in the scenario of surplus mango supply, the excess mangoes are kept with the supplier till PepsiCo can use it. PepsiCo does compensate the supplier for carrying costs. For transportation purposes, PepsiCo outsources to a third party logistics provider for their procurement needs. All transportation is done via road. There are also a few suppliers with transportation fleets that are more cost effective than PepsiCo India's third

⁶ Bottle caps are referred to as crowns by the operations group at PepsiCo India

party providers. Such suppliers directly transport the raw materials to PepsiCo's locations as needed. In this situation PepsiCo is charged a premium for the delivery. However this premium is less than what PepsiCo would incur if the preferred logistics provider were utilized. The supplies leave the supplier directly to the plants for production.

4.1.1.2 Manufacturing

The major characteristics of the manufacturing division are that:

1. PepsiCo directly operates several manufacturing facilities
2. It is equally dominated by fragmented third party bottling plants

Unlike the U.S. model where PBG alone manufactures and distributes more than half of PepsiCo's beverages, only 40-45% of the bottling and distribution is carried out by third party groups in India. The manufacturing division therefore consists of plants run by PepsiCo and the third party groups. With the exception of one family that operates several bottling plants, all the other bottlers are small scale and family operated. However, even the large family bottlers operations are divided between three brothers who have separate plants under their control. Hence, there are a large number of small scale bottlers. All the bottlers are required to utilize the same suppliers as PepsiCo's own plants. The information regarding the suppliers and the PepsiCo's contract negotiated prices are passed on to the independent bottlers and the PepsiCo owned plants by the procurement division. However, the third party bottlers are free to negotiate their own pricing with the suppliers. Often the third party bottlers do this as they can negotiate better prices by offering cash payments.

Besides producing and bottling the liquid products, manufacturing is also responsible for making the bottles from the PET resins. PepsiCo buys the resins for the bottles and these are then blown into the bottles used for production. PepsiCo India also utilizes glass returnable bottles to

package its products. Glass returnable bottles have started to be phased out off the Indian market only recently and this phasing out is currently ongoing. This phase out in contrast with the U.S. market shows a significant lag as glass returnable bottles stopped being marketed during the early 1990s completely while the phasing out process started as early as the late 1970s. In the U.S. the glass returnable bottles may be obtained at certain restaurants but it is not actively marketed as packaging for the general consumer. Once the manufacturing has the packaging ready, the liquid products are packaged and made available for pick up by customers or distributed via the distribution network.

4.1.1.3 Distribution

The major characteristics of PepsiCo India’s distribution network are:

1. Third party outsourcing
2. Hub and spoke model in rural regions

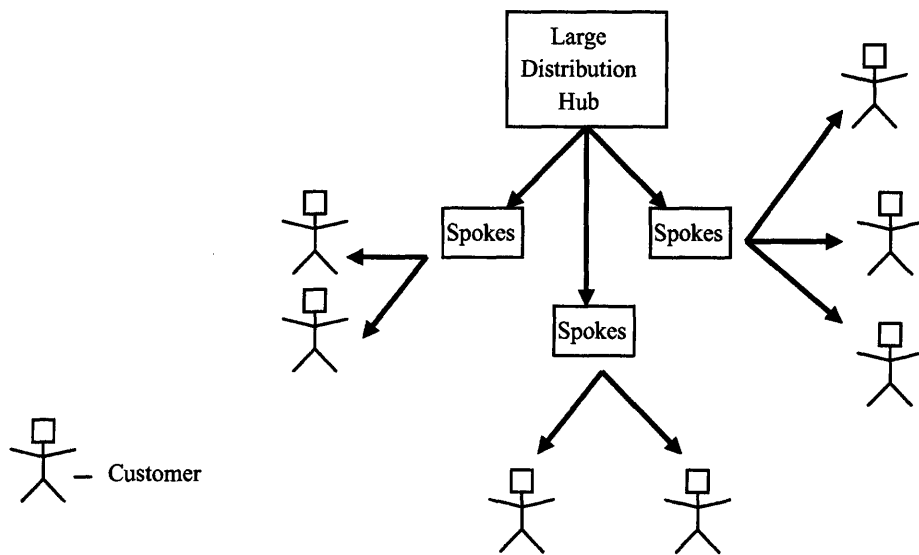


Figure 4: Hub and Spoke Model for Distribution

PepsiCo India’s distribution is entirely outsourced to third parties. The distribution network is designed like the classic hub and spoke model for the rural regions (See Figure 4).

Local entrepreneurs usually individuals, own the smaller spokes in the distribution network. In the urban regions the distribution centers are utilized for the vendors to pick up their demand requirements. All products are distributed through this network with the exception of the modern trade partners⁷ who pick up the finished products directly from the plants.

Unlike the U.S. operating model where DSD promotes Vendor Managed Inventory (VMI) by distributors like PBG, PepsiCo India does not have DSD. Large retail outlets like the modern trade partners pick up their required products from the plants while the smaller vendors pick up their demand periodically from the distribution centers closest to their locations. Like with procurement, transportation of Pepsi products for its distribution network is outsourced to third parties. However, large distribution center operators utilize their own fleets for transporting finished products.

Overall PepsiCo India's supply chain has managed to meet the demand requirements of its consumers. However, there are challenges that are inherent with the market and due to the complexity of its supply chain. The next section describes these challenges along with the successful supply chain strategies that have helped PepsiCo India's growth.

4.1.2 Challenges and Successes of PepsiCo India's supply chain

This section describes in detail the challenges that PepsiCo India's supply chain has faced as well as some of the successes that it achieved due to the implementation of innovative strategies. Challenges that have resulted from past practices and certain unavoidable conditions associated with the current Indian market scenario are given the most importance. The successful strategies are also compared with trends observed from the U.S. market based on data obtained

⁷ Modern trade partners are retail stores that are currently operating in tier 1 or tier 2 cities of India. The first such store was *Spencer's* in Chennai. Now Indian industrial giants like Reliance and Tata are venturing into the retail sector as well.

from PBG. While success has been seen in the procurement and distribution areas, challenges currently facing PepsiCo India have also been seen in the same divisions. The next subsection identifies such issues.

4.1.2.1 Challenges of PepsiCo India's supply chain

Challenges or issues concerning PepsiCo India's supply chain are present throughout all divisions of the supply chain. However, relevant issues are mostly associated with manufacturing and distribution. These are paraphrased below and described in greater detail in the next paragraphs.

1. Several plants with obsolete practices
2. Insufficient distribution in rural sector
3. Inherent market risks

The first issue that is mentioned above mostly pertains to manufacturing. PepsiCo currently has many plants scattered all over the nation without the ability to adapt to new requirements. For instance the PET bottles are rapidly replacing the returnable glass bottles in the consumer market. However, most of the third party plants operated by small families are not equipped with the PET blowing capabilities. In addition, these plants are often located with proximities close to their glass bottle suppliers due to which any consolidation is complicated as this proximity becomes irrelevant from the supplier-customer relationship perspective once the glass bottles become obsolete in the Indian market.

Distribution is a major part of PepsiCo's operations and its concerns are more abundant and problematic from a profitability standpoint. This is because the challenges troubling PepsiCo's distribution network not only amount to lost revenue but also potential market share. This is of more concern in the rural regions where PepsiCo needs to expand its efforts in order

that it can become the market leader. However, distribution of products in the rural sector for PepsiCo India in a manner similar to PepsiCo's or PBG's operations in the U.S, is not feasible from a cost standpoint. The challenge facing the distribution of PepsiCo India's product is in part due to the physical conditions of the Indian market as well as the financial position of its customers thus increasing distribution set up costs and insufficient sales that could offset the set up costs. The insufficient sales are a result of a variety of factors. Income levels of the villagers are a major reason and so is the reasoning from a consumer perspective. The average Indian prefers or is rather used to freshly made juices from local fruit stalls. Due to this reason the juice market which is also one of PepsiCo's biggest is harder to crack; exception mango juice. While this may seem as a marketing concern, it can be perceived as a question for supply chain design. For instance could the PepsiCo India's juice division modify its supply chain in a manner that provides the consumer a perception of a fresh product? All these notwithstanding, other factors persist from a supply chain perspective.

For instance, retail outlets are usually small mom and pop stores and the concept of supermarkets like Wal-Mart and K-Mart are limited if not absent in rural regions. Current supermarkets are the modern trade partners that were mentioned in the description of the PepsiCo India supply chain and they are mostly present in urban regions. As a result, VMI is not possible. PBG's VMI practice in the U.S. market has proven exceptionally successful both from a cost savings and in driving sales numbers due to the DSD model. The small size of the retail outlets also limits the stock keeping units (SKUs) that can be stocked at these outlets. This further fosters lost sales opportunities and limits brand marketing in rural regions. This adds up to the national level as indicated by the comparison in numbers from the Indian and U.S. market. Most rural distributors for PepsiCo in India distribute around twenty thousand cases or so a year.

In the U.S single distributor facilities for PBG sell 15-20 million cases a year. Currently India's entire regional distribution zones (East, West, South or North) do this type of volume. The lost opportunity is enormous as the sheer population of India's rural regions is indicative that multi-million beverage unit volumes can be achieved per rural district.

Inherent risks associated with the Indian market conditions also persist. An example of an issue that PepsiCo's distribution services faces is the need to have retail centers in rural regions that are consistently serving customers. Since rural retail outlets are small stores, they have limited refrigeration⁸ and storage capacity. Inventory levels of all products at these outlets (predominantly fresh produce) are usually kept only at levels sufficient to meet the demand for the day. Most of the fresh produce is kept out in the open too due to lack of space. Thus monsoons force the retailers to close shop thereby reducing possible sale of products. This prevents a consistent exposure of PepsiCo products in the rural regions.

PepsiCo India also has other challenges or issues. These are usually associated with procurement and tend to be unavoidable as they arise from government issued regulations. For instance sugar⁹ which is one of the largest procurement items for PepsiCo is rationed by the Indian government even though India is the largest producer of sugar in the world. Government regulations are characteristics of emerging markets due to which overcoming them becomes a question of legal issues and anticipation. Hence, they are not delved into further. Factors such as seasonal impacts on procurement are unavoidable but they are common for all markets due to which those only those issues associated with the climatic conditions of the Indian subcontinent were mentioned but not elaborated.

⁸ Freezers and refrigerators are still considered luxury items in rural India. Usually the mom and pop stores rarely carry refrigerated products. Sodas are sold at room temperature or from portable coolers filled with ice.

⁹ PepsiCo India consumes about 1% of India's total sugar production annually.

However, other challenges such as fragmentation within the agricultural supply mentioned in the literature review along with the barriers to rural distribution mentioned above are inherent conditions associated with India that resulted in the creation of unique strategies. These strategies proved successful or helped to mitigate some of the pressures of these challenges for PepsiCo India and are discussed next.

4.1.2.2 Successful strategies of PepsiCo India

PepsiCo's marketing success in India was amplified by the innovative supply chain strategies adopted by its management divisions. But the key supply chain strategies that helped PepsiCo succeed in India include the following

1. Utilizing collective efforts of small scale farmers, land holders and regional governments
2. Alliances with other multinationals
3. Promoting entrepreneurship

These strategies were essential to overcome the regional, professional, political and cultural barriers to entry in India. This section describes these strategies while comparing the U.S. scenario as needed through PBG's operations. Other strategies mentioned include those which molded the current supply chain framework of PepsiCo India as well, starting with the PepsiCo's entry strategy

When PepsiCo first entered the Indian market it decided to take the partnership route. For this purpose it selected a broad range of third party bottlers of which 40-45% of them remain partners to this day. As time progressed, the partners that phased out were brought by PepsiCo India, which had slowly started building its manufacturing presence. Since agricultural land ownership is predominantly fragmented in India, PepsiCo also tested partnerships at the supplier level. The first series of partnerships were utilized to develop India as a source for PepsiCo's

tomato paste supplies outside India. This example is described in detail in section 2.2. The highlight of this successful partnership was that Pepsi utilized the small scale farmers with the support of the local government to harvest tomatoes. The project overcame the deficiency of fragmented land holdings of the farmers by pooling the collective efforts and lands of the farmers. In return it utilized its marketing power to educate the farmers and also provided them with a portion of the farming raw materials such as the tomato seeds. This ensured the quality that PepsiCo guarantees at the corporate level. Gandhi, Kumar and Marsh cite that lack of quality raw materials is a constraint for the agro industry. The tomato model was subsequently replicated in Punjab to harvest citrus fruits. The purpose of the venture aimed to reduce the dependence on imports of orange juice from Brazil and is currently ongoing.

When PepsiCo had trouble distributing its products in rural regions, it utilized a strategy similar to the project Shakti adopted by Hindustan Lever, details of which are given in the literature review. However, this involved alliances with individuals and another multinational. Rural distribution of PepsiCo products were relatively ineffective compared to the poor transportation infrastructure within India. So when Pepsi was looking to expand its distribution to the rural regions, it started fueling the ambition of local entrepreneurs to foster its own interests. First it invited enterprising individuals to form the spokes and certain hubs of its distribution network in rural regions. Since distribution of just Pepsi products weren't sufficient to sustain the local entrepreneurs, PepsiCo then convinced the already experienced Hindustan lever to join their distribution network as well. Thus the collaborative effort ended up supporting these entrepreneurs by providing them a larger product spectrum to distribute. In return both PepsiCo and Unilever were able to increase their rural penetration. However, rural distribution is still a challenge for PepsiCo due to the reasons mentioned in section 4.1.2.1.

The U.S. market is at a more advanced level even for rural regions when compared to India. PBG can source from large scale farmers or suppliers and chose to distribute beverages through DSD strategy through the excellent road transportation infrastructure in the U.S.

The difference between PBG’s market environment and PepsiCo India’s market environment help to build the analysis of this case study. This is elaborated in the next section.

4.1.3 Analysis of PepsiCo India’s supply chain

This section analyzes the characteristic of PepsiCo India’s supply chain and its relevance to Indian market conditions based on the data collected and the literature reviewed. Unique characteristics of the strategies and the market are categorized in the section as well. The details of PepsiCo India and PBG’s supply chains and their operational strategies yield insights about the characteristics of India as an emerging market and about strategies that could be associated with business practices in similar markets.

Characteristic	Indian Market	U.S. Market
Market type	Emerging	Developed
Market consumption (distribution statistics)	20000 – 25000 cases per distribution center (rural)	Average 15-20 million cases per distribution center
Population	1 billion	300 million plus
Characteristics of suppliers	Fragmented, small farmers	Consolidated, large farmers
Characteristics of production	PepsiCo owned and outsourced	Mostly outsourced (companies like PBG)
Characteristics of Distribution network	Outsourced to third parties, fragmented. Numerous entrepreneur operated, small distribution centers	Large bottlers like PBG run Direct Store Delivery. Operate out of large distribution centers
Characteristics of Distribution operations	Pull system with Inventory regulated by retailers	Push system with retail system promoting Vendor Managed Inventory
Vertical Integration within manufacturing	Manufacturing is leaning toward Vertical Integration	Manufacturing is mostly done by large scale bottlers like PBG
Parent company’s core focus	PepsiCo involved in all aspects: Operations, Sales and Marketing	PBG does operations and Sales. PepsiCo does product innovation, R&D and marketing

Table 3: Differences in Operating conditions for PepsiCo in India and the U.S based on data from PepsiCo India and PBG and the U.S. respectively

A benchmark of the Indian market conditions against the U.S, in a manner pertinent to the operational framework of PepsiCo and its affiliate PBG in these regions is given in Table 3. This benchmark provides a framework for a comparative analysis of PepsiCo India and PBG. This comparative framework is used to discuss the key strategies of PepsiCo India, their impact on and why they are relevant to the supply chain. The data collected show the following prominent characteristics pertinent to the emerging market scenario of India and the PepsiCo supply chain:

1. Fragmentation
2. Partnerships

The next sections elaborate on these aspects.

4.1.3.1 Fragmentation within PepsiCo India

Fragmentation in the supply chain context can be described as the presence of numerous small players within the various echelons of the supply chain instead of large consolidating players for each of the same divisions (e.g. distribution characteristics in table 3). It is an attribute that arose from the constraints of the Indian business environments and the historical aspects of Indian culture before liberalization in the 1990s. Existing fragmentation within PepsiCo India's supply chain is mostly seen within its manufacturing and distribution divisions. Fragmentation in PepsiCo India's procurement has been reduced to a certain extent due to certain partnerships that is discussed later in this section.

Within manufacturing, the fragmentation refers to the presence of numerous independent small scale bottlers as opposed to the likes of a dominant player like PBG in the U.S market. This fragmentation was due to PepsiCo's entry strategy in India. Since PepsiCo decided to enter the Indian market by outsourcing operations to the family owned bottlers, fragmentation is still

prevalent. When it first started PepsiCo India's manufacturing division was 100 percent outsourced. However, once the market conditions were deemed favorable, PepsiCo India started acquiring some of the bottlers and now PepsiCo directly owns 50% of all its bottling plants. However, there is still the drawback of the lack of uniform practices throughout the remaining bottlers. Fragmentation within manufacturing has also lead to some of the challenges that is facing PepsiCo's supply chain today. An example is the lack of PET blowing capability of small scale bottlers as glass returnable bottles are phased out. Such challenges are promoting the need of consolidation as indicated by PepsiCo's increasing acquisition of the third party bottlers.

The distribution network of PepsiCo is also fragmented but this can be attributed to the lack of transportation infrastructure. Since there are no proper roads connecting rural areas with cities and vice versa, there is the lack of logistics providers that have the capability of serving large regions. In addition, the Indian consumers mainly the rural consumers have lower incomes due to which a pull system determines the sales of the distribution network. This is a huge contrast with PBG (refer table 3) where it utilizes DSD to push sales toward the retail outlets and thus to the end consumer. However, this characteristic resulted in promoting entrepreneurs and the creation of collaborative and entrepreneurial partnerships that are described further under partnerships. The fragmentation in distribution networks will take time associated with improvements in infrastructure before it can be reduced.

Fragmentation is not prevalent within the procurement division itself as communication technology is relatively advanced in India due to which a centralized procurement division could be utilized to coordinate the needs of the other divisions. Procurement is also the division of PepsiCo's supply chain that has been able to adapt to the effects of fragmentation the most effectively.

To compare with the U.S market, PepsiCo in the U.S does not currently experience the fragmentation across various echelons in its supply chains as PepsiCo India does. The U.S market is advanced at a level where PepsiCo's U.S operations resulted in a different type of fragmentation. Here companies such as PBG were spun off from PepsiCo to consolidate entire echelon functions. PepsiCo U.S. in turn just concentrates on its core competencies such as R&D and marketing of the Pepsi Brands.

However, PepsiCo India has taken steps in order to overcome the fragmentation within its echelons. This was achieved through the help of the innovative experimental partnerships which will be elaborated further in the following section dedicated to partnerships.

4.1.3.2 Partnerships of PepsiCo India

The non-alcoholic beverage industry is a commodity based industry due to which prices are low and margins are lower. PepsiCo's supply chain successes in India can be attributed to key partnerships that can be characterized as **experimental, collaborative and entrepreneurial** (figure 5 and 6). These partnerships are described further.

1. **Experimental partnerships** within PepsiCo India are those types of partnerships with individual farmers or a collective group of farmers and local governments. This requires commitments from PepsiCo's end for certain time-frames. However, the PepsiCo is free to pursue or discontinue the experimental partnerships at the end of the commitment period. Some of these partnerships are discontinued while successful ones are used as models for others or simply adopted as permanent practices. These types of partnerships were initially established when PepsiCo started seeking alternatives for existing practices or to overcome supplier fragmentation. The case of the citrus fruit project with the farmers in collaboration with the local government in Punjab is an example. Likewise PepsiCo's tomato project whose success led to

the initiation of the citrus project is also an experimental partnership. Both the tomato and citrus projects were detailed in the literature review. The success of the tomato project also showed that partnerships could be utilized to overcome the fragmentation that is seen in the Indian farmlands. Even though the land holders still own small parcels of land, getting them as a collective unit enabled PepsiCo to reap the benefits of economies of scale from large scale farming.

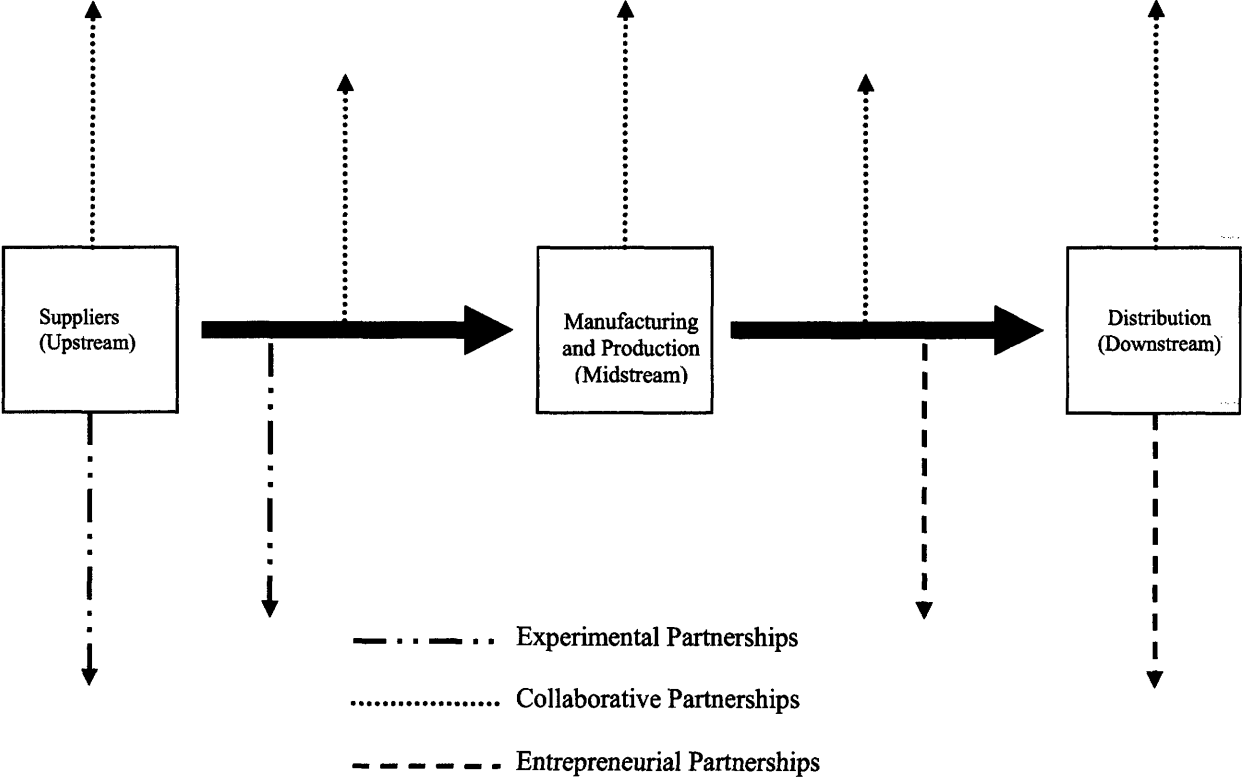


Figure 5: Partnerships situated at various points across PepsiCo India's supply chain

The current use of the sole mango supplier is perhaps the best example of an experimental partnership, which advanced significantly over the years. PepsiCo started this partnership as a quality assurance experiment and it eventually led to the current long term supplier-customer relationship that guarantees reliability for demand along with quality. The mango supplier provides the mangoes from his orchards as well as from consolidated land

holdings that he uses to grow the mangoes. In the event of shortage in supply he would also procure from markets and other individual farmers to provide for PepsiCo India. Experimental partnerships are usually seen upstream in the supply chain (Figure 5).

2. **Collaborative partnerships** are those types of partnerships where PepsiCo collaborates with established business group(s) or other multinational(s) to reduce operating costs. The predominant collaborative partnership for PepsiCo India is seen down stream (Figure 5). This is the partnership with Unilever to reduce costs associated with rural distribution. This is also an example where non-competing multinationals have a symbiotic partnership to lower costs. The partnerships between the PepsiCo India and the third party bottlers; and the PBG-PepsiCo relationship in the U.S can also be viewed as a collaborative partnership; they are midstream in the supply chain. The PBG-PepsiCo relationship in particular extending downstream as well.

However, in the Indian scenario, neither is PepsiCo India advanced enough in terms of sales units like it is in the U.S. market, nor are the third party bottlers large enough to be spun off due to which the collaborative partnerships are considered as fragmented within the respective echelons. While a success initially to enter the market, the current existence of multiple bottlers is more of a concern. PepsiCo India has bought out several bottlers over the years thus showing a pattern of **vertical integration** within the manufacturing division in order to overcome this fragmentation.

Collaborative partnerships can be seen, both in developed markets like the U.S and an emerging market like India in other instances as well. For instance procurement (PET resin sourcing) and information technology resource sharing. These are examples of collaboration upstream in the supply chain.

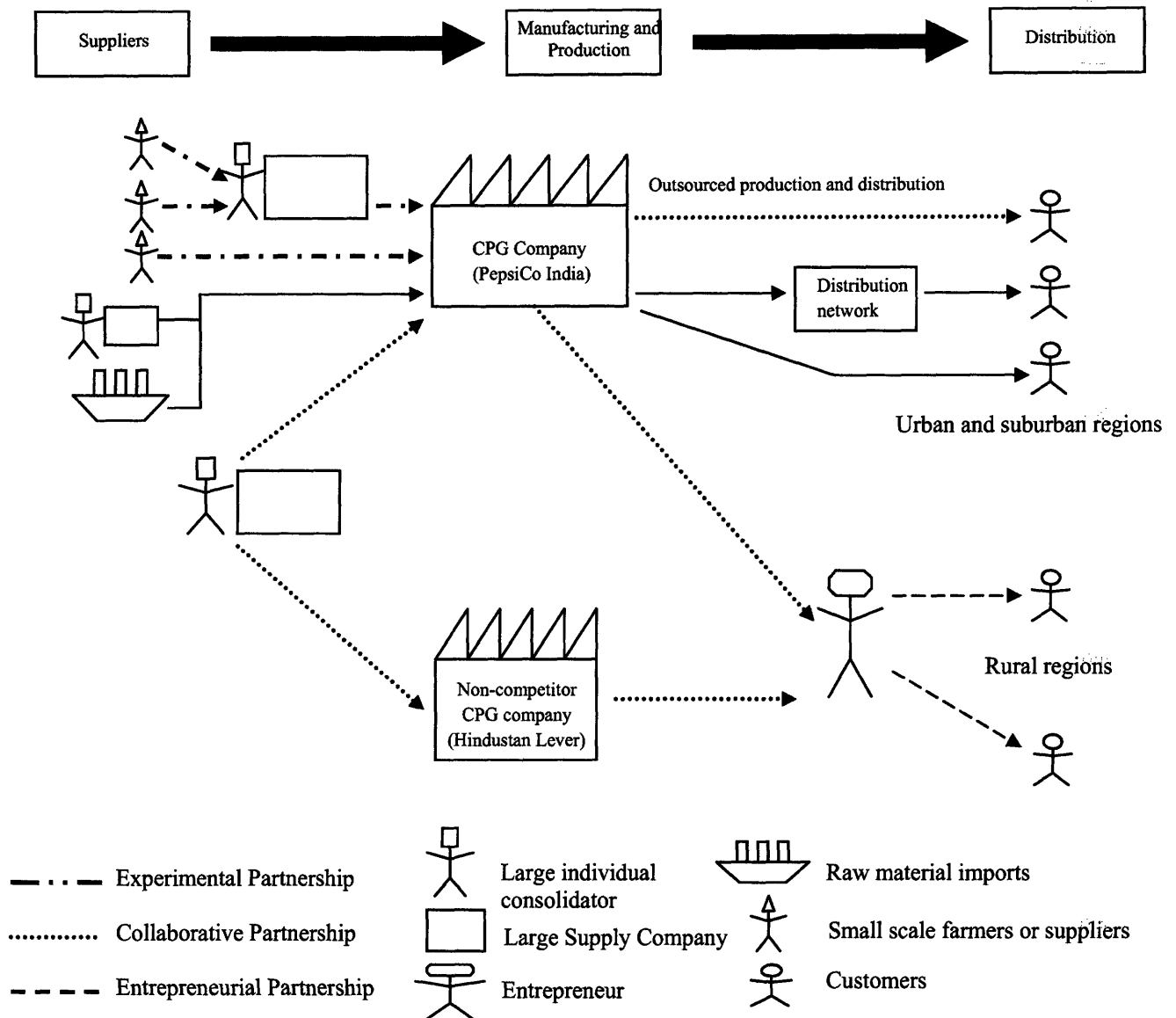


Figure 6: Business Partnerships of PepsiCo's supply chain in India showing the various players

3. **Entrepreneurial partnerships** can be seen mostly downstream within PepsiCo India's supply chain. The entrepreneurial characteristic is usually attributed to the partners of the multinational. The partners are usually individual entrepreneurs or collective groups of enterprising individuals. These partnerships hold the key to lowering costs for dominating the rural markets in India in addition to the longer term goals of overcoming the hurdles of

insignificant labor intensive workforce and poor infrastructure. The hub and spoke distributors in the rural region that cater to the collaboration between Unilever and PepsiCo are examples of entrepreneurial partnerships.

The suppliers who are willing to lease land holdings from other farmers as well in order to utilize the benefits can also be regarded as entrepreneurs in this sense and so their relationship with PepsiCo can be classified as entrepreneurial. The mango supplier for PepsiCo is one such instance. To meet the demands of PepsiCo not only does he utilize his land to cultivate, but he leases land from small land holders and also buys the mangoes at lower costs from other small scale farmers. Even though it started out as an experimental partnership for a quality assurance project, his relationship with PepsiCo is now an entirely entrepreneurial partnership. Such partnerships may be seen in the U.S as well, but most of the suppliers and distributors for multinationals are large and have had long term relationships with them. Due to this reason they can be considered to have moved out of the entrepreneurial realm and are now established businesses and so the entrepreneurial partner classification will not be justified. The mango supplier can be soon classified outside the entrepreneurial realm due to his long term standing with PepsiCo but it may take some more time before PepsiCo could regard him in the class of suppliers like those in the U.S.

4.2 Case Study 2: Tata Motors and the Tata Nano Supply Chain

Tata Motors is the largest Indian automaker, in terms of commercial and passenger vehicles. It was first established in 1945 as commercial vehicle manufacturer. In terms of market share, Tata Motors is the undisputed leader in the commercial vehicle segment while its passenger car business unit (PCBU) is at third position in India. As of 2007, Tata Motors reported earnings in

excess of six billion U.S. dollars and had a market capitalization greater than to sixty five hundred million U.S. dollars. Tata Motors is a subsidiary of the Tata Group of companies, a large conglomerate that has been in India since its establishment in the latter half of the 19th century.

Among the Indian automobile manufacturers, Tata Motors Limited and Maruti Udyog Limited stand out. While both of them have enjoyed mild success in the export scene, recently Tata Motors has clearly shown its emergence as an international presence with the Jaguar/Land Rover acquisition from Ford motors and the launch of the INR 1 lakh¹⁰ (\$2500) car, the Tata Nano. While the Jaguar/Land Rover acquisition shows that Tata Motors is ready to be considered as a global player, it is however, the launch of the Tata Nano that exposes Tata's strategic superiority in the supply chain context. The key indicator for this: The Nano is priced at a mere \$2500. To become profitable after accounting for materials, overhead and taxes, the Nano must have a highly reliable and low cost supply chain network that must churn the demand that it has to generate. Therefore understanding the Tata Nano's supply chain could provide key insights to strategies that are crucial for automobile supply chains in emerging markets. However, not all details of the Nano's supply chain are available to public sources but the cost reduction strategies for the Nano have been compared by experts to the strategies that were used in the development of Tata Motors's light commercial vehicle, the "Tata Ace". For this purpose the Tata Ace's supply chain will be referred, to analyze the key strategies involved in the development of the Tata Nano and its supply chain.

Beside the Tata Ace, General Motors (GM) and aspects of its supply chain practices in the U.S and some of its challenges in India are also referred, to benchmark Tata Nano against an experienced automaker from the U.S. market. GM is the world's largest passenger car maker

¹⁰ In the Indian numerical system a lakh refers to 100,000

with revenues exceeding one hundred eighty billion U.S dollars and a market cap greater than thirteen billion U.S. dollars. Table 4 gives a comparison of the general characteristics between GM and Tata Motors.

Characteristic	Tata Motors	General Motors (India and U.S)
Domestic market	India	United States
Vehicles Sold worldwide	582,407 (including commercial)	3.87 million
# of Passenger car brands	5 including Nano under Tata brand	88 vehicles under 8 separate brands
Market Capitalization	\$6.609 billion (May 02, 2008)	\$13.131 billion (May 02,2008)
Revenues (for 2007)	INR 266.5 Billion	\$178.199 Billion
Affiliates	Tata Group and its subsidiaries	GM capital and GM Onstar

Table 4: General characteristics of Tata Motors and General Motors within India (Tata and GM) and U.S. (GM only)

GM has recently seen a slump in earnings due to labor contracts but also due to costly manufacturing practices that had previously worked well for them. GM first established itself in India in 1994 as a joint venture (50:50) with another Indian conglomerate, the C.K. Birla group (General Motors, 2008). Since then GM has acquired the venture and launched its Chevrolet brand to the Indian passenger car market. However, the Chevrolet brand has not caught on as well as some of the other brands launched by companies like Hyundai or Toyota. Due to its past successes and as one of the original innovators in the automobile industry, GM’s practices are benchmarked with Tata in the analysis section. The analysis section also refers to practices of the Japanese car manufacturers as well. The next section describes the Tata Motors’s supply chain focusing on the Nano and refers to the GM or Tata Ace supply chains as needed.

4.2.1 The Tata Nano Supply Chain

The general framework of Tata Motor’s supply chain consists of tier 1, 2 and 3 suppliers and original equipment manufacturers (OEMs) representing the suppliers; the design group,

engine and transmission OEMs along with the assembly plant(s) representing the automaker itself; and the third party dealers, representing the distribution network. This is similar to the traditional automobile supply chain designs of GM or Toyota (Figure 7). However, the Tata Nano's supply chain has some distinct features within this supply chain design that separate it from the other car brands' supply chain designs at Tata Motors. These unique aspects of the Nano supply chain have been put in place to specifically bring down costs in order to justify the car's price tag.

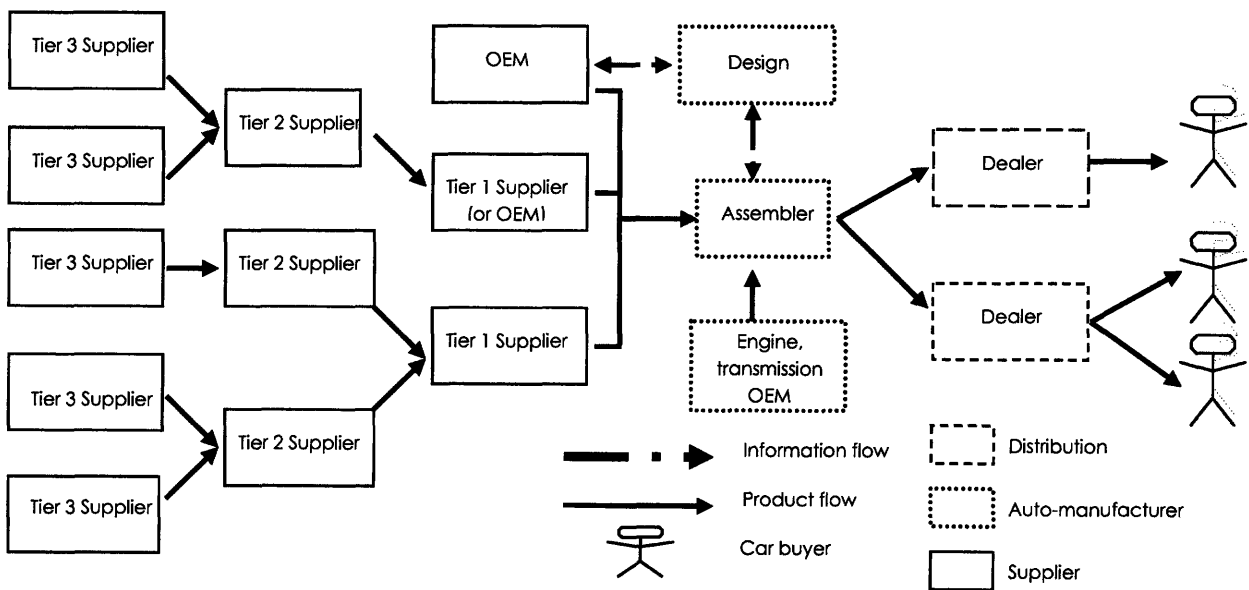


Figure 7: Automobile Supply Chain

The next sections elaborate the details of the Nano's supply chain as well as the unique characteristics that are specific to cost reduction. Aspects of the Indian and U.S scenario are also evaluated using GM's strategies in the U.S as a benchmark. References are also made with respect to Japanese auto-manufacturing practices that are increasingly becoming the standard for automakers throughout the world.

4.2.1.1 Suppliers

The major aspects of the Nano's supplier network are

1. Proximity to assembly plant
2. Local and single sourcing
3. Tata group subsidiaries
4. Two and three wheeler market suppliers

The Tata Nano's supplier network consists of approximately one hundred tier one suppliers. The supplier selection process was highly selective. Invitations were extended to almost a thousand suppliers but the selected 100 were based on their expertise, capacities and reliability in terms of quality. The suppliers also took part in the design process of the Nano through unique vendor initiatives such as 3P: Production, Preparation and Process Methodology. In addition, the suppliers were also asked to set up facilities near the assembler. Fifty suppliers were confirmed to have co-located with the Nano's assembly plant in Singur, a region in the eastern Indian state of West Bengal. Of these 15-20 are integrated facilities. Other subsidiaries are considered to be close enough. For instance, the Tata steel plant is in Jamshedpur, a city that is approximately 250 kilometers from Singur but with access to rail networks. The supplier proximity was achieved by offering long term contracts and giving significant commitments on volume.

Most of the suppliers are also single sources for the components and only 3% of the components are imported. For all the outsourced design components, it made sure that the suppliers were well established and that there was a local presence. An example is the alliance with Bosch for the engine management system which had centers in both Bangalore and

Germany. Likewise Tata Steel is in an evenly split joint venture with Ryerson to make all the chassis and a few non-load bearing components of the vehicle.

Like the steel plant, several other subsidiaries of Tata such as Tata Auto Comp Systems (TACO) and HV axles are also involved.

Beside the Tata subsidiaries, Tata also has some unique suppliers providing components for the Nano. Some of the suppliers for the Nano are suppliers to the two wheeler and three wheeler industries. For instance the continuous variable transmission (CVT) engines (automatic transmission engines) utilize gear boxes made by Kinetic Motors, the first indigenous developer and largest manufacturer of CVT engines in India. Kinetic Motors makes CVT equipped scooters in India as well. Similarly, Caparo a parts supplier used to cater to the two wheeler and three wheeler markets was roped in for making the composite material used in the body of the Nano (Group C. , 2008). This was a repetition of a strategy used for component suppliers for the Tata Ace truck. TVS Motors was roped in to supply certain parts for the Ace. TVS Motors is a conglomerate which also manufactures two wheelers and three wheelers in India (Motors T. , 2007). These suppliers coordinated with the automaker, i.e. Tata Motors, whose key function within the supply chain is described next.

4.2.1.2 The Auto-manufacturer; Tata Motors

Beside the major function of marketing the car, Tata Motors's major roles from the supply chain perspective of the Tata Nano are in **design, manufacturing¹¹** and **assembly**.

1. **Design:** The design of the Tata Nano (figure 8) is often credited for the cost effectiveness of the Tata Nano's supply chain and the reason for the car's low price. Due to this reason, it is included within the supply chain framework of the Tata Nano. The \$2500 version (figure 8) of

¹¹ Usually the automakers are involved in manufacturing of their core competencies such as engines, transmissions etc...

the Nano comes in one basic format and any customizations add to the cost. Simply put, the Tata Nano is designed to reduce costs from bumper to bumper. The main aspects of the design of the Tata Nano are

- A critical design team
- Innovative design
- Multi-functionality

From l-r: Tata Nano, Tata Logo, Dashboard (tatanano.com)



Figure 8: Pictures of the Tata Nano and components

The design team was crucial to the development of the cost constrained car. The reputed team did not solely consist of employees from Tata. When the designing phase of the Nano was in progress, Tata Motors invited suppliers with strong resources to take part in the idea generation and design inputs. In addition they also took trainee engineers from the Indian Institute of Technology at Kharagpur and, Jadavpur University, both of which are universities

within West Bengal, for its original Nano design team. This combination enabled them to bring about the innovative features of the car.

The innovations of the Nano's design are abundant. For instance the body structure of the Nano is not made entirely of steel but a composite material. Wheels are made of pressed steel but looks like alloy. These wheels are called style-in-steel wheels. Innovations are also present within the core components of the car. The engine of the Nano is small enough to fit underneath the back seat which is similar to the design of certain auto-rickshaws in India. Due to this the back passengers could have more leg room. Not only did this save space, but also it aided multi-functionality. The rear engine with a front wheel drive¹² gave the Nano a more efficient way of transferring power to the front cheaply.

Multifunctional properties of design aids supply chain efficiency while keeping costs in check. Multifunctional parts cost more but it enables sourcing for two parts at the cost of one. For instance, the seats have metal structures with headrests integrated into them. Likewise the Nano has a dashboard where the instrument panel is in the center. This limits the need to manufacture separate dashboards for left¹³ and right hand drive vehicles. In order to make it aesthetically pleasing the design team had the dashboard's instrument cluster arranged like the Tata logo (figure 8). Likewise left and right door handles are identical and thus eliminating redundant but costlier manufacturing practices. However, manufacturing practices of Tata motors are also in place to control costs.

¹² Usually cars are front engines with rear wheel drives. This is costlier since power has to be transferred to the rear of the vehicle. In the case of the Nano this design did call for different types of front and rear wheels but the wheels are relatively small comparable in size to that of auto-rickshaw wheels due to which costs were further driven down. The design is also like the Tata emblem in order that it is aesthetically more pleasing.

¹³ Indian cars are right hand drive but left hand drive vehicles are usually exported

2. Manufacturing and assembly: Tata Motors's manufacturing division is responsible for its core competencies such as engines and manual transmissions. It also encompasses the assembly plant and the paint shop. Tata Motors has plants in cities such as Pune, Singur, Lucknow, Jamshedpur and Uttarakhand in India. The Tata Nano's plant is in Singur. This plant is also integrated with some of its supplier facilities and is in close proximity to other key suppliers such as the Tata steel plant. It is also expected to run in three shifts to produce 350,000 units a year. This is expected to reach 500,000 in three years and the eventual goal of 1,000,000 units should be realized with the opening of additional plants in three other geographical regions.

Tata Motors's manufacturing division is renowned in India and is considered world class. It introduced the first indigenously designed diesel engine in India. As a result, Tata Motors's advanced manufacturing capabilities are sought after by other car makers as well. While the Singur plant will not initially be used for such purposes, it is known that Tata presses body panels for Mahindra at its Pune plant. Tata Motors also utilizes its highly advanced paint shop in Pune to earn revenue from other car manufacturers such as Mercedes Benz.

Manufacturing practices have been set to follow the Japanese processes of lean manufacturing and continuous improvement. Tata Motors takes important measures to ensure that these practices are followed as well. All Tata plant workers receive training in Japanese manufacturing techniques and the smallest of measures are adopted to improve performance. Forbes cited an instance regarding waste control (Meredith, 2007). The Pune plant used to have consistent problems with damaged front grills for a particular passenger car model. It was found that, when employees leaned over, the belt buckles tore the grills making them unusable. Tata Motors found a simple solution by providing belt caps for the plant workers thus saving around

\$17,000. Other practices such as cycle manufacturing or PC manufacturing that involves mass manufacture and assembly are also implemented.

Certain inherent aspects of the Indian market are beneficial for the manufacturing process of the Nano but also to new car models made by other auto-makers as well. Most notable is the Indian car purchasing scenario which enables “make to assemble” manufacturing for new models. This is because customers in India are accustomed to long waiting periods for newer models of cars once orders are placed. This benefit provides assemblers lead times of 3-4 months for urban customers and as long as one year for a rural customer (Figure 9).

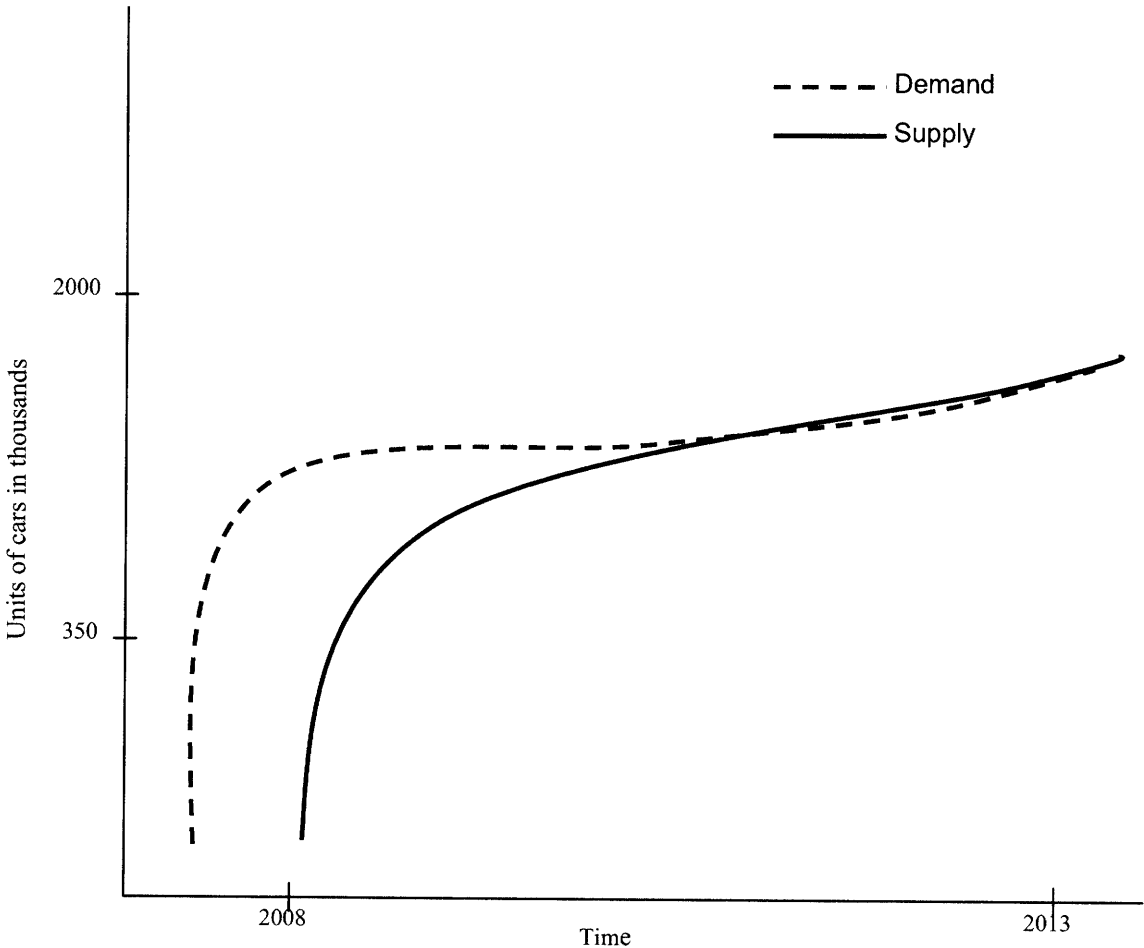


Figure 9: Tata Nano Supply and Demand

Even though the \$2500 version of the Nano comes in a standard format, customized versions are available for additional costs. The make to assemble manufacturing aids postponing the customization based on demand thanks to the lead times favorable to the manufacturer. Due to this reason considerable cost savings can be realized in terms of inventory holding costs. However, the distribution network also plays a role to advance this benefit, in spite of the unintentional nature. The distribution network of Tata motors is discussed next.

4.2.1.3 Distribution

Tata Motors has dealer networks similar to that of GM in the United States. It requires its dealers to have substantial land holdings and inventory available for customers to take cars with them immediately, once financing is complete. However, this is only relevant for existing models of cars. The new models such as the Nano require lead times as mentioned earlier due to which their stock is usually limited.

Tata's dealers are predominantly existing dealers from the commercial vehicles unit of Tata. There are applications and a selection process for dealers. Existing dealers get preference over new dealers when new dealer locations are announced. However, unlike Western car manufacturers such as GM, Tata does not have government regulations that reduce the influence it can exert on dealers. International manufacturers give their dealers higher margins whereas Indian dealers usually make 3-4% margins on their car sales (Hindu-Business-Line, 2001). Tata Motors also has stakes in some dealers and is efficiently synchronized with the dealers. For example, changes made to an order are received immediately and electronically at the marketing division of Tata Motors. However, all the advances made by Tata Motors in the production of the supply chain aside, there are some challenges that face Tata as well as the other automobile manufacturers in India. These challenges are discussed in detail in the next section.

4.2.2 Challenges and Successes of Tata Motors's supply chain

This section describes in detail the challenges that Tata Motors's supply chain has faced, as well as some of the successes that it achieved due to the implementation of innovative strategies. Challenges are described in relevance to the auto industry as a whole as this is a recurring theme for the entire industry.

The successful strategies seen in the Tata Nano's supply chain framework could be viewed as attempts to overcome some of these challenges. More importantly these strategies are discussed to emphasize on how these helped Tata Motors to develop the cheapest car in the world at a time when other manufacturers are facing issues of cost reduction.

The challenges and strategies are also compared with trends observed from the U.S. market based on data obtained from GM. The next subsection identifies the challenges.

4.2.2.1 Challenges of the automotive industry

Until recently, various factors prevented Indian automakers from becoming reputed international brands while foreign brands could not become successful in India. The reasons are two fold: **transportation infrastructure** and **lack of supplier expertise**. These issues need to be resolved or adapted to maintain profitability and competency amidst rapid development and changing consumer preferences locally and cost concerns internationally.

1. Transportation infrastructure is a recurring theme in the discussions of obstacles that hamper growth in the Indian economy but it is a problem that requires adaptation till the Indian government and private infrastructure developers can make significant headway. The lack of a good transportation network in India is one of the reasons that there are long waiting lists for new cars as well. Since demand for new models of cars are usually high following the immediate launch, dealers often have to resort to setting long waiting lists for the customers before fulfilling

orders. This provides an advantage for manufacturing but there are instances when long waiting lists could turn to lost sales as well (Figure 9 shows lag between supply and demand for the Nano). However, the greatest disadvantage of this challenge is when transporting unassembled cars or components result in delays as that prove costly, especially when a plant has to remain idle while waiting for a critical component. In the U.S. however, transportation issues are rarely a problem for the OEMs and automakers.

2. The challenge posed by transportation infrastructure is further aggravated by the unreliability from the suppliers' end. In the past and even today local Indian suppliers were notorious for their quality deficiencies. Automakers attribute this to lack of blue collar skilled labor to maintain quality assurance practices. The labor shortage prevents sophisticated instrumentation techniques and machinery from being implemented to control quality due to which obsolete practices are still followed. While there are local suppliers that can be considered leaders or "world class", the majority of the local component parts makers are below par in customer service and delivery of quality products. As a result, most automakers have to import certain components due to which production costs are driven up as a result of the costlier parts and tariffs associated with imported parts. While a completely assembled car incurs the highest tariffs, component parts also incur heavy tariffs (Currently at 100% but expected to be reduced to 65%). Not helping the situation is the fact that some suppliers are faced with international orders and deadlines as well. The situation is worsened for international automakers as some of the suppliers who cater to multiple automakers have to deal with the different ordering processes from each car maker. Most of the time, local suppliers are not equipped to deal with multiple variations of order processes due to which complications arise in the form of mismatched orders and delivery schedules.

Regional and political issues are also challenges that occasionally trouble automakers. Most notably, the Tata plant in Singur was tried to be picketed by local groups around Singur claiming that the land acquisition was unfair. Political instability can also cause result in certain picketing of all businesses in the regions due to which plants may have to be shut down. Tata Motors has overcome some of these challenges like the other manufacturers but it does have an advantage that positioned it better when it entered the Indian passenger car market. This advantage and the successful supply chain strategies for the Tata Nano are discussed next.

4.2.2.2 Successful strategies for Tata Nano's supply chain

Tata Motors's success up to date and its future positioning as a global player can be attributed to a variety of strategic approaches whose cumulative impacts have made the much needed difference. Some of the successes are not due to strategies as such but rather by association. This association and the key approaches that have helped Tata Motors to improve its supply chain to a standard that enables it to produce a cheap car like the Nano are

1. Tata Motors is part of a larger conglomerate
2. Product design of the Nano
3. Repetitive strategy
4. Utilization of government support
5. Selective supplier base and its specifics

Tata Motors is the world's youngest passenger car manufacturer. While the automobile market was open to local players before the nineties and while Tata was already involved in the commercial vehicle segment since 1945, its first entry in passenger car segment was in 1991 with the launch of the Tata Sierra. It was only after the later launch of the Estate, Sumo and Indica models from the mid through the late nineties that Tata started to become a major player in the

Indian passenger car market. However Tata Motors is a part of a bigger **conglomerate**, the Tata Group which manufactures everything from tea to steel. The Tata Group had established subsidiaries catering to the automotive market before the launch of the Nano and before it moved full steam into the passenger car market with Tata Motors. For example, Tata Auto Comp Systems or TACO was launched to provide products and services in three areas of business – namely manufacturing, engineering and supply chain management. The main purpose of TACO was to establish itself as a modern leader and provider of superior automotive components in India and abroad. Having a subsidiary like TACO before entering the small car market enabled Tata to understand the complexity of the passenger car business as their supply chain management teams were helping other manufacturers with their issues. In addition, most of these subsidiaries are also part of Tata Nano's supplier network, due to which issues such as proximity and integration with the assembly plant are negotiable. Importantly, these subsidiaries were among the suppliers that were a critical component of the Nano design team.

The **design** of the Nano can be considered as the principal reason behind the cost savings of the Tata Nano. Utilizing multifunctional parts and innovative materials enabled cost savings overall that outweighed individual component costs. Multifunctional parts may have cost more but it meant that purchasing was paying for two parts at the price of one. Innovative materials such as the composite body reduced the weight of the car thereby improving fuel efficiency. Other innovations include utilizing a hollow steering wheel shaft, one windshield wiper instead of two; thereby reducing material costs and helping in reduction of the car's weight which gave additional advantages. But the greatest advantage was the continuous reinforcing flow of benefits that resulted from the innovations. For instance, limiting the car's weight enabled the need for only two cylinders instead of four and thus made the need for only a small engine. The small size

in turn allowed the engine to be placed beneath the back seat thus providing more leg room. All innovations aside, it would be a fair assumption to say that the overall development of the Nano took elements from a previously successful launch: the Tata Ace (figure 10). Table 5 lists some of the **repetitions** across Tata Ace and Nano's supply chain frameworks.

Strategy	Tata Ace	Tata Nano
Target replacement	Commercial auto-rickshaws	Two wheelers
Innovative suppliers	TVS Motors: supplier to two and three wheeler industry	Kinetic Motors: Supplier to two wheeler industry and first developer of CVT transmission for scooters
Local government support in the form of subsidies	Uttarakhand government	West Bengal government
Additional moral purpose	Providing a sense of social status for commercial three wheeler drivers	Making social status and security of safety for the nuclear family commuting on two wheelers more affordable
Price tag	\$5000	\$2500

Table 5: Similarities between supply chain strategies for Tata Ace and Tata Nano



Figure 10: The Tata Ace truck (www.tatamotors.com)

Girish Wagh the leader of the design team of the small car project¹⁴ was also the head of the design team that developed the Tata Ace truck. When the Tata Ace was developed as a

¹⁴ The Tata Nano was referred to as the small car project

replacement for the commercial auto-rickshaws, its design was such that the cost concerns of the auto-rickshaw owners were addressed while providing more benefits than what the rickshaws did. Not only did it capture a portion of the three wheeler segment but it has resulted in the creation of a niche market with a huge first mover advantage. In the case of the Nano which is targeting households¹⁵ with two wheelers, the design is such that it provides more than what a two wheeler could do and is cheaper than the price of two scooters. Tata's aspirations of converting families with two wheelers to car owners could possibly lead to a niche market just like it did with the Tata Ace.

The Tata Ace project also showed how local **governments** can also aid cost reduction measures. When the new Tata Ace plant was decided to be built, Tata Motors roped in the recently formed state of Uttarakhand's local government to subsidize its investments, provided that its new plants in Pant Nagar within Uttarakhand will create jobs as well in addition to infrastructural provisions for the local inhabitants.

Likewise the Tata Nano's new plant in Singur in the eastern state of West Bengal in India has considerable provisions from the West Bengal government. On paper the government of West Bengal is to receive approximately USD two hundred million for the land acquisition. However, Tata can pay this amount in roughly one hundred years, with the installments being made in thirty year blocks. Factoring in the current inflation rate of India of approximately 5.11% (Kumar, 2008), Tata is expected to save almost USD one hundred seventy five million out of the two hundred million that it has to give. For this benefit, apart from generating local jobs, the automaker will provide additional support for local villages in Singur mostly in the form of

¹⁵ Households targeted are mainly families owning two or more two wheelers. Indian families are used to operating two wheelers with more than three people. For instance it is common to see a family of four on a scooter. While it is a safety hazard, costs are the reasons preventing families from buying a car.

vocational training, indirect business opportunities and infrastructure. For instance, in a recent effort eighty local youth were recruited as apprentices in the Singur plant (Ganesh, 2008). In addition Tata is also encouraging women for vocational jobs and local entrepreneurship such as the self-help group of women who are to set to run the cafeteria for the local plant (Mitra, 2007). Beside the trainee engineers taken from the West Bengal universities such as IIT-Kharagpur and Jadavpur University, Tata Motors is also recruiting from the local Indian technological Institutes (ITI) which graduates vocational trainees would otherwise leave in search of opportunities outside the state or to countries in the Middle East¹⁶. Not only are all these benefits for the community trivial in terms of cost savings for Tata Motors but also the investment in the community can be seen as a strategic move to develop a local skilled blue collar labor pool; a characteristic shortage experienced throughout the country.

These similarities between the strategies for the Ace truck and the Nano car show how Tata Motors leveraged its strength in another sub-segment of the industry, namely the commercial vehicle sector to create a successful strategy which was then repeated in sister segments, i.e. the passenger car sector. Another successful strategy that was repeated from the Ace's supply chain framework was supplier selection.

Supplier selection for the Tata Nano was highly selective and resulted in a tier one supplier network consisting of just one hundred suppliers. However, this enabled Tata Motors to allow single sourcing of components which in turn helped to give the volume commitment that was needed for the suppliers to move to facilities close to Singur. More importantly, the suppliers' roles in the design process enabled the selection process to identify the suppliers with the capability to manufacture the required demand for the Nano without compromising quality.

¹⁶ Skilled blue collar labor shortages in India are further affected by the existing companies moving to countries such as Kuwait or Saudi Arabia for better paying opportunities

Well renowned suppliers such as Bosch and Caparo were selected even though they were international players. But by requiring a local presence, Tata Motors was able to reduce costs associated with importing parts and transportation and reduced the woes associated with moving parts from ports to the inland plants. The local presence made sure that the design focused on costs as usually global design centers focus on costlier, sophisticated systems and employ personnel on higher pay scales. Further more, the unique vendor initiatives such as 3P adopted for the supplier base and the suppliers' willingness to relocate with Tata Motors to Singur is indicative of the fluid supplier-assembler relationship that Tata Motors has with its suppliers. The Nano is still in its early stages of commercial production; however, excerpts from the various strategies and the frameworks mentioned above can be used to analyze how its supply chain is unique or similar to other automotive supply chains. This is elaborated in the next section.

4.2.3 Analysis of Tata Nano's Supply Chain

The Tata Nano's supply chain has innovative and unique aspects that are set to adapt to the Indian market conditions as well as to reduce costs. However, the analysis of the case study reveals the following main characteristics.

1. The Tata Nano's supply chain adopts both U.S. and Japanese car-manufacturing processes.
2. The Tata Group provides the benefits of vertical integration for Tata Motors.

The strategies adopted by Tata have mitigated some of the challenges that were found to be troubling the auto-industry in India. However, overall the analysis of the case study finds similar practices in supply chain for the Tata Nano when compared to foreign manufacturers. The similar characteristics were revealed by benchmarking the supply chain framework, the

challenges and successful supply chain strategies, with those of GM and from available literature sources. They are described in detail in separate sections that follow.

4.2.3.1 Adoption of U.S. and Japanese practices

Table 6 identifies the similar practices adopted by Tata Motors for its Nano supply chain benchmarked against the origins of that particular practice. The decision of Tata motors to enter the passenger car market in 1991 along with foreign automakers even though it had a better competitive advantage earlier due to the Indian government’s restrictions on foreign multinationals prior to 1990, could have positioned itself with a strategic advantage. Having a dominated the commercial vehicle segment, Tata Motors had ample time to accumulate resources and study strategic moves of well established car manufacturers before its entry into the passenger car segment. Later when it officially ventured into the passenger car market, it adopted these successful strategies to facilitate its entry. Tata Motors’s supplier network and manufacturing processes are very similar to Japanese practices that are now trying to be adopted by U.S. manufacturers as well. However, its distribution network and vertical integration practices of the Tata group replicate U.S. models.

Tata Motors practice for Nano production	Original practice of foreign automaker
Limited tier one suppliers	Japanese manufacturers especially Toyota
Vendor inputs in design	Japanese practice (Toyota)
Vendor initiatives	Traditional Japanese practice (Toyota)
Lean manufacturing and continuous improvement	Traditional Japanese practice (Toyota process)
Dealers with large inventory levels	U.S. practice
Vertical Integration	Traditional U.S. practice

Table 6: Traditional practices of foreign origin adopted by Tata Motors

For example, Tata has numerous suppliers but for the Nano it selected only 100 suppliers which is even lower by Japanese standards; Toyota used to deal with 170 tier one suppliers

where as GM traditionally dealt directly with 5000 suppliers (McMillan). Tata's supplier relations also resonate more of Japanese practices. While western car manufacturers such as the GM have actively being pursuing their first tier suppliers to take active part in the design process recently, Japanese manufacturers have always sought supplier expertise for design. Tata Motors incorporated early vendor involvement initiatives such as the 3P to improve its vendor relations and integration to facilitate the design and assembly processes of the Tata Nano. Additional Japanese practices incorporated into the Tata Motor's supply chain are the manufacturing practices such as lean manufacturing and continuous improvement within its manufacturing division. It also implements the just in time manufacturing that is facilitated by the market scenario in India (figure 9). Tata emphasizes these practices during employee training and this ensures that dealers have quality products to distribute.

Having a large dealer network is typical of the American car purchasing scenario. While even old brands such as the "Ambassador" cars made by Hindustan motors have waiting lists, most of Tata's brands except for brand new models are kept at high inventory levels in large dealer lots so that customers can drive off once financing is complete. Tata also has stakes in some of its dealers due to which it is also able to increase its control downstream in the supply chain as well. Such stakes point to the vertical integration aspect of Tata Motors which was traditionally a practice adopted by U.S. car manufacturers such as Ford and GM. This is discussed in greater detail in the following section

4.2.3.2 Vertical Integration within the Tata group

Tata Motors's benefits from the aspects of vertical integration due to its association with its parent company the Tata Group. The parent company is emphasized, because in a highly technical industry vertical integration could prove costly. According to Cremer's model, if costs

of monitoring are high, outside supply is preferable but if costs are low, vertical integration is preferable (McMillan). This is possibly why U.S. manufacturers such as GM are leaning away from vertical integration to focus on core competencies such as engine and transmission development and marketing of the automobiles. Under vertical integration, managers are tempted to monitor production processes with more scrutiny in manners that do not benefit efficiency. When supply is outsourced, production can be organized more efficiently (McMillan).

Since the auto-industry is highly technical, costs of monitoring could be high even in emerging markets like India. But when a conglomerate like the Tata Group has subsidiaries that are involved in component production serving multiple automakers, its own auto-manufacturing division reaps the benefits of vertical integration. In Tata Motors's case, it does not directly own most of its subsidiaries. But a lot of the vendors are from the Tata group; TACO IPD, Tata Toyo Radiators, Tata Johnson Controls, Tata Visteon, Tata Yazaki, Tata Ficossa, Tata GS Yuasa batteries and Tata Ryerson (for the steel service center and the roll form sections) Tata Bearings for bearings and Tata Steel Tubes for the engine cradle etc. As a result, Tata Motors was able to obtain these facilities to set up operations close to the Nano plant in Singur and even have integrated facilities that improved overall transparency of the relationship.

Vertical integration may also be the key to addressing some of the challenges mentioned in the previous section (4.2.2.1). Auto-manufacturers might obtain faulty parts or experience delays in delivery when suppliers have different priorities. A consistent problem especially is the quality of components. American car manufacturers attribute this to lack of skilled labor. Vertical integration results in the enforcement of strict protocols and uniform manufacturing practices throughout the network. Since there is a larger labor pool to train, training costs are lowered due to economies of scale. As a result vertically integrated companies such as the Tata

Group have a better pool of skilled laborers. In addition, having a reliable supply of key components such as steel from its own subsidiaries enables Tata to avoid delays or manufacturing shutdowns due to material shortages. This is perhaps why the manufacturing division of the Tata Nano is not expecting supplier unreliability and quality concerns which were mentioned as one of the challenges facing the entire automobile industry in India. The Singur plant expects a rejection rate of less than 100 parts per million which is significantly less than that of the other Tata plants and the national average.

4.3 Cross analysis of PepsiCo India and Tata Motors

This section cross analyzes the shortcomings and the success strategies of the supply chains of PepsiCo India and Tata Motors and identifies common factors from the case studies that could be pertinent to high volume supply chains in emerging markets like India.

Characteristic	PepsiCo India	Tata Motors
High volume product	Mango Juice	Tata Nano
Product type	Commodity, agriculture-based	Technology-based
Price	INR 12.00 – 76.00 ¹⁷	INR 100, 000.00
Innovation benefiting supply chain	Experimental, collaborative and entrepreneurial partnerships	Product design
Challenges from Indian market conditions	Fragmentation of land holdings, poor transportation infrastructure, inefficient rural retail structure	Obsolete practices due to lack of blue collar skilled labor, poor transportation infrastructure
Relationships with other multinationals	Unilever for collaborative partnerships in distribution	Multinational suppliers and subsidiaries of the Tata group
Vertical Integration	Manufacturing division is becoming Vertically Integrated	Vertical Integration is present throughout due to Tata group

Table 7: Comparison of PepsiCo and Tata Motors

For this purpose, the literature review and the individual case analyses of PepsiCo and Tata Motors have been utilized to compare and contrast the two industries (Table 7) with each

¹⁷ Juice prices vary based on pack size

other and other similar industries, while evaluating aspects such as the cultural, regional, political and business dimensions of India.

In this section, PepsiCo India's products are classified as commodities while the Tata Nano is a Technology-based product. Commodity products in this context can be classified as those products whose raw materials are sourced from agriculture or land and involve cheap and unskilled labor for manufacturing. Technology oriented products are identified as those products who require components that are processed from basic materials usually by vendors using relatively sophisticated methods compared to the agricultural products. Technology oriented products also require costlier and skilled labor for their manufacture. Based on this, the case analyses reports the following findings which are elaborated in the next sections.

- 1) **Inefficiencies of the Indian market conditions** such as
 - a. lack of transportation infrastructure require adaptation
 - b. obsolete practices, and blue collar skilled labor shortage could be resolved
- 2) **Partnerships or collaborations customize supply chains**
 - a. Partnerships or collaborations by supply chain divisions benefit operations or cost reduction strategies
- 3) **Advantages of Vertical Integration:**
 - a. Benefit both commodity-based industries and technology-based industries

4.3.1 Inefficiencies of Indian Market Conditions

The lack of transportation infrastructure and scarcity of skilled blue collar labor are often counted as the biggest drawbacks of the Indian market. China is the preferred destination over India for manufacturers looking to outsource their operations due to these specific reasons

(Huang). This analysis evaluates the obstacles slowing India's manufacturing success, separately in the next sections.

4.3.1.1 Bad transportation infrastructure

The bad transportation infrastructure, particularly roadways in India is a constant problem affecting various industries and business organizations. PepsiCo India lists that this is a problem but it is not a major hindrance to its operations. However, it is a serious problem for the auto industry as delays due to transportation of key components can prove extremely costly, especially when it is components being transferred from suppliers. While distribution is affected it does provide benefits to manufacturing due to the ability to implement just in time practices. However, if supplies are delayed, plants have to be idled. Such an instance if prolonged can cause severe losses incurred in operating expenses. Tata Motors insistence on suppliers to set up facilities near the assembly plants could be viewed as a step to mitigate such losses. In addition it also reduces transportation costs.

Not all companies however, can provide such volume requirements to convince their suppliers to relocate and set up integrated facilities. However, companies are noticed to have set up plants near key suppliers or utilize the expertise of other established firms. For instance, most of PepsiCo's small bottling plants are based on proximity of their glass returnable bottle suppliers. Another example is Wal-Mart utilizing Reliance's logistics platform for its procurement needs. Such practices should be adopted especially by technology-based industries as well. This is because operating costs of technology-based industries could increase in the event of plant closure or idling as indicated in the automotive industries.

However, key change management processes should be implemented (Byrnes, 2004) alongside such practices in order to adapt to change in market conditions for better or worse. An

example is the challenge that PepsiCo is facing regarding the lack of PET blowing capabilities among its small bottlers. This issue also raises the instance of obsolete practices and scarcity of skilled blue collar labor.

4.3.1.2 Obsolete practices, and blue collar skilled labor shortage

Obsolete practices can be attributed to cultural and economic constraints. However obsolescence and labor shortage, particularly skilled labor shortage can also be linked from this thesis's findings. India as a country has an extensive labor supply but only in the unskilled labor force and the high end skilled labor force according to Huang. Obsolete practices that were seen from the case studies appeared in the form of two consequences for the industry segments

- 1) Fragmentation among farmers that supplied to the PepsiCo India supply chain.
- 2) Supplier unreliability in the automotive industry due to scarcity of skilled blue collar labor.

Both PepsiCo India and Tata Motors adopted strategies to overcome these issues. For instance the experimental partnerships overcame the fragmentation of agricultural suppliers for PepsiCo while Tata Motors investments in the Singur community may be viewed as a step taken to reduce the shortage of local blue collar skilled labor. Re-investing in the community not only brings about productivity from the community but also in the form of government support such as the subsidies Tata Motors received for setting up the plant in Singur. Likewise experimental partnerships brought long term benefits such as the relationship of Pepsi with its current Mango supplier. However, such experimental partnerships are examples of components within customized supply chains that are discussed next.

4.3.2 Partnerships or Collaborations Customize Supply Chains

Various partnerships or collaborations have been key initiatives taken by PepsiCo and Tata Motors to benefit their supply chain strategies. These have resulted in customized supply

chains in India that are different from their traditional settings¹⁸. An example is PepsiCo India's supply chain which is customized to facilitate the experimental or entrepreneurial partnerships¹⁹. Such partnerships are uncommon in developed markets such as the United States. Likewise the ventures between Mahindra and Mercedes Benz with Tata Motors are collaborations that were undertaken to reduce costs of operations.

Since PepsiCo India's products are classified as commodity based, they are dependent on high volumes to realize profits. Hence in PepsiCo's case, customization of the traditional supply chain framework is essential in order that the materials required to generate the volume can be sourced at lower costs²⁰ in spite of the barriers of fragmented farm lands and obsolete agricultural practices. Likewise they are also needed so that the finished products can be distributed to the regions with greater consumers at equally lower costs even in spite of barriers such as poor transportation networks and retail outlets. For instance, the finished products have too low margins and did not generate sufficient volume in rural regions to justify the needs for distribution centers catering to just PepsiCo products. Hence, the effort to collaborate with Unilever to encourage distributors to promote products from both the companies helped to lower costs of distribution while enabling marketing of the finished products to the heavily populated rural segments.

The need for customizations to facilitate such partnerships may be indicative of a need in India and for companies such as PepsiCo India and Unilever. While a single case study is not sufficient to make this result a generalization, the PepsiCo India case shows the relevance of how

¹⁸ In this thesis's context, traditional supply chain settings are referred to as the supply chain framework that exists in the U.S.

¹⁹ From section 4.1.3.2

²⁰ Refer experimental partnerships in section 4.1.3.2 for example of a customization in supply chain that facilitates this.

these partnerships in its supply chain divisions could help to overcome obstacles such as fragmentation that are associated with India.

The Tata Motors case study showed that neither did the Nano's supply chain have any unusual partnerships nor customizations that deviated from the traditional supply chain settings. The Tata Nano rather relied on its product design to drive down costs. Other aspects such as integrated facilities and the selective supplier base are not unique to the industry either. Auto-manufacturers from Japan and the U.S implement these strategies as well. This may be because technology-based industries such as the automotive industry are too capital intensive to have fragmented suppliers and manufacturers. Likewise since the car is not a commodity product relative to a beverage, its distribution does not also have the fragmentation characteristics relative to consumer products.

However, Tata Motors did collaborate with companies such as Mahindra and Mercedes Benz to gain additional revenues that offset the high capital set up costs associated with its manufacturing equipment such as the paint shop²¹. Information from section 2.3 also described instances of collaboration among technology-based companies. For example, Bharti Airtel shares infrastructure with competitors such as Tata Teleservices to bring down its operating costs for the rural regions. Technology-based industries rely more on skilled labor as opposed to unskilled labor and experience high costs associated with technology implementation. Due to this, they can charge higher prices relative to consumer products. But, certain industries such as wireless service providers are examples of technology-based industries that have to charge commodity like prices to customers in order to remain competitive. Similarly, companies such as Tata Motors and GM have to resort to alternative methods to offset costs associated with production

²¹ According to automotive industry sources 30% of assembly line investment is sunk in the paint shops.

as there is not sufficient volume generated yet to realize the benefits of the higher margins from the sales of their products. As a result these technology-based companies may also have to change their traditional supply chain framework as well and cannot simply rely on product innovations unless the product innovations specifically aid cutting down operating costs like the Tata Nano does.

4.3.3 Advantages of Vertical Integration

The case studies of both PepsiCo India and Tata Motors showed aspects of vertical integration. Tata Motors's supply chain has more properties of a vertically integrated structure with dominance toward backward integration. PepsiCo India on the other hand only showed aspects of vertical integration within its manufacturing division. While PepsiCo India's choice of buying out the bottling plants is because of the need to consolidate the numerous fragmented third party bottlers; the Tata group's vertical integration efforts are contrasting to the standard practices of Japanese and U.S. automakers. This is because the Indian economic conditions and business climate, lower costs involved with integrating supply and production. This is not possible in advanced markets such as the U.S due to higher labor and technology costs associated with monitoring supply integrated with production (McMillan).

These benefits of the Indian market scenario could possibly be beneficial for other companies as well. An example of another multinational that is vertically integrated was cited in the literature review: Reliance Industries was one of the first Indian companies to backwardly integrate (RIL.com) and is one of the most successful Indian companies as well. However, future trends and additional companies must be evaluated to confirm if vertical integration may be viable as development occurs, thereby increasing cost structures. Such trends are evaluated along with fragmentation in the last chapter of this thesis.

5. Conclusion

This section initially summarizes the thesis and the findings of the case studies. In addition, additional research topics are also discussed based on the thesis's findings along with suggestions on Indian market benefits based on the analyses of the case studies and literature review.

5.1 Summary

The thesis's intent to study the strategies for high volume supply chains was based on two case studies:

1. A foreign consumer product goods multinational that re-entered India in the 1990s after liberalization of the Indian economy, i.e. PepsiCo
2. A local automotive giant that entered the passenger car market in India in the 1990s, i.e. Tata Motors.

The data for the case studies were collected by interviewing personnel from PepsiCo and Tata Motors as well as their respective affiliates PBG and GM. A semi-structured interview protocol was followed. The case studies were then developed using the descriptive practice oriented case study approach (Dul and Hak). From the data, the general framework of the supply chains of the companies, challenges facing the companies and successful strategies adopted by the companies were analyzed. The companies were first analyzed separately and then a cross analysis was also done. All through the analysis the regional aspects of India and the U.S were compared by benchmarking the information from the companies against the information from

their affiliates. The overall results of the analysis pertaining to the supply chain context are summarized in table 8.

Analysis of PepsiCo	Analysis of Tata Motors	Cross Case Analysis
<p><u>Challenges</u></p> <ul style="list-style-type: none"> ▪ Obsolete practices of 3rd party bottlers ▪ Economic conditions of rural India ▪ Inefficient retail practices ▪ Rural distribution fragmentation 	<p><u>Challenges²²</u></p> <ul style="list-style-type: none"> ▪ Transportation infrastructure ▪ Supplier unreliability ▪ Lack of blue collar skilled workforce 	<p><u>Inherent problems of market</u></p> <ul style="list-style-type: none"> ▪ Fragmentation ▪ Obsolete practices and blue collared skilled labor shortage ▪ Lack of transportation infrastructure
<p><u>Successful strategies adopted</u></p> <ul style="list-style-type: none"> ▪ Partnerships to overcome fragmentation ▪ Alliances with multinationals ▪ Promotion of entrepreneurs to overcome rural distribution woes 	<p><u>Successful strategies adopted</u></p> <ul style="list-style-type: none"> ▪ Repetition of existing successful strategies ▪ Part of Tata Group ▪ Cost reducing design ▪ Utilization of government support ▪ Selective supplier base 	<p><u>Key observations</u></p> <ul style="list-style-type: none"> ▪ Vertical Integration ▪ Partnerships & collaborations customize supply chains

Table 8: Summary of case study analyses

Based on the above analyses, and excerpts from the literature review, recommendations are made for additional research, as well as on the benefits of entering the Indian market.

5.2 Future Research

The scope of the case studies for this thesis was limited to two companies and two affiliates and spanned two industry segments. The findings from the thesis however, are interesting enough to propose recommendations that may help to generalize the findings with respect to industries or across industries. The first set of recommendations elaborate the inherent advantages of going into a market like India.

²² Challenges are characteristic of the automotive industry as a whole

For instance, the subsidy offered by the West Bengal government on the land acquisition by the Tata Motors is an example of how regional government support can be utilized to reduce capital investment. Likewise, there are opportunities to utilize unused cheap labor. For instance, Hindustan lever's project Shakti was an innovative idea to improve distribution in rural regions without having to set up costly distribution centers. Women in India's unskilled workforce have been a scarcity mostly due to cultural aspects of the traditional male dominated society. Women in rural regions were always considered as to "belong to the home" and even in most rural regions today are not considered for their revenue earning potential. Educating the rural regions has been a priority of the government but such reforms take time. Certain enterprising multinationals have led the way in recruiting women into the blue collar skilled and unskilled workforce. The lack of women in the work force could be ceased as an opportunity to gain benefits, as by offering women jobs, not only are companies able to diversify their skilled and unskilled labor pool, but also welcome government and local support.

Increasing women in the workforce also means additional consumer spending power for the average Indian family. The sheer population size of India and the middle class size also indicate the potential of the consumer spending and the sales revenue that can be achieved especially when compared to the population of the U.S (Table 1). However, additional consumers mean larger networks and more sophisticated supply chains that are needed to tackle the flow of huge volumes of products and information. Preparation and forecasting such needs may reduce risks associated with rapid expansion and growth. The findings of this thesis and the literature review have provided interesting results to recommend additional research that could aid forecasting trends or general characteristics that could be definitive of supply chains in emerging markets like India as a whole. The topics for additional research are

1. Fragmentation within supply chain echelons
2. Partnerships and collaborations

5.2.1 Fragmentation within Supply Chain Echelons

Fragmentation in this thesis's context refers to the presence of numerous suppliers, distributors or other players within the various echelons of a supply chain.

The disadvantages of fragmentation are costs and complexity. The more fragmented echelons are within supply chains, greater are the costs associated with coordinating the flow of products or information within and throughout the various echelons. Economies of scale may be harder to achieve and there may be increased difficulty in implementing new practices that would reduce costs. For instance, having small land holdings mean farmers cannot utilize modern farming tools such as tractors. Likewise, it is not financially feasible for each and every single third party bottler to incorporate PET blowing capabilities²³ as opposed to implementation of the same by a single consolidated large bottler.

Fragmentation within supply chain echelons is a characteristic prevalent throughout the PepsiCo case study. For instance, for their distribution network in rural regions PepsiCo India had numerous small entrepreneurs. On the other hand, companies in developed markets have seen decreasing fragmentation in the various supply chain echelons. As a matter of fact, PepsiCo in the U.S. had consolidated to an advanced level that it spun off PBG to manufacture and distribute its beverage products. PepsiCo in the U.S. now concentrates mostly on its core competency of product development and marketing²⁴.

²³ refer section 4.1.2.1

²⁴ Such advances were also seen in the U.S. automotive industry; GM spun off Delphi and Ford spun off Visteon

The PepsiCo India case analysis and the information in chapter 2 suggest that fragmentation of supply chain echelons is prevalent in India where as it is not so much in a developed market such as the U.S. But PepsiCo India has taken steps to overcome fragmentation within its supply chain since its entry in India in the early 1990s. PepsiCo India's acquisitions of a portion of the third party bottlers support this statement.

Likewise the various partnerships for procurement and distribution are efforts at reducing fragmentation as well. Overall, these findings suggest that there is a chance that the fragmentation pattern within supply chain echelons of MNCs could change over time in India. This change is proposed to take or follow similar patterns represented by the graph in figure 11.

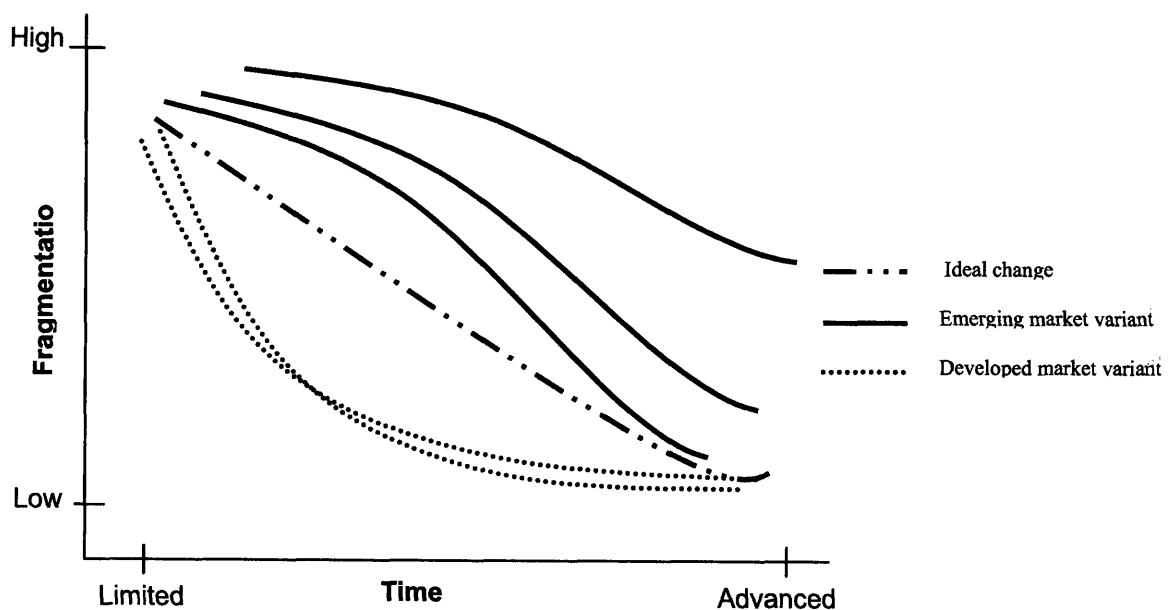


Figure 11: Expected trends of fragmentation within supply chain echelons over time

The graph proposes that a reduction in fragmentation of the supply chain echelons will occur over time. The reduction rate will also flatten out or normalize to an equilibrium level. These statements can be interpreted in the following manner:

Over time, markets and technology develop due to which it becomes easier and cheaper to consolidate. For instance, distribution can be better managed by large groups when there is

sufficient transportation infrastructure, thereby reducing the need for multiple distributors catering to several regions. However, at least one or a few large groups will be needed to run the entire distribution network. For example, in the U.S. market PepsiCo has bottlers beside PBG such as Pepsi Americas Inc and Pepsi Bottling Ventures LLC (PepsiCo annual report) to cover the entire country.

The graph also shows variants from the ideal trend²⁵. The developed market variant is what may be expected, with respect to fragmentation in a nation like the U.S. This variant is predicted to have a faster rate of reduction in supply chain echelon fragmentation due to the advancements in technology and infrastructure in these markets. The emerging market variants represent the scenario for a nation like India. These variants are proposed to have slower reductions in fragmentation. Factors such as lack of transportation infrastructure and financial barriers may reduce the rate of reduction. But more importantly, there may also be reasons that do not warrant the immediate need for a reduction in fragmentation. For instance, in the U.S, labor costs are high, making coordination of fragmented segments expensive. However, in India, labor costs are relatively lower, thereby making coordination more affordable. For example, in a market such as the U.S large scale consolidation through bottlers like PBG is more cost effective. The presence of advanced technology such as resource planning software and the internet also enable efficient communication in spite of PepsiCo and PBG being separate companies. However in India, the fragmented small suppliers, bottlers and distributors do not have access to such software currently but if technology is made available to them cheaply, further reduction in fragmentation may not be required as labor costs of operating these many units are cheap when compared to the labor costs in the U.S.

²⁵ Ideally, uniform reduction in fragmentation can be hypothesized to occur over uniform periods of time until it reaches the point where further reduction in fragmentation doesn't add value or cannot be avoided.

The proposal also cannot predict currently, the definite rates at which fragmentation may reduce to lower levels; hence, the presence of multiple variants and the uncertainty associated with the slopes²⁶ of the variants. The reason for this being, technology could be utilized to coordinate the complexity of fragmentation without the need for consolidation. The ITC e-Choupal case mentioned in section 2.4 illustrates in detail, an example where technology was utilized to reduce the disadvantages put forth by fragmentation. But the challenge of educating illiterate users on technology, and financial barriers to implementation in emerging markets makes the practicality of such innovations, uncertain with respect to time. This is why the reduction rates cannot be accurately predicted, at least currently.

More data may help to identify specific properties of the graph in figure 11 and to narrow uncertainties or variances with respect to aspects such as the units or reduction rates for fragmentation. Hence, additional research should be done to see if this is the exact trend that could be observed with respect to fragmentation within supply chain echelons over time. Once a trend is established it could be utilized for benchmarking companies, industries or emerging markets against each other based on fragmentation levels.

Since the scope of the proposal is limited to the findings of two case studies, generalizations cannot be made beyond the two industries studied in this thesis. Likewise the case studies were also only on companies based in India compared against the U.S. Thus the findings cannot be generalized to emerging markets as a whole.

Additional case studies on multiple companies from other emerging markets such as China, Brazil or Turkey are recommended in order that the findings can be generalized with

²⁶ Slopes of the variants correspond to rate of reduction in fragmentation

respect to emerging markets. However, the concept of fragmentation showed how partnerships were utilized by PepsiCo in its supply chain framework to overcome the same.

5.2.2 Partnerships and Collaborations

The cross case analysis identified the concept of customized supply chains due to partnerships and collaborations among the studied MNCs. It pointed out the relevance of how a customized supply chain helped PepsiCo to overcome the obstacles present in India. In PepsiCo India's case, its supply chains' customizations were in the form of its various business partnerships. Since the case study only spanned PepsiCo India and PBG in the U.S, generalizations cannot be made on emerging markets as a whole. Additional case studies or data from more consumer product goods companies spanning different emerging markets may provide more information to make generalizations with respect to the partnerships of the consumer product goods supply chains. The research would also help to identify whether these partnerships exist or could be applicable in other emerging markets as well.

The cross analysis also evaluated the supply chain of Tata motors. Based on the findings from the Tata Motors case study, it was identified that Tata Motors had collaborative efforts with other companies that offset costs by bringing additional revenue through its customized operations. Other technology-based products that required customizations to facilitate cost reduction through collaborations were also identified in section 2.4. But the limitations of time for this thesis have constrained this thesis's scope due to which generalizations cannot be made on the individual technology-based industries or emerging markets as a whole. However, additional research similar to the recommendations proposed for the consumer product goods industry could be utilized to generalize these findings.

References

1. Anonymous, 1. (2003, April 28). Friendly Rivals. *Country Monitor* , 5.
2. *About Us*. (2008). Retrieved January 5th, 2008, from Reliance Industries Limited: www.ril.com/html/aboutus/aboutus.html
3. Affairs, Dept. of. (2008). *United Nations Development Policy and Analysis Division*. Retrieved January 28, 2008, from United Nations: www.un.org
4. Arvis, J.-F., Mustra, M. A., Panzer, J., Ojala, L., and Naula, T. (2007). *Connecting to Compete: Trade Logistics in the Global Economy: The Logistics Performance Index and its Indicators*. Washington D.C.: The International Bank for Reconstruction and Development / The World Bank.
5. Bellman, E. (2007, September 24). In India, rural poor are key to cellular firm's expansion. *Wall Street Journal* , p. A1.
6. Byrnes, D. J. (2004, October 4). The Challenges of Paradigmatic Change. *Harvard Business School Working Knowledge* .
7. Dagar, S. S., and Bajaj, K. (2007, May 20). Seeds of hope in its bud to put the cheapest and best produce on store shelves, organized retail could end up helping the Indian Farmer. *Business Today* , p. 112.
8. Dul, J., and Hak, T. (2008). *Case Study Methodology in Business Research*. Oxford, UK: Elsevier Ltd.
9. Gandhi, V., Kumar, G., and Marsh, R. (2001). Agroindustry for Rural and Small Farmer Development: Issues and Lessons from India. *International Food and Agribusiness Management Review* , 331-344.
10. Ganesh. (2008, January 16). *News*. Retrieved March 2008, from Machinist: http://machinist.in/index.php?option=com_contentandtask=viewandid=810andItemid=2
11. General Motors, C. (2008). *Global Operations: India; General Motors India Private Limited*. Retrieved March 2008, from GM: http://www.gm.com/corporate/about/global_operations/asia_pacific/indi.jsp
12. GM. (2007). *General Motors Corporation 2007 Annual Report: next*. Detroit, MI: General Motors Corporation.

13. Group, C. (2008, February 07). *news and events*. Retrieved March 2008, from caparo: <http://www.caparo.com/news/news-article.asp?nid=168>
14. Group, T. P. (2008, April 10). Confidential. (D. J. Palathinkal, Interviewer)
15. Hamm, S., and Lakshman, N. (2007, March 19). The Trouble with India. *Business Week* , p. Cover story.
16. Hindu-Business-Line. (2001, March 15). *Auto Dealers want regulation of two-wheeler imports*. Retrieved April 2008, from Hinduonnet: <http://www.hinduonnet.com/businessline/2001/03/15/stories/021507g8.htm>
17. Huang, D. Y. (2008). *Economy and Business in Modern China and India*. Cambridge: Massachusetts Institute of Technology.
18. Huberman, A. M., and Miles, B. M. (2002). *The Qualitative Researcher's Companion*. Thousand Oaks, CA: Sage Publications.
19. Humphrey, J., and Salerno, M. (2000). Globalisation and Assembler-Supplier Relations: Brazil and India. *Actes du Gerpisa n 25* , 77-91.
20. India, O. o. (2007). *Population Since 1901*. Retrieved January 28, 2008, from Census of India: www.censusindia.gov.in
21. Kumar, V. P. (2008, March 16). *Global Markets*. Retrieved April 2008, from Market Watch: <http://www.marketwatch.cm/news/story/fed-rate-action-inflation-worries/story.aspx?guid=%7BC474EAE2-4D5A-43FE-94F9-3611EC6AD57A%7Danddist=morenews>
22. McMillan, J. (1995). Reorganizing Vertical Supply Relationships. In e. H. Seibert, *Trends in Business Organization: Do Participation and Cooperation Increase Competitiveness?: International Workshop* (pp. 203-222). University of Michigan Press.
23. Meredith, R. (2007, April 16). *The Next People's Car*. Retrieved January 2008, from Forbes: <http://www.forbes.com/forbes/2007/0416/070.html>
24. Mitra, I. R. (2007, February 08). *News*. Retrieved March 2008, from Rediff: <http://www.rediff.com/news/2007/feb/08singur1.htm>
25. Motors, G. (2008, February 19). Confidential. (D. J. Palathinkal, Interviewer)
26. Motors, T. (2008, March 20). Confidential. (D. J. Palathinkal, Interviewer)
27. Motors, T. (2007). *News*. Retrieved March 2008, from TVS Motors: <http://www.tvsmotor.in/news.asp?id=156andyr=2007>

28. Mukherjee, A., and Sastry, T. (1996). The Automotive Industry in Emerging Economies: A Comparison of Korea, Brazil, China and India. *International Motro Vehicle Program* , 1-5.
29. PBG. (2007). *Portrait of a Leader: Annual Report 2007*. Somers, NY: The Pepsi Bottling Group, Inc.
30. PBG. (2007, January 30). *Press Room: Fast Facts*. Retrieved January-April 2008, from The Pepsco Bottling Group: <http://www.pbg.com/press/facts.html>
31. PepsiCo. (2007). *PepsiCo 2007 Annual Report*. Purchase, NY: PepsiCo, Inc.
32. India, P. (2008, February-March). Confidential. (D. J. Palathinkal, Interviewer)
33. Pingali, P., and Khwaja, Y. (2004). Globalization of Indian Diets and the Transformation of Food Supply Systems. *17th Annual Conference Indian Society of Agricultural Marketing* (pp. 2-3). Hyderabad: Agricultural and Development Economics Division of The Food and Agriculture Organization of the United Nations.
34. Prahalad, C. K., and Hammond, A. (2002, September 01). Serving the world's poor profitably. *Harvard Business Review* .
35. Raj, S. J., and Selvaraj, D. P. (2007). Social Changes and the Growth of Indian Rural Market: An Invitation to FMCG Sector. *International Marketing Conference on Marketing and Society* (pp. 103-110). Kozhikode: Indian Institute of Management, Kozhikode.
36. Rangan, V. K., and Rajan, R. (2005). Unilever in India: Hindustan Lever's Project Shakti-Marketing FMCG to the Rural Customer. *Harvard Business School Cases* . Boston, MA, U.S.A: Harvard Business School Publishing.
37. Saripalle, M. (2005, June). Competing through Low labor costs versus Capabilities: Organizational transformation of the Indian automobile industry. Storrs, CT, USA: University of Connecticut.
38. Tommelein, I. D., and Yi Li, A. E. (1999) Berkeley, July 26-28). Just-in-Time Concrete Delivery: Mapping Alternatives for Vertical Supply Chain Integration. Berkeley, CA, USA: University of California.
39. Unknown. (2001). *Reaching the Billion Dollar Mark: A Review of Today's Global Brands*. New York: AC Nielsen.
40. Upton, P. D., and Fuller, V. A. (2003). The ITC eChoupal Initiative. *Harvard Business School Cases* . Boston, MA, USA: Harvard Business School Publishing.