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Management of Supply Chain in Petroleum Corporations in India

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Abstract

Supply chain initiatives have become a critical part of firms operations. Success is increasingly being dictated by how well a company can control its supply base and mitigate supply bottlenecks and liabilities. This paper used inductive and qualitative approaches to explore the salient factors that simultaneously enhance the "greening the supply chain" as well as maximizing the customer reach while maintaining the efficiency of the supply chain system of petroleum companies. The key indicators identified were environmental policies, supplier policies, sustainability, market orientation and commitment to human capital and diversity. A survey was conducted with key informants across many divisions of the LPG segment to investigate how well these environmental and customer reach in the supply chain are in synchronized with the top management's commitment towards environmental responsiveness and maximizing customer orientation. The responses to the survey were statistically analyzed and a relationship model was constructed with Market orientation as the dependent variable and independent variables as: environmental policies, supplier policies, commitment to human capital and diversity, sustainability and market orientation. The paper proposes to measure the performance of the corporation with respect to greening the supply chain, maximizing the reach of consumers and operational efficiency with a view of re-engineering the existing supply chain of LPG cylinders in India.

Keywords
Greening the supply chain, Customer reach, Re-engineering, Supplier diversity, Operating efficiency

Introduction
Supply chain initiatives have become a critical part of firms operations (Eskioglu et. al., 2009). Success is increasingly being dictated by how well a company can control its supply base and mitigate supply bottlenecks and liabilities. Such disruptions are a 6-figure to 7-figure expense for companies, with a handful of companies citing that the cost was more than $10 million according to recent reports (see Hendricks and Singhal 2005, as an example). Reengineering (or re-engineering) is the radical redesign of an organization's processes, especially its business processes. Rather than organizing a firm into functional specialties (like production, accounting, marketing, etc.) and looking at the tasks that each function performs, we should, according to the reengineering theory, be looking at complete processes from materials acquisition, to production, to marketing and distribution. The firm should be re-engineered into a series of processes. The changes, and subsequent improvements, have been clearly identified by Hammer and Champy (1993) who have claimed originality and conveniently packaged the ideas into the concept of "business re-engineering", which has subsequently been called business process re-engineering (BPR). The main proponents of re-engineering were Hammer and Champy (1993). In a series of books including Reengineering the Corporation, Reengineering Management, and The Agenda, they argue that far too much time is wasted passing-on tasks from one department to another. The Business processes pictured as a set of triangles as shown below. The model will be used to define the supplier and process inputs, your process, and the customer and associated outputs. The feedback loop from customers will also be used as shown in Figure 1.

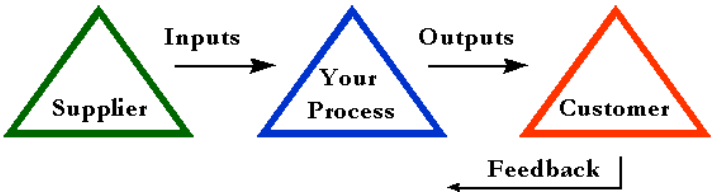

Figure 1: Customer feedback loop

Improving business processes is paramount for businesses to stay competitive in today's marketplace. Over the last 10 to 15 years companies have been forced to improve their business processes because we, as customers, are demanding better and better products and services. And if we do not receive what we want from one supplier, we have many others to choose from (hence the competitive issue for businesses). Many companies began business process improvement with a continuous improvement model. The proposed model will attempt to understand and measure the current process, and make performance improvements accordingly.

Figure 2 below illustrates the basic steps. The research will begin by documenting what Oil Marketing Companies (OMC's) do today, establish some way to measure the process based on what their customers want, do the process, measure the results, and then identify improvement opportunities based on the data collected. Then implement process improvements, and measure the performance of the new process. This loop repeats over and over again, and is called continuous process improvement and the proposed research will be following this line of action.

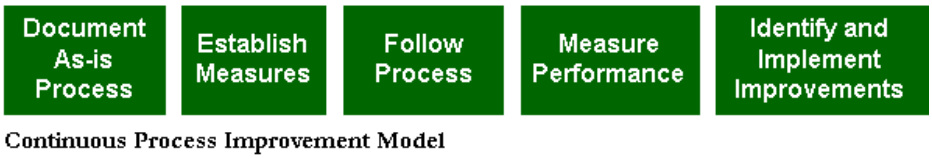

Figure 2: Basic steps in continuous improvement

Critical Issues in Managing the Supply Chain

Based on a literature review, the following are the critical factors in managing the supply chain of an oil company:

- **Greening the Supply Chain**
  How the LPG division can take a proactive posture in requiring a significant level of environmental responsibility in core business practices of their suppliers and vendors. Greening the "Supply Chain" refers to firms integrating environmental issues which include pre-development activities, supplier's business practices, product design and development. Environmental responsive companies take proactive posture in requiring a significant level of environmental responsibility in core business practices of their suppliers and vendors (Business and Environment 1993; Sarkis, 2002).
  Companies are increasingly giving attention not only to the environmental characteristics of their products, but also to the developmental process, paying particular attention to the supply chain activities. Oil Corporations are considered to be in the high environmental impact sector, and hence more attuned and sensitive to environmental issues.

- **Maximize the reach of consumers**
  It is critical to work with supply chain partners to prospect and generate quality customers. Accelerating sales cycles by innovating internet based selling and hence allowing customers to access us 24/7 via web touch settings. It is imperative to educate customers by enabling them to complete routine self-service tasks by themselves (Ashcraft 1992). It also helps to build loyalty by relying on a variety of programs in giving our customers an outstanding use experience. A sustainable business value can be created by offering a tiered approach with distinct marketing, sales, training, and support services for each customer segments.

- **Enhancing Supplier Diversity**

  Expanding the supplier base enables firms to include more diverse suppliers hence encouraging competition, enhancing transparency, and lowering costs for all parties concerned. Increase participation of local and national divisions in seeking out diverse and under-represented categories when seeking out new sources for suppliers and services (Caminiti 2005; Carbone 2005). It is critical to implement enhanced quality training, educational, employment and networking services for the under-represented suppliers, and a successfully implementation of a web based Business-to-Business exchange system, mutually and simultaneously beneficial to many stakeholders.

- **Maximizing Operational Efficiency**

  How we can maintain cost competitiveness through the restructuring of the supply chain systems for LPG cylinders of the oil marketing companies. Companies are serious about maintaining cost competitiveness or customer service differentiation must re-examine their process, measurement, and technology approaches and seek new areas of supplier performance improvement (Rudberg and Thulin 2009), including:

  1. Inserting control points at suppliers to minimize errors.
  2. Resolving last-minute supply disruptions based on cross-functional business goals.
  3. Using predictive analytics to transform static supplier scorecards into forward-looking risk management instruments.

Objective of the Research

Indian Oil Corporation (IOC), Bharat Petroleum Corporation (BPC) and Hindustan Petroleum Corporation (HPC) are the major Companies in India who are operating their LPG Bottling Plants and supplying LPG cylinders to customers. The objective of this research is to re-engineer the LPG cylinder supply chain system of a petroleum corporation. The goal was to study the existing supply chain system involving procurement, production and distribution of LPG cylinders throughout the country. The proposed research involved a situation analysis of how the LPG Cylinder supply chain system in a petroleum corporation is performing on the three identified dimensions, i.e., greening the supply chain, maximizing the reach of consumers and operational efficiency and thereby suggest for recommendations for improvements on these three dimensions. At the outset, a basic overview of these three major oil firms is provided. They are all listed in the latest (2009) Fortune 500 list with assets of $20,659.9 million (Indian Oil), $10,658.0 (Bharat Petroleum) and $9,728.9 million (Hindustan Petroleum) and are three of the top five Indian companies on this list. Other particulars of these three companies are provided in Figure 1:

Figure 1: Overview of the Three Major Petroleum Firms in India

Name of Company	2009 Fortune 500 Ranking	Ranking within Country (India)	Web site	Employees	Revenues ($ millions)	Profits ($ millions)
Indian Oil	105	1	http://www.iocl.com	35,896	62,993	564.9
Bharat Petroleum	289	4	www.bharatpetroleum.com	14,797	29,989	137.7
Hindustan Petroleum	311	5	www.hindustanpetroleum.com	11,426	28,247.3	164.6

Source: Data from 2009 Fortune 500 ranking at http://money.cnn.com/magazines/fortune/global500/2009

Methodology

Using an inductive and qualitative approach including case studies and experiential in-depth interviews (see Glaser and Strauss 1967; Miles and Huberman 1980), we explored the salient factors that simultaneously enhance the "greening the supply chain" as well as maximizing the customer reach while maintaining the efficiency of the supply chain system. Based on our exploratory research, we identified "environmental policies," "supplier policies," "commitment to human capital and diversity," "sustainability," and "market orientation" as key indicators of interest amongst the managers in petroleum organizations. A survey was then conducted with key informants across many divisions of the LPG segment to investigate how well these environmental and customer reach in the supply chain are in synchronized with the top management's commitment towards environmental responsiveness and maximizing customer reach. The constructs were operationalized to formulate a list of about 30 statements, each tested on mostly 5-point Likert scales (1 = "*strongly disagree*", 5 = "*strongly agree*"). All questions were pre-coded and pre-tested with managers, academics and selected consumers. The survey was then mailed to key informants (i.e., State LPG Heads and Area Managers throughout the country) and the returned responses analyzed using statistical software, e.g., SPSS.

A survey was then be conducted with key informants across many divisions of the LPG segment to investigate how well these environmental and customer reach in the supply chain are in synchronized with the top management's commitment towards environmental responsiveness and maximizing customer orientation. The constructs were operationalized to be formulated to a list of about 40 statements, each tested on mostly 5-point Likert scales (1 = "*strongly disagree*", 5 = "*strongly agree*"). All questions were pre-coded and pre-tested with managers, academics and selected consumers.

Results and Analysis

At the outset, we perform a "gap analysis" of how petroleum companies perform on these indicators (e.g., "environmental policies," "supplier policies," "commitment to human capital and diversity," "sustainability," and "market orientation") and how they "should" perform using t-tests for difference of means. The responses from the managers of the three major petroleum companies in India (Indian Oil, Hindustan Petroleum, and Bharat Petroleum) on these major factors were compared using one way ANOVAs. Across all three firms, informants felt that their respective companies under-performed, particularly with "sustainability" issues. Finally, a linear regression using "Market orientation" as a dependent variable, and the other indicators (e.g., "environmental policies," "supplier policies," "commitment to human capital and diversity," "sustainability," and "market orientation"), as independent variables, as well as some demographic variables (e.g., name of company, division etc. as "dummy" variables) was run. The results will be presented at the conference.

Conclusion

Supply chain factors are most critical in the success of any firm. While reviewing the literature, no study was found to have been done in the field of re-engineering the LPG cylinder supply chain. The proposed topic was selected with a view of re-engineering the existing supply chain of LPG cylinders in India. This research assesses the critical supply chain factors accounting for the LPG division's posture in being environmentally responsive and a commitment to maximizing the customer reach. It also investigates the impact of environmentally responsive supply chain and corporations commitment on both environmental and market performance and subsequently product quality. Pilot projects will then we undertaken and thereafter, will be implemented in a few major towns in India and see how the corporation is performing on the three identified dimensions, i.e., greening the supply chain, maximizing the reach of consumers and operational efficiency.

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