A Case Study on SCM Structural Analysis for a Pharmaceutical Company Based on as-is and to-be Model Approach

Chanchal Saha  
Systems Science and Industrial Engineering  
State University of New York at Binghamton  
Binghamton, New York 13902, USA

Md. Shafayet Hossain Bhuiya  
Mechanical and Materials Engineering  
University of Western Ontario  
London, Ontario, Canada N6A 5B9

Abstract

As-is model is one of the unique method to figure out existing conditions of a supply chain and to identify obstacles in a supply chain system. Overall company performance can be enhanced by solving those problems efficiently using To-be model. In this paper, a case study on supply chain management of a Bangladeshi pharmaceutical company namely AIT Pharmaceuticals Ltd. has been presented. Firstly, a complete picture of the company’s current supply chain has been drawn through vertical integration and each stages of the supply chain has been investigated to develop the as-is model. Later on, To-be model has been suggested as a solution of the problems found in the current supply chain management under as-is model.

Keywords
Supply chain management, vertical integration, as-is model, to-be model, reverse logistic.

1. Background

AIT Pharmaceuticals Ltd. is the largest pharmaceutical company in Bangladesh which is established in 1958 and is holding the strong leadership position in the pharmaceuticals industry of Bangladesh since 1985. The sales turnover of SPL was more than Taka 7.5 Billion (US$ 107.91 million) with about 16.92% market share (April 2006– March 2007) having a growth rate of about 23.17%. It manufactures and sells pharmaceutical finished products, basic chemicals, agro-vet and pesticide products. In this study, supply chain management structure is analyzed only for the finished pharmaceutical products such as tablets, capsules, suppositories, injections, syrup, spray, drops, ointments, cream and so on. The company has five formulation units namely Pabna, Animal health, Pesticides, Dhaka and Cephalosporin in different parts of the country for the production and supply of pharmaceutical products. The whole company is controlled by the head quarter situated in Dhaka which is divided into several functional units as shown in Table 1.

Table 1: Description of existing functional units

<table>
<thead>
<tr>
<th>Functional units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance and legal</td>
<td>Set future plans, allocate budgets and deal with legal issues</td>
</tr>
<tr>
<td>Human resource and administration</td>
<td>Organizational development, recruitment, employee relation and policy formulation</td>
</tr>
<tr>
<td>Marketing and sales</td>
<td>Promotional activities, market research and overall sales</td>
</tr>
<tr>
<td>Technical services</td>
<td>Sourcing and implementation of project</td>
</tr>
<tr>
<td>Procurement</td>
<td>Bidding, negotiation, contract signing, purchase order issue and follow-up</td>
</tr>
<tr>
<td>Product management</td>
<td>New product development and launching</td>
</tr>
<tr>
<td>Warehouse and inventory management</td>
<td>Purchased inventory stock management and issue when necessary</td>
</tr>
<tr>
<td>Transport</td>
<td>Staff, inventory and finished goods vehicle management</td>
</tr>
</tbody>
</table>
2. Existing Supply Chain Management

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. This is the basic idea used to form the existing supply chain of the company.

![Existing supply chain network](image)

Figure 1: Existing supply chain network

Figure 1 shows the existing supply chain management where each stage has its own distinct responsibility for fulfilling the goal of the supply chain. In the existing supply chain, suppliers participate in different biddings, negotiation, contract and supplies according to the necessity of the company. Next, procurement department arranges raw and other materials as per requirement, issue purchase order and follow-up. Raw material and other inventory control department issues materials when required, and keeps proper track of materials and stock. After that, production department converts the raw materials into finished products, ensure maximum machine utilization, proper scheduling and so on. QC and packaging unit do the quality checking and proper packaging of finished products. After packaging, finished goods inventory management team keeps stock of finished goods and issues when it needs. Next, logistics and transport management delivers the finished goods in regional depots which work as a wholesaler shop. Regional depots keep stock for local retail shops. Finally, retailer shops satisfy the demand of the end users.

![Existing inventory control flow chart](image)

Figure 2: Existing inventory control flow chart

The existing inventory control system in figure 2 shows the current company strategy for keeping inventory. It can be seen that raw materials received at receipt are sent for acceptance test. Raw materials are sent in the stock whether they pass the test otherwise they are disqualified or keep in pending for further test. Sometimes, through acceptance test they receive batch delivery also. The raw materials in stock are sent for work-in-process and keep in stock after each stage. At the end, in finished goods inspection if the products pass the test, they are sent to inventory otherwise they are rejected.
Figure 3 shows the existing production process in every stage starting from research to return-works along the responsibilities of each department to ensure the smoothness of production process.

![Figure 3: Existing production process flow chart](image)

The logistic flow diagram in figure 4 shows that company sends its raw materials to its five formulation units located different parts of the country from the warehouse in Dhaka. Next, the finished goods are sent to finished goods warehouse in Pabna. After that, products are sent to regional distribution center. Later on, products are gradually sent to whole-seller, then to retailer and finally to customer.

![Figure 4: Logistics Flow Diagram and location of company facilities over Bangladesh map](image)

3. Explanation of Existing Supply Chain

Figure 5 shows the vertical integration of the existing supply chain management. This figure gives the overall scenario of the company’s supply chain at a glance.

In the existing supply chain, initially there were lacks of coordination among suppliers and the company’s purchase dept, purchase dept. and production dept., production dept. and distribution unit. Then, supply chain has been formed for total system integration. According to figure 6, the company also wanted to achieve flexibility, delivery reliability, quick delivery and lower inventory level. In addition, the following few points also encouraged them to introduce a new supply chain.

- For proper information, material and cash flow.
- For extreme market competition in terms of cost, quality, and delivery lead time and cycle time.
• For better inter-organizational relationship.
• Information technology revolution.
• Currently, packaging materials and transportation services are in-sourced by the company itself for more cash flow within the same organization. For transportation, reliability is also a main consideration of in sourcing rather than a third party.
• For other procurement items (Raw materials, machineries and supporting items) the company is not in a position to perform these activities inside the company. They are now outsourcing these materials. The Company’s R&D and sourcing unit is trying to develop a number of qualified suppliers so that the company will get benefit in terms of price, quality, and reliability.

Figure 5: Degree of vertical integration

4. Problems in Existing Supply Chain
The problems of the existing supply chain are described in the following few points. In addition, the problems of each stage in the supply chain are presented in the As-is model in figure 7.
• The company is not getting updated market research information from its Market Promotion Officer (MPO) in due time, because of traditional means of communication. MPO usually contacts with doctors and medical centers but not directly to the customers.
• In the distribution centers, lack of security and employee commitment exists. In some places, interruption occurs due to utility problem.
The company has limited number of vehicles and they are not full-filling the transportation code of pharmaceutical materials. In most of the cities of Bangladesh, vehicles can enter inside the city only from 8 o’clock at night to 8 o’clock in the morning.

For all the formulation units, there is only one finished goods warehouse at Pabna which is at the north-east part of Bangladesh. As a result, the company is facing lots of problem for finished goods distribution all over the country in terms of time and money. Moreover, due to political and natural hazards, sometimes distribution and logistics system crippled down.

In the formulation units, company is not following routine maintenance, which increases machine idle time. Standard task time for each activities is not monitored which decreases effective production time. Machine assembly lines are not well balanced. So, it increases the balanced delay \((1-\eta)\%\).

Inventory data control system is completely manual and lack of transparency exists. As a result, process monitoring is difficult. Real time inventory stock data is not available. 3R (reduce, reuse, recycle) system is not followed which increases overall cost. Pharmaceutical inventory preservation code is not followed completely which ultimately, reduces the life cycle of valuable production raw materials. The company has no balance between under-stock and over-stock.

Strategic and operational buyers are not separated yet. As a result, strategic responsibilities are often ignored. Company has centralized purchasing authority which causing unnecessary delay. In sourcing takes place for packaging materials. For awarding the inside supplier, the company wait until the offer submission of all the suppliers and lastly inside bidder submit the lowest rate. This process invites inefficiency for the company. As a consequence, the company is in a threat of back-door buying due to less satisfaction of the internal customers. Sometimes, user raises requisition in such a way that may prefer one particular supplier. As the number of supplier is very few, price competition is not so high. No software or database is available for huge number of contract management. Purchase requisition system is manual. For procurement system, the company has no complete written procedure or policy. They don’t use blanket purchase order. So, work repetition is high. In case of long term agreements, suppliers very often raise their voice for increasing the existing price. So, number of amendment is very high. The company has no EDI or ERP system. This causes ordering errors, order tracking errors and increasing order cycle time. Before negotiation, the company is not doing proper cost analysis.
5. Suggestions to Overcome Current Problems

To overcome the problem of the current supply chain To-be model is suggested in figure 8. The suggestions are described below.

- As insourcing causes delay and inefficiency, qualified vendors can be developed for packaging materials. It will give the company a flexible and competitive environment. Degree of vertical integration will decrease and it can concentrate more on its core activities.
- Automation will reduce errors and repetition of tasks. It will increase efficiency and internal customers’ satisfaction. The company can use ERP, EDI and contract management software for this purpose. In addition, a written procurement policy is mandatory for the company.
- 20% of the items cause 80% of inventory cost. By using ABC inventory analysis showing in left side of figure 9 can classify and separate those items from less important items. The company should prioritize item A as the safety stock of item A is very important.
- Automation in inventory management will make tracking of items very easy. It will also help to get real-time data.

Figure 8: To-be model

- Routine maintenance of equipment will reduce system breakdown significantly. As a result, productive time will be more.
- Assembly line balancing can increase machine utilization. In this process, it can combine tasks together to increase utilization of each stage or work station.
• For proper planning and inventory control system, the company should use historical data, feedback from the market and human judgment to meet the inconsistent demand. For production planning, linear programming model (right side of figure 9) and lot sizing can be used.
• More field warehouses are needed for smooth distribution of finished products. It also improves the overall response time.

![Figure 9: ABC Inventory Analysis, and production planning & control system respectively](image)

• Transparent records, tracking and control are very important. Automation may help for better tracking and control.
• Cross docking may be applied for reducing warehousing cost and also for quick response. In a traditional warehouse, goods are received from vendors and stored in devices like pallet racks or shelving. When a customer (e.g., the consumer or perhaps a retail outlet) requests an item, workers pick it from the shelves and send it to the destination. In a cross docking system, goods arriving from the vendor already have a customer assigned, so workers need only move the shipment.
• It is necessary to increase the number of vehicles for reducing transport delay. For minimizing transportation cost, transportation model can be used.
• As a pharmaceutical company, its business is very much sensitive. For following the pharmaceutical code during transportation, the company needs to maintain minimum standard of the existing vehicles.
• In transshipment model (left side of figure 10), distribution centers themselves act as source and sink. By implementing this, the company can make its service quicker.
• By increasing the number of distribution center will take the company closer to the customer. The company can use gravity location model for finding new locations. This model uses center of gravity approach. The company can also analyze current situations of the distributions by using break-even method.
• The concept of reverse logistic is shown in right side of figure 10 which is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. Normally, logistics deal with events that bring the product towards the customers. In the case of reverse logistic, the resource goes at least one step back in the supply chain. So, the company can also apply this process.
6. Conclusion
Supply chain analysis is a very strong tool for finding the strength and weakness of an existing company. As-is model is one of its example. In this study, current supply chain of AIT Pharmaceuticals Limited is investigated to find out its problems those are mainly responsible for its inefficiencies. Then, it is tried recommend some solutions in To-be model to reduce those inefficiencies. Currently, the company does not get actual demand information from the end user. So, bull-whip effect takes place as a result of demand change, time shift and magnification. It creates problem in each stage of supply chain management. This company is currently performing well in the local market. But, still there are some problems in each stage of supply chain. So, the company may reduce these inefficiencies by following To-be model suggestions, in order to verify the scope to export its product. This research can be extended by implementing these suggestions practically on each unit of the company and comparing the efficiency changes based on the practical data.

References