

Supply Chain Optimisation for Operational Efficiency in Indian Pharmaceutical Industry – A Review

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Abstract

Supply Chain Management has become a prominent discipline in all the businesses of the world. Organisations are looking for an edge over the competitors by achieving operational efficiency through optimization techniques. Cost effectiveness and maximisation of productivity are the major focus areas for any organisation to achieve the operational efficiency. Pharmaceutical supply chains are exceptionally complex as there are no second sales for the drugs and medicines. Huge amounts are spent for research and development in supply chain processes of Pharmaceutical industries. The extensive review on pharmaceutical supply chains identified research gaps in various areas such as inventory management, new product and process development, plant design, network design, capacity planning, pipeline and development management, logistics activities in outsourcing, reverse logistics, lean manufacturing, green supply chain management and implementation of e-business processes etc for operational excellence. Not much research is available in the areas of pharmaceutical supply chains. Thus, it is found necessary to evaluate and describe an optimization-based approach on inventory management for the operational excellence in the Indian pharmaceutical industries. The current study reviews the literature available on supply chain optimization from 2012 to till date. Major studies conclude that supply chain process is complex especially in pharmaceutical companies as there are many challenges in the form of material flow, distribution, logistics and transportation etc.

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I. INTRODUCTION:

In the present scenario there is an intense competition globally as well as domestically and customers are demanding for more and more variety with best quality and service at lowest possible price. In order to meet the customer expectations, companies have to work on their supply chain strategies and also logistical capabilities for maximizing the overall profitability.

Supply Chain Management (SCM) has been a prominent area for successful implementation of strategy designed to lower the costs and improve the sales revenue in the organization. Organisations are looking for an edge over the

competitors by achieving operational efficiency through optimization techniques. Pharmaceutical

supply chains are exceptionally complex as shelf life of these drugs is relatively less and there are no second sales for expired drugs and medicines. Huge amounts are spent for research and development in supply chain processes of Pharmaceutical industries.

In order to maintain efficient supply chain and to maximize the effectiveness in supply chain, it is necessary to handle pricing pressures by providing products with lowest possible price while maintaining the same quality and ensuring the least possible lead time. Organisations that are into distribution of medicines have to practice

more effective and efficient supply chains for sustaining in an extremely pricesensitive market.

II. WHY PHARMACEUTICAL INDUSTRY?

The following reasons are identified for selecting pharmaceutical supply chains:

1. Trends show that focus has been shifted from doctor-centric approach to Patient-centric approach.
2. Health care services have an ever growing demand for prescribed medicines for treating plethora of diseases.
3. General physicians are not showing inclination to meet sales personnel directly.
4. Most of the pharmaceutical information about drugs, their usage and the side effects are extensively provided online. Patients and Doctors are not privy to this information.
5. There are threats in the form of patents and litigations.
6. The shelf life of drugs is relatively less and there are no second sales for expired drugs in Pharmaceutical companies.

III. LITERATURE REVIEW

Susarla & Karimi (2012), "the leading organisations are realigning and redesigning their supply chain practices to provide functional solutions in demand planning, sourcing, forecasting, procurement and execution of supply chain activities".

Assey (2012), "the overall operational efficiency of supply chain get reduced when connections and nodes does not function well. The most faced challenges in the supply chain are managing the short lifecycles of products, adjusting to these demands and consolidations".

Tang & Zhou (2012) in their study found that environmental factors are more towards consumption of natural resources and contribute to resource wastage and social factors are more consumer and producer related factors.

Tyagi & Agarwal (2014), "most of the Indian Pharmaceutical organizations spend almost half of their revenue on managing the supply chain activities. This is because of badly maintained transportation".

Adhikary & Bora (2014) observed that "the costs involved in management of supply chain are coming to 13% of India's GDP when compared to rest of the world".

Wisner, Tan & Leong (2015), "efficient use of supply chain management can make any organization achieve more profits and lack of effective supply chain management can create more number of problems to the organization".

A.T. Kearney (2016) identified that timely delivery greatly increase the satisfaction levels of customers. About 25 percentile felt that for a regular item, three days seems to be acceptable for delivery and majority felt two to five days as acceptable delivery time.

Jonas Mayer, Hans Wiesinger and Peter Nyhuis (2017) has emphasised that synchronisation of the material supply poses a specific challenge to the organisations while planning and controlling the supply chain activities. They introduced a logistic model which would describe the synchrony of inventory system mathematically.

Nyhuis, P., Mayer, J. (2017) validated a linear programming model which explains the lateness distribution in inventory system.

Modestus O. Okwu1, F. I. Ashiedu et al (2017) came up with linear programming model to minimise the high costs that were incurred while distributing the materials and products downstream to fulfil demands at various destinations.

IV. PROBLEM AREA

The major challenge which most of the Pharmaceutical companies in India are facing is effective and efficient management of the supply chain activities to cut down the excess costs and end up with impressive revenues.

V. NEED FOR THE STUDY

There is a pressing need to identify the factors which were highly contributing to the increase in managing the supply chain costs. The key areas in supply chain activities have to be identified. A certainty model has to be developed which helps in building supply chain strategies to prevent uncertainties and challenges faced by the organizations.

VI. RESEARCH QUESTIONS

1. What SCM strategies can be used by Indian Pharmaceutical companies to lower the associated costs incurred for SCM activities?
2. Which supply chain areas are to be considered in supply chain optimisation for achieving operational efficiency?
3. What factors play a major role in the optimisation of effective and efficient supply chain management?
4. What are the supply chain challenges faced by pharmaceutical companies in India?
5. Which optimization tools or methods are to be used in order to achieve operational efficiency?

VII. RESEARCH OBJECTIVES

1. To explore the key supply chain areas for achieving the operational efficiency from the available literature.
2. To identify the factors contributing to optimisation of supply chain.
3. To identify the challenges in Indian Pharmaceutical companies.
4. To find the optimisation tools used for achieving operational efficiency.

VIII. KEY SUPPLY CHAIN AREAS

1. Demand Forecasting
2. Material Flow
3. Inventory Management
4. Distribution
5. Logistics and Transportation

IX. KEY PERFORMANCE INDICATORS:

1. Inventory Turnover – it helps in understanding the efficient supply chain practices in terms of buying, forecasting and ability to move the inventory. Ability to move inventory is quite essential for any organisation because it plays a major role in lowering the carrying costs and selling the products at the same price instead of going for promotional schemes or clearance sales.
2. Timely Delivery–A.T.Kearney (2016) identified that timely delivery greatly increases the satisfaction levels of customers. About a quarter percentile felt that for a regular item, three days seems to be acceptable for delivery and majority felt two to five days as acceptable delivery time.
3. Order Cycle Time–it would help in measuring the time right from material purchase to selling the product in the market.
4. Inventory Accuracy – Accuracy of Inventory has to be matched manually and also in the database. But in most of the cases, manual count does not match with the database which comes to 68% and increases the inventory holding costs and also results in high number of backorders.
5. Warranty costs- these are considered as part of sales percentage to reduce the costs that are related to defects that amount to in quality control. These costs would give an idea of how much costs were incurred for repairs and replacements when compared to total number of sales.

X. CHALLENGES IN SUPPLY CHAIN

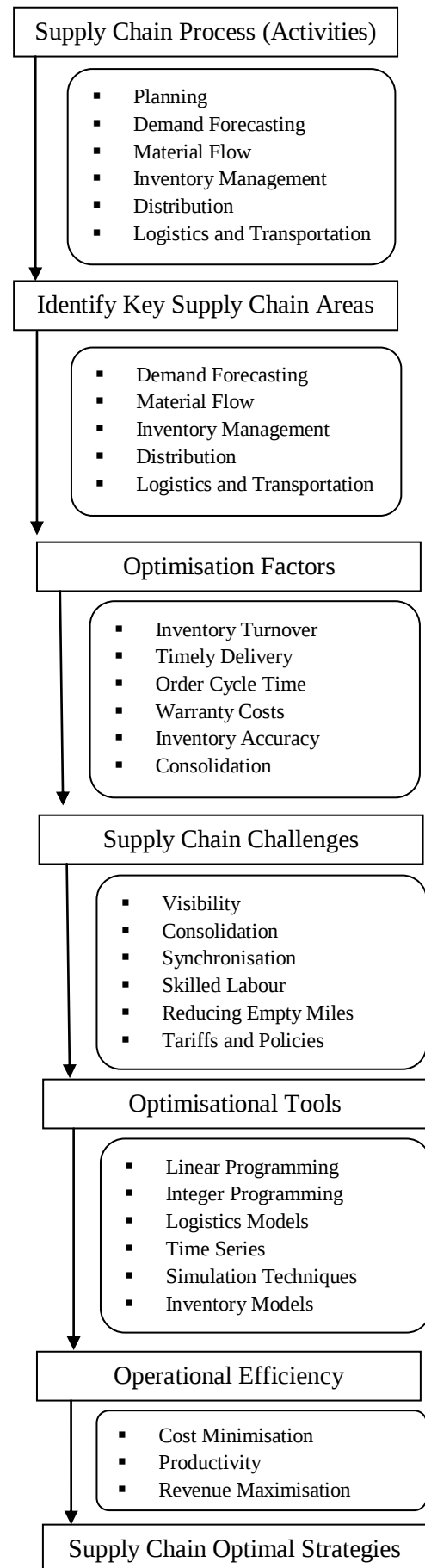
1. Consolidation and visibility in supply chain.
2. Expired drugs – companies take back expired drugs and destroy them. Only large companies have the ability to deal with the expired drugs financially and other companies cannot bear the losses.
3. Co-ordination and synchronization of material flow.

4. Demand fulfillment at multi destinations simultaneously.
5. Shortage of skilled drivers.
6. Companies trying hard to reduce the amount of empty miles driven while distributing goods.
7. Companies are adopting supply chain analytics to bring digital culture into their firms to gain a competitive edge.
8. Tariff and International supply chain networks – rising tariffs, natural calamities and economic policies are concerns for any company which deals with supply chain.
9. Customers preferences are shifting drastically which are impacting order cycle times and service requests.
10. Quality and Regulatory issues

XI. OPTIMISATION TECHNIQUES IN SUPPLY CHAIN (Based on studies)

1. Mixed Integer Programming models are used for supply chain applications.
2. Logistic models for lateness distribution in inventory system.
3. Linear Programming for transportation of materials and supplies.
4. Inventory models for material classification, safety stock, optimal stock quantity, tardiness and handling costs.

Operational Efficiency Optimisation Model
(Proposed model based on studies)



XII. Further Scope:

This study can be put into different areas like:

1. Best practices to be adopted in managing the supply chain activities
2. Supply Chain Challenges in Distribution of Pharmaceutical companies
3. Supply Chain Distribution Process
4. Quantitative solutions to SC Processes
5. Optimisation models for inventory and stock handling

XIII. CONCLUSION

India's contribution of generic medicine internationally accounts to 20 percent volume of all exports. Supply chain activities are posing major challenges to supply chain based companies especially to the pharmaceutical companies. Pharmaceutical products are time-bounded and it faces threat in the form of patents and it has to find a solution for near expiration drugs. There is a dire need to restructure the supply chain strategies to counter the challenges and to have operational excellence in the optimization of cost, productivity and revenue. This study proposed an optimisation model for operational efficiency based on the optimisation factors, supply chain challenges, optimization tools, operational efficiency and ultimately restructuring optimal SC strategies. Many studies were conducted on optimization of Inventory management, yet there is wider scope to build an optimal model.

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