ISSN 1816-6075 (Print), 1818-0523 (Online)
Journal of System and Management Sciences
Vol. 8 (2018) No. 2, pp. 65-73

Pharma Supply Chain: Efficiency Modelling Approach

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Abstract. In previous decades, companies were used to manage their supply chain individually and produce inaccuracies in overall chain performance. To avoid inefficient revenue and expense operations, companies need an end-to-end view to the supply chain. The implementation of supply chain management solutions gives wider visibility for production, better planning of orders, and reduction of inventory. In accordance, with holistic view on pharma supply chain companies get opportunity in decision-making as well as business efficiency. In the study historical supply chain changes and future efficiency increase opportunities are identified. Finally, conclusions and recommendations are presented.

Keywords: pharma supply chain, costs cutting, public service, efficiency, efficiency modelling.

1. Introduction

There is an endless search for better performance in logistics in general aiming to avoid over-costs. Transaction costs and internationalisation theories of multinationals, which are present in pharma supply chain as well, state that they exist because possess advantage that allows them to deliver services and products to the market at lower costs than national companies could manage on their own (Malone, Rose, 2006). Transaction costs theory has the view that multinational suppliers have managerial skills, which gives them ability to operate at low transaction costs.

The analyse of economic science literature (revised books published by famous world publishers) shows, that the authors, who published books about pharma supply chain, have used term “efficiency” quite rarely. The application of efficiency is figured out as important priority of research in the theme of

pharma supply chain. The analysis of literature showed that there is a lack of scientific generalisations and solutions regarding to the topic of efficiency evaluation.

However, pharma supply chain is usually managed by medicine rather than supply chain professionals. As a result, research which helps pharma practitioners, has a significant importance (Asgari et al. 2016).

The study will focus on efficiency solutions application to improve pacient access to products at a reasonable price.

The study is based on historical, comparative and benefit-cost analysis.

2. Pharma supply chain

There are considerable benefits to society in terms of service quality, access, and costs. Pharma supply chains are likely to benefit more from such development in terms of volume, network and population coverage.

Patients are largely unaware of the costs of distribution. Patients in some cases argue that the pursuit of profit across pharma supply chains is responsible for problems in geographical territory.

Trade schemes are approached to regulate wholesale and retail mark-ups. Countries have different starting-point within pharma supply chain – one of them could be cost of goods that the first distributor has to pay which further on could be used as the basis to which mark-up is applied.

The application of pricing on country level requires information about the cost of goods and the supply chain costs, and some enforcement capacity.

Study compared pharma products prices in Austria with those in other European countries. Price range between Austria and other European countries was higher at the pharmacy level because ex-factory price level (Kanavos et al. 2011).

In India, for example, retail price is formulated as the costs of manufacturing plus post production expenses including trade mark-ups and producer margin. A mark-up represents the additional charges and costs that are applied to the price of a commodity in order to cover overhead costs, distribution charges, and profit. Single cross-country European study found significant variations in manufacturing prices (lowest in Italy), distribution mark-ups, etc. (Garattini et al. 2008). In the context of the pharmaceutical supply chain, policies might involve regulation of wholesale and retail mark-ups (WHO, 2015).

Cost-plus pricing is a method for setting retail prices of medicines by taking into account production cost of a medicine together with allowances for promotional expenses, manufacturer's profit margins, and charges and profit margins in the supply chain (WHO, 2015). Even with regulation, highest mark-

ups are applied in Lithuania but are not proven by expensive labour costs. Some studies have shown that high mark-ups may be required for sustainability of distribution operations if implemented in market.

3. Efficiency in pharma supply chain

It is imperative that steps be taken in the near future to improve efficiencies and attempt to cut costs in the pharma supply chain. Here are suggestions how this could be done:

1). Cut out the middle man (wholesaler) not bringing added value. This will do two things:

• Speed up the distribution process as the company will be delivering directly to pharmacies or to consumer.

• Cut costs by cutting out the middle man. Average wholesale margins range from 2% in Turkey to 18.25% in Portugal, with the majority ranging between 4-8%. In principle, changes in the distribution model should make the process of delivering medicines from factory gates to pharmacies or end users more efficient and cost-effective. Of cource producers should be aware of products availability; in streamlining supplies and managing stock producers should take care how to avoid shortages in those markets.

The increased trade does not mean the increased process synchronization among supply chain partners. But in general option to make process more synchronized between trade partners exists.

2). Implement paperless process in supply chain operations, as 20 percent of logistics costs are linked with paper work. This will do two things:

• The higher level of paperless, the lower costs in supply chain. More intensive usage (higher number of e-documents and more partners take-in), the better result is reached

• Reduction of inventory cycle time is due to speed and quicker response.

The adoption of electronic supply chain documents is first delayed because of switching costs, transaction costs, originating in the lack of usage in the market, and the difficulty of assessing its return from economies of scale. The condition of increasing returns makes it possible. The adoption of electronic documents starts at poineer supply chain partners and continues until the critical mass in usage is reached.

Increasing returns are combined with the introduction of e-service as an innovation.

In theories of economy the application of e-documents is associated with quick response for maximizing efficiency through economies of time (by reducing inventory cycle time).

The usage of common standard in the sector would decrease the cost of e-document implementation (economies of scale, implementation costs and lower costs of transactions, etc.). In fact paperless process replacing standard process by cutting costs and streamlining to make it more efficient.

Service provider is also taking important role to speed the implementation of electronic supply chain documents, to the market. It is specializing in transforming supplier's document format into the desired format of buyer. Supplier does not have to agree on format with the buyer but can use its own as service provider will shift information from one format to another.

Schumpeterian Mark II model presents companies that are able to introduce an innovation at time t and to earn profits above the norm for a long period of time.

Companies need to focus as well on correct documentation accompanying buying and selling operation. Compliance with operational models order-to-pay and procure-to-pay touches such areas: companies' internal purchasing policies and procedures, contracted pricing, and payment terms.

Today companies could choose from variety of viable options. The growing number of standardized and cloud-based supply chain management solutions is driving down costs and reducing implementation time.

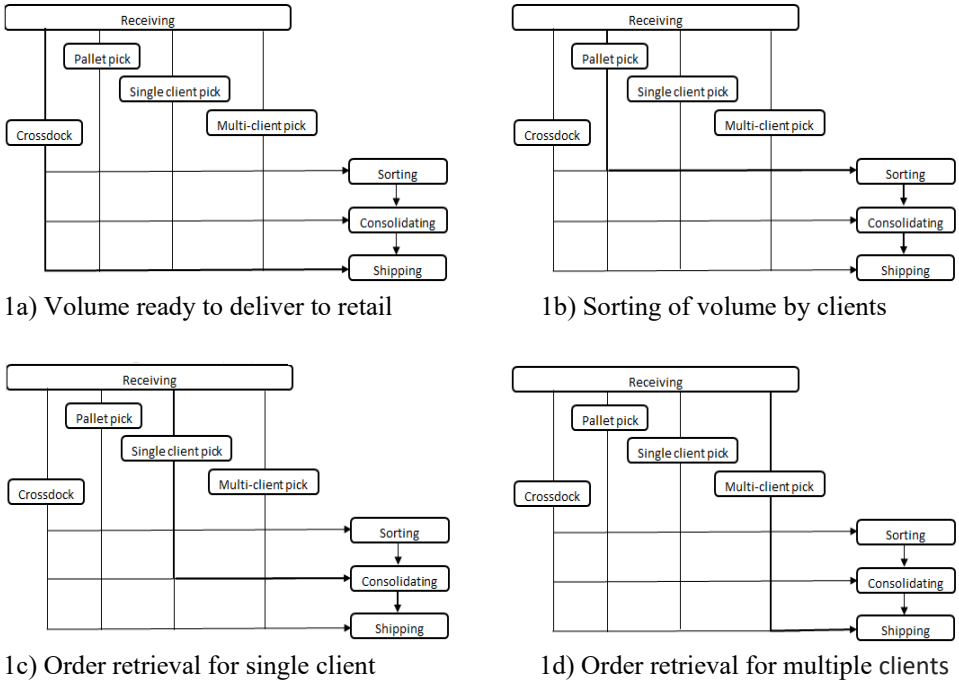
Properly settled paperless process reduces costs and increases efficiency in supply chain. Companies due to perceived complexity of paperless process are having various implementation challenges, which additionally slowing down its broad implementation. This process is treated as the exchange of invoices by electronic tools excluding manpower intervention, generates benefits such as time and cost savings in supply chain.

The greater the level of cooperative behavior between supply channel members, the greater the level of efficiency achieved in the chain.

3). It is then important to understand the patterns in the customer orders. This could be done in two directions:

• In order to cut costs an initial financial analysis of customer orders must be done. It will then be possible to know where to cut costs and how to make proper budgeting of funds. If customers ordered more than one sku, then the preceding activity analysis gives insights how to organise work in distribution center.

• The sooner order is available for shipping to the customer. There are many ways how client operations could be organised in most efficient way. Pharma supply chain could take solutions from fast moving consumer goods (FMCG) supply chains.



1a) Volume ready to deliver to retail

1b) Sorting of volume by clients

1c) Order retrieval for single client

1d) Order retrieval for multiple clients

Figure 1. Flow of client order throught warehouse

Because pallets are most standardized and mostly are handled one-at-time, both space and labor requirements scale: it takes about n times the space to store n pallets as for one; and it takes about n times the labor to handle n pallets as for one (Bartholdi et al. 2014). This is simple crossdocked pallets (see Fig. 1a). If an arriving volume has already been requested by pharmacy there is no need to store it; instead, the volume is directly moved from receiving to shipping area (crossdocked), without involvement of other warehouse activities, such as storage or replenishment. Thus, volume is quickly moved through warehouse most labour warehouse activities are being avoided.

Figure 1b represents the pallet handling and sorting by clients of pallet volume. Travel time to retrieve an order is a direct expense. In fact, it is the largest costs factor in distribution centers. But travelling is a waste in general, as it requires labour and doesn‘t bring added value. Thus, logistics, professionals introduced faster methods. The productivity is 30 percent higher, if an order can be retrieved by sorting. This is more efficient than pick by single client (see Fig. 1c). In single client pick case, employee has to move along products to find the one is searched. Thus, in multi-client pick case, it is much more efficient as the employee take not single product but multiple products during the tour (see Fig.

1d).

In fact, from the location at which one order is finished, there is little travelling necessary to location, where next order is started to be picked. Both individual orders are easily connected.

4). Cutting costs in areas where there is wastage and money is not being used efficiently. There are always areas in any company that are not working as efficiently as they could. Too much money can be squandered in places where less investment would be equally effective (see Fig. 2).

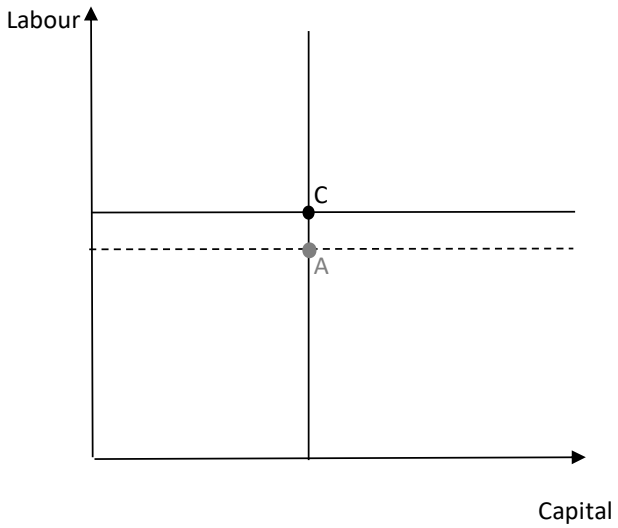


Figure 2. Two warehouses operating under the same capital conditions & different labour resource consumption

Benchmarking shows that A warehouse has higher efficiency, because of smaller consumption of labour resources. In comparison, for the same output C warehouse is consuming much more labour.

5). Supply chain management deals with several suppliers and works on a global basis. The more efficient the suppliers are the better the supply chain will work.

• This may mean that they need to change suppliers to get better prices but still maintain supply quality. It is important to get detailed data from the purchasing section of the company to make the process more efficient and cost-effective.

• Quality is associated with proper inventory management. Overstocking can cause wastage and force companies to lower prices to get rid of old stock in order to prevent heavy losses. Buyer has to be aware of such cases.

Understocking can incur losses as the company will need to back order and sometimes need to compensate the customer for waiting. Worse scenario is that customers can go to competitors to get their order done on time, rather than wait for the back order.

Finally, the efficiency improvement reached in pharma supply chain, requires some costs to reach another efficiency level.

In the enterprise at its starting point has higher costs, but they can decrease during the time. While costs decrease, there is a monetary return, which forms an appropriate economy of activity costs (benefits).

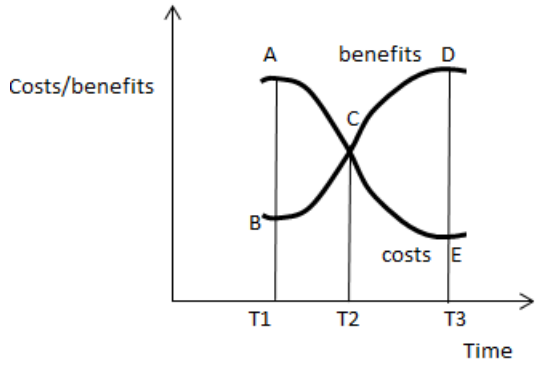


Figure 3. Costs and benefits from client perspective

Initially at time T1 (see Fig. 3), the costs of transactions at point A are quite high and the benefits at point B are low, because of resources consuming process. When the number of transactions expands (reaches critical mass), the costs per transaction are reduced (moved down) (to C and later to E), and benefits move to opposite direction because of economy of scale (to C and later to D). During time period, the economic benefit increases rapidly. In this particular case, it increased more than twice per period (between T1 and T3). In terms of money this means savings which could correspond to lower logistics fees to consumers at the end. It is calculated that investments into medical ICT during investing year are 4.2 % of annual incomes and reached economic efficiency is 2.2% comparing with initial costs of operations. Still producers and consumers could gain if advanced solutions are implemented.

Various methods could be used to evaluate efficiency in pharma supply chain, including models with analysis logic of benefit-cost, are used (Fig. 4). The importance of solution implementation is emphasized in these methods. Such methods are intended for assessing cost and the results of implementation. In practice these methods are used for making decisions on selecting proper supply chain development solutions.

4. Conclusions

Actually, in pharma supply chain, no big pressure on seeking efficiency because mark-ups are ussually regulated by local markets. Main drivers for efficiency oriented solutions are technological availability, supply chain partners behaviour, and wilingness for partners to collaborate.

From the costs structure in logistics it‘s evident that even small reduction in costs could give for consumers reasonable changes in prices, especially if distribution charges are reduced. In final price it will result lower retail mark-up and value added tax in absolute values.

For the activation of the usage of efficiency solutions in pharma supply chain, it is appropriate to apply proposed benefit-cost method which helps to evaluate efficiency. The method realise various levels of economic evaluation, the costs of implementation, as well as – results reached by the deployment of such implementation have been analysed.

These recommendations could be used by supply chain academics and professionals to redefine the focus point in pharma supply chain. Therefore, for further research necessary to understand the problems these companies face, how they can be overcome and what they can learn from other industries in order to reach higher efficiency level.

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