

PHARMA LOGISTICS – A FEW PROBLEM STATEMENTS OR GAPS

Adithya D Shetty¹, D Sreedhar¹ and Sandeep Shenoy²

¹ Department of Commerce, MAHE, Manipal, Karnataka, India

² Department of Pharmacy Management, Manipal College of Pharmaceutical Sciences, MAHE, Manipal, Karnataka, India

INTRODUCTION

The pharmaceutical industry is responsible for manufacturing pharmaceutical drugs which aim to diagnose, cure, treat, or prevent diseases. The sector represents a huge industry, with the global market value nearly one trillion US dollars.

PHARMA LOGISTICS

Pharma logistics is the framework that enables the medicines to be delivered to people who need it most. It offers 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 the end customers.

The pharma logistics generally consists of four main stakeholders: the producers (pharmaceutical manufacturers), purchasers (dealers/depositaries and wholesalers), providers (healthcare organizations, Hospitals and pharmacies) and the patients.

Producers produce pharmaceutical products, medical devices, implants and medical/surgical supplies that are necessary in the delivery of healthcare. Purchasers consist of group purchasing organizations (GPO) and distributors who facilitate the payment for and the shipment of goods from producers to providers. Among them, the main players are depositaries and wholesalers.

The difference between these two key players is fundamentally linked to the acquisition of the goods ownership. Depositaries work in deposit account and they are paid based on a fee-for-service. They carry out

temporary storage of products and send them to providers. Wholesalers acquire the ownership of pharmaceuticals and the related business risk from the industry or depositories. They satisfy the demand of providers quickly, with a widespread distribution network. Providers play a key role in pharma logistics as they trigger the distribution process. Providers may purchase goods from purchasers or directly from the producers. They use pharmaceuticals to administer healthcare services to patients. In particular, pharmacies can distribute pharmaceuticals to out-patients or to patients who, due to debilitating diseases, cannot get to the hospital to access the necessary pharmaceuticals. Patients (both hospitalized and out-patients) are the final customers where the process of pharma distribution culminates.

LITERATURE REVIEW

A brief literature review involving national and international research/review papers was conducted to identify the problem statement/gaps pertaining pharma logistics. It is been represented below with the authors of the research/review papers followed by their work.

Jan Grund and Thor-Erik Vartdal (2000)¹ opined that the cost of reaching niche set of customers is high. Hence they proposed a unique model of supplying drugs through mails which can take the form of new channels for retailing.

Nilay Shah (2004)² observed that the pharma industry is facing lots of problems in designing and establishing a proper supply chain for its products. He was of the view that a particular problem faced by this industry is the need to balance future capacity with

anticipated demands. He further stated that there is a high level of uncertainty for both the existing drugs as well as for the new drugs which are creating a long lead time in its supply chain operations.

N. Viswanadham and M. Puvaneswari (2004)³ pointed out that pharmaceutical industry in India is facing a major challenge in improving their R&D and improving the distribution system to penetrate a wide market. Hence some of the Indian pharmaceutical companies are trying to enter into alliances to increase their geographical coverage, market reach, and distribution network, accepting the fact that setting up a new marketing and distribution network from scratch is an expensive proposition.

Robert B. Handfield, Ph.D. and Vel Dhinagaravel (2005)⁴ expressed that the pharma supply chain is facing several major problems in its operations such as pedigree and securing the supply chain. It requires a high degree of surveillance to protect against counterfeits at all nodes of the network. They also mentioned that there are some more addition issues such as an increased demand for the cold chain which safeguards medicinal product from the external temperature. This control mechanism has become essential since pharma logistics in exploring its connectivity beyond the country boundaries, and hence the safety as well the life of the product has to be maintained in its long distance travel.

Rafik H. Bishara (2006)⁵ was of the view that due to the existence of various unrestrained entities in the distribution system, designing a suitable temperature and humidity monitoring program is necessary to safeguard the quality of environmentally sensitive pharmaceutical product and ensure patient safety.

Liz Breen (2008)⁶ conducted a study to gain a more accurate understanding of the nature and occurrence of risk in the Pharmaceutical Supply Chain. According to his study risks recognized are similar to those predominant in industrial supply chains. Irrespective of the peculiarities of pharmaceuticals such as lack of visibility of stock, short-term SC planning, unanticipated rise in demand, nonstandard practice (customized policies per hospital), Lack of common codes, lack of

information, Counterfeiting, Inadequate buffer stock – JIT/lean, Storage/cold chain, etc.

Ali Tamaddoni Jahromi Mehrad Moeini Jazani (2008)⁷ investigated on Iranian Pharmaceutical logistics providers and found that the high delivery lead-time and high inventory cost in pharma logistics are all because of lack of real-time connection between the drugstores and the manufacturers which have created an imbalance in the demand-supply ratio. Thus he proposed two information-based solutions to improve the efficiency and effectiveness of pharmaceutical supply chain industry.

Eric Langer and Abhijeet Kelkar (2008)⁸ stated that India as a geographically diverse country with extreme climates makes distribution a critical function. Hence a modernized cold chain management is required to retain the life of drug during transit. Also, the long channel of distribution and high incidence of brand substitution is making it mandatory for the companies to maintain all its stock keeping units (SKUs) available at all levels at all times, thereby directly affecting the cost of maintaining the inventory.

S. Gravesa, L. Leib, B. Melamedb, M. Pinedoc, L. Qib, Z.J. Shend and X. Xub (2009)⁹ documented that sales and distribution of pharmaceutical products are completely dependent on third party distributors who wholly own and control stocks once they leave the manufacturer's site. The involvement of additional parties in pharmaceutical supply chains intensifies their complexity and the odds of malfunction. It is also deduced from the study that inventory positioning for short shelf-life products has become highly critical an adequate safety stocks not possible in most of the pharma supply chain which carries products of short life span.

Christian L. Rossetti, Robert Handfield and Kevin J. Dooley (2011)¹⁰ examined the major forces that are changing the way biopharmaceutical medications are purchased, distributed, and sold throughout the supply chain. The study focused on understanding the forces that influence the attitude of the supply chain members, the mode of supply and also the price of the product.

Haresh Mahendran, Karthik Narasimhan, Nakul Nagarajan and Gopinath S (2011)¹¹ found that the pharmaceutical industry is suffering from many supply

chain infirmities including raw material shortages, short product life, quality of the product, and seasonal demand. Therefore supply chain risk management has become a vital part of the industry to overcome all these supply chain related problems.

Karan Chechi (2012)¹² observed that the key reasons for this complex supply chain environment is the presence of more than 55,000 retail pharmacies which are spread across India. Therefore it requires a higher cost in moving the sensitive drugs through poorly maintained roads when compared to that of USA or Europe. At another problem faced by the industry is a weak supply chain network and management which makes it difficult to take care of temperature sensitive drugs which has to make a long distance travel with a lengthier travel routes. Hence the presence of proper supply chain management which also includes the temperature controlled vehicles and storage houses have become important for the pharmaceutical industry of India.

Ms. Sushmita Narayana Aghalaya (2012)¹³ observed that there is a continued presence of expired and poor quality drugs in the supply chain resulting in the generation of disposable (expired and damaged) medicines that are continuously returned to the companies. Hence there is a requirement of a better infrastructure which improves the performance and quality management in the pharmaceutical supply that eliminates the expired stock and poor quality medicines in the market.

Godeliver A.B. Kagashe1* and Terevael Massawe (2012)¹⁴ opined that all wastages such as pilferage, overstocking and expiry of products should be managed efficiently in the supply chain to achieve cost effectiveness in the system. This wastage decreases the actual quantity of drugs offered to the patients and therefore the quality of health care they receive. Both understocking or overstocking and expiry of drugs highlight problems within the supply chain activities which include selection, quantification, procurement, storage, distribution and use.

Philip Berk, Marc Gilbert, Marc Herlant, and Gideon Walter (2013)¹⁵ analysed that the pharma logistics in India is facing a unique set of constraints that has hindered past efforts to develop an efficient supply chain

in its operations. It is also observed that the quality standards can never be compromised in the pursuit of saving the cost, and regulatory restrictions can obstruct some creativities that could generate economies of scale in the system. Furthermore, to mitigate the risk of stock out in life-saving drugs, most of the pharma companies would rather prefer to oversupply the products to maintain availability in the store inventory. Hence it is clear that in today's competitive business environment, companies must rethink on their strategies and should develop a proactive mechanism to stay one step ahead in the market.

John Frimpong Manso1, Jonathan Annan2, Sowornu Sovoe Anane (2013)¹⁶ analyzed the that for any important decision to be taken on procuring and redistribution of medicines, information plays a prominent role by providing stock status on time which enables effective and efficient management of pharma logistic system. However, the report indicated that the information was not always easily available or well organized leading to overstock, stock-outs, and expiry of drugs.

Dr. Ganesh L and Prof. Ghadially Zoher H (2013)¹⁷ stated that supply chain optimization to channel management in the pharmaceutical industry which can transform the organization to utilize assets and resources better. But generating a better profits is challenged by some of the constraints, like highly fragmented nature of distribution network, strong resistance from trade associations in developing a cost effective supply chain and poor infrastructure for cold chain management for carrying whether sensitive goods.

Manish Panchal, Siddharth Paradkar, Anirban Majumdar (2013)¹⁸ identified in his study that the companies to remain competitive and to differentiate from the competition, continues to launch generic drugs in new dosages as well as various combination drugs. This strategy increases the number of SKU's for a company, which in turn increases the complexity of the supply chain. Also, with product launches that are phased out by geographies, the complexity only increases as diverse product portfolios have to be managed in different regions. Therefore both the inventory, as well as distribution cost, rises exponentially along with the product categories.

Akos Mojzes and Peter Csavajda (2013)¹⁹ reported that one of the biggest in pharma supply chain is to deliver several different temperature-controlled drugs and to maintain the required temperature throughout its transition in a most cost effective way. The problem occurs when the pharmacies order small quantities one time, so the active cooling method is no longer economically. Addition to this providing separate vehicles each with different temperature ranges becomes still more costly as it drastically increases the freight costs. Hence designing a cold storage supply for the products has become a critical problem in a long distance pharma supply chain.

Malik Iqbal Kabir (2013)²⁰ in his article stressed there is a need for accurate tracking and visibility of inventory which takes care of expiry control and also provides better on counterfeiting of the goods both from inventory as well during in its transit. He also emphasized that a good cold chain should be adopted in the supply chain and in storage which resolves the problems of product damage due to any climatic change.

Mona Jaberidoost1, Shekoufeh Nikfar, Akbar Abdollahias and Rassoul Dinarvand (2013)²¹ analyzed that majority of the reported risks were connected to directly with supply chain and distributors issues such as counterfeit in supply, the supply lead time, supplier's conflict, etc. Institutional and tactical issues, monetary, logistic, party-political, market and regulatory issues were considered in next level of importance.

Haidar Abbas and Jamal A Farooque (2013)²² opined that the pharmaceutical supply chains are characterized by the high level of wastage and spillover, therefore requires extra care in handling especially during storage and transportation. It is also documented that an additional demand for temperature-controlled transport is increasing to restore a safe condition and long shelf life for the products. Hence, many companies use sensor-based systems to track a product's temperature throughout its journey and sometimes send an alert if the temperature veers too far.

Samit Jain and Sagar Chatterji (2014)²³ reported that around 80% of the drugs produced by India companies are losing their shelf life because of inefficient handling systems which doesn't ensure a temperature controlled environment in its storage as well in its transit.

Therefore the pharma companies that are losing their profits because of the recalled goods due to unstandardised transportation procedures and storage facilities. Hence an effective cold supply chain is required to preserve the life of temperature sensitive drugs which safeguards the health of the end consumer.

Marina Papalexi, Liz Breen, David Bamford, Nicoleta Tipi (2014)²⁴ documented that one of the emerging concerns in the pharmaceutical industry is linked to the specific features of medications; drugs can be transformed into hazardous or non-consumable items for the customers due to their undersized expiration dates. Furthermore, the clearance of expired/unwanted medicines is very expensive and destructive to the environment. Therefore, hospital pharmacies should focus on innovative programs to reduce waste and costs, while improving the quality of services.

Meghana Vyas (2014)²⁵ studied the pharmaceutical distribution system in India, the challenges faced by pharmaceutical supply chain, and the critical issues in managing the pharmaceutical supply chain. She found that there is a need to manage operational excellence in terms of cost-effective development and to fasten the lead-time by upgrading real-time connectivity between the hospitals and also by adopting an accurate forecast mechanism which will help in maintaining optimal inventory levels in the supply chain.

Alejandro Romero (2014)²⁶ observed that many of the hospitals are facing problems like drug stock out or drug expiry because of no proper inventory control in their drugstores. He has also pointed out that in many of the hospitals, the inventory is compared manually hence the procurement cycle becomes lengthier which makes it difficult to supply medicines on time.

Osaro Aigbogun, Zulkipli Ghazali, and Radzuan Razali (2014)²⁷ found that the turbulence risks is the most sensitivity issue in an uncontrolled environment which are frequent unpredictable changes in external factors beyond one's control. Hence creating an environment which can safeguard the product and process integrity is essential for the day.

Josef Packowski (2015)²⁸ observed that there is a need for meeting the challenges in products requiring

active temperature control and traceability. He explained that security requirements and measurements against counterfeiting as well as pressure to reduce logistics costs are also expected to become more important or even significantly more important both about the near- and the medium-term future.

Kong Hua-li, Feng Duan-hao, Fan Wei-wei, Li Qian (2015)²⁹ found that there is an information gap between hospitals and drug suppliers because of a traditional Hospital Information System. Thus by using real-time tracking and supply chain management system will surely increase the efficiency during the purchase of drug, request, distribution, acceptance, provision and also in drug inventory management.

Roberta Pinna, Pier Paolo Carrus and Fabiana Marras (2015)³⁰ stated that there should be an improvement over information systems which will provide accurate data and reports and improves the forecasting in product procurements. Also, there is a need to improve the distribution activities by maintaining a clean and secure storage.

Kris M. Y. Law (2016)³¹ opined that the pharma logistics play a vital role in the hospital service performance. Hence an in-depth study should be performed in order to understand the means to reach the growing demand of the market on time with an effective plan which ensures 100% competitiveness in drug logistics system in hospitals. Therefore purpose of the study was to explore the current situation of the drug logistics and the drug centres operations in public hospitals in China; specifically how the organizational partnerships with the supply chain partners can affect the operational performance.

6 Pressing Pharmaceutical Logistics Challenges That Need to Be Addressed Now. (2016)³² found that biologics are quite expensive, therefore, it creates a higher opportunities for counterfeits in pharma supplies. Because of the brand name medicines represent high costs makes them very expensive. Hence the counterfeiters introduce the second copy drugs into the supply chain, which has alarmed a need for better security for pharmaceutical supplies.

Traceability efforts forge ahead, anticounterfeiting technologies are reviving, and

cargo security becomes a more settled practice (2017)³³ reported that US is emphasizing more on complaining the deadlines through a practice of effective tracing which will provide complete information of pharmaceutical shipments all the way from the point of dispatch to point of receipt absolutely via electronic, interoperable traceability system. This makes the entire pharma chain more secured and thereby supports the statement “traceability is the next definition of the security”.

Pharmaceutical cold chain logistics is a \$13.4-billion global industry (2017)³⁴ found that the pharma logistics is positively developing its cold supply chain with refrigerated facilities in its storage and transportation accounting upto \$13.4 billion which shows a rapid growth of 9% in sensitive drug management, thereby suggesting that the industry is learning how to manage cold chain costs more efficiently.

REVIEW ANALYSIS

After analyzing the a few problem statements/gaps, a pie chart (Fig. 1) is been prepared to provide a picture of a problem areas of pharma logistics from existing literature.

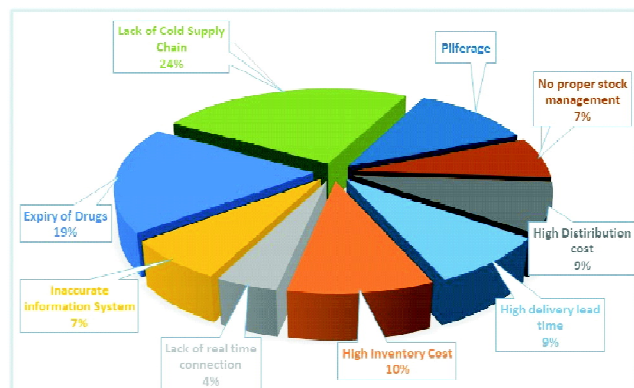


Figure 1: Problem areas of Pharma Logistics

PROBLEM AREAS/GAPS

On analyzing the above articles it is found that majority of the pharma logistics is facing a major problem in providing a best temperature controlled carriage for the products. Variable factors like poor road infrastructure and connectivity, high cost of availing facility from the existing service providers because of limited competition

and the poor support in providing controlled temperature during multimodal transportation for temperature sensitive products.

It is also determined from substantial researchers in their articles, explains that controlling drugs from expiry is another big challenge in the pharma logistics to maintain the shelf life of the product and to avoid movement of obsolete products in the supply chain.

Pilferage and high inventory cost is another obstacle for the progress of pharma logistics. The supply chain is witnessing the problem of counterfeit in most of its transaction because of the weak security system practiced in pharma logistics. Mean time the inventory cost is shooting up day by day because of inadequate stock handling mechanism. In most of the cases it is either the products are been purchased in excess or in short leading towards over stocking or shortage of the items. Hence driving in the direction of growing inventory cost because of expiry and holding of excess drugs also increasing the ordering cost in case of shortfalls.

Yet another hurdle confronting the pharma logistics is the high delivery lead-time. This is mainly because of three reasons; the lack of real time connection between hospitals and the vendor with no proper information system is creating a gap between two points. This gap is increasing the lead-time in delivery as no information is being communicated on time. A poor stock management system will not give accurate data on requirement of drugs that in turn makes forecast an outdated and in return increases the cost of managing the logistics of the drugs.

It is also analyzed that distribution cost is rising because of long distance transportation of the products and multiple delivery points. Therefore, high cost incurred in supplying to some the niche segment with high level of protection and with minimum units is very difficult. It contributes in building cost for individual items, thereby adding on more price for the items.

CONCLUSION

Numerous studies have attempted to identify critical factors that lead to a lack of real time connection between pharmacies and various distribution points, but none have been able to conclusively establish the relationship

between the two variables. Not many researchers have studied the areas of cold storage distribution, the length of delivery lead-time in supply of critical drugs. Limited studies has been undertaken on areas such as achieving operational excellence in terms of cost-effectiveness in pharma logistics, factors involved in maintaining optimal inventory level of critical drugs and the loopholes in Pharma logistics handling the critical drugs. Though pharma logistics in India is growing in a rapid phase, it is equally influenced by various imperative factors like improper cold chain, long distance transportation, less connecting points, minimum number of competitive logistic providers, inadequate handling system and facilities in controlling expiry drugs. Hence, by analyzing the reviews it is resultant that there is a wide scope to further study and develop a mechanism which can abolish all these problems by reducing delivery lead-time, developing an accurate and reliable real time information system which can escalate pharma logistics to the next level of effectiveness and efficiency.

BIBLIOGRAPHY

- Grund, J., & Vartdal, T. E. (2000). Distribution of pharmaceuticals” a Norwegian logistic perspective. *Pharmacy World and Science*, 22(3), 109-115.
- Shah, N. (2004). Pharmaceutical supply chains: key issues and strategies for optimisation. *Computers & chemical engineering*, 28(6), 929-941.
- Viswanadham, N., & Puvaneswari, M. (2004). Research Report on India Logistics Industry.
- Handfield, R. B., & Dhinagaravel, V. (2005). Future trends in pharmaceutical and biotech distribution. Supply Chain Resource Consortium.
- Bishara, R. H. (2006). Cold chain management-an essential component of the global pharmaceutical supply chain. *American Pharmaceutical Review*, 9(1), 105-109.
- Breen, L. (2008). A Preliminary examination of risk in the pharmaceutical supply chain (PSC) in the National Health Service (NHS). *Journal of Service Science and Management*, 1(02), 193.
- Jazani, A. T. J. M. M. (2008) Towards More Integration: Investigation of Iranian Pharmaceutical Logistics Providers.
- Langer, E. S., & Kelkar, A. (2008). India Today-Pharmaceutical Distribution in India. *BioPharm International*, 24.

- Graves, S., Lei, L., Melamed, B., Pinedo, M., Qi, L., Shen, Z. J., & Xu, X. (2009). New Challenges to Emergency Management of Pharmaceutical/Healthcare Supply Chain Disruptions.
- Rossetti, C. L., Handfield, R., & Dooley, K. J. (2011). Forces, trends, and decisions in pharmaceutical supply chain management. *International Journal of Physical Distribution & Logistics Management*, 41(6), 601-622.
- Mahendran, H., Narasimhan, K., Nagarajan, N., & Gopinath, S. (2011). Investigation of Supply Chain Risk in the Indian Pharmaceutical Industry: A Case Study. In Proceedings of the World Congress on Engineering 2011 (Vol. 1, pp. 836-841).
- Cechi, K. (2012, September 19). The Indian Cold Chain Pharma Market. Retrieved from <http://www.pharmalogisticsiq.com/supply-chain-security/articles/the-indian-cold-chain-pharma-market>.
- Aghalaya, S. N., Elias, A. A., & Pati, R. K. (2012). Analysing reverse logistics in the indian pharmaceuticals industry: a systems approach. In 26th Australian and New Zealand Academy of Management (ANZAM) Conference 2012.
- Berk, P., Gilbert, M., Herlant, M. and Walter, G. (2013, MAY 15). Rethinking the Pharma Supply Chain: New Models For A New Era. Retrieved from <https://www.bcg.com/publications/2013/biopharmaceuticals-operations-supply-chain-management-rethinking-the-pharma-supply-chain-new-models-for-a-new-era.aspx>
- Kagashe, G. A. B., & Massawe, T. (2012). Medicine Stock Out and Inventory Management Problems in Public Hospitals in Tanzania: A Case of Dar Es Salaam Region Hospitals. *International Journal of Pharmacy*, 2(2), 252-259.
- Annan, J. (2013). Assessment of Logistics Management in Ghana Health Service. *International Journal of Business and Social Research*, 3(8), 75-87.
- Ganesh, L. (2013). Optimization of Supply Chain Management in Pharmaceutical Industry.
- Marina, P, Liz B, David B, & Nicoleta T. (2013). Supply Chain Efficiency – A Lever for Enhanced Competitiveness. *Pharma Bio World*. 10-14.
- Mojzes, A., & Csavajda, P. (2013). Packaging Challenges and Problems In The Pharmaceutical Cold Chain Distribution.
- Kabir, M. I. (2013). Reverse logistics in pharmaceutical industry. *International journal of supply chain management*, 2(1).
- Jain, S. and Chatterji, S. (October 7, 2014). Need for innovative cold chain transport solutions in pharma industry. Retrieved from http://www.business-standard.com/content/b2b-pharma/need-for-innovative-cold-chain-transport-solutions-in-pharma-industry-114100700710_1.html
- Jaberidoost, M., Nikfar, S., Abdollahiasl, A., & Dinarvand, R. (2013). Pharmaceutical supply chain risks: a systematic review. *DARU Journal of Pharmaceutical Sciences*, 21(1).
- Abbas, H., & Jamal, A. F. (2013). Return and disposal of unused medicines: a customer perspective of reverse logistics. *International Journal of Business and Management Invention*, 2(11), 59-66.
- Papalexi, M., Breen, L., Bamford, D., & Tipi, N. S. (2014). A preliminary examination of the deployment of lean and reverse logistics within the pharmaceutical supply chain (PSC) UK. In Logistics Research Network (LRN) Conference.
- Vyas Meghana (2014). Studying Scope, Challenges and Issues With Indian Pharmaceutical Logistics Management.
- Romero, A. (2013). Managing medicines in the hospital pharmacy: logistics inefficiencies. In Proceedings of the World Congress on Engineering and Computer Science (Vol. 2).
- Aigbogun, O., Ghazali, Z., & Razali, R. (2014). A Framework to Enhance Supply Chain Resilience The Case of Malaysian Pharmaceutical Industry. *Global Business and Management Research*, 6(3), 219.
- Packowski, Josef. (2015). Current and Future Trends for Pharma Logistics. *CHE Manager International*. 5. 4-7.
- Hua-li, K., Duan-hao, F., Wei-wei, F., & Qian, L. (2015). Design and Implementation of Pharmaceutical Logistics and Supply Chain Management System for Hospital.
- Pinna, R., Carrus, P. P., & Marras, F. (2015). Emerging Trends in Healthcare Supply Chain Management—An Italian Experience.
- Kris M. Y. Law, (2016), “How schedule issues affect drug logistics operations: an empirical study in hospitals in China “, *Industrial Management & Data Systems*, Vol. 116 Iss 3 pp. 369 – 387.
- 6 Pressing Pharmaceutical Logistics Challenges That Need to Be Addressed Now. (2016, November 14). Retrieved from <http://gaia-trade.com/pharmaceutical-logistic-challenges>.
- Traceability efforts forge ahead, anticounterfeiting technologies are reviving, and cargo security becomes a more settled practice. (2017, May 18). Retrieved from <http://pharmaceuticalcommerce.com/supply-chain-logistics/2017-product-security-report>
- Pharmaceutical cold chain logistics is a \$13.4-billion global industry. (2017, May 10). Retrieved from <http://pharmaceuticalcommerce.com/supply-chain-logistics/pharmaceutical-cold-chain-logistics-13-4-billion-global-industry/>