

Driving Logistics Change in the Pharmaceutical Industry



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Abstract: *The pharmaceutical logistics mainly involved the process of packaging, handling, storage, and transportation of drugs, vaccines or pharmaceutical products to the patient that slightly different from the mainstream logistics practice. The nature of the products that need to reach the destination in a fast and safe manner make the pharmaceutical logistics are very challenging and expensive. Despite various issues faced in pharmaceutical logistics, there are still lacking research to address the gap in managing the issue which is the focal point of this study. In this research, a qualitative method was adopted due to the complexity of the process that requires close investigation to understand the real issue. Four (4) Pharmaceutical companies were selected to unveil the theme issue. A strategy framework was developed as a result of the findings and provide an insight to the practitioner on the critical factors that driving on the logistics changes in the Pharmaceutical industry. This study provides a vital finding and serves as an exploratory study for future research.*

Index Terms: Supply Chain, Pharmaceutical Logistics, Pharmaceutical Industry.

I. INTRODUCTION

The implementation of Logistics in the Pharmaceutical industry may be the most complex process among the logistics practice. Like the other requirement in the major logistics industry, pharmaceutical logistics also have a specific logistical method to maintain the integrity of the pharmaceutical shipment. This includes the requirements of specific equipment, storage facilities, handling procedures and strong cooperation among the cold chain partners. Since pharmaceuticals are dealing with a delivery of vital products for the benefit of the public,

the availability and sustainability of pharmaceutical logistic is always a concern for both companies and governments. It is crucial to ensure the pharmaceutical products are delivered at the right time to the right person in a standard condition. Improper distribution and handling of the pharmaceutical product is not only affected the companies' reputation, costumers' satisfaction, and companies' profit but could also distribute the healing processes of patients and produces a negative effect on public health. Despite a government concern on the logistics practice in the pharmaceutical industry, there is still a lack of research on this area that able to bring insight into the issue and challenge face by logistic practice in the pharmaceutical industry. As such, there is no serious effort to address the gap and improve the logistics practice in the pharmaceutical industry that well-known as a lucrative business.

II. RESEARCH BACKGROUND

The pharmaceutical industry as a whole has traditionally been very profitable worldwide. In Malaysia, this industry is estimated to be worth RM12 billion (2017), which is more than two times the same market for Singapore. Malaysia's pharmaceutical market is expected to grow at approximately 10% annually, double than the Asia-Pacific average. The positive growth of this industry and a lack of entry barriers into the Malaysian pharmaceutical industry have attracted many foreign players to set up the facilities in this country which contribute to the rapid growth. The significance of this industry to the Malaysia economy is evident in the government initiative to include the pharmaceutical industry as one of the focus areas of NKEA (National Key Economic Area). This is part of the government plan to achieve the contribution of RM13.8 billion by the year 2020, and to create more than 12,000 job opportunities from this industry.

Pharmaceutical logistics is very complex process due to a specific issues related to the pharmaceutical industry that includes tight regulations, reimbursement, pricing applied by government agencies, direct sell models, 3PLs (third party logistics), product diversity, hardness in forecasting a product's life cycle, shipment of R&D products for clinical studies and counterfeit products which all lead to putting the pharmaceutical logistics in a different category called "life science" and "healthcare logistics".

The problem faced by the pharmaceutical logistics were also contributed by the differences in the demand characteristics,

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underlying a unique problem of incentive alignment between the manufacturer and the distributor which resulted in the implementation of two different types of supply chain policies that contradict each other and against the prevailing practice in the industry that operate with one type of supply chain to manage the whole process.

III. LOGISTICS CHALLENGE IN PHARMACEUTICAL INDUSTRY

The logistics process in pharmaceuticals is the essential component to enable the medical products being delivered to the right patient for the healing process [1-2] & [5]. It has emerged as a differentiator in the last mile distribution of medical among the pharmaceutical player. The capability of Pharmaceutical companies to exploit the alternative transport options and the increased usage of shares infrastructures like multi-user warehouse and trucks will bring a positive impact to the product cost [10]. Although pharmaceutical Industry has positively grown over the years, there are various issues contribute to this pitfall of the pharmaceutical industry as a result of the logistics issues discussed in the following:

Lack of coordination

The capability of the organization to matching supply chain design and demand characteristics is vital for business alignment to maximize performance in the long run [7,8]. However, these structures are different in the pharmaceutical industry where both manufacturer and the distributor owns two different types of supply chain policies that contradict each other due to different objectives and constraints that requiring different types of supply chain capabilities.

As a result, two separate supply chains practice implemented in this industry contradicting the prevailing practice in the industry. Consequently, there is a dramatic shift in the models and techniques employed to support the logistics process in this industry. The complexity of supply chain strategy in the pharmaceutical industry is perhaps, the number one challenge that most pharmaceutical companies face the logistics services.

Temperature control

The uniqueness of the logistics practice in pharmaceutical logistics is the capability of managing the product temperature. Most pharmaceutical products need to be kept at a particular temperature throughout the transit period from the manufacturer to the end-user. This is to make sure that the products are useful for the patients. But transporting pharmaceuticals through different mode of transport has its distinct advantage as well as disadvantage. This is why many logistics companies charge a temperature-controlled freight which directly makes the freight cost of the pharmaceutical products much expensive than a normal product.

Cold chain logistics is one of the processes in controlling the product temperature that differentiates the pharmaceutical logistics process from the other mainstream logistics. It is a logistics process that required a special method to conduct and to ensure the pharmaceutical goods are in good condition during the packaging and handling, storage and transportation process [9]. Misconduct or mishandling the cold chain logistics procedure may affect the whole pharmaceutical

logistics operation. As such, only trained workers are permitted to handle the cold chain procedure which supported the [3] that shortage of skilled workers has contributed to the most cases related to misconducted and mishandling in cold chain procedure. The increasing demand for the skilled worker demands in the cold chain logistics evident a fast-moving of this position within the industry.

Close monitoring of the Malaysia government on the pharmaceutical process through its agency, Ministry of Health, National Pharmaceutical regulation agency (NPRA) has forced the pharmaceutical company to comply with the temperature control guideline underlying in the Good Distribution Practice (GDP) guideline.

Warehouse Management

In the pharmaceutical business, stock administration is important to improve the accuracy of inventory orders. A good stock control helps the company to avoid the shortage problem and allow the business to keep a sufficient inventory which facilitates much faster the order fulfillment operations and improve customer satisfaction. Additionally, it also will help reducing time and cut the prices.

As a result of the rapid growth of the pharmaceutical market over the years, the need for warehousing as a strategic action to cater to the increase in demand cannot be overemphasized. This has made the industry to rely heavily on logistics services because of the increasingly attractive markets as well as increased visibility in the chain of supply and reduction of costs. But unfortunately, most of these logistics companies don't have enough warehousing structures that can meet the needs of the pharmaceutical industry. There is also no guarantee that these logistics companies will safeguard the secrecy of exclusive knowledge as well as be able to ensure constant improvement and service reliability.

Packaging

A pharmaceutical product is easily damaged if excessively expose to temperature or moisture while transporting to the destination. As such an effective packaging method is requiring to protect and preserve the product. An insulating unit and cooling unit methods are adopted to protect the pharmaceutical products during transportation from the change of temperature that causes the goods from smelting and damage.

Procedure of Pharmaceutical Goods Shipment

Due to the nature of the Pharmaceutical product, a special logistics procedure is established to prevent the product from damages which discuss in the following sub-heading.

Documentation

Any transportation of pharmaceutical products requires proper documentation such as road channel bills, invoices, packing lists and own knowledge for export and import documentation. These documents are subjected to the audited by the authority.

Packaging

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Packaging safety

To move the product, handling operations should capture or marked the product with a proper command such as " Do not Throw ", or cut the seal on the packing.

Weight and dimensions

The air conservation agent or broker should inform all data on the weight and dimensions of the cargo in custom customs handing over the product, the packaging on the documentation, to facilitate the freight carrier to include in the air bill to an overseas agent.

Lack of Local Capabilities

The pharmaceutical logistics is continuously facing a huge shortage of skilled workers if policymakers don't up to their game in the face of growing competition from the neighbor countries. A shortage of specialized skills that operate the technology optimizing the distribution of goods to customers is threatening even the best efforts at scaling operational capability.

Technology

The adoption of technology can reduce the use of manpower incomplete operation, [11-12]. Some technology like RFID, automated warehousing and pick up technology is important in logistics operation to maximize the production and increasing the efficiency on handling the space, safety, and accurately managing the product ([11].

Modern logistics includes a lot of characteristics, such as systematic industry, a combination of logistics and information technology, technology modernization integration of supply, integration services, full service and network architecture of logistics system [13]. However, the adoption of technology is also one of the greatest challenges facing the pharmaceutical industry. The use of warehouse management systems and the integration of IT are not yet at an all-time high when it comes to the pharmaceutical industry. Even though there are many, the pharmaceutical industry does not even rely on logistics companies to handle this aspect.

Government role

Government intervention is required for pharmaceutical markets to function effectively. This includes supporting the industry by developing a proper blueprint for the human capital required for the pharmaceutical industry. The government also can play as an enforcer to ensure all the

pharmaceutical company follows a standard process of managing pharmaceutical logistics.

IV. METHODOLOGY

The scope of this study covers the process and the challenge faced by logistics providers to access the pharmaceutical industry. The scope is covering the method are handling the pharmaceutical goods, the process of shipment the pharmaceutical goods and the challenge that had to face on logistics providers handling the pharmaceutical goods. This study will cover the process from a pharmaceutical manufacturer until the customer (hospital and pharmacy retailer).

In this study, a qualitative method was used to gather information on the subject research. The data were collected using an in-depth interview from four (4) pharmaceutical companies. The respondent has been selected based on their experience in managing the pharmaceutical product which mainly a senior management level that responsible for the logistics process in their respective company.

V. RESULTS AND DISCUSSION

Logistics process in the Pharmaceutical Industry

Despite the existing of two types of supply chain strategy in the pharmaceutical industry that covers a different strategy for manufacturer and Distributor, the process flow of pharmaceutical logistics is similar to another mainstream logistics which involved the process of packaging and handling, storage and transportation. The obvious difference in Pharmaceutical logistics as compared to other mainstream logistics is the management of cold chain for storage and transportation. This is due to the nature of the product that requires a specific temperature required to maintain the quality. This operation of the cold chain requires a specific logistics procedure to maintain the product temperature starting from the packaging and handling, storage until transportation to the patient. This process is subject to be audited for process compliance as stated in the Good Distribution Practice (GDP) which is monitored by the National Pharmaceutical Regulation Agency (NKRA).

Driving factors in pharmaceutical Logistics.

The uniqueness of the supply chain practice in the pharmaceutical has directly impacted logistics activities such as inventory management, material handling, packaging, warehouse management, and cold chain management. Based on data gathered from the in-depth interview, it is revealed that the management of cold chain logistics is the main challenge among the respondent in managing pharmaceutical logistics. It can be concluded that the critical success factor in pharmaceutical logistics heavily relies on the process of managing the following cold chain logistics activities:

- i. Handling process of the Pharmaceutical product
- ii. Managing the temperature storage and product arrangement

- iii. Equipment requirement for handling and transportation
- iv. Cost of handling the cold chain logistics

The handling process in cold chain logistics involved the activities that include identifying the product, storage and delivery arrangement of goods until arriving at the patient. Managing temperature storage mainly focuses on maintaining the right temperature for the product during the storage and transportation process. A mishandling on the temperature management will lead to the quality issue and impacting the healing process of the patient. Besides, the cost is always a bottleneck in the management of cold chain logistics which involving a high cost in maintaining the right temperature for the product and the use of special equipment for storage and transportation which is can be used for another purpose than the cold chain logistics activities.

As such, the cost of managing the cold chain logistics is relatively high compared to other general logistics activities.

Cold chain management is one of the issues that differentiate the pharmaceutical logistics process from other mainstream logistics. It is required a special method to conduct and ensure the goods are in good condition during the packaging and handling, storage and transportation [4] & [9]. Improper handling of cold chain procedures can affect the whole pharmaceutical logistics operation. As such, only trained workers are permitted to handle the cold chain procedure which supported the [3] that shortage of skilled workers has contributed to the most cases related to misconducted and mishandling in cold chain procedure. The operation of cold chain logistics activities requires special skill workers that know the characteristic of the product and capable to handle the cold chain logistics activities such as maintaining the temperature and operating and handling the special equipment from the storage process until the transportation to the patient. This worker normally poses a special skill and limited in the market. As such, this group of workers is highly demanded by the pharmaceutical company.

The absent of a government effort to develop the right strategy for this specific human capital evident on fast-moving of this position within the industry

The role of government in developing the pharmaceutical industry is not only limited to the development of human capital only.

The implementation of Good Distribution Practise (GDP) for pharmaceutical industry that cover the elements of documentation, vehicle and equipment, transportation, complaint & product recall, self-inspection, contract activities, legal documentation, quality management, personnel, premises & facilities, and disposal should strictly implemented to create a balance in the market between the local and foreign player.

The adoption of technology had proven to improve the performance of the logistics process in mainstream logistics. However, the finding in this study revealed less adoption of technology in pharmaceutical logistics indicates an opportunity for improvement in this area. The enforcement of GDP which requires a multi-level of document verification at different stages in the logistics process has caused slow adoption of technology particularly in terms of system integration. In reality, a manual of paper checking verification is still needed as part of complying with the GDP procedure.

The Lack adoption of technology in the pharmaceutical industry also contributes by huge dependency on third-party logistics to manage their logistics process that not interested to invest in the technology for improvement.

Implementation of the logistics process for pharmaceutical industry framework

This research adopted a qualitative approach in which the formulation of the framework is useful for discussing the research practice and discussions on research quality. The dimension framework in this study can be useful in the different research process or project and also can be used as a guiding principle in different evaluation processes such as review processes [6] as the following figure;

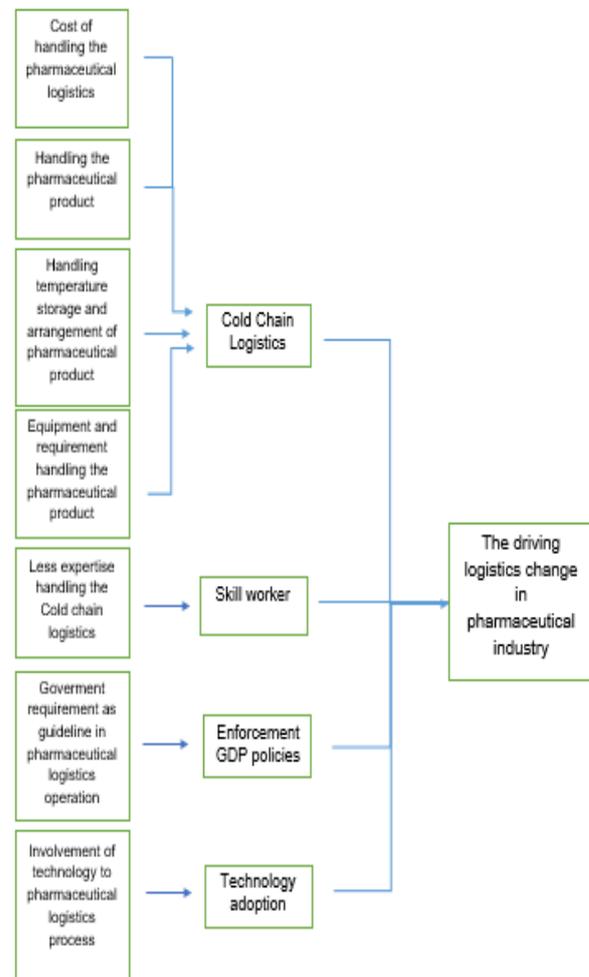


Fig. 1 Strategic framework in driving logistics change in the pharmaceutical logistics

VI. CONCLUSION

This study constitutes and offers a theoretical framework that driven the logistics change in the pharmaceutical industry. The framework consists of cold chain logistics, skill worker, GDP enforcement and technology adoption were identified as the influence factor in driving the improvement of the logistics in pharmaceutical logistics.



The important of cold chain logistics which is the backbone process of pharmaceutical logistics play a crucial role in the efficiency of the logistics process in this industry. The capability to balance the operation cost and managing the handling, storage, and transportation requirement that closely link with the capability of managing the temperature requirement will give a distinct advantage for the pharmaceutical player.

The role of government in this industry undoubtedly will improve the development of pharmaceutical logistics by providing sufficient skill workers require for the industry and healthy competition in the market.

Technology Adoption in the pharmaceutical industry is an important role in improving the logistics process. The evidence from the interview indicates a huge opportunity for this industry to adopt the appropriate technology to improve efficiency by eliminating manual work which mainly part of GDP requirement. the pharmaceutical company is not using the advanced technology toward operation cause of managing cost should be expenditure.

From the theoretical framework, it can give an idea to the pharmaceutical company to improve its logistics

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REFERENCES

1. Amorim, P., Meyr, H., Almeder, C., & Almada-Lobo, B. (2013). Managing perishability in production-distribution planning: a discussion and review. *Flexible Services and Manufacturing Journal*, 25(3), 389- 413.
2. Aung, M. M., & Chang, Y. S. (2014). Temperature management for the quality assurance of a perishable food supply chain. *Food Control*, 40, 198- 207.
3. Eliakimu, H. (2013). Pharmaceutical logistics system performance of public health facilities in Pemba (Doctoral dissertation, Muhimbili University of Health and Allied Sciences.).
4. Li, F., & Chen, Z. (2011, December). Brief analysis of application of RFID in the pharmaceutical cold-chain temperature monitoring system. In *Transportation, Mechanical, and Electrical Engineering (TMEE), 2011 International Conference on* (pp. 2418-2420). IEEE.
5. Patrick Albert Chikumba, Application of Geographic Information System (GIS) in Drug Logistics Management Information System (LMIS) at District Level in Malawi: Opportunities and Challenges, Conference: E-Infrastructures and E-Services on Developing Countries - First International ICST, 2010.
6. Pa'r Mårtensson, UnoFors, EmelieFro'berg, UdoZander, Gunnar H.Nilsson, Quality of Research Practice- An interdisciplinary face validity evaluation of a quality model, 2016, <https://www.researchgate.net/deref/https://www.researchgate.net/deref/https%3A%2F%2Fdoi.org%2F10.1371%2Fjournal.pone.0211636>
7. Porter, M. E., "What is Strategy?" *Harvard Business Review*, Nov-Dec 1996.
8. Porter, M. E., and Tiesberg, E. O., "Redefining Competition in Health Care," *Harvard Business Review*, June 2004.
9. Puri, S., & Ranjan, J., Study of logistics issues in the Indian pharmaceutical industry. *International Journal of Logistics Economics and Globalisation*, 4(3), 150-161, 2012.
10. Roberta Pinna, Pier Paolo Carrus, and Fabiana Marras, Emerging Trends in Healthcare Supply Chain Management — An Italian Experience, 2015, DOI:10.5772/59748
11. Rong, Wang, et al. "Logistics Management System Based on Permissioned Blockchains and RFID Technology." 2019 International

Conference on Computer, Network, Communication and Information Systems (CNCI 2019). Atlantis Press, 2019.

12. Singh, M. P. (2005). The pharmaceutical supply chain: A diagnosis of the state-of-the-art (Doctoral dissertation, Massachusetts Institute of Technology).
13. Zhengxia, W., & Laisheng, X. Modern logistics monitoring platform based on the internet of things. In *2010 International conference on intelligent computation technology and automation* (Vol. 2, pp. 726-731).2010.

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