Analyzing Pharmaceutical Reverse Logistics Barriers: An Interpretive Structural Modeling Approach

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ABSTRACT

The purpose of this paper is to explore the barriers affecting the application of reverse logistics at a leading pharmaceutical manufacturer in Egypt. The methodological approach of Interpretive Structural Modeling (ISM) is applied to study the mutual influences across barriers listed by a preliminary case analysis, and to identify the “driving” barriers which may worsen other barriers, and “dependent” barriers influenced by the driving barriers. Findings: This paper reveals that as many as 17 reverse logistics barriers are affecting the case company in implementing reverse logistics and these barriers have been ranked into 10 levels using the ISM method. The analysis also showed that eight dependent barriers are influenced by nine driving barriers. A key finding of the analysis is that lack of regulation enforcement and lack of public awareness regarding the importance of reverse logistics are the most driving barriers influencing the rest of the identified barriers.

KEYWORDS

Interpretive Structural Modeling, Pharmaceutical Reverse Logistics, Pharmaceutical Supply Chain, Pharmaceuticals Industry, Reverse Logistics, Reverse Logistics Barriers

INTRODUCTION

Reverse logistics is one of the most critical aspects for any business related to manufacturing, distribution, and service and support of any type of product (Donald F Blumberg, 2004, p. 1). It is also practiced in different industries, including those producing steel, commercial aircrafts, computers, automobiles, appliances, and chemicals and medical items (Dowlatshahi, 2000, p. 144). The importance of reverse logistics is underscored by its increasing popularity in both business and academic communities since the last decade (Nikolaou, Evangelinos, & Allan, 2013, p. 173).

Earlier, reverse logistics was often considered as a process that has little effect on enterprises as a whole. However, the evolving financial and competitive pressure, as well as the complexity in environmental regulations, have made it clear that reverse logistics is no longer an option for an organization to meet its goals and increase profitability (Partida, 2011, p. 62).

Deployment of reverse logistics is not free from barriers (Ravi & Shankar, 2005, p. 1012). Some of the most common barriers facing companies implementing reverse logistics in different industries are: Importance of reverse logistics relative to other issues, company policies, lack of systems, competitive issues, management inattention, financial and personnel resources, and legal issues...
(Dale S. Rogers & Tibben-Lembke, 1998, p. 32). In spite of these barriers, companies are becoming active in reverse logistics for different reasons, including economic reasons, legislative reasons, and corporate citizenship (de Brito & Dekker, 2003, p. 6). Growing concerns relating to environmental issues, coupled with legal regulations, have made organizations responsive to reverse logistics not only in developed countries but also in developing countries (Samir & Rajiv, 2006, p. 525).

Reverse logistics is very important in the pharmaceutical industry—not only from the economic point of view but also from the environmental and the regulatory points of view. In addition, the application of reverse logistics in this industry is more challenging than in any other industries, as most pharmaceuticals get destroyed when they are recalled or returned, they are seldom repaired or resold (Kabir, 2013, pp. 89, 97).

Proper disposal of recalled, unused, and expired pharmaceuticals is an important issue with legal implications, as some of these products contain hazardous chemicals. Also, the sensitive nature of medicines as well as the potential harm from use of expired or non-effective medicines means that pharmaceutical companies must effectively implement reverse logistics to promptly clear their supply chain channels of expired and non-conforming drugs (Shaurabh, Saurabh, & Moti, 2013, pp. 12, 18).

In Egypt, the head of the General Directorate of Pharmaceutical Inspection and the head of the Pharmacist Syndicate explained that “only slight amounts of expired medicines are accepted by pharmaceutical companies to be returned from distributors and pharmacies which, in turn, leads to the improper handling and disposal of expired pharmaceuticals” (Seif, Tharwat, Naser, & Madiha, 2010). Furthermore, The General Directorate of Pharmaceutical Inspection in Egypt discovered 48 cases where they found a large amount of expired pharmaceuticals in pharmacies and in distributors’ warehouses, which have not been returned to manufacturers (General Directorate of Pharmaceutical Inspection, 2010). In addition, 150 pharmacists were arrested in a recent government crackdown on pharmacies; they have been charged with selling drugs past their sell-by date (BMI, 2014, p. 84).

**RESEARCH PROBLEM**

Reselling expired pharmaceuticals in Egypt is an increasing problem with severe consequences (Ramadan, 2014; RASSD, 2015). Recent studies by Kabir (2013); Kwateng, Debrah, Parker, Owusu, and Prempeh (2014) suggest extended focus on reverse logistics to potentially reduce this problem. There are however several barriers which hinder or prevent the application of reverse logistics in pharmaceutical industry. Accordingly, this research attempt to explore these barriers that hinder or prevent the application of reverse logistics practices at a leading pharmaceutical manufacturer in Egypt.

The methodological approach of Interpretive Structural Modeling (ISM) is applied to study mutual influences across barriers listed by a preliminary case analysis, and to identify the “driving” barriers which may lead to other barriers, and “dependent” barriers influenced by the driving barriers. Ravi and Shankar (2005) indicate that “we lack a holistic view in understanding the barriers that hinder reverse logistics” (p. 1011), and highlight that the ISM approach allows for a more in-depth understanding of the situation than observing individual barriers in isolation.

Structural modeling was defined by John N. Warfield (1974) as a methodology that employs graphics and words in carefully defined patterns to illustrate the structure of a complex issue or problem. The ISM method can be used to employ a systematic and logical thinking process while approaching a complex issue and then to communicate the results of that process to others (Malone, 1975).
Linear Programming Based on Piece-Wise Linearization for Solving the Economic Load Dispatch Problem
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