

Chapter 19

Modelling the Growing Process of Integrated Healthcare Supply Networks

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ABSTRACT

This work contributes to the practice of healthcare system modelling, by presenting an urgent issue: the growing process of integrated healthcare supply networks in reducing public healthcare systems' annual expenses and improving performance. Various critical aspects affect the strategic design and development of healthcare logistic networks in practice. The conceptual discussion is empirically derived on the basis of the challenge created by the development of centralized healthcare supply networks supported by the implementation of new IT/IS investments and advanced logistic hubs for hospital material inventory management. The study moves towards the development of a newer "Healthcare Supply Network Causal Loop Diagram," to analyse and predict the growth pattern of a healthcare logistic network in its complexity, and understand how well the supply network will fit with the benefit provided by new logistic economies of scale and the risk of failures under uncertainty.

1. INTRODUCTION

International healthcare systems are under increasing pressure to reduce waste, eliminate unnecessary costs while improving quality and consistency of the care they provide. The EU's Second Health Programme (2008-2013) has recently stressed the urgent need to increase the sustainability of public health systems in the face of important chal-

lenges, such as increasing prevalence of chronic diseases (elderly people) and patients' demands for high-quality care and latest diagnostics and treatments availability. These multiple factors call for changes in the way healthcare services are delivered, partners are linked and mutually correlated one another and logistic flows and processes are managed and transferred between partners in a network-oriented system.

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International experiences demonstrate that the implementation of integrated Supply Chain Management practices by healthcare organizations would yield significant savings (i.e. inefficient and redundant processes reduction) and will allow them to better focus on the patient care mission (Kumar et. al., 2008; Nicholson, 2004; Persona et. al., 2008; Rossetti et. al., 2008; Ensenyat, 2008; Friesen S, 2005). In this context, the development of new advanced and centralized healthcare supply networks permit to achieve economies of scale, while permitting to outsource the logistics operations to a third part supplier. Thus, the European healthcare sector is asking to the scientific research to investigate healthcare supply network models, going through a complete re-thinking process of inventory management and resources planning criteria based on the new “Healthcare Supply Network” paradigm.

To reach this purpose, a “Network Oriented” re-design of the whole healthcare logistic structure from an holistic point of view is just as necessary, as the investigation of innovative approaches, materials and resources flows inside the network, including logistic services and related costs, in order to define an optimal logistic network architecture (i.e. the best centralization degree of resources).

The design of new simulation models and optimization tools is the primary key to implement these changes and reduce future healthcare expenditure without compromising quality of care.

Following a deep investigation on supply network structure interactions, and on benefits and risks associated to different centralization levels and logistic network structures, this paper investigates new possibilities, working towards the analysis and qualitative dynamic modelling of an integrated healthcare supply network, highly centralized thanks to the presence of distribution hubs and service sharing.

Here a “Healthcare Supply Network Causal Loop Diagram” - accurately supported by the existing literature - is provided, showing the most rel-

evant internal feedback loops and decision-making process that affect the growth and development of a centralized supply network of hospitals (the so-called Italian “Area Vasta Consortia”)

The study starts with the presentation of the background of this study, to then develop a new Causal Loop Diagram to describe the growing process of an integrated healthcare supply network, present its conceptual discussion and first application. Finally, conclusion and suggested future direction in which this research should proceed are discussed.

2. BACKGROUND

The growing pressures to increase healthcare efficiency and effectiveness while decreasing costs, largely explains the augmented concern with healthcare supply network optimization in many countries like U.S.A., Canada, The Netherlands, Spain etc.

Most important changes in international healthcare supply chains structure (Kumar et. al., 2008; Friesen, 2005; OntarioBuys, 2007 report; Ensenyat, 2008; Rossetti, 2008; Azzi et. al., 2012) include centralized and/or outsourced control of logistics (to a third-party logistics provider), shared healthcare supply services, advanced electronic tools and automated processes implemented into key hospital supply chain functions (i.e. RFID technology: including requisitioning, ordering, invoicing, payment, contract management and reporting) and drug/material inventory centralization and distribution (i.e. Nicholson et al., 2004; Persona et. al., 2008).

The leading approach of published works is the adoption of centralized healthcare logistic network, in a “hub-and-spoke” system, improving efficiency and effectiveness by gaining scale and scope economies and achieving an integrated structure pursuing service sharing, like

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