

Resilience in the public healthcare supply chain: a theoretical framework for the Moroccan case against covid19

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Abstract

The covid19 pandemic was an opportunity for the healthcare supply chain. The aim of the paper is to build a theoretical base for resilience aspects that should be considered by the Moroccan healthcare supply chain during pandemics.

Keywords: *Healthcare supply chain, crisis, risk, pandemic, covid19, resilience.*

Introduction

Resilience of the healthcare supply chain is one of the areas not much investigated. However, there is no consensus on what resilience is exactly. We can say that resilience is an approach that helps organizations to overcome disruption events and so return to normality in order to ensure the service level desired.

Certainly, the covid19 pandemic was a major event that escalated the academic interest of resilience of the healthcare supply chain. It was a test of the capability of the healthcare systems to challenge their management structures including Morocco through this article we tried to investigate the behavior of the supply chain reaction during covid19 pandemic in order to identify the enablers that can improve healthcare supply chain resilience during pandemics. We held investigations in two Moroccan hospitals in the north region. A theoretical framework was built for sake to identify areas of improvement for more robust reaction of the healthcare supply chain during pandemics.

The study can be a contribution for learning from the previous covid19 crisis to be more effective and efficient in upcoming crisis.

The plan of the present paper is summarized as follows

- Present resilience specificity in the healthcare context
- Demonstrate the importance of resilience in healthcare supply chain during pandemics
- Operationalization of healthcare supply chain resilience enablers during pandemics
- Establishing guidelines for implementing resilience in the Moroccan public healthcare supply chain.

1-Healthcare supply chain:

The supply chain is a set of processes between several actors to ensure the effectiveness and efficiency of operations and the satisfaction of stakeholders. The concept appeared with the development of information and communication technologies in the industrial environment. Indeed, the hospital supply chain has remained little advanced in comparison with the industrial and commercial supply chain (Costin 2010). Research on the adaptation of the supply chain in the hospital environment only began in the late 1980s in North America.

According to (Swinehart et al, 1994). A health facility consists of five activities to meet the needs of patients.

Internal logistics: the activity of acquiring, receiving, and distributing the various supplies used to support the provision of intermediate and final services

Demand management: the objective of predicting, planning and directing the use of the various resources necessary to meet needs.

Operations and services include all the activities ensuring the passage of the patient in the hospital center from admission to discharge.

External logistics: consists of medical follow-up of the patient, ancillary services to patients represent the secondary activities offered by the hospital: gift shops, religious programs, etc.

(Landry, 2001) presents the structure of a hospital as interfaces between the following services:

a purchasing and supply function for products, materials and consumables;

a patient reception, management and transfer function;

a hotel and catering function;

medical-technical functions: pharmacy, sterilization, laboratories and imaging.

Sampieri (Sampieri 2000) classifies hospital logistics activities into Traditional logistics: includes the management of physical flows (purchasing and supply, transport, distribution)

Service logistics: serves to manage patient flows simultaneously with demand.

(Taher Hassan, 2006) identifies seven areas of intervention in the hospital supply chain. These seven components are divided into three levels (strategic, tactical, operational).

1. Stock management models (operational);
2. Flow management resources and tools (operational);
3. Organization of supplies (tactical or even strategic);
4. The hospital information system (tactics);

5. Configuration of the healthcare system (strategic);
6. Future trends in hospital logistics (strategic);
7. Capitalization of knowledge and feedback on all fields of intervention (operational, tactical or strategic).

1-Supply chain resilience.

Supply chain resilience is an emerging concept that started to take interest recently. Supply chain systems are faced with multiple risks events that could constantly disturb their activities Such as Natural disasters and economic crises (glinchery, 2009). The evolution of society and globalization makes supply chains more vulnerable. Searching for new mitigation risks. Risk disruption severely affects performance operations for organizations which cause losses of profit and quality, and service level. (Kumar, 2014)

Organizations are treated continuously by changing disruptions in the environment. Traditional methods of the supply chain networks have to be more adapted for change in process and structures. The crisis situation is considered a very complex building solution and strategy is not that easy. It is evident that people, organizations and societies should transform the way of thinking and perceiving reality especially with environmental evolutions. Supply chains are more concerned by this issue. However, supply chain networks are essential for normality of human existence, supply chains are responsible for normality of food, medicine and all necessary items for all community categories. Although there is no consensus about supply chain resilience there are some papers that treat supply chain resilience theoretical framework and issues.

Definitions.

Author	definition
Christopher & Peck (2004)	“The ability of a system to return to its original state or move to a new, more desirable state after being disturbed”;
Sheffi (2005)	resilience represents the ability of a material to recover its original shape following a deformation
(Ponomarov & Holcomb 2009)	“Supply chain resilience is the adaptive capability of the supply chain to prepare for unexpected events, respond to disruptions, and recover from them by maintaining continuity of operations at the desired level of connectedness and control over structure and function”.

2-Resilience within healthcare supply chain context:

Healthcare sector is characterized by many differences with the commercial sector. Uncertainty of demand makes procurement decisions very complex. (Beaulieu 2001) Delays are intolerable in the healthcare supply chain; in this case the loss is human life. Pandemics make the threat (sheffi, 2005) indicate five characteristics of supply chain resilience: increasing redundancy in the supply chain, flexibility, changing corporate culture.

There are researchers that tend to analyze strategies for building more resilient supply chains. (CHRISTOPHER S. TANG, 2014) present some supply chain robust mitigation strategies we will cite some that can suit healthcare supply chain as:

Postponement: this strategy enables modifying the design of internal process design production to respond effectively to disruption. While losing control over operations, changing usual practices is useful to meet demand increase.

Strategic stock: keeping strategic stock of medical supplies in strategic location can be a good approach to anticipate pandemic disruption

Flexible supply base: the capability of shifting suppliers is useful in the case of stock-out of products.

2.2-Supply chain resilience enablers.

A lot of authors treated supply chain resilience enablers (Pavel WICHER, et al. 2012) (Martin Christopher and Helen Peck, 2004) the main factors found in literature are summarized as follows.

Visibility: one of the most important aspects that affect supply chain management actors is visibility of the situation and operations changing. Having a clear insight on what is going to help to anticipate crisis events.

Agility: establishing a strategic plan for responding effectively to disruption events. It Is crucial to organizations to always be prepared to overcome environmental challenges.

Collaboration: supply chain management is constructed of units and organs similar to the human all parts success is related to one another. Cooperation is beneficial between these supply

chain partners. Sharing information about inventory demand forecasts can serve the stakeholders to achieve more efficient and effective performance. Especially during a crisis, collaboration will alleviate the pressure on the whole chain.

Communication and Information sharing: without information sharing no supply chain exists. Information flows maintain the normality of operation in optimal conditions. Which implies more to healthcare context. Having the accurate information status leads to optimally serving the patient care service.

Supply chain design and reengineering:

Certainly, the design of processes and participants in a supply chain clarifies the overall performance and also will define how resilient it will be. Supply chain can include a multivariate process of purchasing production distribution operations, linked by actors. Having a fluent structure that fits the demand needs simultaneously is evident.

Human resources: building strong human resource relationships is without any doubt a key factor for flexible response during pandemics. Medical staff are the actors capable of taking decisions and acting optimally to situations.

3-Operationalization of resilience enablers into healthcare context:

Applying resilience in the healthcare context is constrained by many factors that characterize the healthcare context; however, the healthcare system is a complex system that involves several actors, processes and operations. We suppose the supply chain resilience enablers cited before have significant positive influence on healthcare supply chain resilience. Covid19 showed us how resilience is crucial for the healthcare supply chain during disruption. After speaking with some healthcare professionals, it's evident that covid19 pandemic was a challenge and opportunity at the same time which made healthcare actors reconsider and look at what they are capable of. Although due to Moroccan healthcare supply chain failures observed in the system. We will try to present general points that will enable a more resilient response for the Moroccan public healthcare supply chain.

After looking at the nature of the Moroccan healthcare system and interviewing and talking with two hospital responsables in the north region we can summarize the main factors that should be considered for a more robust resilient healthcare supply chain.

Informations systems	Supply chain and Logistics planification	Human resources	Downstream network
There is a lack of implementing information technologies in the healthcare sector. During pandemics it is important to be aware of inventory and patients' status to prevent breakdowns.	Unfortunately supply chain thinking is almost absent at the healthcare institutions. It is necessary to implement planification methods such as forecasting, inventory, warehousing, optimization methods and performance measurement for effective and efficient performance.	Human resources are neglected in literature in fact we see that it is an important pillar in improving resilience in the healthcare supply chain, nevertheless human resources in hospitals should take in consideration motivation and work conditions of medical staff	Downstream supply chain is the most critical part that enables the delivering and availability of items to the last tier of the supply chain. The Moroccan actors in the healthcare sector should reform the structure of the logistics and the supply chain network.

Some points are inspired from works of (Kenza Tadlaoui et al, 2015) (Kenza Tadlaoui et al, 2016)

(Hayat Gharbaoui, 2021)

Lean management practices as endeavor for healthcare supply chain resilience:

Lean management practices are not widely applied to healthcare systems. However, there are studies that prove the utility of lean management generates benefits, reduces cycle and so improves care chaine effectiveness. ([Almutairi](#) et al. 2020). Just in time, value stream mapping, are practices that could identify bottlenecks and so improve performance.

Organizational learning: Organizational learning is necessary in the healthcare institutions to build a resilient supply chain. Learning from mistakes and trying to seek new ways of behavior, decision and problem-solving leads to more resilient structure.

Resource dependence theory: The dependence on other supply chain partners or tiers makes upstream supply chain struggles under pandemic crisis. Although supply chain healthcare supply partners. Hospitals should be able to be innovative in matters of satisfying internal needs in case of scarcity (Alexander Spieske et al, 2022) (Amy J. Hillman et al, 2009).

Conclusion:

We tried through the elaboration of this Article to highlight on the healthcare supply chain resilience management during pandemics which is a recent subject that needs further research. The axes of our work are based on presenting humanitarian supply chain concepts, actors, criteria's plus analyzing Moroccan public healthcare criteria's response against the covid19 pandemic. Furthermore, some suggestions and recommendations were proposed to stakeholders in order to build a more resilient healthcare supply chain and therefore. minimize future pandemics effects. However, there are huge gaps concerning studies about resilience strategies and approaches during pandemics. Nevertheless, we invite the research community to boost research concerning resilience factors enablers and find more optimal solutions for healthcare supply chain resilience during pandemics.

The covid19 outbreak was a real lesson for us that we're not safe from potential diseases. The transformation of lifestyle, globalization, and population growth leads us to reconsider our capacity to deal with such events. Understanding resilience factors enables us to propose a more innovative managerial approach to healthcare to deal effectively and efficiently during pandemics. Aiming to improve the response against such events and so saving more lives.

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