

Review Article



A Review of Supply Chain Innovation and Healthcare Performance in Healthcare Industry

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ABSTRACT

Healthcare is one of the industries with high potential to contribute further towards Malaysia economy. Nowadays, healthcare system is facing critical issues with challenges and opportunities from changing the operating environment. Healthcare organization requires innovating their capabilities to cope with unexpected events. Evidence has shown that SCI is an important tool for competitive advantage. Thus, this paper provides a proposed conceptual framework for examining the relationship between supply chain innovation and healthcare performance. Two dimensions of supply chain innovation (technological innovation and process innovation) were determined to have a significant and positive direct relationship with healthcare performance (financial and customer satisfaction). A structural relationship model using Structural Equation Modeling (SEM) has been proposed. Based on the proposed conceptual model and reviewed, research hypotheses are being developed. Finally, the paper culminates with suggested future research work.

Keywords: Supply Chain Innovation; Healthcare Performance; Lean Healthcare; Healthcare Industry.

INTRODUCTION

Nowadays, research in the Malaysian healthcare industry is getting more fascinating among researchers and practitioners. To improve quality and efficiency, healthcare industry applies quality initiatives such as, lean initiative, customer relationship management, six sigma, supply chain management and so on. For example, Khaidir¹ looks six sigma as a process improvement in healthcare industry, Habidin² focused on lean as a quality initiative while Yap and Tan³ and Mustaffa and Potter⁴ interested in supply chain for competitive advantage. The era of globalization has begun the community very care and concerned about health and required a good service in the healthcare industry. In Malaysia, healthcare is one of the industries with high potential to contribute further towards Malaysia economy³. Refers to ETP Annual Reports⁵, healthcare industry in Malaysia has become a powerful engine of economic growth due to demographic shifts as well as greater affluence and changing lifestyles.

Thus, the healthcare industry must concern about their critical issue such as medical error, patient safety, quality of care, efficiency and medical cost. It is because; Mustaffa and Potter⁴ found that Malaysian healthcare industry is currently facing a critical issue with the concerns for inventory management. They mentioned that many clinics in Malaysia were placing urgent orders due to poor inventory control methods which gives an impact on transportation costs. Thus, they need a key to manage their inventory efficiently.

Organizational effectiveness is easy to achieve through Supply Chain (CS) strategy. An effective in SC management plays an important key role in improving

organizational performance and competitive advantage^{2,6-9}. SC shows a significant impact on hospital performance in terms of giving better results in reducing capacity adjustment and service delays⁸ and providing quality of care⁷.

However, evidence has shown that organizations seldom achieve the competitive advantage offered by supply chain management technique¹⁰.

Lee⁷ revealed that the healthcare industry has been slow to modify and innovates its business model especially in technology compared to other industries.

Healthcare providers use a limited technology in their work station. It typically relies on standardized manual systems for ordering supplies and causes a negative results data entry errors and inaccurate information for ordering.

Thus, it can create problem of inefficiency and give bad performance in Supply Chain Management (SCM). Therefore, the healthcare industry should strive for efficient operations such as value-added process improvement, reduction of the delivery cost, improved quality of services and maintaining close cooperation with their suppliers⁷.

In addition, Lee⁷ also noted that organization needs to innovate their business process such as considering their supplier process for sustaining the SCM effectiveness. Based on that issue, healthcare sector must adopt a Supply Chain Innovation (SCI) for assessing an organization to achieve SC efficiency then achieve their performance. Thus, the paper interest to explore and review the SCI and Healthcare Performance (HP) will benefit the healthcare industries.



Literature Review

This section will highlight on existing literature on SCI. There have two domain categories in SCI this study that are namely Technological Innovation (TI) and Process Innovation (PI). Furthermore, this research is also focused on Healthcare Performance (HP). There are two elements of HP. They are Financial Performance (FP) and Customer Satisfaction (CS). Next, this paper reviews the literature on SCI and HP measures and the relationship between SCI and HP.

Supply chain in healthcare industry

Nowadays, healthcare industries give more attention on improvement, value added, provide quality of care, cost of care, patient safety, effectiveness, and efficiency. In an attempt to achieve all that kind, healthcare organizations worldwide increasingly adopts an approach called SC. The supply chain is a one strategy that involves the customer and suppliers in activity such as in warehousing and distribution. More researchers in healthcare industry had given attention to this approach since it shows a significant impact on organizational performance. For example, rising in cost and concern about better quality in services have increased attention to developing and adopting supply chain in the healthcare sector. According to Gunasekaran¹¹ SCM showed a strategic key for improving competitiveness, better customer care and increased profitability. Samuel⁸ also agreed that implemented a SC in healthcare industries can gain a positive result in terms of reducing capacity adjustment and better result in service delays. Meanwhile, the result of Dobrzykowski and Vonderembse¹² showed that the SC of a hospital is positively direct to supply chain outcomes such as improvement in cost and quality.

However, a study by Mustafa and Potter⁴ highlight that SC in healthcare associated with pharmaceutical product is critical in ensuring a high standard of care for patients and providing adequate suppliers of medication for pharmacies. Therefore, as viewed a study, the healthcare industries need to implement a new strategy such as SCI in order to maintain the SCM effectiveness in terms to reduce the operating cost and increase the customer service level.

Supply chain innovation (SCI)

The innovation is an integral part in providing a competitive advantage and essential for organizational sustainability whereby healthcare industries can transform an idea for improving their services. Innovation has been regarded as a best key to improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace¹³. Thakur¹⁴ has described innovation in healthcare as the changes that help healthcare organization focus on the patient by doing some efficient work and more cost effectively. Besides that, Omachonu and Einspruch¹⁵ views healthcare innovation as a new concept, idea, service, process, or product aimed to

improving treatment, diagnosis, education, outreach, prevention and research, and with the long term goals of improving quality, safety, outcomes, efficiency and costs.

Akenroye¹⁶ noted required for innovative capabilities for healthcare organizations to cope with unexpected events and organizations need innovation in SC context to remain competitive¹⁷. They pointed out that the stress driving required for innovation in healthcare sector are supply chain issues, social concerns, sustainability obligations, unstable operational landscape, technological changes, budgetary cuts, persistent and long-term health problems and changing patient needs. Hence, innovation could be realized by responding to the supply chain issues, social concerns and able to sustain. Apart from that, some researchers have taken their initiative to explore and review about innovation in SC context.

Arlbjorn¹⁸ defined SCI as a change (incremental or radical) within the supply chain network, supply chain technology, or supply chain process that can take place in a company function in order to enhance new value creation for the stakeholder. Besides, innovation generation in a supply chain context can be viewed as changes in product, process, or service that either reduces cost or improve efficiency such as increased end-of-chain customer satisfaction¹⁹. Thus, SCI allows give a good impact on hospital in terms of ensuring an efficient supply of products and services for patient and hospital. All these will give an impact on organizational performance in healthcare industry⁷.

Therefore, to implement the SCI, Arlbjorn¹⁸ suggest that organizations must focus on supply chain network, supply chain technology and supply chain process for improvement. Regarding Lee⁷ SCI is conceptualized as a two dimensional constructs which are technological innovation and process innovation. Thus, the description details regarding the development of the SCI construct study provide as the following paragraph.

Technological innovation (TI)

Hospital effectiveness can be achieved through providing quality services to patient at reduce cost, maintaining patient history, adjudicating payer claims, providing referral and pre-certification service, case management, medical record and maintaining close cooperation with their suppliers. For speed and accuracy of that information, information technology plays an important role in healthcare industries²³. Apart from that, hospital must focus to enhance their technology like information technology as a strategic source when delivery healthcare^{7,24-26} for increasing the service level, and process quality to survive in the competitive markets to give a better result in hospital financial performance²⁴. In addition to that, healthcare industry can realize an increasing in productivity and attain higher service levels without expending more resources²⁷.

According to Lee⁷ information technology will lead to efficiencies and opportunities on SCM. This is because,



technology is potential to make changes in supply chain networks and process for reducing non-value adding time spent to support alternative ways of working²⁸. Relation to that, it can give improvements in productivity and customer satisfaction by making available online, real-time information networked around the organization and giving full supply chain visibility²⁸. Besides that, advanced technology in SC will lead to increase vendor collaboration, optimize pricing and sourcing efforts, and improve prediction of required order quantities and inventory level²⁹.

TI in the supply chain can be categorized into data acquisition technologies, information technologies, warehouse technologies, and transportation technologies²⁶. Based on Lin and Ho²⁶ result study, they found that adopting innovative technologies will increase supply chain performance for the logistics industry in China. All these can be worked successfully through technological, organizational, and environmental. Based on the review, TI in hospital in terms of SCM is a key for provides improvement in their process, quality in services and reduced hospital cost. Thus in a dynamic competitive industry, technology is essential in the healthcare industry for giving an effective delivery of service.

Process innovation

Process innovation defined as new organizational attempts to change production and service process³⁰. According to Desbarats³¹, service industries need to involve every link in their innovation supply chain and become active participants in their process innovation to focus on managing customer experience.

Research on medical industry by Tsiachristas³² has stated that the three elements of process innovation in medical innovation on their exploratory study are integrated care and disease management, distribution and retail, integrations and contracts. The finding showed all these elements can increase healthcare outcomes such as labor saving in health care. Apart from that, an organization can achieve an effective process innovation as stronger climates for initiative and psychological safety exists in the company³⁰. In a reflection survey, overall process innovation provides for increase efficiency in healthcare with given any positive outputs. Thus, process innovation is assumed to give multiple positive outcomes for SC that assist organizations achieve a competitive advantage and organizational performance.

Healthcare Performance

Table 1: Construct measurement of SCI performance

| SC performance | Contract Measurement |
|-----------------------|---|
| Financial performance | market share, reduced cost ¹⁰ ; supply cost reduction, improve profitability ²¹ |
| Customer satisfaction | customer value ⁷ customer query time and post transaction ¹⁰ ; total product value of customer, customer needs, retentions of loyal customer ^{11,34} |

In order to achieve an efficient and effective supply chain in the healthcare industry, SCI needs to be assessed for its performance measurement in healthcare industry. According to Gunasekaran¹¹ performance measures in SCM usually deal with suppliers, delivery performance, customer-service and inventory cost. However, performance measurement in healthcare setting seems to be more complicated compared to industrial companies due to the complexity of concepts as quality of care³³. Thus, these comprehensive measures of performance based on two perspectives: financial performance and customer/patient satisfaction. Table 1 shows the proposed measurement summary on SCI performance.

Financial performance

Organization commonly used a financial performance indicator in their performance measurement. Through healthcare sector, financial performance may not be the one critical outcome measure for overall healthcare service performance but they are crucial for the continued existence of the service³⁵. Refers to Nerenz and Neil³⁶ financial performance in healthcare system describe as net gain and operating gain. Many researchers in SC have stressed this measurement of SC effectiveness performance^{6,9,11,37}.

Customer satisfaction

Satisfaction views as an accepted part of the quality domain³⁶. Patient satisfaction from healthcare decides the healthcare delivery system and hence needs to be measured to enhance the quality of service³⁸⁻⁴⁴. According to Gunasekaran¹¹ for effective performance measurement in SC strategy, the measurement must be linked to customer satisfaction. For example, measuring the customer service and satisfaction on SC perspective can reduce the delivery cost. So, in order to measure the customer satisfaction in SC perspective, the metric measurement categorized into customer query time and post transaction measures. Post transaction measures of customer service mean by service level and customer perception. All of this customer satisfaction measures are important to describe the customer value creation in SCI as efficient data management, reduction in medical error, and speedy processing of patient⁷.

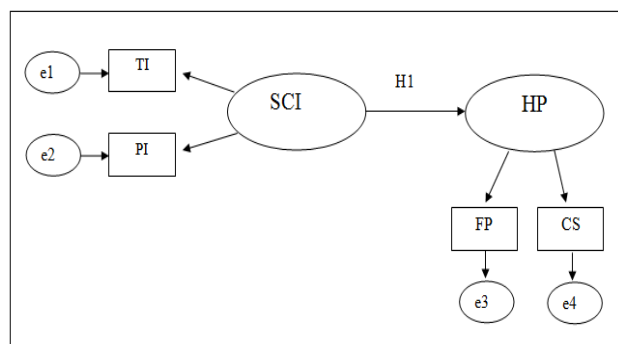
Research Hypotheses

Based on a comprehensive literature review, healthcare performance has a direct impact with SCI. It would be appropriate in this study and suitable for the healthcare sector. Therefore, based on literature review and the research framework, to understand the relationship of SCI and HP in Malaysian healthcare industry the following hypotheses were set up to be tested:

H1: There is a positive and direct significant relationship between SCI (Technological Innovation and Process Innovation) and HP in the Malaysian healthcare industry.



Thus, these hypotheses have been developed based on the proposed conceptual model. This model presented in Figure 1.



*Note: SCI=Supply Chain Innovation, TI=Technological Innovation, PI=Process Innovation, HP=Healthcare performance, FP=Financial Performance, PS=Customer Satisfaction

Figure 1: A proposed research model

The relationship between supply chain innovation (SCI) and healthcare performance (HP)

According to previous studies, SCM has shown a positive impact on firm performance. Vickery³⁷ had studied the effects of an integrative supply chain strategy on financial performance and customer satisfaction. Based on their study, they found that there are relationship between supply chain integration and financial performance through customer service performance. Meanwhile, Johnson and Templar⁶ revealed that SCM has a direct significant on firm performance based on financial performance. Furthermore, refer to study by Li⁹ they found that SCM can lead to increase competitive advantage and improve organizational performance.

However, they are hard to find the relationship between SCI and HP. A few researchers on SCI found that significant relationship of SCI with organizational performance. Study by Lee⁷ found that SCI and efficiency have a direct relationship on organizational performance in the healthcare industry.

Research Methodology

In order to achieve the objectives of this study, the Malaysian healthcare industry was selected as the population which has limited studies among researchers based on their efficiency. In this study, samples were comprised in hospital in Malaysian. A questionnaire will created to collect the data for this study. Hence, questionnaires will distribute to manager in the Malaysian healthcare industry. The statistical Package for the Social Sciences (SPSS) version 20 was used to analyze the preliminary data and provide descriptive analyses about thesis sample such as means, standard deviations, and frequencies.

Then, two statistical techniques were adopted to analyze the data. A Structural Equation modeling (SEM) technique was utilized to perform the required statistical analysis of

the data from the survey. Exploratory factor analysis, reliability analysis and confirmatory factor analysis to test for construct validity, reliability, and measurements loading were performed. Having analyzed the measurement model, the structural model was then tested and confirmed. SEM using AMOS 20 will use to test the measurement model.

CONCLUSION

In this paper, we argued that SCI becomes the most important strategy for providing competitive advantage, value added, continuous quality improvement and SC efficiency. The healthcare industry will reach benefit through an accurate understanding through value added, process quality improvement, information system and supply chain efficiency, which is needed to be incorporated into SCM strategies. Generally, this study concludes that SCI can give a better result in HP in Malaysian Healthcare industries and provide competitive advantage. However, it was found that limited empirical study, research paper and knowledge on SCI especially investigate the relationship of SCI and Healthcare Performance. Arlbjorn¹⁸ agreed that they are lack of study about SCI. Hopefully in future research agenda, the findings study can be benefited for Malaysian health firm and pharmaceutical to find ways to improve its performance.

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