

# An Information System Model in Healthcare Supply Chain and Logistics in Thailand

Artaphon Chansamut

*Office of Dean ,Faculty of Home Economic Technology, Rajamangala University of Technology  
Krungthep, Thailand*

artaphon.c@mail.rmutk.ac.th

**Abstract**— This research is a survey study. The research about an information system model in healthcare supply chain and logistics in Thailand. The research finding has been found that an information system model in healthcare supply chain and logistics in Thailand comprises four main components, namely, manufacturer, Purchasers, Healthcare provider and consumer. All elements are connected with information technology namely Drug information, manufacturer information, patient information trading information and data storage. The research aims to develop and assess an information system model in healthcare supply chain and logistics in Thailand. A sample group are ten experts. The research tool was evaluation form to evaluate an information system model in healthcare supply chain and logistics in Thailand. The data is analyzed by arithmetic means and standardized deviations. The research methodology consisted of three phase namely Analyze and synthesize document related, Develop the model and Evaluate Evaluate an information system model in healthcare supply chain and logistics in Thailand. The measurement and the evaluation of an information system model are based on Black-Box Testing. The evaluation result an information system model in healthcare supply chain and logistics in Thailand from ten experts was appropriate in a good level which mean that an information system model in healthcare supply chain and logistics in Thailand to support sustainable Information system development.

**Keywords**— *An information system mode, healthcare supply chain and logistics in Thailand*

## 1. Introduction

Supply chain and logistics has been continuously developed to improve business performance in organizations over the last three decades. It is undeniably the one of the most critical mechanisms for any industry since the efficient management of supply chain and logistics is the key to success of any suppliers, manufacturers and retailers, for example. Hospital industry, in particular, has been growing with the ever increasing demands for healthcare services. Hospitals serve customers and patients whose demands are varied dramatically; therefore, the supply chain and logistics has been at the heart of hospital management. However, hospital's supply chain and logistics development is still at the early age as opposed to that of other

industries. A typical hospital supply chain is a complex network consisting of the linkage role between vendors, manufacturers, distributors, hospital and internal departments. The co-ordination of material flow and information flow within the chains are subject to individual hospital's strategy and policy. [1] An application of the concept of supply chain and information system. The awareness of the supply chain information system This is because the business and industrial sector needs to be highly competitive due to increasingly high competitions from both within and outside the country. In order to be highly competitive, organizations in the sector need to have personnel with knowledge, ability and skills who can work efficiently to increase output and products. The organizations, therefore, need to have sufficient information and resources to increase their values and respond to the demand of their clients. Thus, the supply chain and information system process is a key process to support the organization's whole activities system from upstream to downstream. It enables the organization to promptly check digital system to ensure that the organization operates smoothly and effectively based on the determined strategies. [5] however The researcher had an idea to develop and to assess an information system model in healthcare supply chain and logistics in Thailand for add value and increase satisfaction of consumers.

## 2. Literature Review

Healthcare supply chain is a system of organizations, people, activities, information and resources involved in moving a product or service from manufacturers, logistics providers, distributors to end customer. These stakeholders have business process which are related each other, such as procurement, manufacturing, storage, information technology, distribution and transportation. It enables the organization to promptly check digital system to ensure that the organization operates smoothly and effectively based on the determined strategies.

Heinbuch (1995) described an approach to meeting the challenge of healthcare cost reduction through the hospital material management function. The work highlights the value of taking a proactive

stance to meet the challenge of transferring technology across industry sectors.

Alverson (2003) suggested the importance of disciplined inventory management for hospitals, and suggested serious consequences of traditional hospital purchasing including lack of inventory control, missed contract compliance, excess inventory levels, frequent stock-outs and costly emergency deliveries, workflow interruptions, expensive rework, and increased health system labor requirements. The literature on information technology provides some solutions to material management in the healthcare sector.

Burns (2002) suggested the aggregation of suppliers and their products through electronic catalogues, visibility of orders and materials, and efficiency in procurement.

Schneller, Schneller, Larry and Smeltzer (2006) recommended that e-procurement systems can help to significantly reduce purchasing costs through the consolidation of supplier networks and creation of supplier partnerships. They also suggested that transaction and administration costs can be reduced through the use of enterprise Resource Planning systems, which provide an automated and paperless format for information to flow throughout an organization.

### 3. Research Methodology

3.1 Analyze and synthesize document related of an information system model in healthcare supply chain and logistics in Thailand

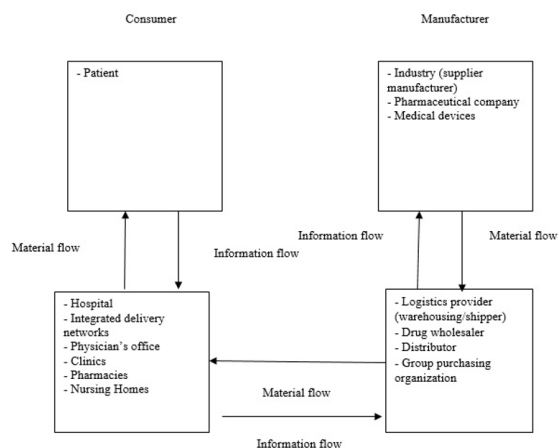
3.2 Develop an information system model in healthcare supply chain and logistics in Thailand

3.3 Evaluate an information system model in healthcare supply chain and logistics in Thailand.

The statistics utilized in this study were arithmetic means and standardized deviations following the weighing criteria of appropriateness of the design using five rating scales of Likert.

### 4. Results

4.1 Research results about an information system model in healthcare supply chain and logistics in Thailand and the major processes can be shown in Fig 1



**Fig 1:** An information system model in healthcare supply chain and logistics in Thailand

4.2 Explanation on elements of about an information system model in healthcare supply chain and logistics in Thailand

1 **Manufacturer** mean industry (supplier/manufacturer) is one major supply chain process and Pharmaceutical company. The raw material is delivered the information from the despatch advice is used in combination with the identities of the logistic units to check that the right quantities have been delivered. The global trade item number and batch number of the raw material are read and registered. The registered trade item numbers and batch numbers of the raw material are used in the manufacturing process to create traceability from the product back to the raw material. Each packaging level of the manufactured products is assigned a global trade item number. The products are marked with batch number and dates and the information is registered in order to achieve traceability in the next stage of the supply chain. The logistic units are marked with identities and information is also registered in order to achieve traceability at logistic unit level.

2 **Purchasers** mean Logistics provider are as follows

2.1 **Warehousing-Preparation** :The products are received and stored at the warehouse. During the storage period physical inventories are carried out. Upon reception of an order from a customer the ordered products are picked and logistic units are created and made ready for shipping. Product arrivals can be managed using the identity of the logistic units During storage, physical inventory can be carried out using the global trade item numbers and batch numbers of the products and the identities of the logistic units. Inventory management can be optimised using batch/lot numbers. Orders may be sent electronically. Each logistic unit created at order picking is assigned an identity. Traceability can be achieved by connecting the identity of the goods recipient, the identities of the products and batch/lot numbers.

2.2 Shipping The logistic units are loaded onto the transport vehicle. The vehicle leaves the warehouse. When the logistic units are loaded onto the transport vehicle the identities are read and registered. Before the transport vehicle leaves the warehouse a despatch advice is created and sent to the goods recipient. This enables more efficient and effective delivering, goods receipt and invoicing processes.

3 Healthcare Provider

Healthcare Provider is one fundamental partner of the healthcare system . Providers including doctors, nurses pharmacist, allied health, community health ,public health professionals and other health provider and health felicities/dispensaries is one major supply chain process.

4 Consumer

Patient receiving health products from the hospital retailers or wholesalers .

5 Material flow namely Medicines, medical supplies, medical equipment, people and money.

6 Information flow namely Drug information, manufacturer information. patient information trading information and data storage.[7],[8],[9],[11],[12] and [14]

4.3 Results on Evaluation of An information system model in healthcare supply chain and logistics in Thailand

**Table 1:** Results of appropriateness evaluation of main components of an information system model in healthcare supply chain and logistics in Thailand

List of Evaluated Items	$\bar{X}$	S.D.	Appropriate Level
Manufacturer	3.70	0.48	Good
Purchasers	3.70	0.48	Good
Healthcare Provider	3.60	0.84	Good
Consumers	3.60	0.69	Good
<b>Total</b>	<b>3.65</b>	<b>0.62</b>	<b>Good</b>

From Table 1, it can be seen that all of the main components of an information system model in healthcare supply chain and logistics in Thailand are rated to be appropriate in a good level. The total rating mean is 3.65, which is also at the high level.

**Table 2:** Appropriateness of Sub-components of the Manufacturer

List of Evaluated Items	$\bar{X}$	S.D.	Appropriate Level
Industry (supplier manufacturer)	3.60	0.84	Good
Pharmaceutical company	3.70	0.48	Good
Medical devices	3.70	0.47	Good
<b>Total</b>	<b>3.66</b>	<b>0.66</b>	<b>Good</b>

From Table 2, it can be seen that manufacturer component are rated to be appropriate in a good level. The total rating mean is 3.66 and standard deviation of 0.66.

**Table 3:** Appropriateness of Sub-components of purchasers

List of Evaluated Items	$\bar{X}$	S.D.	Appropriate Level
Logistics provider (warehousing/shipper)	3.60	0.69	Good
Drug wholesaler	3.70	0.67	Good
Distributor	3.70	0.94	Good
Group purchasing organization	3.60	0.51	Good
<b>Total</b>	<b>3.65</b>	<b>0.70</b>	<b>Good</b>

From Table 3, it can be seen that purchasers component are rated to be appropriate in a good level. The total rating mean is 3.65 and standard deviation of 0.70.

**Table 4:** Appropriateness of Sub-components of the healthcare provider

List of Evaluated Items	$\bar{X}$	S.D.	Appropriate Level
Hospital	3.70	0.67	Good
Integrated delivery networks	3.60	0.84	Good
Physician's office	3.60	0.51	Good
Clinics	3.70	0.48	Good
Pharmacies	3.70	0.67	Good
Nursing Homes	3.70	0.67	Good
<b>Total</b>	<b>3.66</b>	<b>0.64</b>	<b>Good</b>

From Table 4, it can be seen that healthcare provider component are rated to be appropriate in a good level. The total rating mean is 3.66 and standard deviation of 0.64.

**Table 5:** Appropriateness of Sub-components of the patient

List of Evaluated Items	$\bar{X}$	S.D.	Appropriate Level
patient	3.70	0.48	Good
<b>Total</b>	<b>3.70</b>	<b>0.48</b>	<b>Good</b>

From Table 5, it can be seen that patient component are rated to be appropriate in a good level. The total rating mean is 3.70 and standard deviation of 0.48.

**Table 6:** Results of appropriateness evaluation of an information system model in healthcare supply chain and logistics in Thailand

List of Evaluated Items	$\bar{X}$	S.D.	Appropriate Level
Main components	3.65	0.62	Good
Manufacturer	3.66	0.66	Good

**Table 6:** Results of appropriateness evaluation of an information system model in healthcare supply chain and logistics in Thailand (Cont.)

List of Evaluated Items	$\bar{X}$	S.D.	Appropriate Level
Purchasers	3.65	0.70	Good
Healthcare Provider	3.66	0.64	Good
Consumers	3.70	0.48	Good
<b>Total</b>	3.66	0.62	Good

Referring to Table 6 it is found that expert agreed with the value of overall suitable on the list show the overall rating mean of 3.66 and standard deviation of 0.72, which means that an information system model in healthcare supply chain and logistics in Thailand are of a good level.

## 5. Discussion

The result of an information system model in healthcare supply chain and logistics in Thailand has four main components, namely, manufacturer, Purchasers, Healthcare provider and consumer. Which correspond to Chansamut and Piriya-surawong has studied supply chain and information system about educational [6],[12] In addition, with the study of Chansamut [4],[12],[11] and [7] who found that supply chain and information system also.

## 6. Conclusion

According to evaluation by ten experts, an information system model in healthcare supply chain and logistics in Thailand is considered has suitability in a good level and **an information system model** in healthcare supply chain which mean that an logistics in Thailand to support sustainable Information system development.

## 7. Recommendations

An information system model in healthcare supply chain and logistics in Thailand should be conducted on the creation of required database for developed the model.

## 8. Acknowledgements

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