

SRIPATUM UNIVERSITY KHON KAEN

PROCEEDINGS OF  
**THE 7<sup>th</sup>**

**REGIONAL  
CONFERENCE  
ON GRADUATE RESEARCH  
2021**

**RCGR<sup>7<sup>th</sup></sup>  
2021**

**Theme "Sustainable Business Growth, Challenges,  
Measures and Solutions in Global Scenario Part II"**

**16 January 2021**

Sripatum University, Khon Kaen Campus, Khon Kaen, Thailand



University  
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UNIVERSITY  
OF WOLLONGONG  
IN CHINA



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Proceedings of  
The 7<sup>th</sup> Regional Conference on Graduate Research

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Organized by



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Edited by

Assoc. Prof. Dr. Vichit U-on, Sripatum University, Thailand  
Prof. Dr. George C. Hadjinicola, University of Cyprus, Cyprus

Published by

Sripatum University Press  
2410/2 Phaholyothin Road, Jatujak, Bangkok, 10900, Thailand



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0111	11:20	11:40	Factors Affecting Export Volume Of Ribbed Smoked Sheet Rubber 3 From Thailand To The People's Republic Of China Jatuvit Kitcajohnkeict and Poomthan Rangakulnuwat			
0112	11:40	12:00	Online Marketing Communication Strategies Affecting the Purchase of Dietary Supplements among Generation Y Consumers Kanumporn Imjai and Anothai Ngamvichikit			
0113	12:00	12:20	The Expectation of Personal Income Taxpayers in Phuket on Tax Deduction Nalumon Sittidate			
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0120	14:40	15:00	The Cross-border Freight Transportation Driver Competency Development Guide Chatchai Raka, Jirattaya Kraivichien, Rattaya Phromhitathorn and Siraphob Wonglaphat			
0121	15:20	15:40	Long-Run Relationship Between Financial Ratios And Stock Price Of Amazon.com: E-Commerce Industry Sukree Saelee and Poomthan Rangakulnuwat			
0123	16:20	16:40	LEAN Supply Chain And Logistics In Healthcare In 2010-2021 Suwat Janyapoon, Vacharawadee Niruthumthara, Chakhorn Kasemsan and Kranthima Prapasrianan			
0124	16:40	17:00	Logistics Management Guidelines Tourism, Amphawa Floating Market Worapol Wangkananon, Chayapol Phupatt, Warisa Kawsaard and Patcharaprat Kawsaard			



# RCGR<sup>7<sup>th</sup></sup> 2021

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# LEAN Supply Chain And Logistics In Healthcare In 2010-2021

by

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## Abstract

The hospital has adopted LEAN tools for management in areas such as strategy, administration, service system administration, pharmacological management, treasury management. Which are all in order to improve the quality and safety of the clients. This article provides an educational idea of how LEAN tools such as Blockchain, AHP, MCMD, Six Sigma, RFID. There are used in the hospital management development process, whether strategic, risk management, operation management and pharmacological management by searching articles from 2010-2021. This paper is founding the 12 articles in 2020, the most used tools were: Tools in the group 16 articles of mapping / framework / model and the most used areas were Operation / Management as 15 articles. This paper studies only the tools of the LEAN concept, which the researcher finds other ideas. Many of the logistics and supply chains are also interest in other industries.

**Keywords:** LEAN, Logistics, Supply Chain, Healthcare, Hospital

## 1. Introduction

At present, it can be seen that the concept of logistics and supply chain has been applied in many industries. The manufacturing industry such as automobile industry, pharmaceutical industry.

And service industries such as hotel business, education business, healthcare business. It has been widely adopted LEAN with a wide variety of tools, including Blockchain (Kamble, Gunasekaran, & Sharma, 2020), Analytic hierarchy process (AHP) (Hussain, Malik, & Al Neyadi, 2016), Multi-criteria decision-making methods (MCDM) (Stević, Pamučar, Puška, & Chatterjee, 2020), Six Sigma (Yadav & Desai, 2016), Radio Frequency Identification (RFID) (Southard et al., 2012), Industrial vending machines (IVM)/ Artificial Intelligence (AI) (Kros, Kirchoff, & Falasca, 2019), Internet of things (IOT) (Papa, Mital, Pisano, & Del Giudice, 2020) to be developed in areas such as strategy (Kamble et al., 2020), risk management (Alizadeh, Makui, & Paydar, 2020), pharmacological management (Chandra & Kumar, 2020), strategy (Machado Guimarães & Crespo de Carvalho, 2013).

## 2. Methodology

### 2.1 Scope

The objective of this research is to study the application of LEAN tools in logistics and supply chain of healthcare businesses or hospitals. This is a relevant research article analyzed on the LEAN tools and systems where LEAN tools are applied.

### 2.2 Identification of publications

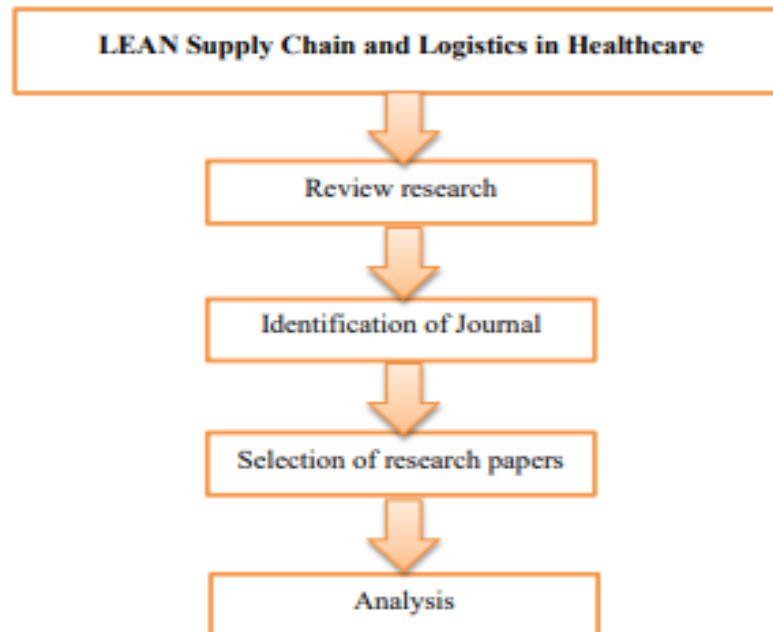
To study this research, the researchers searched online databases. By using the following keywords: 'Lean' AND 'supply chain' AND 'Logistics' AND 'hospital' AND 'healthcare' via ESBCO's base and select journals of Emerald Insight and ScienceDirect bases from 2010-2021. And choose only English Which has obtained a total of 97 articles when it is selected. There will be 41 articles that meet the specified criteria.

**Table 1** Summary of journal classification

No.	Journal	Number of articles
1	IMP Journal	1
2	International Journal of Operations & Production Management	3
3	International Journal of Health Care Quality Assurance	4
4	International Journal of Lean Six Sigma	2
5	Benchmarking: An International Journal	4
6	Business Process Management Journal	3
7	Computers & Industrial Engineering	4
8	European Journal of Operational Research	1
9	International Journal of Production Economics	2
10	International Journal of Productivity and Performance Management	2
11	Journal of Health Organization and Management	3
12	Journal of Enterprise Information Management	1
13	Journal of Purchasing and Supply Management	1
14	Omega	1
15	Strategic Outsourcing: An International Journal	1
16	Supply Chain Management: An International Journal	1
17	Technological Forecasting & Social Change	2
18	The International Journal of Logistics Management	2
19	The TQM Journal	2
20	European Management Journal	1
<b>Total of articles</b>		<b>41</b>

### 2.3 Literature classification framework

The literature is thematically classified along the framework. (see Figure 1)

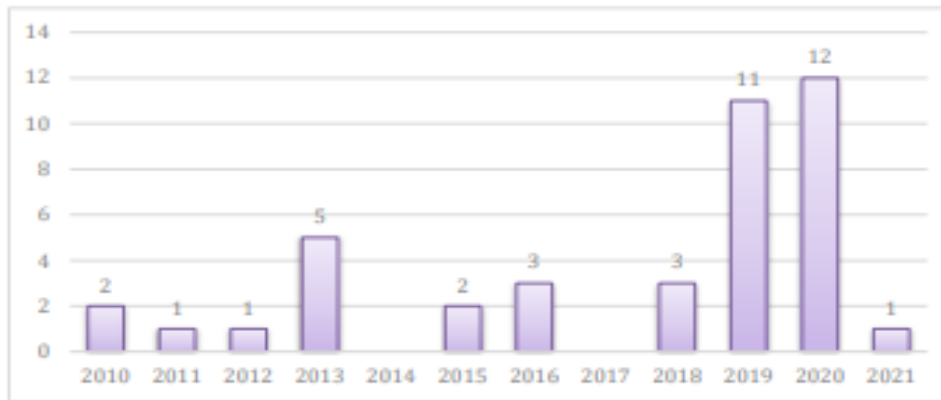


**Figure 1** Literature classification framework

### 3. Publication meta-analysis

#### 3.1 Thematic categorization

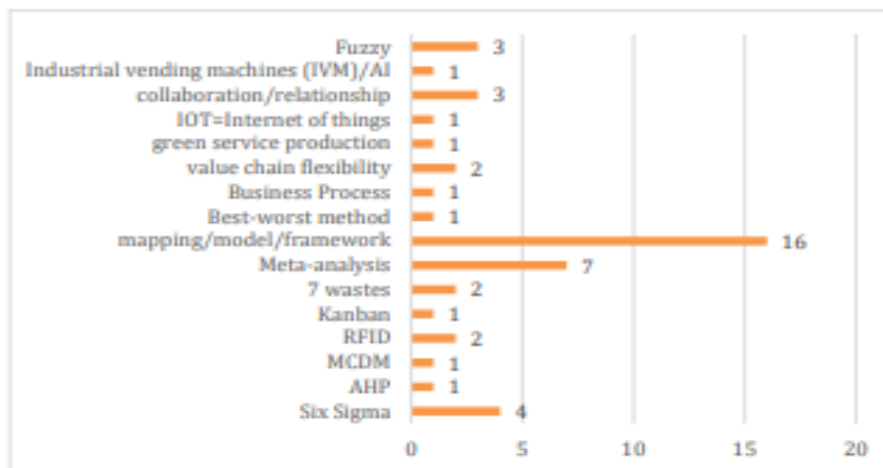
We generally limit the scope to publications published from 2010-2021 onwards. From 2010-2021. The trend of LEAN study to be increasing year by year. Starting on 2019 and 2020. (see Figure 2)



**Figure 2** Amount of articles

### 3.2 Tools categorization

The tool applied in the review publications are presented in Figure 3 and Table 2. From 2010-2021. The trend of tooling to be using in mapping/model/framework area.



**Figure 3** Amount of tools



**Tables2** Tools and articles citations

<b>Tools</b>	<b>Citations</b>	<b>Scopes</b>
Six Sigma	(Ali et al., 2020) (Vaishnavi & Suresh, 2020) (Yadav & Desai, 2016) (Southard, Chandra, & Kumar, 2012)	Operation Operation Operation Operation (time)
AHP	(Hussain et al., 2016)	Material/Inventory
MCDM	(Stević et al., 2020)	Supplier
RFID	(Bendavid, Fosso Wamba, Boeck, & Philippe, 2010) (Southard et al., 2012)	Operation (Que) Operation (time)
Kanban	(Bendavid et al., 2010)	Material/Inventory
7 Wastes	(Alizadeh et al., 2020) (Hussain & Malik, 2016)	Risk Operation
Meta-analysis	(Tortorella et al., 2020) (Regattieri, Bartolini, Cima, Fanti, & Lauritano, 2018) (Papalexi, Bamford, & Breen, 2020) (Virtue, Mustafae, Chaussalet, & Kelly, 2013) (Chandra & Kumar, 2019) (Rubbio, Bruccoleri, Pietrosi, & Ragonese, 2019) (Lewis, Baxter, & Pouder, 2013)	Financial/Economic Pharmacy and Material Pharmacy Operation Pharmacy (Vaccine) Operation Strategy
IVM/AI	(Kros et al., 2019)	Warehouse
Fuzzy	(Ajmera & Jain, 2019) (Ranjan Debata, Sree, Patnaik, & Sankar Mahapatra, 2013) (Göleç & Karadeniz, 2020)	Operation Medical Tourism Operation
Business Process	(Feibert & Jacobsen, 2019)	Operation
Best-worst method	(Talib, Asjad, Attri, Siddiquee, & Khan, 2019)	Decision
Value chain flexibility	(Kumar, 2020) (Machado Guimarães & Crespo de Carvalho, 2013)	Strategy Strategy
Green service production	(Kumar, 2020)	Strategy
IOT	(Papa et al., 2020)	Operation
Collaboration/relationship	(Kros et al., 2019) (Singh, 2019) (Martins, Machado, Queiroz, & Telles, 2020)	Warehouse Warehouse Supplier

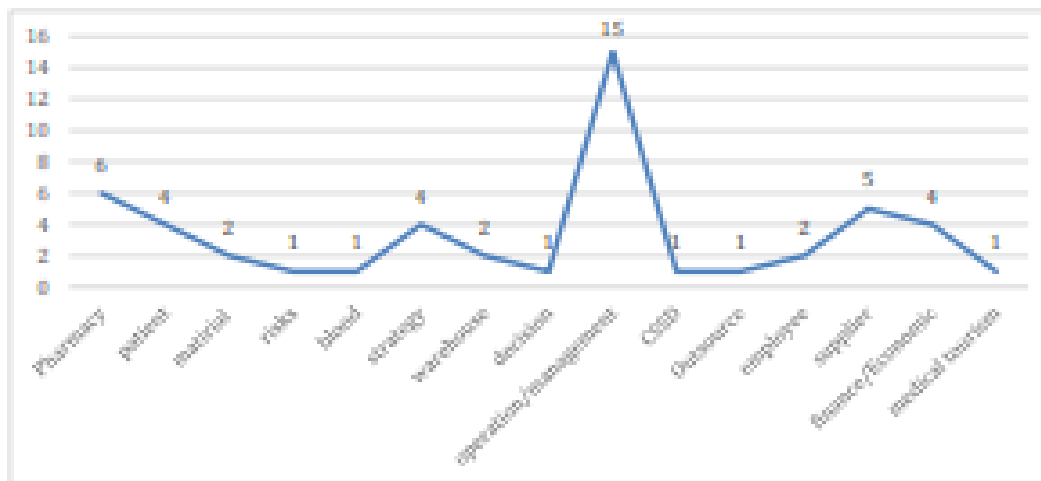


**Table 2** Continue

Mapping/Model/ Framework	(Skipworth, Delbufalo, & Mena, 2020) (Chandra & Kumar, 2019) (S.-Y. Lee, Chinnam, Dalkiran, Krupp, & Nauss, 2021) (Fournier, Chênevert, & Jobin, 2020) (S. M. Lee, Lee, & Schniederjans, 2011) (Virtue et al., 2013) ( Glasgow, Perkins, Tai, Brohi, & Vasilakis, 2018) (Samuel, Gonapa, Chaudhary, & Mishra, 2010)  (Khorasani, Keshtzari, Islam, & Feizi, 2018) (Dev, Shankar, & Arvind, 2013) (Pohjosenperä, Kekkonen, Pekkarinen, & Juga, 2019) (Lahberge, Cote, & Ruiz, 2019) (Gonzalez, 2019) (Samaranayake, Dadich, Hayes, & Sloan, 2015) (Bygballe & Persson, 2015) (Ranjan Debata et al., 2013)	Supplier Pharmacy (Vaccine) Patient (Bed)  Employee Operation Operation Blood Warehouse and Financial Pharmacy Patient Material  Patient Patient Operation Strategy Medical Tourism
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**3.3 Scoping categorization**

The scoping applied in the review publications are presented in figure 4. From 2010-2021. The trend of scoping to be increasing in operation/management area. (see Figure 4)



**Figure 4** Amount of scope

#### 4. Conclusion and Future research

According to the data above, there were 12 articles the most in 2020. From figure 2 showing, there was a significant increase in LEAN studies in 2019 and 2020, showing that in the health industry. Focus on the application of LEAN to develop and improving management processes in various areas, especially in the area of operation/management. And operation/management which were found to be developed as 15 articles. The most tooling that used in the group as 16 articles by mapping / framework / model subjects in this study. In this study, we focus on LEAN tools and healthcare business. In the future research, who study for other tools or other industry/business.

#### Acknowledgements

We would like to thank Suwat Janyapoon, Ph.D. College of Logistics and Supply Chain Sripatum University that supports this conference. And must be highly grateful for Waraporn Thaima, Ph.D. to help verify the accuracy of writing articles in English.

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