Journal of Optimization in Industrial Engineering,
Vol.17, Issue 1, Winter & Spring 2024, 171-174
DOI:10.22094/QJIE.2024.951125

Research Article

The Survey of Lean Implementation Maturity Level of Hospitals in Thailand: Does the Hospital Type Matter?

Kwanchanok Areewong [a,*] , Vichayanan Rattanawiboonsom [b], Robert Van Der Meer [c]

[c] *Department of Business Administration, Faculty of Business, Economics and Communications, Naresuan University, Phitsanulok, Thailand*
[b] *Department of Business Administration, Faculty of Business, Economics and Communications, Naresuan University, Phitsanulok, Thailand*
[c] *Department of Management Science, University of Strathclyde Business School, Glasgow, Scotland, UK*
Received: 22 January 2024; Revised: 07 March 2024; Accepted: 18 April 2024

Abstract

The purpose of this study is to survey the lean implementation maturity level of the hospitals in Thailand and explore the differences across hospital types on lean implementation maturity level. The survey questionnaire was developed from existing literature based on lean practices, lean performances and lean organizational culture, validated by three experts. Data were collected from staff with an experience in hospital lean quality improvement from 160 hospitals in Thailand. Descriptive statistics and T-tests were used to analyze the differences across hospital types on lean implementation maturity level. Most hospitals in Thailand implemented lean at a medium maturity level (33.75%). The regional, non-Health Ministry and private hospitals had higher levels of lean implementation maturity than the general and community hospitals. The regional hospitals had the highest mean scores in all domains but significantly differed in the total mean score and lean activity domain compared with the community hospitals.The regional hospitals, tertiary care units with more speciality, resources and capacity, implemented lean at a higher maturity than other hospital types. Significantly the difference to community hospitals with limited resources, staff and capacity. Further study on the difference across hospital size and hospital capacity on lean implementation should be investigated.

Keywords: Lean; Healthcare quality improvement; Hospital type

1. Introduction

The global healthcare industry, even in Thailand, is facing an economic crisis, business competition, and satisfaction of service quality as same as in other industry sectors. Although the Thai Government supports the Thai healthcare industry by promoting a Medical Tourism project and promoting the Thai healthcare sector to be a medical hub of ASEAN, the private hospitals in Thailand, mainly medium-sized and small-sized private hospitals, are still facing a decline in customers, both foreign and Thai customers. Quality improvement is a strategy that can be used to increase an organization's strategic competition by satisfying the customer (Brown 1994; Asif et al. 2009).

Lean is a quality improvement approach focusing on customers and continuous improvement, like Total Quality Management (TQM) (Pettersen 2009), well-known by another name, 'Toyota Production System' (TPS) (Liker 2004). The concept of Lean Thinking is eliminating waste and Non-Value-Added (NVA) activities in processes by using Lean tools (Kim et al. 2006;) to improve the flow of processes, information, and goods. Lean tools and practices play a role in improving an organization's competitive advantages (Anand et al. 2009), helping an organization to achieve a quality award (Corbett 2011), and also helping an organization to improve organizational performance, for example, improving productivity, reducing lead time, reducing cost and increasing profits (Anand et al. 2009).

To successfully lean tools and practices implementation, an organization requires an understanding of the lean's principles (Grove et al. 2010), integration with organizational strategy and operation activities (Asif et al. 2009), company culture, leadership, quality strategy and employees' motivation (Dahlgaard et al. 2006), Social system support (Landar et al. 2007) and a particular approach in the different culture and country (Liker et al. 2010) adapt to their own context.

Lean thinking implementation in hospitals in Thailand was first promoted by The Hospital Accreditation Institution in 2009 at the 10th Hospital Accreditation (HA) National Forum. After that time, many hospitals presented their lean implementation projects and performances at HA National Forum every year. However, only three hospitals were still recorded as winning the Thailand Lean Award.

Over 90% of the Thai population are under three different healthcare coverage schemes (UCS, SSS and CSMBS), which have different their own reimbursement for medicines and treatments. The payments may limit the systemic optimization of lean implementation (Hallam 2018), so the different hospital types with various and different healthcare coverage scheme limitations and reimbursements, different in their context, may have

Corresponding Author Email Address: kwanchanoka@nu.ac.th

different success levels of lean implementation. Thus, this study aims to survey the lean implementation maturity level of the hospitals in Thailand and explore the differences across hospital types on lean implementation maturity level.

2. Materials and Methods

This study uses an electronic questionnaire developed from existing literature focused on lean adoption, lean practices and lean performances (Malmbrandt et al. 2013) and Lean organizational culture (Urban 2015). The lean implementation maturity level questionnaire consisted of 21 questions about lean activities, 17 questions about lean organizational cultures, and 7 questions about lean performances with a 5-Likert scale. The measurement instrument was validated by three experts and a pre-test pilot with 30 healthcare professionals, the result of the index of item-objective congruence (IOC) was more than 0.67, and Cronbach's alpha coefficient was more than 0.7. The survey was approved by Naresuan University Institutional Review Board, Thailand.

The questionnaire was developed in Google Forms and first distributed via social network application (Line) to the targeted respondents by convenience and snowball sampling. Since the targeted respondents were the staff with at least one year of experience in quality improvement (QI) in hospitals, the first responses were too low. Second survey distribution, the questionnaire was cluster sampling and distributed to hospitals by mail in a total of 500 samples. The returned questionnaire in total was 179 from 500 hospitals. After screening and excluding incomplete or duplicate answers, the respondents remained in 160 hospitals. The response rate was 32%.

3. Results and Discussion

The lean implementation maturity level was analyzed by descriptives statistic, and the results as shown in Table 1. Most hospitals in Thailand implemented Lean at a medium maturity level (54 hospitals, 33.75%), followed by a high lean implementation maturity level (47 hospitals, 29.38%), respectively. The general hospital and community hospital group is more implemented lean at a medium maturity level. While other hospital-type groups (regional hospitals, private hospitals and non-public health ministry hospitals) implemented lean at a high maturity level the most.

Table 1
Lean implementation maturity level VS hospital Type

Hospital type	Lean Implementation Maturity Level					Total
	Very Low (45-81 points)	Low (82-117 points)	Medium (118-153 points)	High (154-189 points)	Very high (190-225 points)	
Regional hospitals	0 (0.00%)	0 (0.00%)	2 (28.57%)	3 (42.86%)	2 (28.57%)	7
General hospital	1 (5.56%)	3 (16.67%)	6 (33.33%)	6 (33.33%)	2 (11.11%)	18
Community hospitals	5 (6.25%)	22 (27.50%)	31 (38.75%)	20 (25.00%)	2 (2.50%)	80
Non-Ministry of Public Health hospital	4 (13.79%)	6 (20.69%)	7 (24.14%)	8 (27.59)	4 (13.79%)	29
Private hospital	1 (3.85%)	3 (11.54%)	8 (30.77%)	10 (38.46%)	4 (15.38%)	26
total	11	34	54	47	14	160

As an unequal sample size, the Homogeneity test of Variances and Shapiro-Wilk Test for the Test of Normality was conducted. Both p-value results in the lean activity domain and lean culture domain were less than 0.05. That means sample groups have unequal variance and non-normal distribution. Welch's ANOVA test and the Games-Howell post hoc method were used to investigate the differences in lean implementation maturity levels across hospital types. The result of the lean implementation maturity level across hospital types in Table 2 shows significant differences in total score, lean activity domain and lean culture domain. Regional hospital type had the highest mean score in all domains. However, there were significant differences only in total score and lean activity mean score between the regional and community hospital groups (p-value 0.017 and 0.001, respectively). Vanichchinchai 2021 found that regional hospitals had significantly higher responsiveness than general and community hospitals. The explanation was because of their tertiary; they tended to focus on advanced clinical and advanced management systems rather than other groups. Like the results in this study, it can be explained that the regional hospitals have more resources and capacity to implement lean, while the general hospitals and community hospitals were secondary and primary care units which have the limitation of staff, resources and capacity to implement lean, so their lean implementation maturity level was slightly lower than other groups.

Table 2
Differences between hospital types

hospital type		lean maturity level			
		total score	lean activitiy	lean culture	performance
	sig	0.002*	0.000*	0.042*	0.165
Regional	mean	3.80	3.29	3.97	4.02
	sd	0.50	0.44	0.57	0.57
General	mean	3.28	2.94	3.59	3.54
	sd	0.87	1.19	0.68	0.91
Community	mean	2.94	2.43	3.35	3.45
	sd	0.65	0.85	0.70	0.78
Non-HM**	mean	3.10	2.84	3.29	3.42
	sd	1.02	1.14	1.04	0.98
Private	mean	3.39	3.00	3.73	3.74
	sd	0.86	1.12	0.83	0.99
Regional and General		0.364	0.302	0.624	0.530
Regional and community		0.017*	0.001*	0.137	0.197
Regional and non-HM		0.100	0.067	0.166	0.265
Regional and private		0.492	0.226	0.889	0.863
General and community		0.526	0.434	0.654	0.995
General and non-HM		0.964	0.998	0.735	0.994
General and private		0.994	1.000	0.975	0.960
Community and non-HM		0.930	0.408	0.998	1.000
Community and private		0.131	0.153	0.240	0.669
Non-HM and private		0.784	0.986	0.409	0.768
notes: * significant at 0.05, ** HM = Health Ministry					

4. Conclusion

Most hospitals in Thailand implemented lean at a medium maturity level. The regional, non-HM and private hospitals had slightly higher levels of lean implementation maturity than the general and community hospitals. The regional hospitals had the highest mean scores in all domains but significantly differed in the total mean score and lean activity domain compared

This study had limitations. The larger sample size and the differences across hospital size and hospital capacity on lean implementation should be further investigated.

Acknowledgements

Our wish is to acknowledge all support from the faculty of business, economics and communications and financial support from the Royal Golden Jubilee Ph.D. program (PHD/0004/2560)

References

Anand, G and Kodali, R. (2009). Development of a framework for lean manufacturing systems. *International Journal Services and Operations Management*, 5(5), 687-716. https://doi.org/10.1504/ijsom.2009.025121

Asif, M. Bruijn, E. Douglas, A. and Fisscher, O. (2009). Why quality management programs fail: a strategic and operations management perspective. *International Journal of Quality and Reliability Management*, 26(8), 778-794. https://doi.org/10.1108/02656710910984165

Brown, S. (1994). The role of work study in TQM. *The TQM Magazine*, 6(3), 9-15. https://doi.org/10.1108/09544789410057827

Kim, C.S. Spahlinger, D.A. Kin, J.M. and Billi, J.E. (2006). Lean health care: What can hospitals learn from a world-class automaker?. *Journal of Hospital Medicine*, 1(3), 191-199. https://doi.org/10.1002/jhm.68

Corbett, L.M. (2011). Lean Six Sigma: the contribution to business excellence. *International Journal of Lean Six Sigma*, 2(2), 118-131. https://doi.org/10.1108/20401461111135019

Dahlgaard, J. and Dahlgaard-Park, S.M. (2006). Lean production, six sigma quality, TQM and company culture. *The TQM Magazine*, 18(3), 263-281. https://doi.org/10.1108/09544780610659998

Grove, A.L. Meredith, J.O. MacIntyre, M. Angelis, J. and Neailey, K. (2010). UK health visiting: challenges faced during lean implementation. *Leadership in Health Services*, 23(3), 204-218. https://doi.org/10.2147/jhl.s16322

Hallam, C. and Contreras, C. (2018). Lean healthcare: scale, scope and sustainability. *International Journal of Health Care Quality Assurance*, 31(7), 684-696. https://doi.org/10.1108/ijhcqa-02-2017-0023

Lander, E. and Liker, J.K. (2007). The Toyota Production System and Art: making highly customized and creative products the Toyota way. *International*

Journal of Production Research, 45(16), 3681-3698. https://doi.org/10.1080/00207540701223519

Liker, J.K. (2004). The Toyota Way: 14 management principles from the world's greatest manufacturer New York: McGrew-Hill Professional. https://doi.org/10.1504/ijhrdm.2010.029445

Liker, J.K. and Hoseus, M. (2010). Human resource development in Toyota culture. *International Journal of Human Resources Development and Management,* 10(1), 34-50.

Malmbrandt, M. and Ahlstrom, P. (2013). An instrument for assessing lean service adoption. *International Journal of Operations & Production Management*, 33(9), 1131-1165. https://doi.org/10.1108/ijopm-05-2011-0175

Pettersen, J. (2009). Defining lean production: some conceptual and practical issues. *The TQM Journal*, 21(2), 127-142. https://doi.org/10.1108/17542730910938137

Urban, W. (2015). The lean management maturity self-assessment tool based on organizational culture diagnosis. *Procedia - Social and Behavioral Sciences*, 213, 728-733. https://doi.org/10.1016/j.sbspro.2015.11.527

Vanichchinchai, A. (2021). An Analysis of hospital characteristics on lean and service quality. International Journal of Lean Six Sigma, 12(6), 1184-1208. http://dx.doi.org/10.1108/IJLSS-07-2020-0107