

# Lean Healthcare Practices and Operational Performance: Safety Climate as a Moderator

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**Abstract:** The main propose of this study was to examine the relationship between lean healthcare practices (LHP) (operational and sociotechnical aspects) and operational performance among Malaysia's private hospitals. Specifically it aimed at investigating both the moderating role of safety climate on the relationship between operational aspects and sociotechnical aspects on operational performance. Quantitative method was applied for this study with the questionnaires were randomly distributed to 118 private hospitals in Malaysia as the sample. The data collected were analyzed by performing the PLS-SEM technique. The results indicate that operational aspects and sociotechnical aspects improved operational performance, showing that these are the important elements that should be seriously considered by practitioners. However, safety climate as a moderator failed to support the relationship between operational aspects and sociotechnical aspects on operational performance. These findings have contributed theoretically, practically and methodologically with imperative implications to academicians, policy-makers and private hospitals specifically.

**Keywords**– Lean healthcare practices, operational performance, safety climate and private hospital

## 1. Introduction

Lean healthcare is started with a basic concept of lean within an organization that seemed to be an efficient way to reduce waste, time, cost, as well as unnecessary travel while at the same time provide high quality services [1],[2],[3],[4]. Lean originated from Toyota Production System (TPS), a concept which was widely used in the manufacturing sector after World War II in 1940 [5]. Following that, lean service emerged in the 1990s, derived from lean manufacturing which has then expanded to non-manufacturing sectors such as insurance, banking, financial, and other service sectors including healthcare [6].

However, not all elements of lean practices have been deployed in the services sector, including in the healthcare industry. Womack and Jones introduced the idea of lean practices as lean thinking which include five main principles, namely specific value, value streams, value flow,

pull value, and pursue perfection; however, it was within the manufacturing context [7]. As opposed to Womack and Jones, the principles of lean proposed by [8] have fourteen principles which included a people-focus that can be applied by organizations [8]. On the other hand, Dennis, in his book *Lean Production Simplified*, focused on the concept of the house of lean production by introducing six lean principles [9]. These three examples proved that lean principles described by scholars are inconsistent, but noted that the one introduced by Womack and Jones appears to be cited frequently [9]. Hence, [5] suggested that lean practices implementation in an organization is required to further strengthen the adopted lean principles, where they define lean production as the integration of sociotechnical system which is mainly adapted to eliminate waste and is associated with the social and technical practices to meet company's objectives.

There were also discussions whether lean thinking which has its background in the manufacturing sector will be suitable to be applied in healthcare firms [10]. Indeed, it is advisable to perceive lean thinking or lean healthcare into two different context by quantifying tools or operational aspects [11],[12] and the role of human factors or sociotechnical [13],[14].

Subsequently, past studies said that lean principles are capable to increase operational performance by reducing costs and lead times, and provide a high quality service, increased safety, and high morale [15]. Study by [16] discovered that JIT was a useful method to reduce costs and improved quality in the healthcare environment. This notion was further supported by [17] who said that lean provides some positive benefits such as improved quality of care and reduced costs in the healthcare sector.

Consistently, social aspects of lean service also had a positive relationship on operational performance [18]. Besides, sociotechnical in the context of teamwork [19] and leadership [20],[21] are capable

to improve operational performance. However, from the findings, it has revealed studies on the relationship between lean healthcare practices (operational aspects and sociotechnical aspects) with operational performances were limited specifically in the private hospital. Therefore, the researcher will examine does operational aspects have a relationship with the operational performance in the Malaysia's private hospital.

In accordance with [20], the application of lean management in the healthcare sector seems to be successful, but unfortunately it comes ambiguous, because no strong improvement in safety or patient care quality. However, [22] claims, the embracing of healthcare lean management (HLM) in the organization conceivable to acquire significant results in the aspect of quality and safety improvement, if the organization provides a good strategy.

In light of this, this study will explore safety climate at the organizational level as a moderating effect as to observe the relationship between lean healthcare practices (operational aspects and sociotechnical aspects) with operational performance among Malaysia's private hospitals.

## 2. Literature Review

It is noted that this study accentuates on lean healthcare practices into two aspects namely operational aspects and sociotechnical aspects. Both aspects are essential to take into account where it has been pointed out by [23], the reliance on technical and social of lean can gives a significant relationship to the organization.

However, the implementation of lean healthcare can be impairable due to number of factors such as lack of staff, re-definition of roles and jobs contribute that could affect the organizational performance [23]. Parallel with the study of et al [24] and [25] also underlines the prominence of the employees role in order to solve the problem of the organization which is the main criteria of the organizational performance. Besides, other issue that usually encountered in practicing lean healthcare, the weaknesses of leadership at the top management as well as workforce flexibility will affect the sustainable of lean healthcare in the organization [26],[24].

Therefore, it has been proposed to improve the organizational performance by performing lean bundles (JIT, TQM and HRM) which this study was carried out in Jordan's private hospitals regardless of the size of the hospital whether it small, medium or large [24]. The purpose of lean bundles is used to reduce resources, effort and time

where the idea of lean bundle was initially came from [5] by looking at the manufacturing context.

Indeed, there are little evidence have shown significant impact between lean with safety climate; and safety climate with operational performance. For example, [27] have found 5s event given a significant impact towards safety climate in the manufacturing organization. Furthermore, they have been suggested to conduct a longitudinal study as to ensure the sustainability of 5s, as well as other lean tools such as *kaizen* and *poka yoke* are required to be implemented as to see the similar effect on safety climate. It was also can be practiced into other sectors to appreciate the advantages [27]. Consequently, looking at the healthcare sector, study guided by [28] have conducted study in ICU where they found all the factors of safety climate were positively associated with organizational performance. On top of that, [29] had examined the association between safety climate and safety performance. The result indicates that with a robust safety climate in the hospital setting, safety performance will be better.

Notwithstanding, negative effect was found in previous studies such as study by viewing at the construction sector, negative relationship was established between co-workers ideal safety response and group variation [30]. Subsequently, [31] in his study indicates no relationship between safety climate and job communication with accidents in the UK, manufacturing plant. While [32] have found negative effect between co-worker characteristics and perceptions of safety climate among nurses. Conversely, in subsequent work, et al. [33] have found positive significant between lean orientation and patient safety. Moreover, the results have shown major implication between patient safety and financial performance. It has been emphasized; healthcare leaders should concern lean expansively in order to eliminate waste without compromising it.

Furthermore, inconsistent results between safety climate and other related variables were found existed, and it indicates, safety climate has a high potential to be a moderator for the purpose of this study. Therefore, this study proposed to examine does the safety climate moderates between lean healthcare practices (operational aspects and sociotechnical aspects) with operational performance. As well as to investigate the relationship between lean healthcare practices (operational aspects and sociotechnical aspects) and operational performance in the Malaysia's private hospitals.

### 3. Methodology

This study was carried out uses cross-sectional studies. A modified and well-designed questionnaire approximately 118 has been disseminated using mail to the managerial level at the private hospital. This method was used as to ensure the questionnaire form is given to the right person such as General Manager, Operational Manager, Safety Manager or Quality Manager that involved to assist the top management level in implementing the whole operational process of the organization, especially related to lean healthcare practices.

Consequently, to ensure the questionnaire are valid and reliable, face validity and content validity have been conducted to ensure the adapted instruments from the previous studies can be reliable which also has been used interchangeably among researchers [34]. Face validity was used to modify the measurement items by interviewing the experts such as Head of Nursing and General Manager at the selected private hospitals, together with two academicians from the educational institutions. These experts have been chosen based on their extensive knowledge, vast experience and motivation to assess the items of each construct and approve it after the judgment has made.

Next, Lawshe's method was used for content validity because according to [35], this established method has been extensively used among scholars to form content validity in various sectors including healthcare sector. Lawshe had created a Content Validity Ratio (CVR) for the purpose to scale or measure the content validity of each item which will be assessed by the expert or panel. There are three scales has been set up to see whether an each item in the category of "essential", "useful, but not essential" or "not necessary" [36]. From the result, it indicates the result has fulfilled the minimum criteria of Lawshe's scale with more than half saying "*essential*", denotes as an E compared to U "*useful but not essential*" and N "*not necessary*".

Thereby, the data collection were analyzed using SPSS version 23 and SmartPLS 3.0 for the purpose of descriptive statistics and inferential statistics respectively.

## 4. Result Analyses and Discussion

### 4.1 Demographic Profile

Initially, completed surveys were returned by 56 out of 118 respondents through questionnaire form. However, only 54 usable responses were accepted after a data cleaning process and with these 54 final responses are deliberated for further analysis.

By analyzing using descriptive statistics, it was found most of the respondents were mainly from General Manager with 29.6 percent (16). Following Operational Manager 25.9 percent (14) and third ranked was other position wherein the category 'others' included from other managers such as Head of Nursing, Financial Manager and Administrative which presented 24.1 percent (13) due to the absence of their respected Manager in the organization. As such, they have given the authorization of other manager in answering the questionnaire. While compared to the other position remaining Quality Manager, 13 percent (7) and Safety Manager, 7.4 percent (4).

In terms of working experience, the majority of respondents, 37 percent (20) have been working with the current organization between 1 to 5 years. In spite of the fact that they are the majority group, it is believed they have been worked some other places to gain an experience. Next, followed by 11 to 15 years of working experience with 22.2 percent (12), 14.8 percent (8) of them were within the range of 6 to 10 years, 16 to 20 years and 26 years above were constitutes 14.8 percent (8), 13 percent (7) and 7.4 percent (4) respectively. Finally only three managers were discovered have working experienced at the aged between 21 to 25 years with 5.6 percent (3).

### 4.2 Operational Aspects and Operational Performance

This study found that the operational aspects of lean healthcare has given positive relationship towards operational performance. These findings support previous empirical evidence by [24], indicates lean bundles (HRM, TQM, JIT) managed to improve dramatically the operational performance in Jordanian private hospitals. Ref. [18] found that lean technical contributes better operational performance. The findings include process, customer value and error prevention in the service sector. Corresponding with the study of manufacturing sector, [37],[38], and [39], verified that lean practices have positive effect with operational performance.

Referring to the healthcare sector, the technical aspects like visual management, kanban, quick setup, cross-training, patient-focused and time management have placed second highest priority of changing the processes in healthcare setting after prioritizing the connection with patients [40]. These prevailing technical aspects of lean healthcare in line with the finding of this study focuses on kaizen, 5s, VSM, waste elimination, visual management and kanban. It indicates that by implementing lean healthcare practices in the operational aspects, private hospitals have become more efficient.

### 4.3 Sociotechnical Aspects and Operational Performance

A sociotechnical aspect of lean healthcare has been determined to have a positive relationship towards operational performance instead of operational aspects. Nevertheless, [18] produced different result of lean bundles in social side whereby the first result has shown significant relationship between social side of lean in the aspect of motivation bundle and operational performance; while second result reveals insignificant relationship between human factors and operational performance. Interestingly, both bundles of sociotechnical aspects namely motivation and human factors were tested in this study where the questionnaire was adapted from [18] and surprisingly, the sociotechnical aspects contributes to increase operational performance in the private hospitals.

Given the fact that not many empirical studies or empirical evidence on the relationship between sociotechnical aspects and operational performance, has led some scholars to conduct qualitative study [19], [20], [21]. Ref. [19] emphasized in achieving a good teamwork of sociotechnical aspects such as a strong leadership and communication are important to increase operational performance in the healthcare organization. As suggested by [41], a strong leadership team will be required for a lean implementation to be effective, together with a good communication among leaders and employees which is in line with the present study that private hospital should provide a good communication system and need to show good leadership practice. Communication need to be operated as a tool to report progress to senior leaders and others in the organization. In fact, the effectiveness of sociotechnical aspects has proven to ensure the operational performance in private hospitals to be more efficient.

### 4.4 Operational Aspects, Sociotechnical Aspects, Safety Climate and Operational Performance

It specifies the significant negative relationship between operational aspects and operational performance is not reliant on the safety climate establishment. Thus, the result proposes the creation of safety climate does not have significant moderating effect on the negative influence of operational aspects and operational performance.

Another moderating finding is concerning the hypothesized moderating effect of safety climate on the relationship between sociotechnical aspects and operational performance. Thus, the moderating effects of these variables were tested and predictably the result has failed to support the

hypotheses which are also similar to the previous moderating result. This result indicates that the influence of sociotechnical aspects on operational performance is not significantly enhanced by the safety climate.

For this finding, it has brought the researcher to make a plausible explanation. First, the organization has allocated a certain amount from their budget to conduct safety training which apparently training aspects has been placed as one of the indicator in the construct of sociotechnical aspects and safety climate. It indicates, the endless support from top management has made safety training is more effective [42]. Second, a sociotechnical aspect of lean has featured some important aspects which were totally supported among leaders about the prominence of safety climate in the work place. [28] notes, it is necessary to train all leaders in the organization as a strategy to build a sufficient unit climate with hope that the hospital performance is increased. Third, the quality of teamwork among the new and old staff in prioritizing safety climate as the eminence component has made the private hospital is a trustworthy organization. In line with the study of [43], it has examined safety climate in the ICU of public hospital Cyprus, it was found that working at ICU are more challenging and stressful which this study proposed, a high quality teamwork and a strong competencies are indispensable and these appearances should be embedded among staff.

### 5. Conclusion

Undeniably, the establishment of private hospitals in Malaysia has given a significant impact enormously to the nation especially the growth of GDP. Besides, private hospitals has given a big opportunity to the stakeholders whether internally or externally to share expertise in various field, full utilization of facilities, technological advancements, job vacancies, undertaking corporate social responsibility (CSR) and many more to ensure the organization is able to sustain in the long term.

Therefore, this study has given a crystal clear and produced a positive result whereby Malaysia's private hospitals can improved the operational performance by practicing lean healthcare in the context of operational aspects and sociotechnical aspects. Moreover, lean healthcare and operational performance can be a synergistic in the aspect of waste reduction and inefficiency. Unfortunately safety climate was not moderated between operational aspects and sociotechnical aspects with operational performance. Hence, there is still a need for ample space to strengthening safety

climate in order to enrich the benefits gained from sociotechnical aspects for operational performance.

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