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OPERATIONAL PERFORMANCE AS A MEDIATOR ON THE RELATIONSHIP BETWEEN LEAN HEALTHCARE AND SUSTAINABILITY AMONG PRIVATE HOSPITALS IN MALAYSIA USING PLS-SEM

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Abstract: *Private healthcare has shown tremendous growth over the past decades, even though the public healthcare in Malaysia still dominated. Thus, Eleventh Malaysia Plan has put a revolutionary effort to transform private healthcare sector by pursuing sustainability as well as to improve regulatory framework and increasing global competitiveness. In order to achieve this, it is suggested to perform the best practices in the context of operational excellence to ensure the robustness of Malaysian economy. Therefore, the study was intended to identify if lean healthcare practices positively impacts sustainability but can be influenced by operational performance, among private hospitals in Malaysia. Hence, a quantitative method was applied and the data was collected through survey questionnaires which were randomly distributed to a sample 118 private hospitals in Malaysia with 45 percent response rate. They were analysed by performing PLS-SEM technique with four hypotheses were supported. Results indicates that lean healthcare practices and operational performance positively improved sustainability, showing that these are the important elements should be considered by practitioners. Likewise, the mediating role of operational performance between lean healthcare practices with sustainability were established. Finally, this paper provides some limitations of study and recommendations for future research.*

Keywords: *Lean Health Care, Lean Health Care Practices, Operational Performance, Sustainability, Private Healthcare*

Introduction

Sustainability in the healthcare system is a key component in order to fully utilize healthcare assets wisely, and to deliver services with better efficiency (Economic Planning Unit, 2015a). A report by the National Healthcare Service (NHS) in United Kingdom (UK) reveals that most NHS leaders believe that sustainability is vital to the NHS, and it is highly important to deliver multifaceted changes as to ensure that the organization will be more sustainable (Ling et al., 2012). Hence, Ling et al. (2012) further reported that the most challenging areas of improving sustainability in the NHS include working with other groups/organizations, changes to pathways and models of care, as well as infrastructural changes.

In Malaysia, it has been found that the country's healthcare system, especially in private healthcare, the main cause which has made improving sustainability a challenge is increasing cost (Nerminathan, Adlan, & Nerminathan, 2014), particularly in the aspects of technology, infrastructures, equipment, and scientific advances. A study by Haque, Sarwar, Yasmin, Anwar, and Nuruzzaman (2012), have raised the same issue. It noted that to ensure that private healthcare will be more sustainable in generating revenue and providing high quality services, they should improve on their efforts to attract customers into using their services and retain the patronage without imposing costly charges. Increase of cost in private hospitals is recognized as an issue that may possibly affect sustainability. Ministry of Health Malaysia (2011) had stated that sustainability issues are related to increasing cost that lead to waste, which is a notion supported by Ramlan and Ahmad (2014), who said that healthcare providers often fail to sustain and improve their services due to waste incurred and rising costs. Therefore, Nerminathan et al. (2014) proposed that to minimize expenditure and any rising costs related to healthcare, healthcare providers need to consider reducing waste which will ensure the sustainability of their organizations.

Nelson (2011), on the other hand, has underlined eight types of waste in healthcare organizations which include transportation, inventory, motion, waiting, overproduction, overprocessing, errors, and waste of talent. These different classifications of waste was introduced by Taiichi Ohno at Toyota in the 1940s, where seven types of wastes were discovered within the manufacturing sector (Radnor, 2011). Subsequently, research by Malaysia Productivity Corporation, or MPC (2014), summarizes issues and challenges that affected twelve Malaysian private healthcare providers that lead to waste as depicted in Table 1.1.

Table 1: Types of wastes occurred in Malaysian private healthcare organizations

Original wastes	Private healthcare issues	Consequences
Waiting	It takes time to resolve certain issues due to requirement of having it made in official writing.	Time consuming and causes delays.
Overproduction	Tonnes of paperwork required to fulfill a request, such as certified copies of reports.	Inefficiency that can lead to higher costs. In addition, numerous interaction across units in order to meet certain requirements.
Errors	Requirements' revisions that were done without any communication and information given.	Errors that existed due to misunderstandings which causes difficulties in achieving agreement.
Waste of talent	The deficiency of experienced and skills among nurses. Restricted from employing foreign nurses to focus on hiring unemployed graduates.	Hospitals being saddled with low-quality graduate nurses by the Nursing Board.

Source: MPC, 2014

Consequently, Gowen III, McFadden, and Settaluri (2014) have proposed a lean approach in the healthcare sector that will support a continuous quality improvement to reduce waste, since other transformational approaches such as six sigma, total quality management (TQM), and business process re-engineering seems to have less than desirable results when it comes to sustainability, as is apparent in the United States (US) and UK healthcare systems (Grove, Meredith, MacIntyre, Angelis, & Neailey, 2010). The implementation of lean healthcare will assist organizations to eliminate waste, and is seen as one of the best practices to accelerate productivity growth (Economic Planning Unit, 2015a).

Literature Review

Lean healthcare Practices and Sustainability

Undeniably, lean thinking capable to reduce waste and defects to bringing up sustainability in the healthcare sector (Ling et al., 2012). Conversely, study by Elshennawy et al. (2012), quantified the staff awareness level of lean tools using Lean Sustainability Assessment Framework (LSAF) and it was discovered, about 80 percent hospital managers were conscious several lean tools which include 5s, continuous improvement, waste elimination, 5 why's, visual stream mapping (VSM) and types of waste. It indicates hospital managers concerns in practicing lean to their workplace because it will lead to sustainability and enhance the level of performance. While Norazlan et al. (2014) in their findings have shown positive significance between *kaizen blitz* and sustainable performance in the healthcare industry. Moreover, it is believed *kaizen blitz* not only can be applied in the healthcare industry, but most importantly to deliver the quality of patients' service and to fulfill customer satisfaction.

Ho (2010) had introduced the integrated of lean TQM model for sustainable development with the aiming to minimize waste in the organization and from his findings, it was found lean 5s provides a powerful process tool to convince many types of organizations are able to sustain. Subsequently, Dellifraine, Langabeer Ii, and Nembhard (2010) have found two popular tools, namely lean systems and six sigma capable to improve financial performance, instead of clinical outcomes and efficiency. Notwithstanding, it is argued the improvement was based on the conceptual argument, rather than evidence based on empirical

research. Thus, it is confirmed there is a dearth of research has been conducted to see the direct relationship between lean healthcare practices and sustainability. Therefore, this relationship will be analyzed based on the following hypothesis.

Hypothesis 1: There is a positive relationship between lean healthcare practices and sustainability

Lean Healthcare Practices and Operational Performance

A scarce research has been found in the relationship between lean healthcare practices and operational performance in the healthcare setting. A study conducted by Al-Hyari et al. (2016) empirically substantiates that lean bundles comprises JIT, HTM and TQM intensely improve hospital performance of private hospitals in Jordan. However, it has been proposed to examine the relationship between lean management and hospital improvement such as cost, quality, safety and delivery (Roszell, 2013). For instance, recent study has shown, the adaptation of lean in a nursing unit managed to eliminate operational failures which has led to costs reduction around $200,000 annually per unit (Kotchevar, 2015). Operational failures such as scheduled medication not delivered on time and adjourning patient care that can cause patient harm have been identified as a major error or disruptions to system functionality. While Miller and Chalapati (2015) have proven lean tools such as root cause analysis and VSM are able to reduce waste dramatically and improves productivity at the Indian hospital.

Cost reduction was also has been highlighted in the efficiency dimensions, instead of resource utilization (Purbey et al., 2007). They pointed out, it is important for the hospital management to use the funds or resources wisely in order to produce a good output. Besides, the ability to control production costs has to look seriously as to avoid any possible waste in the organization (Cho, 2014). Subsequently, it has been revealed, less cost incurred if average length of stay (ALOS) is shorter, while lower cost associated with higher number mortality rate (Stock & McDermott, 2011). Hence, this analysis does verify operational performance have a positive correlation on the overall hospital costs performance. Meanwhile, Gares (2011) discovered length of stay (LOS) was significantly associated with patient overall satisfaction. The study conducted in acute inpatient medical/surgical nursing unit whereby this study had restricted to patients who were 18 years old or above and discharged to go home less in seven days or less.

Nevertheless, it has been debated by Nerminathan et al. (2014), if discharge patients too early, the deficiency in monitoring and supportive care certainly exist because the intention of hospital to avoid any additional cost. Thus, they have suggested, lean management need to employ within the hospitals in order to cutting out waste in the aspect of bed occupancy, turnover interval and ALOS. Furthermore, study by Capkun et al. (2012) indicates, the reduction amount of patients spent their time in the hospital has enhanced operational performance because the number of medical doctors and staff has increased in Austrians public hospitals.

Thus, the results have shown, the improvement of operational performance, which can be seen the reduction of staff has made low patients length of stay, as well as reduced hospital costs because principally, lean goals based on Toyota House, attempts to reduce costs, lead times, provides best quality, safety and high morale (Suryadevara, 2015). Another staffing issues, also has been a major problem in the Emergancy Department (ED) at Israel's hospitals because they have to work shifts and overtime that might involve an extra costs.

Hence, Sinreich and Jabali (2007) proposed the strategy of restructure and downsize of ED's workforce that aim to reduce costs of hospital and increase hospital efficiency.

In summary, past research indicates, operational performance has strongly associated with lean practices. However, various scholars have debated lean management comprehends a set of complementary of operating practices with the intention to eliminate unnecessary activities throughout the organization (Hajmohammad, Vachon, Klassen, & Gavronski, 2013). Hence, considering this gap, this study will test the relationship based on the following hypothesis.

Hypothesis 2: There is a positive relationship between lean healthcare practices and operational performance.

Operational Performance and Sustainability

Forgoing studies reveals lack of empirical research has been conducted when dealing with service sector and performance (Yasin & Gomes, 2008) especially in the context of operational performance in the healthcare and sustainability. However, there are few evidence were found to prove that operational performance contribute to sustainability. For example, Nerminathan et al. (2014) in their study have substantiated, operational performance has increased in the healthcare sector and managed to save up roughly about RM250 million, but this accomplishment can be done through a wise strategy.

Notwithstanding, sustainability in the NHS, UK should be stand in the quality improvement (Ling et al., 2012) because it is a strategy to improve healthcare (Ament et al., 2012). In fact, if the quality improvement does not sustainable, it will lead to waste of resources (Hovlid, Bukve, Haug, Aslaksen, & von Plessen, 2012). Thus, it has been suggested to form an army quality improvement consultants within the healthcare organizations as to improve the incongruences of healthcare system (Schattenkirk, 2012).

Besides, Gomes et al. (2010) have to come an agreement whereby the element of quality, service efficiency, and availability are the critical elements to measure overall healthcare organizational performance. This is align with the establishment of Accountable Care Organization (ACO) in the USA, that has been designed to promote sustainability in the healthcare, and managers has given the opportunity to analyze the relationship of significant elements which include cost/financial issues and quality of care (Ramirez, West, & Costell, 2013). Moreover, Dannapfel et al. (2014) implemented lean improvement program in the year 2008-2011 by initiating lean healthcare in the Swedish healthcare, has deeply concerned on the quality as to ensure the organization achieve sustainability in the long term.

Nonetheless, it can be seen past studies unable to examine the significant relationship between operational performance and sustainability statistically or in short, more studies need to be done related to investigate these relationships. Therefore, the testable statement for this study as follows.

Hypothesis 3: There is a positive relationship between operational performance and sustainability.

Mediating Role of Operational Performance

Factually, operational performance has been measured in a different way which it depend the purpose and suitability of the study. For instance, a substantial study was done by Belekoukias, Garza-Reyes, and Kumar (2014); Chavez et al. (2013); Feng, Li, Sun, and Wang (2013); Nawanir et al. (2013); Rahman et al. (2010); Shah and Ward (2003); and Voss, Åhlström, and Blackmon (1997) have measured the influence of lean production or lean bundles towards operational performance that stand as dependent variable in the manufacturing sector. Nevertheless, operational performance was tested to examine other performances such as business performance and financial performance (Nawanir et al., 2013; Fullerton & Wempe, 2009).

Correspondingly, prior scholars like Hadid et al. (2016); Malmbrandt and Åhlström (2013); and Hadid and Mansouri (2014) positioned operational performance as dependent variable as well. With respect of these studies, operational performance was tested in observing the relationship with lean service in the aspect of technical and social. In contrast, alluding to the healthcare sector, operational performance was performed as independent variable where the dimensions of operational performance are length of stay and mortality of rate (Stock & McDermott, 2011) but conversely, some studies conducted by Al-Hyari et al. (2016) and McDermott and Stock (2007), have placed hospital performance and operational performance (average length of stay) as dependent variable. In addition, Nerminathan et al. (2014) explored operational performance in terms of length of stay between public sector and private sector towards sustainable healthcare in Malaysia. While Ling et al. (2012); Hovlid et al. (2012); Schattenkirk (2012); and Gomes et al. (2010) deliberated sustainability in a different form by seeing quality improvement as one of the operational performance dimension.

Subsequently, it has revealed, most of the operational performance have been measured qualitatively in the healthcare sector where it took an extensive period to obtain the result (Bamford et al., 2015; Elg et al., 2013; Capkun et al., 2012; Yasin & Gomes, 2008). This is due to healthcare sector considered as a huge sector that have numerous departments such as emergency department, ICU department, pharmaceutical department, operation theatre and many more. Besides, the implementation of each department is varies in terms of work areas, work flow, process and inventory. Another fragmented issue is the dimension of operational performance was arguably debated due to previous studies unable to establish the dimensions consistently (Purbey et al., 2007) regardless in what sector because every scholar from a various setting has their own purpose and objective to achieve which apparently, inconclusive result was derived.

In reflection upon on the result of operational performance, number of respective scholars like Nawanir et al. (2013) and Fullerton and Wempe (2009) supports operational performance as a role of mediator to examine the relationship between lean and other performances such as business performance and financial performance. Whereas, in the healthcare sector, Capkun et al. (2012) anticipated future research should consider operational performance in terms of quality can be mediated between specialization and economic performance. In this regard, operational performance undeniably should be stand as mediator

to investigate the relationship between lean healthcare practices with sustainability in the private hospital. Therefore, the testable statement for this study as follows:

Hypothesis 4: Operational performance mediates the relationship between lean healthcare practices and sustainability.

Framework of Study

Conceptual framework has been proposed as to explicate the relationship between variables in this study (Sekaran, 2003). This framework was developed based on the literature review and it has been identified, one independent variable, one mediating variable, and one dependent variable. Figure 1, illustrates the theoretical relationship of the sustainability, lean healthcare practices and operational performance for this study. The independent variable is lean healthcare practices, operational performance quantified as mediating, while sustainability as the dependent variable. Thus, the understanding of lean as a whole is crucial as to ensure the organization manage to identify what are the right tools or practices can be applied and finally enable to improve financial, social and environmental of sustainability.

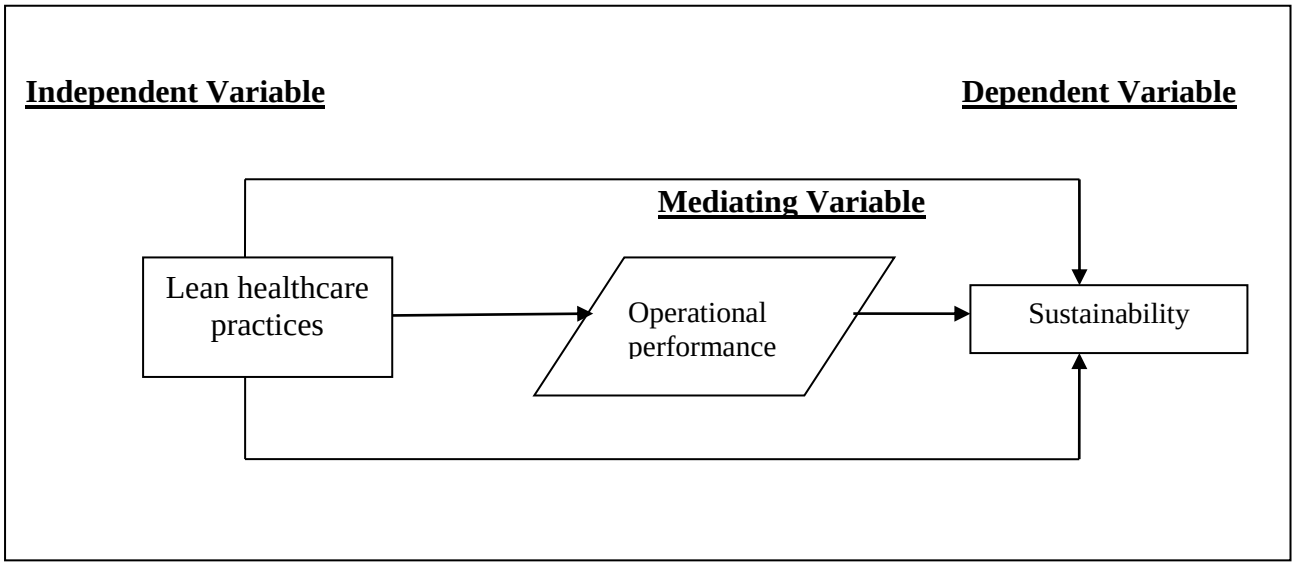

Figure 1: Conceptual Framework of the Study

Methodology

This research is conducted in quantitative study by employing descriptive study and to examine the relationship between lean healthcare practices and sustainability. The target population of this study is the private healthcare organizations in Malaysia, especially hospital. According to the latest report by Ministry of Health, Malaysia (MOH) in 31st December 2016, approximately about 187 licensed private hospitals that still operate progressively in this country (Health Facts 2016, 2016). Apart from a private hospitals, there are also offers other healthcare facilities to the people such as maternity homes, nursing homes, hospice, ambulatory, blood bank, haemodialysis, community mental, as well as other facilities. Thereby, this study intends to choose an organization among private hospital in Malaysia as the unit of analysis. The targeted respondents will include people who are responsible at the organizational level and involved in the strategic decision.

The simple random technique will be used as representative of the target population. The design of the questionnaire will be prepared, and will be validated by the Subject Matter Experts (SMEs) through content validity using Lawshe's method. This is to ensure the item of each section is reliable and can be accepted. Moreover, to make respondents understand the questions without any confusion. Due to the fact that the response rate for unit analysis of an organization is low, which has demonstrated in the past studies (Hadid et al., 2016; & Gu & Itoh, 2016), the researcher decided to use PLS-SEM with the recommendations of sample size ranging from 30 to 100, compared to CB-SEM generally range from 200 to 800 (Sarstedt, Ringle, & Hair, 2014). Therefore, the data collection will be analyzed using SPSS version 23 and SmartPLS 3.0 for the purpose of descriptive statistics and inferential statistics respectively.

Data Collection and Responses

A sample of 118 Malaysia for private hospitals was identified using Krejcie and Morgan (1970) in determining the sample size. Hence, the private hospitals were randomly selected using randomizer software. Questionnaire enclosed along with an official letter from the university and return envelope was sent by express mail to the targeted of hospital's. The online survey was also has been used as a medium to collect the data from the respondents. It was found the majority of the managers returned the questionnaire by courier compared to online survey.

Intentionally, the questionnaire has been addressed to the managerial level, such as General Manager, Operation Manager, Safety Manager, Quality Manager and other managers since they are expected to have a vast knowledge about lean health care, operational performance and sustainability in the organization. Consequently, within the six months of data collection process, a total of 56 questionnaires were received after follow-up mailings and telephone calls producing a primary response rate of 47 percent. This is demonstrated in Table 5.1 below.

Table 1.2: ***Data Collection and Responses***

	Frequency	**Percentage %**
Distributed questionnaires	118	100
Returned questionnaires	56	47
Rejected questionnaires	5	4
Retained questionnaires	54	45
Questionnaires not returned	62	52

It shows, only 54 usable questionnaires were analyzed throughout this study. Similarly, Hadid et al. (2016) reported this rate were also common in survey studies especially if the organization was chosen as the unit of analysis and it was confirmed by previous studies such as Hadid et al. (2016) 10 percent, Buchanan (2013) 18 percent, Patel (2012) 15 percent, Gadenne et al. (2012) 21 percent, while Gu and Itoh (2016) even much more lower with 5 percent. However, Ulhassan et al. (2014) mentions, response rate in survey studies were less imperative as compared to other issues that linked to surveys such as incorrect response scales, inappropriate questions or others which are generally an issue in the healthcare sector. Therefore, a response rate of 45 percent is sufficient for this study.

Analysis

Measurement Model

The evaluation of the measurement model or also called outer model is the first step of PLS analysis and it reveals to fulfill the certain criteria of reliability and validity, it must be linked with reflective and formative outer models (Rigdon, Ringle, & Sarstedt, 2015). Similarly, Henseler, Ringle, and Sarstedt (2012) also specified, measurement model specifically associated with reflective and formative measurement model which analyzing the measures of reliability and validity. Prior to that, it is vital to distinguish between reflective and formative model. According to Hair et al. (2014), a reflective measurement model has relationships from the latent variable to its indicators. In contrast formative measurement models have relationships from the indicators to the latent variable.

Since the researcher had found all the indicators reflected to the constructs in the research framework, it is important to meet the criteria of evaluation reflective measurement models. As described by Hair et al. (2014) and Hair, Sarstedt, Ringle, and Mena (2012); the evaluation involves determining internal consistency (composite reliability), indicator reliability, convergent validity (average variance extracted, AVE), and discriminant validity (cross-loadings, Fornell-Larcker criterion and HTMT).

To fulfil the condition of validity, indicator reliability of the measurement model is first checked by examining the items loadings. After examining the outer loadings through Smart PLS 3.0 for all latent variables, it were detected all outer loading were above 0.5. It can be categorized of significant loadings as per aforesaid criteria by Hair, Hult, Ringle and Sarstedt (2017) while considered moderate by Chin, Marcolin, and Newsted (2003). Nonetheless, it was noticed that Average Variance Extracted (AVE) of sustainability below 0.5 which indicates some of the outer loading with low value need to be deleted. It was found after run the PLS-algorithm, the outer loadings of six indicators (LHP_FS8, LHP_KAI3, LHP10, SUS_F1, SUS_E2, SUS_S4,) have been detected which have low values with the ranged of 0.512 to 0.575 need to be eliminated from the PLS model and indirectly the AVE of sustainability had increased to 0.5.

Traditionally, Cronbach's alpha has been used for internal consistency which provides an estimate of the reliability (Hair et al., 2017). It is assumes that all indicators are equally reliable (tau-equivalance) and hence, Cronbach's alpha sensitive to the number of items in the scale. Nevertheless, PLS-SEM is more suitable because it highlights the indicators according to their individual reliability (Hair et al., 2012). Conferring to Hair, Ringle, and Sarstedt (2011) composite reliability should be higher than 0.70 and specifically composite reliability values of 0.60 to 0.70 are considered acceptable in exploratory research, while values between 0.70 and 0.90 can be regarded as satisfactory. Therefore, by using SmartPLS standard algorism, the composite reliability of each variable are met the criterion which exceeded the minimum the threshold value of 0.70 (Table 2).

Consequently, additional support to measure reflective measurements model discriminant validity by looking at the heterotrait-monotrait ratio of correlations (HTMT) (Henseler, Ringle, & Sarstedt, 2015) and it was applied for this study. Apparently, only one of the inter-constructs between operational performance and sustainability were above 0.9 which indicates some item need to be deleted. Thus, the item of SUS_S3 was removed and the value had reduced to 0.899 which can be seen as the highest HTMT value. Thereby, the HTMT results proved that there is a lack of discriminant validity between the constructs and it did not

violate the 0.90 threshold. Therefore, it can be concluded that the measures' discriminant validity were established.

Table 2: Measurement Model

Constructs	Items	Loadings	Composite Reliability (CR)	AVE
Lean healthcare practices	LHP_FS1	0.713		
	LHP _FS10	0.666		
	LHP _FS2	0.772		
	LHP _FS3	0.813		
	LHP _FS4	0.775		
	LHP _FS5	0.689		
	LHP _FS6	0.639		
	LHP _FS7	0.596		
	LHP _FS9	0.664		
	LHP _KA1	0.831		
	LHP _KA2	0.837		
	LHP _KAI1	0.593		
	LHP _KAI2	0.659		
	LHP _KAI4	0.718		
	LHP _VM1	0.875		
	LHP _VM2	0.841		
	LHP _VM3	0.689		
	LHP _VSM1	0.787		
	LHP _VSM2	0.739		
	LHP _VSM3	0.793		
	LHP _WE1	0.821		
	LHP _WE2	0.808	0.965	0.557
Operational Performance	OP1	0.838		
	OP2	0.854		
	OP3	0.838		
	OP4	0.781		
	OP5	0.625		
	OP6	0.829		
	OP7	0.817		
	OP8	0.867		
	OP9	0.848	0.946	0.662
Sustainability	SUS_E1	0.731		
	SUS_E3	0.782		
	SUS_E4	0.724		
	SUS_E6	0.883		
	SUS_E7	0.833		
	SUS_E8	0.835		
	SUS_F2	0.551		
	SUS_F3	0.609		
	SUS_S1	0.643		
	SUS_S2	0.645		
	SUS_E7	0.833	0.918	0.534

Structural Model

After performing measurement models in this study, structural model need to be conducted in order to investigate the standardized path coefficients between variables because the combination of measurement models and structural model are important to make the structural equation model more comprehensive (Urbach & Ahleman, 2010). A total of 500 re-samples was applied to test the hypothesized relationships and to produce the standard error as well as to calculate t-values. It was proposed by Mooney and Duval (1993) 500 re-samples can be recommended to estimate a parameter.

The results revealed that lean healthcare practices is positively related to sustainability ($\beta = 0.218$, t-value = 2.101) at $p < 0.05$ significance level, suggesting that H1 is supported. H2 which theorized that lean healthcare practices is positively related to operational performance ($\beta = 0.319$, t-value = 3.312) is also supported at $p < 0.01$ significance level. The results confirmed that operational performance is positively related to sustainability ($\beta = 0.443$, t-value = 3.192) at $p < 0.001$ significance level, thus, H3 is supported. Finally, H4 was supported with the mediating effect of operational performance on the relationship between lean healthcare practices and sustainability ($\beta = 0.157$, t-value = 2.398) at $p < 0.05$ significance level.

Table 3: Hypothesis Testing

Hypothesis	Relationship	Std. Beta	Std. Error	p-values	Decision
H1	Lean healthcare practices -> Sustainability	0.218	0.104	0.018*****	Supported
H2	Lean healthcare practices -> Operational Performance	0.319	0.096	0.000*******	Supported
H3	Operational Performance -> Sustainability	0.443	0.139	0.001*******	Supported
H4	Operational Aspects-> Operational Performance -> Sustainability	0.157	0.065	0.017*****	Supported

Notes: ******* $p < 0.001$, ***** $p < 0.05$

Discussions

Research Objective 1: There is a positive relationship between lean healthcare practices and sustainability in private hospitals.

Generally, most of the private hospitals practically strive towards becoming a provider of high quality healthcare. Hence, the practices of lean absolutely cannot be separated in order to achieve high standards of delivery and efficiency in performance. For instance, commonly the hospitals are aware that every single area should be cleaned perfectly which obviously the element of 5s has been inserted. The element of VSM is implemented whereby the hospitals should warrant the flow of hospitals operations to work smoothly and continuously without any deprivation.

These practices affect the sustainability of the private hospitals because as mentioned by Nelson (2011), the ability to sustain is profoundly reliant on compromising the upshots of lean in the first few years. Furthermore, Nelson in his book has highlighted lean can contribute financial success towards the healthcare sector which interestingly, all the constituency such as senior leaders, physicians, staff, board of governors and patients should recognize their role in managing finances well to achieve a healthier outcome. As an example,

the outcome focus of staff is employee satisfaction, the opportunity to work expressively and the efficiency of workplace.

Therefore, undoubtedly the result indicate that lean healthcare practices brings great influence towards sustainability in the private hospital although several hospitals has been identified as a new entity. To encapsulate, private hospitals with fully practiced lean healthcare practices of lean is probable to attain greater sustainability.

Research Objective 2: There is a positive relationship between lean healthcare practices on operational performance in private hospitals.

As in the TPS Model by the late Taiichi Ohno; he targeted seven types of waste and he believes the operations should progress smoothly without any disruption. Underlying effect of this model, lean management had proven beneficial in the hospital performance or operational performance in the context of cost, quality, safety and delivery can be better (Suryadevara, 2015; Roszell, 2013). Cost reduction is also a part of operational performance that needs to be taken into account and is a sensitive topic that needs to be dealt in a straightforward way (Nelson, 2011). Commonly, people assume that cost reduction is related to layoffs or staff reduction in order to cut cost of the organization. However, layoff is not a major concern to Malaysia's private hospitals because considering the economic turmoil in this country, issue of cost cutting and unemployment must be settled openly.

Alternatively, cost reduction can be managed strategically by making continuous improvement with the specialized team that have been appointed, practicing 5s competently, train the employees in handling waste, and fully utilize the *kanban* system as well as visual management. Suryadevara (2015) and Sinreich and Jabali (2007) in facing staffing issues, they reported staff reduction or downsizing the employees will help to reduce cost and increase hospital efficiency. However, this is not the best solution to resolve the problem. Thus, Nelson (2011) suggested rather than eliminate existing workers; the organization should address concerns in two areas; first, reappointment or internal transfer to other open positions in the organization and second, upskilling or staff training to take on jobs that require new skills for an opportunity to move into higher-functioning positions.

Therefore, the rationalization of the above finding has concluded that there is a positive relationship between lean healthcare practices and operational performance in the private hospitals. In other words, the influence of lean healthcare practices has made operational performance become greater.

Research Objective 3: There is a positive relationship between operational performance and sustainability.

The result of this next hypothesis indicates that operational performance has positive relationship towards sustainability in Malaysia's private hospitals. Operational performance is expected to improve sustainability due to a prior research that has measured operational performance inversely to ensure sustainability is performed. For instance a study conducted by Galpin et al. (2015); Hong et al. (2014); Lacy et al. (2012); and Pagell and Gobeli (2009) have verified operational performance contributes to sustainability in the organization. However, the sustainability focuses on financial performance and environmental performance in the manufacturing sector but not in terms of social performance.

Executing operational performance in achieving sustainability within a short period is the hardest part especially if certain private hospital is newly operated and in under five years of operations, as it usually takes time and effort to advance towards their goals. However, the result of this study has verified private hospitals in Malaysia have their own strategies and initiatives to bring the organization to becoming more efficient. If failed to do so, the elements of sustainability; financial, social and environmental could not be accomplished. In fact to be truly sustainable, Ling et al. (2012) has pointed out, do not think that sustainability concerns was 'someone else's problem' because sustainability is a national agenda and we must thrive to achieve it with the cooperation among leaders and all staff. This is compulsory.

Consequently, findings of the present study continue to recognize the positive relationship between operational performance and sustainability which in earlier findings also indicate that both variables were expressively influenced by lean healthcare practices and sociotechnical aspects. Therefore, it can be concluded from the above discussion, that operational performance is a vital element in stirring sustainability in private hospitals.

Research Objective 4: Operational performance mediates the relationship between lean healthcare practices and sustainability.

The present study hypothesizes the mediating effect of operational performance on the relationship between lean healthcare practices and sustainability. As expected, findings of the study specified that operational performance did indeed function as partial mediator between lean healthcare practices of lean healthcare and sustainability at private hospitals. Consistent with the study of Nawanir et al. (2013), operational performance partially mediates between lean practices and business performance in the manufacturing sector. Business performance was measured by profitability, sales and customer satisfaction. Profitability and sales growth are consequently parallel with the indicators of sustainability in terms of financial elements of this present study. Meanwhile, Fullerton and Wempe (2009) scrutinized the impact of lean manufacturing practices on NFP and financial performance which resulting in operational performance (NFP) mediates the relationship between lean manufacturing and financial performance.

Thus, this study led to the conclusion that lean healthcare practices either lean healthcare or lean manufacturing provides a positive impact towards financial performance directly and indirectly. Nerminathan et al. (2014) further proposed to perform lean management in the public and private hospitals in order to improve profitability. As supported by Al-Hyari et al., (2016), lean bundles (JIT, HRM and TQM) contribute a huge impact to the hospital performance which embraces revenue growth and current ratio. Notwithstanding looking at the financial performance for sustainability, the other two important elements include social and environmental were also being influenced by operational performance and lean healthcare. As had been addressed in the Tenth Malaysia Plan, environmental sustainability was a part of Malaysia's plan to highlight on issue of climate change, environmental deprivation, and sustainable consumption (Economic Planning Unit, 2015). Considering this is one of the major issues in this country, Eleventh Malaysia Plan has become a fundamental shift from environmental sustainability to green growth which all sectors are involved to ensure sustainability of the nations including healthcare sector (Economic Planning Unit, 2015).

Interestingly, this study has confirmed the hospital certainly is concern to protect the environment from any detrimental issues as well as social well-being. Private hospitals in

Malaysia are cautiously aware about the environmental of sustainability in terms of providing new services which requires them to carry out yearly environmental audit. A study conducted by Rohini and Mahadevappa (2010), also established the same result where the environmental impact audit reflected an immediate need to improve sustainability in Indians hospital towards society. Furthermore, it is important for the hospital to promote environmental education to the stakeholders whether it can be assessed online or offline. Besides, energy conservation and monitoring discharges as well as emissions should be taken into consideration by private hospitals where practices of lean operational has been demonstrated and managed to reduce environmental issues of the organization through operational performance. In accordance with Ling et al. (2012), it has been reported, UK National Health Service (NHS) accentuates on stabilizing and reducing carbon emission for environmental sustainability. As such, it is suggested that a campaign of sustainability should be organized for the public in order to educate them with knowledge and awareness.

Despite eliminating waste to strengthen the sustainability impact of financial and environmental through operational performance, Malaysia's private hospitals have mitigated the burden of local communities by implementing social sustainability. It was found that Malaysia's private hospital has emphasized in giving donations to various charities through events. In addition, it allows them to become a member of various local voluntary organizations which is also parallel with the study of Rohini and Mahadevappa (2010) to encourage internal stakeholders by the top leaders to join local voluntary groups. Evidently, sustainability of social can create awareness among employees in the organization, if the practices of lean healthcare can be implemented well, through operational performance by reducing cost, time, human errors and increase operational efficiency, service quality and satisfaction.

Though less research has been conducted in investigating operational performance as mediator between lean healthcare practices and sustainability in the healthcare sector, surprisingly, this study has presented a useful result to the private hospitals. Notably, it was proven that private hospitals indeed emphasized on operational performance which include the efficiency of hospital in reducing costs and waste through lean healthcare practices of lean in order to achieve sustainability in the organization. Furthermore, this subsequently evinced that lean healthcare practices should be combined with operational performance to ensure sustainability can be elevated.

Limitations and Recommendations

Since this is the first time of examining the relationship of lean healthcare practices and operational performance towards sustainability in Malaysia's private hospitals, definitely some limitations or boundaries exist in conducting this research. The evidence to support the findings of this study is quite limited due to past studies that have shown most of the researches have been conducted in qualitative method specifically in the case study compared to quantitative or empirical studies pertaining to lean healthcare, operational performance and sustainability. Respondents to this survey was somewhat not fully cooperative and refuse to participate due to the hospital's policy on non-discloser of information to external parties as well as faced with hectic schedule since the respondents are of managerial level. As some hospitals failed to be contacted, only 54 private hospitals out of 118 participated in this study which contributed 45 percent of response rate.

Although there are limitations to this study, this research can be further explored in different directions in order to attain inclusive understanding of lean healthcare, operational performance and sustainability in the future.

Firstly, considering this is the first research conducted on lean healthcare, operational performance and sustainability in the Malaysia's private hospitals, future study should add more elements of lean healthcare practices instead of the currently existing. This is due to various scholars had tested and defined lean healthcare practices differently. Besides the element of operational aspects and sociotechnical aspects, variables such as 5s, *kaizen*, *kanban*, and many more can be independent which is parallel with the study of Norazlan et al. (2014), to examine the relationship between *kaizen* blitz and sustainable performance. Hence, it was proposed to add the variable of sociotechnical aspects in lean healthcare practices. Conferring to Joosten et al. (2009), social aspects generally been overlooked to make an intervention at the operational level due to most of the research mainly concentrate on technical aspects. As stated by Waterson, Gray, & Clegg (2002), work system based on sociotechnical principles (STS) should be classified into two provisions which include technical (human and machine) and social (human and human). Therefore, future study should include sociotechnical aspects in the lean health care practices because past studies have shown 'respect-for-human-system' has drawn much attention among academicians and practitioners to make lean implementation is successful (Joosten et al., 2009).

Secondly, the scope of study should be wider due to the present study only focuses on Malaysia's private hospitals which produce a response rate of fewer than 50 percent. It is recommended that private hospitals and public hospitals be combined as a scope for future study since the number of public hospitals together with Special Medical Institutions currently is 143 (Health Facts 2016, 2016) and there is a probability of assembling large sample size, which may sufficiently represent the population. Furthermore, the focus group for this study should either be the organizations' senior or middle management as they would be able to address the questionnaires based on their experience and knowledge about the entire organization.

Conclusion

As has been reported by Economic Planning Unit, it is hoped that private hospitals in Malaysia returns high benefit to Malaysia's socio-economic upon their adaptation of lean healthcare. Most importantly, lean healthcare provides a better insight to Malaysia's private hospitals by taking into account operational performance and sustainability of financial, social and environmental. With a strong call from the government, it will project a respectable image for Malaysian private hospitals locally and internationally (Economic Planning Unit, 2015c).

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