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The Mediating Effect of Lean's Soft Factors on Lean's Hard Factors and Operational Excellence in Malaysia Manufacturing Companies

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ABSTRACT : *The purpose of this study is to enhance the understanding of the relationship between Lean's soft factors on Lean's hard factors and operational excellence of Malaysia manufacturing companies. The study will focus on deployment within Lean's hard factors included the Lean operation and Lean supply chain under Lean deployment. Based on the literature review, the author has established a linkage that the effect created by Lean's hard factors is likely to contribute positively to the operational excellence of the company. Besides, the author also wishes to ascertain whether the potential of Lean's soft factors or Lean engagement has full or partial mediating effect on the model. The theoretical framework is guided by innovation diffusion technology (IDT). The gap in the literature also warrants the need for a contextual study of the Malaysian E&E industry. The limitation suggests a gap for a future research by validating its effectiveness with other industries. Practical adoption of Lean's hard factors may improve infrastructural decision in areas of manufacturing strategy such as best practices, benchmarking, quality practices and human resource policies. Therefore, it has implication on activities concerning Lean's soft factors and operational excellence.*

Keywords*: Lean's hard factors, Lean's soft factors, operational excellence, E&E, IDT.*

I. INTRODUCTION

The current globalizing trends, the rapid technological changes, the advancement in manufacturing technology and customers criticism in for customer is quality service are forcing manufacturing organizations to optimize their manufacturing processes, operations, and their supply chains to cope with customers expectation (Mokadem, 2017). Consequently, improving organizational capabilities in the form of operational capabilities plays a major role in building and maintaining operational excellence. The concept of operational excellence is a topic under much discussion today. It is considered as a criterion used to judge the best manufacturer or the best-in-class performer. It has the implication of being the best in the world in terms of manufacturing capabilities. In the era of globalization with major players from all over the world, the term ''world-class'' is appropriate (Sharma & Kodali, 2008). It implies the ability to be able to compete in a globally competitive market. A review of the literature shows that different researchers have different views about manufacturing excellence.

After nearly three decades of research development, the topic of operational excellence and its theoretical models still deserve the attention of the research community. First, the very definition of 'operational excellence' has continuously been modified to accommodate the context of rapid changes in the global business environment (Dahlgaard-Park & Dahlgaard, 2010). Secondly, there is a growing need to harmonize the heterogeneous measures promoted by practitioners and the literature. Thirdly, we contend that there is a real and valid need to close the gaps in the failure of firms in their pursuit of operational excellence, which has not been fully recognized to date. This study is intended to address these key issues.

Research in operational excellence has discussed the evolution of its concepts - past, present and future (Dahlgaard-Park & Dahlgaard, 2010) has led to the question: "How do excellent companies manage to stay excellent (Brown, 2013a)?" One fundamental question in the field of business performance is on how can firms achieve and sustain its competitive advantages in its pursuit of business excellence (Lu, Betts & Croom, 2011, Dahlgaard & Dahlgaard-Park, 2006). The quest in processing excellence and achieving business excellence is

challenging. As a result, various authors have proposed step-by-step road maps as a guide to achieve excellence (Van Looy, De Backer & Poels, 2011).

To guide organizations in their journey towards excellence, investigations have to be largely focused on the identification of critical variables that might better explain how organizational change can be managed to its best effect (Saka, 2002). Therefore, the paper provides an insight in understanding the contemporary influential systems that affect operational excellence. The influential systems may serve as pre-conditions for any companies before embarking on organizational change. The influential systems could be categorized either as "soft" or "hard" (Peters & Waterman, 1982). According to Vora (2013), the hard skills are easy to acquire while the soft skills are hard to build. Furthermore, Kirk (1995) evaluated hard systems have precise objectives that can be expressed in mathematical terms while soft systems are used in relation to human activities where there is unlikely to be agreement about the precise objectives of the system.

Manufacturing companies are increasingly implementing Lean practices (Adamides et al., 2008; Chanegrih & Creusier, 2016). Lean deployment is predictable and liable to improve organizational performance such as increasing productivity, quality and lowering inventories (Womack et al., 1990: Shah & Ward, 2003; Thurston & Ulmer, 2016). The adoption of Lean's hard factor or Lean practices remain significant although some industries may view Lean manufacturing as an obsolete concept. According to Alony and Jones (2008), organizations may not have a choice except to implement Lean philosophy in a globally competitive world. However, Mann (2010) argued that the failure of so many Lean implementations is due to lack of understanding of Lean principles and necessary organizational changes rather than focusing on some isolated Lean tools. Some previous studies also provide evidence that many of the organizations that implemented lean production have experienced limited success in achieving increased organizational outcomes, for example increased competitiveness (Wickramasinghe & Wickramasinghe, 2017).

The root cause of mixed results on performances may be attributed to the multiplicity of Lean practices (Hofer et al., 2012). The need to further understand the link between Lean practices and performance is also justified by the fact that scales used to measure the degree of implementation of Lean practices (Shah and Ward, 2003) are restrictive (Shah & Ward, 2007) and internally oriented (pull system, setup time reduction, continuous flow, employee involvement, total productive maintenance, and statistical process control). Past studies also have identified a gap in this area and emphasized the necessity for research on human related factors that support the adaption of Lean practices (Alony & Jones, 2008; Bayat & Dadashzadeh, 2016). Thus, in this paper we will discuss the possibility of revitalizing the pursuit of operational excellence. The study aims to quantify how well the electrical and electronics (E&E) companies in Malaysia fare with Lean and to define Lean as the practice used and its significant effect on the operational excellence of companies. Furthermore, the authors will analyze the effect of Lean's soft factor in the relationship between Lean's hard factor and operational excellence.

This study examines three research questions:

1. What are the effects of Lean practices elements such as operations on the achievement operational excellence?
2. What are the effects of Lean practices elements such as supply chain on the achievement operational excellence?
3. Is there any mediating effect of Lean engagement include leadership and employee on the relationship between Lean practices and achievement of operational excellence?

II. OPERATIONAL EXCELLENCE

Hayes and Wheelwright (1984) first conceived the notion of world-class performance subsequently expended and enriched by others (Flynn, Schroeder, & Flynn, 1999; Voss, 1995a) might not be sufficient or no longer be entirely suitable for today's business climate. Apparently, most world-class manufacturing literature is dominated by Japanese practices in automobile industries and volume production. Therefore, the key characteristics of the world-class manufacturing and the measures developed are somewhat confined to operational excellence (Lu et al., 2011).

Excellence within manufacturing is widely presented as providing significant benefits, although there is no clear consensus regarding the exact nature of excellence within manufacturing, or approaches for its implementation. To date, many implementations have followed a trial-and-error approach. To achieve the potential benefits of excellence within manufacturing, practitioners require practical and detailed guidance (Sharma & Kodali, 2008). The models themselves are developed from a set of core values and principles that are considered to be essential for long-term organizational success (these are called "Fundamental Concepts" in the EFQM Excellence Model and "Core Values and Concepts" in the Baldrige Criteria for Performance Excellence. Essentially awards and

assessment tools measure the level of deployment of business excellence within an organization (Mann, Adebanjo & Tickle, 2011).

Taj and Morosan (2011) stated that a multi-dimensional approach that consists of production with minimum amount of waste (JIT), continuous and uninterrupted flow (Cellular Layout), well-maintained equipment (TPM), well established quality system (TQM), and well-trained and empowered work force (HRM) that has positive impact on business as well as operational performance which includes quality, cost, fast response, and flexibility.

The author's view is that operational excellence is not just about efficiency in managing day-to-day operations but a way to foster continuous improvement. A fact-based understanding of operational performance is required in order to achieve this favorable position. When addressing today's challenges or capitalizing on tomorrow's opportunities, the key operations' executive or manager must be able to define, monitor (use of metrics), and adjust actions aligned with the operation strategy and objectives and, make changes to the organization's process and performance objectives when necessary.

In this study, results from the application of operational excellence are focused on operational performance and organizational sustainable performance. Operational performance reveals the performance of internal operations of a company such as quality improvements, flexibility improvement, delivery improvement, productivity improvement, and costs and waste reduction. The organization's sustainable performance indicator measures in the present study are environmental performance and social performance.

III. THE MANUFACTURING CONTEXT

The move to customizing products in the twenty-first century is the most critical means to deliver true customer value and achieve superior competitive advantage. This has led to the complex production planning and control systems making mass production of goods challenging. Many organizations, particularly automotive organizations, struggled in the new customer drive and globally competitive markets. Hence, a big challenge to organizations is to look for new tools and methods to continue moving up the ladder in the changing market scenario. While some organizations continue to grow on the basis of economic consistency, others have to struggle because of their lack of understanding of the changing customer's mind-sets and cost practices. To overcome this situation and to become more profitable, many manufacturers turned to "Lean". The goal of Lean is to be highly responsive to customer's demand by reducing waste. The ultimate goal is aimed at producing products and services at the lowest cost and as fast as required by the customer (Bhamu & Sangwan, 2014).

Lean concept originated in Japan after the second world war when Japanese manufacturers realized that they could not afford the massive investment required to rebuild devastated facilities. The modern concept of LM/management can be traced to the Toyota Production System (TPS), pioneered by Japanese engineers Taiichi Ohno and Shigeo Shingo. Alukal (2003) argued that Lean is a "manufacturing philosophy" that eliminates all forms of waste.

According to Kennedy, Plunkett and Haider (2013), though Lean is a powerful means to create value through reduction of waste, application of Lean tools has received more attention in traditional manufacturing industries only and it needs to be explored in other sectors, particular to service industries. In the past ten years, even the manufacturers located in the developing countries such as China and India are working to transform their manufacturing base from traditional low-cost, labor-intensive "Fordist" production to higher value, more flexible and more productive "Lean" manufacturing systems (Jadhav, Mantha & Rane, 2014).

In recent research, Zimmer and Knapp (2017) examined Lean manufacturing deployment in Indiana, US. The findings is a positive relationship between Lean manufacturing and its impact on worker welfare. Furthermore, value-added enhancement is associated with higher level of production employment wages. In contrast, Lean manufacturing is a management approach to manufacturing that strives to make organisations more competitive in the market by increasing efficiency and decreasing costs through the elimination of non-value-added steps and inefficiencies in the process (Garza-Reyes et al., 2012).

In Malaysia, the electrical and electronics (E&E) industry is the leading manufacturing sector, contributing significantly to the country's GDP (6.1%), exports (35.6%) and more than 780,000 people have benefitted through employment (MIDA, 2015). Therefore, this study attempts to bridge the understanding on how Malaysian electrical and electronics firms deploy Lean practices pertaining to operational excellence. Furthermore, it also takes closer look at why Lean engagement is important in Lean implementation.

IV. LEAN PRACTICES

The Lean concept originated in Japan after the second world war when Japanese manufacturers realized that they could not afford the massive investment required to rebuild the devastated facilities. Toyota produced automobiles with lesser inventory, human effort, investment, and defects and introduced a greater and ever-growing variety of products. Lean manufacturing gives the manufacturers a competitive edge by reducing cost and improving productivity and quality. Various authors have documented quantitative benefits of Lean implementation such as improvement in production lead time, processing time, cycle time, set-up time, inventory, defects and scrap, and overall equipment effectiveness. The various qualitative benefits include improved employee morale, effective communication, job satisfaction, standardized housekeeping, team decision making, etc. (Bhamu & Sangwan, 2014).

Lean Manufacturing is a systematic method used to eliminate waste while focusing on customer needs. This approach is known as the production system of the 21st century. The key drivers to Lean are cost, quality, delivery, speed, dependability, flexibility, safety, and morale (Thurston & Ulmer, 2016; Belekoukiasa, Garza-Reyes & Kumar, 2014). Although customers pay for value adding activities, such measures involve time, money and energy spent on non-value adding activities were considered a waste which either had to be eliminated or minimized. In order to succeed with Lean transformation, it is critical to apply the Lean principles from beginning to end. Failure to understand the principles, and lack of commitment, will result in project failure.

Morita and Flynn (1997) confirmed that adoption of technique based best practice approaches, such as TQM, Just-in-time (JIT), and continuous improvement (CI), statistical process control, as well as socio-institutional traits such as commitment and motivation, have all been shown to have an impact in driving superior performance. However, what they might not have specifically realized is that TQM and CI as management philosophies (not just the technical-based practice) do not only have impact on driving superior performance, but more importantly have also changed the way how managers understand operational excellence and, consequently, have driven a never-ending course of paradigm shift (Lu, Betts & Croom, 2011).

Lean has its origin generally in the private sector and particularly in the manufacturing sector (Barry, Chandler & Clark, 2001; Douglas, Antony & Douglas, 2015). Fok-Yew (2015) has proposed that the Lean operations and Lean supply chain to predict operational excellence in Malaysia multinational manufacturing companies. One of the goals of Lean operations is to use fewer resources to generate the same outcome. In contrast, Lean supply chain strategically focuses on building a close, long term relationships with high levels of information transparency with suppliers for the purpose of reducing cost and improving quality (Lamming, 1993).

Bhamu and Sangwan (2014) highlighted that effective customer-supplier relationship is widely recognized as crucial to the success of implementing of Lean manufacturing principles in order to achieve a high level of efficiency and effectiveness in the system. On-time delivery by suppliers allows a firm to keep low inventories and shorten response time to customers. Lean supply is associated with level scheduling and optimization to improve quality, service, and lead time. In the present research, the Lean operation is solely referred to internally-focused operation whereby the Lean supply chain is connected to external factors such as supplier performance.

Thus, present study embraces on examining the Lean practices or Lean's hard factors can be categorized into two elements. The first element consists of lean operations (Taj & Morosan, 2011; Seth & Gupta, 2005) which consist of TQM, cellular manufacturing, pull production and setup time reduction are among the most frequently examined lean tools (Sezen, et al., 2012; Morita and Flynn, 1997). The second element is comprised of Lean supply chain (Bruce et al., 2004; Liu, et al., 2013) which included JIT, supplier feedback and customer involvement (Harris and Harris, 2015; Bhamu & Sangwan, 2014).

V. LEAN PRACTICES AND OPERATIONAL EXCELLENCE

Lean can, inter alia, improve quality, simplify, accelerate and improve processes, increase customer satisfaction and reduce costs (Douglas, et al., 2015).

P_1: The deployment of Lean practices leads to achievement of operational excellence.

P_{1a}: The deployment of Lean operations leads to achievement of operational excellence.

P_{1b}: The deployment of Lean supply chain leads to achievement of operational excellence.

VI. LEAN ENGAGEMENT IN LEAN DEPLOYMENT AND OPERATIONAL EXCELLENCE

Lean is characterized as people-oriented production system and "Employee involvement" is one of the most critical elements to make a Lean transformation programme a success story. In the real world, there is a human

element that can sometimes be difficult to understand and accept the theory of Lean (Thurston & Ulmer, 2016). Ironically, the common barriers that hinder Lean transformation are always on issues surrounding "shop floor employees" such as "lacking of skill or technical knowhow" in practicing Lean among the shop floor employees (including supervisory staff); or companies that have failed to engage shop floor associates into Lean activities (Chay et al., 2015).

Research agrees that all Lean implementation changes the activities on the shop-floor. Many studies have focused on visual elements of Lean operations (for instance 5-S cleanup activities (e.g. Cooke et al., 2010)). The wider changes in workforce treatment will result in larger strategic organizational change in the company. Through specific activities may provide a small improvement in operational efficiency, they are primarily important for engaging workforce in change and increasing their motivation for the larger changes required (Piercy & Rich, 2015).

Research has previously identified a positive correlation between worker engagement or involvement and company performance (Piercy & Rich, 2015). On the other hand, several studies have explained how improvement in performance could be achieved by having a close relationship between Lean manufacturing, high-involvement work practices and human resource management (Marin-Garcia & Bonavia, 2015). Lean is tool set (hard factors) for continuous improvement and employee engagement (soft factors) is important for the organization to solve problems (Fok-Yew, 2015). Balle, Jones and Orzen (2015) suggested that employees had to be engaged and involved in daily continuous improvement to learn how to adapt themselves to big changes (model changes) by practicing daily small changes (kaizen). They had to be part of stable teams. Therefore, there is hardly any doubt that employee's involvement in Lean implementation triggers the impetus in achieving operational excellence. Hence, the following proposition justifies the relationship between employee engagement and operational excellence:

> P_2: Lean engagement in deployment of Lean practices will lead to achievement of operational excellence.

VII. THE MEDIATING ROLE OF LEAN ENGAGEMENT

In the quest for excellence, the most important facilitator is the people working in the organization. In this study, we propose that Lean engagement mediates the link between Lean practices and operational excellence. In other words, the effect of Lean practices on excellence depends, at least in part, on its effect on Lean engagement. Figure 1 depicts this framework. The mediating framework proposes that Lean engagement including leadership engagement and employee engagement should be present in work environment to achieve operational excellence (Jadhav, et al., 2014). Moreover, the leadership not only requires intellectual support but also physical engagement in the programme.

7.1 LEADERSHIP

Albliwi, Antony, Lim and Wiele (2014) conducted a systematic literature review of 56 papers that were published on Lean, Six Sigma and LSS in well-known academic database from 1995 to 2013. Lack of top management attitude, commitment and involvement have been identified as the most Critical Failure Factors of Lean Six Sigma in their research as it appeared in 20 of the papers found. This factor has been found to be detrimental to all industries in different countries and to different organizational sizes. Indeed, the role of top management is to ensure that all the pertinent resources are available and without hindrance during Lean deployment.

Al-Balushi et al. (2014) proposed that senior managers be responsible for actualizing meaningful involvement of employees in the changing process and facilitating the necessary resources to facilitate implementation. In terms of resources necessary for Lean implementation, such as time for employee training, and involvement in Lean activities must be provided (Alange & Steiber, 2009). Particularly, if the new way of working requires new knowledge and skill, members must be provided with the appropriate knowledge and skill either formal or informal for improvements. Many Lean Manufacturing (LM) initiatives have failed due to lack of its understanding between managers and employees (Wong & Wong, 2009).

According to Wong and Wong (2009), it is pertinent for top management to understand and to give adequate support in sustaining the Lean concept. Lack of commitment may lead to a host of other issues, including limited access to resources, lengthy decision-making processes and communication breakdowns. Lean needs dynamic managers with forward-thinking vision and laxity to give staff lee-way to experiment. Management must remove restraining force by motivating people to get them involved in Lean implementation and encouraging them to make decisions without having to follow the normal decision-making procedures (Jadhav,

et al., 2014). On the other hand, the leadership must show concern and understanding to the needs and wants of their employees (internal customers). Once the internal customers feel secured, they will improve processes, and delight the external customers (Vora, 2013). In real life example, the Southwest Airlines values employees more than their customers. As a result, employees set many of the operational policies and make the airline profitable.

7.2 EMPLOYEE

The major challenge within the ambit of Lean deployment lies in managerial and employee engagement. Getting buy in, involving and ensuring managerial and employee need time and balance between routine tasks and improvement is an ongoing challenge. This was cited as an issue in which most organizations had been to deal with in a variety of ways (Brown, 2012). Taylor and Wright (2003) conducted a longitudinal study of the success story of a few selected small outstanding firms and found that one of the key factor in their success is due to the action taken by senior managers taking charge of TQM by ensuring that a majority of employees are involved in its implementation. Therefore, the workforce at all levels are important to invigorate Lean engagement in the organization. The senior managers/leaders would drive the organization in continuous improvement while the workers/employees should be committed and vigilant to the manufacturing process. We need leaders during time of change. If there were no change, then perhaps all we need would be the manager and the workers (Mayfield, 2014).

Vora (2013) emphasized that the key to employee engagement is participation, motivation and development. The participation mentioned includes effective teamwork (Lencioni, 2002), meeting management (Lencioni, 2004), mentoring, and orientating. In contrast, motivation involves recognition, employee suggestions, and the Theory of Strength. The development covers effective education and training, performance management, employee satisfaction, and coaching. Vora (2013) argued that hard skills are easy to acquire, whereas, the soft skills are hard to build. Indeed, soft factors can make or break a change process simply because firms cannot impose hard systems on the organization without considering the effect on people (Kirk, 1995).

Cheng et al. (2015) explained that Lean tools and techniques such as SIPOC, Value Stream Mapping (VSM), SWOT and PESTLE analysis can be used to elicit and capture data from the frontline workforce. Furthermore, the validity of the VSM can be reinforced with Gemba walk as well as providing an additional opportunity to laise with the workforce and strengthen buy-in. The goal of Gemba walk is to understand the value stream and its problem while the work is in process.

Based on this argument, we expect to see greater effect of employee engagement in the relationship between Lean initiatives and operational excellence. Thus, we assume that Lean's soft factors (employee engagement) mediates the relationship between Lean's hard factors (Lean initiatives) and operational excellence. From these reviews, our proposition reflects the mediating effect of employee engagement on the relationship between Lean initiatives and operational excellence which are derived as follows:

P_3: Lean engagement mediates the relationship between Lean practices and operational excellence.

Overall, Lean manufacturing principles and techniques have been widely used by manufacturing organisations to attain measurable results and gain a superior competitive edge over their rivals (Garza-Reyes et al., 2012). In essence, effective approaches in Lean manufacturing will involve not only the practices but also the involvement of employees in the entire organization (Marin-Garcia & Bonavia, 2015). Moreover, Lean with both hard and soft factors have not been integrated in any research which would help to develop new knowledge in the study of operational excellence. In other words, integrating Lean maturity with associated hard and soft factors is absent for the organization to stay competitive by maintaining operational excellence.

The criterion of success behind excellence, both hard and soft factors is important to managing change. As such, managers striving for operational excellence must be able to strike a balance between these two important factors (Fok-Yew & Ahamd, 2014). However, there is little consensus to ascertain the driving factors that arouse the organization in Lean manufacturing initiatives towards excellence. In addition, the integration of both soft and hard factors to predict operational excellence may not be well understood by both academic and practitioners.

VIII. THEORETICAL FRAMEWORK AND THEORITICAL UNDERPINNINGS

Four hypotheses based on the previous literature were being proposed. The relationship among the various factors discussed in this literature is depicted within a framework shown in Figure 1 below. Based on the

literature review, the author develops a linkage that the Lean initiatives are likely to have an impact on operational excellence of the organization only when Lean engagement is present.

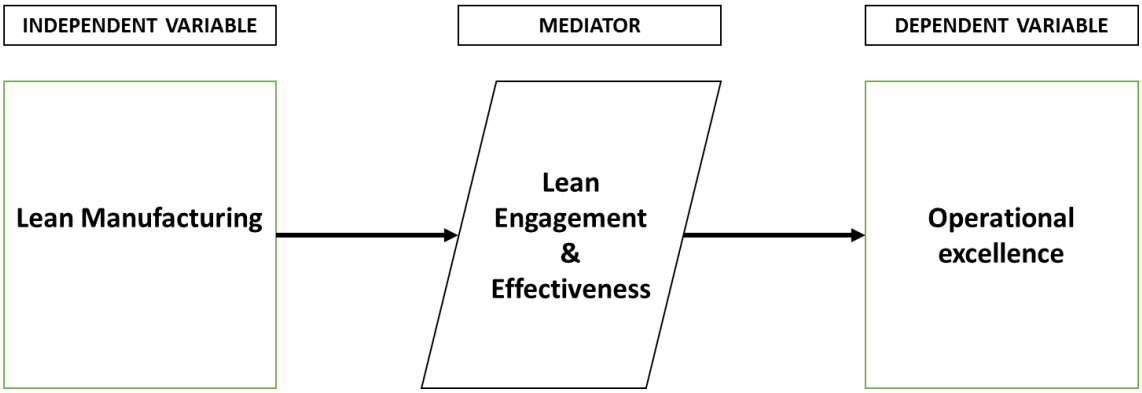

Figure 1: Theoretical Framework

The Integration with Innovation Diffusion Theory **(**IDT) is the dominant theory being adapted and used in the empirical literature on organizations because when organizations feel the pressure in competitive environment will be stimulated to adopt an innovation to change for the better. Rogers (1995) identified "relative advantage" in IDT as a primary factor affecting the adoption of innovation where measurements such as economic benefit can be used for organization to compare the advantage of new practice with the old.

According to the innovation decision process theorized in the IDT, Lean manufacturing has to be used consistently until net benefits can be observed so that decision-makers can be convinced and committed to continue adopting it in the long run (Rogers, 1995). The empirical results demonstrate that IDT can explain Lean initiatives as management practice besides technology real adoption. An extensive review of underpinning theories that may guide the present research.

IX. CONCLUSION, LIMITATION AND FUTURE RESEARCH

This study is on the relationship between the Lean practices and operational excellence. It also determines the mediating effect of employee engagement on Lean practices and operational excellence. The outcome of this study will show that variables are important in explaining the achievement of operational excellence. This study utilizes innovation diffusion theory (IDT) in its approach to theory uses.

The conclusion drawn from this present study should be interpreted in a limited way, which would potentially represent opportunities for further research in future. Firstly, this study is a cross sectional study, as it is carried out once and represents the issue at a specific time. Therefore, researchers in future may delve into a longitudinal study in order to expand the findings that are pre-changes and post-changes in the deployment of Lean initiatives. Secondly, this study uses the E&E industry not only for its high foreign ownership but also for its many restrictions in response to the study. It is suggested that using Malaysian local owned firms like small-medium enterprise (SME) or small-medium industry (SMI) may add more insight to the study. In addition, any future study in service industry will further enhance interest to the area under review. Thirdly, this study shows the importance of Lean initiatives although there are few elements affecting the achievement of operational excellence. However, further studies may focus on other elements or dimensions which have been excluded in this study such as Lean office. Finally, future study can also investigate Lean initiatives that are driven by external environment such as technological factors. Perhaps it will be able to shed a new insight on how firms anticipate the impact of external force and simultaneously improve their business performance.

Based on the proposed framework above, this study is expected to provide several contributions to practice, methodology and theory. In contrast to most previous studies which identified each element separately, this paper will be among the first few studies to examine the Lean's hard factors (operations and supply chain) to predict operational excellence. The findings will show how both Lean's hard and soft factors are important to ensure the achievement of Management are also advised to establish policy, systems and process that integrate all important elements in their planning and charting strategic direction. This paper also hopes to provide managers with an insight of the framework so that they can identify the appropriate model of operational excellence based on organizational needs.

As to methodology contribution, this study on sustainability is an add-on performance metrics (non-economic measure) place on top of the conventional performance metrics (economic measure) in a composite performance index by averaging scores across the performance indicators. Since sustainability is a very important aspect in today's business environment (Hubbard, 2009; Muogboh and Salami, 2009), therefore, this methodology can be validated for future research to measure operational excellence or operational excellence. From the theoretical perspective, it is found that the originality in terms of the model reflects a growing interest in extending business management paradigms in context to emerging developing countries particularly with the knowledge on the insight of Lean initiatives and operational excellence.

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