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Effect of Lean Practices on Innovation Skills of Pharmaceutical organizations in Thailand

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ABSTRACT

Lean practices are crucial to decrease wastages and enhance the quality of pharmaceutical products by the implementation of lean strategies and standardization method in production. However, there is a need to sustain the effectiveness of such strategies by developing the innovation skills of employees. Thus, the core objective of this study to investigate the effect of lean practices on employees' innovation skills of pharmaceutical firms in Thailand. To investigate the proposed relationship among the variables and hypotheses testing, data was collected from the 350 employees of pharmaceutical firms in Thailand. Collected data was analysed by applying PLS software. This study found that lean strategies have positive influence on innovation skills of pharmaceutical firms' employees. Standardization also has significance effect on innovation skills of pharmaceutical firms' employees. Findings of this study offer new insight to the policymakers of pharmaceutical industry. Results of this study exemplified how innovation skills of employees in pharmaceutical organizations can improve by the implementation of lean practices.

Keywords: lean strategies, standardization, innovation skills, pharmaceutical firms

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INTRODUCTION

Innovation transforms the assets of a business with the help of creative minds of human resources into innovative and worthy resources. In the previous decades, innovation was merely associated with technological improvement, quality and cost control. In the current business context, it is more concerned with the human capital skills of innovation (Liebenberg & Mathews, 2012). Now, it has become a multi-disciplinary concept that demands participation from all levels of operations for the purpose of generating products and services according the demands of customers (Junge, Severgnini, & Sørensen, 2016). Moreover, Jimenez-Jimenez and Sanz-Valle (2008) argued that innovation starts at the point where employees participate by their innovative knowledge at firm level. The theory results in a general method in a process of divergence and convergence that ultimately results in the innovation. Progressively, focus has been paid to the demand of high-performance businesses where employees can make their contribution regarding policy making and improvements.

Furthermore, Rowley (2011) studied current model of innovation and its kinds. They conclude by focusing two categories of innovation that are "product and process" innovation. Theoretically, product and service innovation are concerned with the ability of organization to offer a new product or service, while process innovation is based on different terms including administrative, technical, organizational and behavioural processes. Meanwhile, Shahin and Zeinali (2010) studied innovation in terms of organizational and behavioural innovation. Organizational innovation incorporates original figures of management such as TQM. However, behavioural innovation which is mainly based on the innovative skills of human resource is considered as an essential aspect that highlights innovative outcomes and its deficiency acts as a barrier to innovation (Madhoushi et al., 2011). It is a challenge for organizations to have innovation especially with the limit of employee's participation. This pressure can be further increased due to the imposed standards which are critical for the accreditation of many organizations in the fields of healthcare, education and manufacturing. Accreditation standards are important for the organizations to meet the legitimate requirements of quality and safety that consumers, regulators and other businesses demand of products and services. Regarding these standards, Tamm et al. (2011) illustrated how Ohno; the founder of Toyota manufacturing system (TPS) had suggested that "managements must standardize before they can improve. Yet, these standards should not be forced down from above, but rather set by production workers themselves". As a result, organizations need to focus more on the capabilities of the employees and avoid wasting their innovative skills (Rygula et al., 2011). These skills or capabilities are considered as the soft side of quality where Vij and Bedi (2016) measured the quality of service by soft and hard dimensions.

Harms (2015) claimed that lean production serves also as a foundation for innovation throughout the

organization. It is reported that employee's skills can be developed through empowerment and cross-functional team working. Lean production was developed by the Japanese engineers through applying TQM concepts of Deming, Juran, Crosby and other TQM gurus (Landsbergis, Cahill, & Schnall, 1999). The concept of lean has its roots in the Toyota Production System (TPS) at Toyota Motor Co. However, it is not just a combination of techniques that is merely applicable in the production firm bust also equally applicable for non-manufacturing businesses (Furlan, Vinelli, & Dal Pont, 2011). According to Furlan, Dal Pont, and Vinelli (2011), lean techniques which are applied to the sector of services are defined as lean practices. As for pharmaceutical organizations, two fundamental principles of TPS are particularly applicable to pharmaceutical product; mainly to ensure quality at each step and to keep improvement processes as simple as it could be in order to make it practical, reproducible and teachable. Therefore, lean practices are the philosophy that integrates staff empowerment to recognize and reduce Muda- a Japanese expression for waste and stop the production procedure once the problem occurs (Casey, 2007). This process necessitates a teamwork effort which is supported by team innovation (Nepal, Yadav, & Solanki, 2011). Pharmaceutical organizations have gained wider significance in resolving the issues faced by healthcare organizations and providing appropriate means for the process of reform and development in the health sector. With the advent of new variables in pharmaceutical organizations, the significant role played by managers has increased and become more complicated. Besides providing medical and healthcare product, there are other perspectives to be considered regarding financial and business management.

As reported by the United States Department of Justice & Federal Trade Commission, one of the main challenges faced by health organizations is the process of balancing the goals in getting financial revenue to sustain in the market and the responsibility to provide high quality of health service to patients (Junior & Filho, 2012). Hence, some organizations have acted in response to competitive demands by finding innovative ways to decrease costs, enhance quality and compete more proficiently. But in fact, pharmaceutical organizations have limited resources and the best results can be expected by directing those resources to the most critical problems. This in turn will have the greatest impact on the overall organizational performance.

Developed nations have adopted various techniques make possible quality and advanced standards of healthcare product and services. Certain advantages from engaging pharmaceutical organizations in authorization and implementing the TQM standards were reported by (Sadeghi-Bazargani et al., 2015). It includes increasing integration of internal work, inspiration to standardize medical and managerial processes, internal self-assessment mechanisms, learning from customer feedback and refinement of hospitals reputation and satisfaction of customer and staff. With the perspective of numerous developed firms, sustained growth is a key factor of accomplishment and innovation is one of its main motivating forces (Aboyassin, Alnsour, & Alkloub, 2011). Thus, pharmaceutical organizations can be initiative in facing confined challenges and be the one in charge in solving such issues. For instance, giving managers and employees superior independence to innovate and apply change, affording training and improvement opportunities and manipulating with organizational cultural issues (Lee & Lee, 2014).

Overtime, it was reported by several studies (Landsbergis et al., 1999; Pettersen, 2009) that the application of lean practices aims to increase employee involvement through implementing several lean strategies. Moreover and in relation to TQM, lean practices tend to sustain the quality of performance by standardization of work and maintaining the visual control. Thus, an ideal implementation of lean philosophy not only generates value but it also motivates customers for experience and executives to lead and innovate (Subedi & Maheshwari, 2007). The above discussion highlighted the convergence of concepts among different variables particularly, lean practices and innovation skills. Hence, this study examines the impact of lean practices on developing the innovation capabilities of employees of pharmaceutical organizations in Thailand.

Pharmaceutical firms are among those organizations who have been actively engaged in a wide variety of improvement activities, yet their improvement programs have often not met the expectations (Zakuan et al., 2010). At the beginning, innovation was at the level of technology and the focus was only on the measurable profits. However, it is argued that without sufficient skills, organizations benefit less from innovation because they do not have the requisite complementary capabilities (Mohammad Mosadegh Rad, 2006). The competitive advantage of pharmaceutical firms is very much dependent on the competence of their employees and on how they are able to cooperate with other individuals. Thus, employees have to own the essential innovation abilities to help in the generating of innovations for the needs of the pharmaceutical sector (Aoun, 2015; Aoun, Hasnan, & Al-Aaraj, 2018). Pharmaceutical are composite businesses that have numerous departments that are associated with the work swings and greater employee's turnover. This will result in the human capital that have lack of skills and participation particularly in the situation where only few people have the authority and are involved in innovation process (Aoun & Hasnan, 2013; Jekiel, 2011). Therefore, pharmaceutical businesses should have their emphasis on the development of innovative capabilities in their employees.

Pharmaceutical firms should adopt quality development policies likewise lean practices are more proactive in preventing problems at workplace and providing employees with the knowledge, abilities and time they

are required to accomplish and identify extents for development at their work (Morrow & Katz, 2012). It is also stated that improving productivity and supporting processes is achieved by the emphasis on training, standardization and human creativity (Manos, Sattler, & Alukal, 2006). However, there is some consensus on the ambiguous role of standards for innovation. A traditional perspective stated that standardization can limit innovation (Swann & Lambert, 2017), while others found that standards can promote innovation (Blind, 2013; Aphrodite, 2011; (Mangiarotti & Riillo, 2010). Still, a dynamic equilibrium between innovation and standardization is difficult to be formed in the absence of skilled human resources (Acemoglu, Gancia, & Zilibotti, 2012). Moreover, some criticized lean practices when it is implemented into areas where creativity and innovation is required especially at the individual level (Wright, Sturdy, & Wylie, 2012). However, many studies emphasized how practicing lean tools can create a culture of innovation and enhance the skills of the employees as well (Aoun & Hasnan, 2013; Grøtnes, 2009).

However, there is a lack of research in the area of quality and pharmaceutical in Thailand. Most of studies are obtained by the hard work of some specialist supported and funded by limited resources (Abou Mrad et al., 2014; Aldairi, Khan, & Munive-Hernandez, 2016). As a result, the executives must support the successful employee development, soft skills through implementation of quality improvement strategies, mainly lean practices and business environment that is open to innovation. With the development of these capabilities, culture, and incremental innovation, organizations will be able to advance organizational competences and a significant increase in the innovation skills that supportive to the pharmaceutical strategic strategy and competitive benefit in the pharmaceutical sector.

LITERATURE REVIEW

Innovation Skills

In the upcoming days, it recognized by researchers that innovative activities will demand large variety of capabilities in response to the demands of diverse economic conditions. Large number of people having the innovative capabilities will be promoted in well manner. In response to the organisational focus towards services and knowledge-intensive tasks, large variety of innovative skills in employees is needed at workplace (De Grez, Valcke, & Roozen, 2009; Pierre et al., 2014). Additionally, capabilities of critical thinking, creativeness, problem resolving and skills of understanding things with comprehensive perspectives will be desirable. Team work, effective communication, accepting the market changes and interaction with the business environment will be required instead of working in isolation (Hoidn & Kärkkäinen, 2014). Through the literature, there is a great emphasis on the innovation performance at the organizational level (López-Nicolás & Meroño-Cerdán, 2011; Zeng, Xie, & Tam, 2010) but there is lack of definitions related to innovation skills at the individual level. Moreover, the focus is more on the innovation capabilities rather than skills (Lema & Mulema, 2015; Žitkienė, Kazlauskienė, & Deksnys, 2018). In the absence of a definitive list of generic innovative skills, there are many reports and studies which aim to identify those fundamental skills. According to Horan et al. (2009), innovative skills include "management and leadership abilities, technical, scientific and production abilities, soft and interpersonal abilities, problem-solving, language, relationship-building and communication skills, etc". In addition, innovation skills enable individuals to unleash the imagination, energy and talent that are fundamental to innovation (Chell & Athayde, 2009).

Mainly, three corresponding sets of innovation abilities are often considered in literature (Hoidn & Kärkkäinen, 2014). The first set includes technical skills with regard to information and operations. The second set includes mental and innovative abilities that include curiosity, analytical thoughts, problem resolving and relation strengthening. Commonly innovation regarded as the integration of diverse ideas of various fields and demand open-mindedness and analytical questioning of well-established thoughts. Third set includes social and cultural capabilities that include attention, commitment, self-directed knowledge, self-confidence, group, communication, (cross-cultural) integration, cooperation and leadership. Innovation skills are essential to drive innovation through a process of questioning, exploitation, experimenting, learning and adapting of new ideas (Mannan, Khurana, & Haleem, 2015).

According to pharmaceutical organizations, one firm might find complexity when implementing an innovation, while another may engage it easily because it has employees with better leadership, superior skills and greater experience with related innovations. Thus, innovation skills enable an organization to meet the challenges posed by different factors more easily and reduce the diffusion barriers among different departments as well (Adler *et al*., 2003). In addition, policy developments and workers participation have k key role in the improvement of the capability kinds and information that will improve customer response and information exchange. Problem-solving action and the expansion of new information are closely associated when problem is solved in teams that can make clear employees knowledge and provide a place of sharing and gaining new experience. This will lead to polishing and refining the hidden skills at organizations. Thus, such skills are required to help the expansion and distribution of the innovation process. Lavrynenko, Shmatko, and Meissner (2018) believed that curiosity and creativity of employees drive organizations to innovation and encourage it to make new things out of nothing or adopt convergent actions to facilitate the work process. A successful innovation is mainly driven by senior management and a strategic vision of business. It plays an active role in fostering a culture of innovation. Traditionally, employees were classically seen as labourers in the organization. But recently

employees are the norm and the intellectual infrastructure of the organization. Thus, innovation can be defined more precisely as "the way of transforming the resources of an organization through the creativity of the people into new recourses and wealth" (Jack, Anderson, & Connolly, 2014).

It is essential to investigate the association of the intellectual resources and innovation, where they interact in creating and adding value to the organization and customer as well. The process demand wide range of abilities associated with innovation forces that are management, culture and individual contribution (Mohamed et al., 2012). The outcomes of the innovation practices are mainly based on embodying where each employee achieves a level of a skill at each practice that makes it automatic, habitual and effective even in a chaotic situation. This emphasizes the importance of soft skills within an organizational performance, where each employee is considered as a venture to be an innovator. Innovators themselves need to have excellent communication skills but often are best at listening. The skill of listening involves openness, respect for differences and reflexivity. Since a permissive and supporting workplace promotes this kind of behaviour, the first step the senior management should apply is creating this culture of innovation by insuring employees a free atmosphere with the necessary resources and tools. Employees must feel comfortable in their environment and have a good relationship with their fellow staff. Moreover, sufficient assets must be available to help them set some ideas into action and they should not be anxious to ask questions. Innovation in pharmaceutical sector is based on different perspectives such as (a) economic perspective; (b) technology capability and biomedical innovation; (c) information technology (IT) innovation and (d) innovation at the level of service providers and the healthcare system (Djellal & Gallouj, 2007).

Lean practices

Progressively, pharmaceutical organizations are adopting new methods for the productivity improvement derived from other industrial sectors to reduce costs, minimize wastes and better patient delivery (Kundu & Manohar, 2012). One of these transferred methodologies is the lean production system (LPS) (Saengchai & Jermsittiparsert, 2019). Mainly, the concept of LPS is to eliminate wastes, thus to ensure highly appropriate application of current available resources in the business (Alves, Dinis-Carvalho, & Sousa, 2012). Thus, it is considered as a collection of waste reduction tools. The concept of lean production was first sprouted by Taiichi Ohno, as the Toyota Production System (TPS) just after the end of World War II in the 1950's. Then it was termed as lean by John Krafcik (Dibia & Onuh, 2010). When reviewing literature of lean production, researchers can find different terms related to this concept. According to Ghosh (2012), lean thinking is the non-specific name intended for the operational policy, while lean production is applying this strategy in operational capacity. Recent lean concepts outline an ordinary language to obtain continuous improvement across the organizations. Lean is "a set of operating philosophies and methods designed to improve production quality and efficiency" (Bhamu & Singh Sangwan, 2014). Moreover, it enhances competitive edge of a business with the purpose of improving general client value (McGrath, 2007).

Keeping it simple, lean is a way to do more with fewer resources (Tracey & Flinchbaugh, 2006). The theoretical research on lean practices is still in the first stages of development and it is not clarified yet what waste must be eliminated and how lean practices can be adapted to services (Tayyab & Sarkar, 2016). Most organizations that attempt to implement lean gets it wrong. Their concern is mainly about the financial lowest line rather than reducing the actual waste efficiently. Hence, it is more essential to prevent the production line in the incident of a problem and find the root causes of these non-value adding activities (Chun Wu, 2003). Moreover, Ortiz (2012) defines the eighth waste of lean as the waste of human potential, where there is underutilization of the employee's skills. Hence, in a lean environment, best practices can be shared and spread through standardization, and better solutions can be implemented through the use of diverse and cross-functional teams, allowing a broad participation of all employees overall the organization. Based on these principles and with intention to eliminate wastes, lean practices have several tools at its disposal. Jekiel (2011) argued that implementation of lean relies on two main pillars, namely "Just-In-Time (JIT) and Jidoka". Just-In-Time technique indicates the provision of right quantity at the right time and place. However, Jidoka represent the number of environmental and technological problems associated with the application of combine manpower and mechanical power by assigning the single task to a person that has better capability to perform it allowing the machines to self-regulate the value (Aoun & Hasnan, 2013).

Relationship between Lean practices and Innovation Skills

Most of the studies emphasize that with regard to operations and developments, services businesses are least developed as compare to production especially for pharmaceutical production. Many pharmaceutical organizations are facing improvement and development problems such as the increase of costs, recurring medical errors and the increased efforts to improve efficiency and quality of pharmaceutical product. Hence, implementing lean principles is claimed to be essential for solving such problems and providing a space for innovation (Angelis & Fernandes, 2012; Hoerl & Gardner, 2010). The existing literature indicates that the interest in practicing lean production is growing significantly from 2002 to 2008 where most applications have occurred in the United States of America and public healthcare sector of United Kingdom (Box & Woodall, 2012). This reflects the fact

that lean production is becoming a successful approach for improvement of pharmaceutical product.

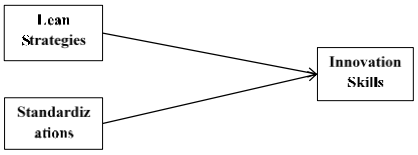
Nat Natarajan (2006) analysed the opportunities and challenges in the healthcare sector for learning and transferring best concepts from other sectors in order to improve and develop the skills of employees and enhance the innovation process. A main challenging issue states that performance measurement and improvement programs within healthcare organizations do not honestly identify the problems, because efforts by outside firms likewise "the Joint Commission on Accreditation of Healthcare Organizations" (JCAHO) may face limitations because of concerns about "legal vulnerabilities or punitive actions". Rousek (2012) demonstrate how "the implementation of lean and human factors engineering (HFE) initiatives can improve quality and patient safety within diverse healthcare delivery problems". Lean aims to eliminate waste to create a more efficient workplace while HFE focuses on human capabilities and limitations to enhance performance. The research completed its objectives by reviewing five case studies. Each analysed and improved processes that are negatively affecting quality in healthcare delivery.

Al-Balushi et al. (2014) studied the perspectives of process implication and development methods in a complex business of a UK National Health Service Trust. This rich qualitative study encourage "lean thinking" for process developments to enhance the competence and efficiency of the distribution of healthcare facilities. Ultimately, the study demonstrates that lean provides a culture of innovations using fewer resources to improve the capabilities and sustain the improvements. Particularly, McGrath (2007) applied a case study involving two Irish Medical Device industries, whereby in-depth understandings of human behaviour associated with lean are examined. The findings of the study emphasizes that lean manufacturing widely influence innovation, and it is considered as a strategic tool to help the competitive advantage of business, where one of the main benefits is the constant development that results in the sustained value and future business development. Based on the above discussion, it is imperative that each lean organization required a comprehensive, incessant, intellectual and self-reinforcing human capital with high innovative skills. According to Dibia and Onuh (2010), human resources are regarded as the hands of constant development, eyes of actual excellence and face of lean.

Research Framework and Hypotheses

Current research aimed to investigate the relationship between lean practices and innovation skills employees of pharmaceutical firms in Thailand. The proposed research framework is given below.

Figure 1: Proposed research framework



H_1: Lean strategies have significant effect on employees' innovation skills of pharmaceutical firms in Thailand.

H_2: Standardization has a significant effect on employees' innovation skills of pharmaceutical firms in Thailand.

METHODOLOGY

Griffin, O'Leary-Kelly, and Pritchard (2004) introduced the behavioural research methods and divided social research into three extensive categories, mainly descriptive, correlation and experimental. As this research aimed to determine the relationship between different variables as discussed earlier, it is classified as a correlational research. However, a descriptive approach was employed as well for identifying specific characteristics of the organization or the members especially the demographical features of the research population (Sekaran & Bougie, 2003). This study carried out quantitative research approach with cross sectional method. The main purpose of the quantitative study is to investigate the statistics, analyse hypotheses to find out the association by applying mathematical and statistical models (Chen & Hirschheim, 2004). Quantitative research uses the wide scale surveys for data collection with the help of questionnaires or structured interviews where it reaches quickly to a large sample of respondents. For this research, the data collected for measuring the relationship between the discussed variables was gathered only once during the research period since the research questions of the study were time independent, and there was no intention to detect a change in response for any external factors. The target population of this study was limited to the employees of pharmaceutical organizations in Thailand. Survey questionnaire used to collect the data for this study. The scale for the measurement of variables adapted from previous studies. The scale for lean strategies adapted from the study of Shah and Ward (2007) and scale for standardization adapted from the study of Malihi and Shee (2017).

ANALYSIS AND DISCUSSION

The main purpose of this research was to determine the relationship between the lean practices and innovation skills of pharmaceutical firms. Therefore, the collected data were analysed and the hypotheses were tested through statistical software such as PLS.

Measurement Model Assessment:

The data was analysed in two steps by using PLS-SEM, In first step the "reliability and validity" was tested by applying "measurement model" where results were reliable with Cronbach's alpha (α) and composite reliability for each item surpass the threshold point of 0.7 (Hair & F, 2010). The Fornell and Larcker (1981) suggested process was carried out to test the discriminant validity.

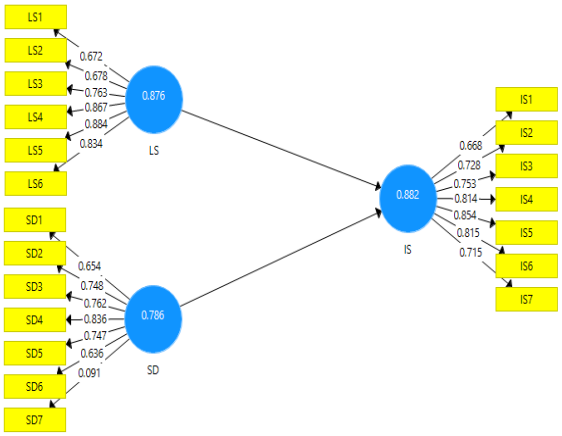


Figure 2. Measurement Model Assessment

Table 1: Values of alpha and CR:

Sr#	Constructs	alpha	CR
1	**EO**	**0.857**	**0.897**
2	**OL**	**0.760**	**0.845**
3	**TQM**	**0.825**	**0.877**

Table 2 presents that the "square root of AVE" and Table 3 presents Heterotrait-Monotrait Ratio for the investigation of Validity of constructs.

Table 2: Discriminant Validity

Sr #	Constructs	1	2	3
1	**IS**	**0.766**		
2	**LS**	0.580	**0.788**	
3	**SD**	0.640	0.556	**0.680**

Table 3: Heterotrait-Monotrait Ratio (HTMT)

	IS	LS	SD
IS			
LS	**0.632**		
SD	**0.689**	**0.646**	

Structural Model:

Hypotheses of the study were tested by using structure model. The results of structure model presents in Table 4.

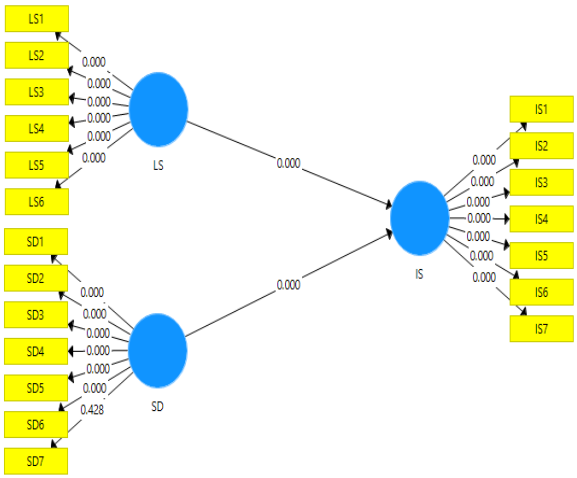


Figure 3. Structural Model Assessment

Table 4. Structural Model Assessment (Direct Results)

	(β)	(STDEV)	T Statistics	P Values
LS -> IS	0.325	0.066	4.941	0.000
SD -> IS	0.459	0.065	7.048	0.000

The core objective of contemporary research study was to examine the association of lean practices with innovation skills of pharmaceutical firms in Thailand. For the estimation of research hypotheses of this study, bootstrapping was carried out. Findings of bootstrapping illustrated that lean strategies has significant influence on the innovation skills of employees of pharmaceutical firms in Thailand. The β value 0.325 shows that lean strategies have positive relationship with employees' innovation skills of pharmaceutical firms in Thailand. The t-value 4.941 and p-value 0.000 directed that H1 is accepted and it is significant at 1% significance level. Furthermore, the hypotheses testing results obtained from SEM analysis validated the second research hypothesis. It shows that standardization also has significant relationship with innovation skills of employees of pharmaceutical firms in Thailand. The β value 0.459 illustrated that standardization has positive influence on employees' innovation skills of pharmaceutical firms in Thailand. The t-value 7.048 and p-value 0.000 illuminated that H2 is also significance at 1% significance level. These findings illustrated that lean practices positively enhance innovation skills among the employees of pharmaceutical firms. These results are in line with previous studies (Hoerl & Gardner, 2010; Papadopoulos, 2011). In contrast to the traditional perception which states that standardization limits innovation, this study approved the contrast as was illustrated by Blind (2013) and Aphrodite (2011). They found that standards promote innovation when the openness of the standardization process is considered. This means that employees can interact in a more flexible way with the changes that occur at workplace while maintaining the basic discipline and standards in

order to accelerate the progress of work through more efficient and cost-effective procedures.

CONCLUSION:

The main objective of this research was to determine the relationship between lean practices (lean strategies and standardizations) and innovation skills of employees in Thai pharmaceutical firms. Basically, the concept of this study has been developed upon detecting a gap in the literature regarding the enhancement of the innovation skills of employees in pharmaceutical sector. To achieve the research objectives, a quantitative research methodology was applied through conducting a survey among the employees of Thai pharmaceutical firms. The data collected was analysed using PLS statistical software. This study found that lean practices are significant predictors of employees' innovation skills in Thai pharmaceutical firms. Implementation of lean practices could enhance the employees' innovation skills that can increase the performance of firm. The theoretical and empirical analyses of this research have contributed academically to the literature through different perceptions. This study has developed the research and focused on more behavioural issues related to the employees and their soft skills at the level of innovation in pharmaceutical organizations. The results of current study have important contributions for the policymakers of pharmaceutical industry. It provides advantageous insights on how lean practices implementation can improve the innovation skills of employees in pharmaceutical organizations. The findings of this study can raise the awareness among employees on the importance of identifying the wastes at workplace.

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