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EXPLORING CRITICAL FACTORS FOR SUCCESSFULLY IMPLEMENTING LEAN MANUFACTURING AT MANUFACTURING COMPANIES IN VIETNAM

Abstract: *This study focuses on exploring the factors that influence the success of the Lean Manufacturing implementation at manufacturing companies in Vietnam. The mix-research methods are applied, including: reviewing previous studies, in-depth interviewing with experts in manufacturing field and case study-researching at two typical manufacturing companies in Vietnam.*

The results show that the significant issues, such as: leadership, communication at work, firm's financial capacity, employee's skills and expertise, organizational culture, customer and supplier management are the critical factors leading to the success of Lean Manufacturing implementation at manufacturing companies in Vietnam.

Overall, this study provides the suggestions to business managers, especially Vietnamese managers, orienting toward utilizing resource on core activities to efficiently achieve Lean Manufacturing implementation.

Keywords: *Lean Manufacturing; Lean implementation; Critical successful factors; Manufacturing companies; Vietnam*

1. Introduction

In the era of globalization and technological change quickly, competitiveness in firm's business has extremely become tense, forcing companies to improve their business capacity for achieving a higher competitive advantage. With this growing concern, Lean Manufacturing thinking which aims at improving service quality, operational efficiency and competitiveness perspective through eliminating waste and reducing total cost of operation (Punnakitikashem et al.,

2013) is emphasized. The implementation of Lean Manufacturing can cope with the difficulties related to standardizing the operational activities; identification of human problems; uptime; commitment and management focus (Kandasamy, 2015). Therefore, Lean is applied as a tool to achieve competitive advantages for many firms (Taleghani, 2010).

Nowadays, in over the world, Lean Manufacturing is well-known as a global standard for production system (Berggren, 1993), a revolution (Melton, 2005), a philosophy (Bhasin and Burcher, 2006), a culture (Angelis et al., 2011) which underlines various improvement activities in firms. In Vietnam, Lean manufacturing is

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also deployed in many manufacturing firms since 2000 and become the big trend (Nguyen et al., 2017). Some companies are applying Lean successfully; however, many companies failed to apply Lean or also high debated on meeting their business objectives. Therefore, the question of which factors facilitate the successful Lean implementation at manufacturing in Vietnam still prevails the concerns both the researchers and practitioners.

Currently, there are many studies on the factors affecting the success of Lean Manufacturing implementation at enterprises in many countries around the world. These studies on this topic use various approaches, varying from theoretical research, qualitative research, applied researches, quantitative research to find out the facilitators or confirm existing elements and explore other items (for example: Hibadullah et al., 2014; Rose et al., 2014; Roslin and Shahadat, 2014; Larteb et al., 2015). In Vietnam, some research on Lean emphasizes different aspects: a roadmap for successfully transforming Lean manufacturing at manufacturing enterprises (Bui et al., 2015) applying Lean manufacturing through some cases (Nguyen and Bui, 2010). However, these prior studies have not been answered well the prevail question is which factors that affect the success of the project of implementing Lean manufacturing at manufacturing companies in Vietnam; which this study tackles.

The study is structured as follows: (1) Section 1 introduces research issues; (2) Section 2 mentions the theoretical basis of Lean Manufacturing and the summary of factors affecting on Lean implementation success which are classified from previous studies; (3) Section 3 presents research methodology, including desk research, including qualitative research techniques through in-depth interviews and observations; and two case study researches at two manufacturing companies; (4) Section 4 discusses the research results; and (5) Section 5 closes this study with conclusions

and implications.

2. Literature review

Lean is a management philosophy related to: (a) identifying and eliminating waste through the value stream mapping of a product towards customer needs (Liker, 1996; Scherrer-Rathje et al., 2009; Wilson, 2010); (b) reducing the time from order to customer (Liker, 1996); (c) increasing flexibility, improve quality (Harrison and van Hoek, 2008); (d) developing provider (Harrison and van Hoek, 2008); (e) expanding the organization's network and the company's supply chain (Scherrer-Rathje et al., 2009) and (f) improving service quality, operational efficiency, and competitive advantage (Punnakitikashem et al., 2013). Lean philosophy gains prominences in improvement methodology from the success of Toyota automobiles and it is adapted in various industries and sectors (Kandasamy, 2015). On the basis of the literature review, Lean can be considered in both viewpoints: (1) the philosophical view which relates to the guiding principles or general objectives (Shah and Ward, 2007); and (2) the operational and practical viewpoint which is a set of activities, tools and management techniques observed directly (Shah and Ward, 2007). On the philosophical view, Lean is often named "Lean Thinking" including two basic concepts of eliminating waste and creating value (Murman et al., 2002; Womack and Jones, 1996; Boyle et al., 2011). Meanwhile, on the operational and practical view, Lean mainly implies the deployment of tools and techniques to reduce waste throughout the whole supply chain and in the plant (Shah and Ward, 2003; Shah and Ward, 2007; Boyle et al., 2011).

Recently, there is a lot of research around the world studying the successful factors of Lean implementation upon different approaches, such as (Kundu and Manohar 2012; Alhuraish et al., 2014; Ciarniene and Vienazindiene, 2012; Asnan et al., 2014; Coronado and Antoni, 2002; Ferdousi and

Ahmed, 2009; Simões, 2008; Rose et al., 2014; Skrudupaite and Jucevicius, 2011). Actually, it is appreciated that most studies on Lean facilitators stand on the operational and practical viewpoint. However, these studies have not obtained the consistency on which critical factors effect on Lean manufacturing implementation from various contexts in over the world (Table 1). In the context of manufacturing business in Vietnam, Lean is recognized its efficiency then, the deployments are increased significantly (Nguyen et al., 2017). However, by observation, there are a few enterprises in Vietnam success with Lean implementation (Nguyen et al., 2017). However, there are some research on Lean manufacturing which emphasize different aspects: a roadmap for successfully

transforming Lean manufacturing at manufacturing enterprises (Bui et al., 2015); applying Lean manufacturing through some cases (Nguyen and Bui, 2010). Therefore, the information or reference of experience and lessons accumulated from Lean implementation may especially be helpful for the Vietnamese companies who are expecting the successful Lean manufacturing implementation to enhance the current business performance.

Overall, the prior studies have not been answered well the prevailing question of which factors effect on the success of Lean manufacturing implementation at manufacturing companies in Vietnam; which motivates this study.

Table 1. Factors effect on the successful Lean manufacturing implementation

Factors effect on the successful Lean manufacturing implementation	Quantitative study						Qualitative study								Element that this study targets		
	Enoch	Punmakitakashem et al.	Alhuraish et al.	Hibadullah et al.	Rose et al.	Larteb et al.	Coronado and Antoni	Simões	Näslund	Ferdousi and Ahmed	Kovacheva	Skrudupaite and Jucevicius	Kundu and Manohar	Ciarniene and Vienazindiene		Asnan et al.	Roslin and Shahadat
	2013	2012	2014	2014	2014	2015	2002	2008	2008	2009	2010	2011	2012	2012	2014	2014	
Leadership																	
Leader's commitment	o	o	o		o	o	x	x		x	x	x	x	x	x	x	*
Leader's participation			o			o	x					x	x				*
Clearly understand leadership vision and strategic objectives of the company							x	x	x					x			*
Communication																	
Informing and communicating the vision of top management											x		x	x			*
Establishing communication between employees and between management and employees		o											x	x			*
Establishing communication between customer and supplier													x				*

Table 1. Factors effect on the successful Lean manufacturing implementation (continued)

Factors effect on the successful Lean manufacturing implementation	Quantitative study					Qualitative study										Element that this study targets	
	2013	2012	2014	2014	2014	2015	2002	2008	2008	2009	2010	2011	2012	2012	2014		2014
Communication																	
Establishing communication between the departments related to the value stream		o											x				*
Building a management mechanism for receiving feedback from employees to the leadership and for process improvement.		o											x				*
Firm's financial capacity																	
Funding for the reward		o	e														*
Funding for infrastructure investment		o	e				x						x				*
The training and materials			e				x										*
Funding for external consultants			e										x				*
Skills and expertise																	
Training employee	o	o	e			o	x	x	x	x	x	x	x	x	x	x	*
Training the management level and higher level	o														x		*
Evaluate the effectiveness			e				x	x									*
Employee's ability		o	e				x		x	x	x				x	x	*
Learning, awareness of staff		o					x		x	x	x				x		*
Organizational culture																	
Openness		o											x	x	x		*
Coordination		o	e										x	x	x		*
Receptive ability		o	e								x		x				*
Data/Information sharing		o					x			x		x			x		*
Customer																	
Satisfying customers			e	o	o		x								x		*
Supplier management																	
Coordinating closely with suppliers			e	o			x	x									*

Note: x: element was discovered in qualitative research
o: element was determined in quantitative research, confirmed by data
e: element was determined in quantitative research, unconfirmed by data
*: Element that this study targets to do research

3. Research method

This study is carried out through: (a) reviewing previous studies; (b) in-depth interviewing with experts of the 8 manufacturing companies and (c) researching case study at two typical manufacturing enterprises in the industry in Vietnam.

The literature review is done to review the facilitators of the successful Lean implementation from previous studies. Theoretical research methods mainly aim at seeking information from previous studies related to the content and research topic. Then, the in-depth interview is conducted with eight experts in industry to explore the insight opinions and judgments of the experts and identify the critical factors for Lean implementation successfully. The interviewees are the managers, team leaders with at least 3-year's experience working on Lean projects (in this study, interviewees have mean 5-years' Lean working experience) at eight manufacturing companies implementing Lean projects. The semi-structured questionnaire is designed to interview directly with the experts. Each conversation takes at least one and half hour and the content is noted and recorded. Information and data are collected, rewritten, classified and presented carefully after each interview. Then, the data is analyzed and synthesized in the results.

Two typical company cases are the textile enterprise (Company A) and the electronic and electrical enterprise (Company B).

- Company A is the enterprise who operates in the textile sector, has 5 years' experience in implementing Lean successfully. Currently, the company A is still pursuing and constantly improving Lean manufacturing implementation. The techniques that are employed during 5 months case study research at Company A are actual observation of Lean project

implementation, in-depth interview with four experts in Lean of company A, discussions with different employee groups who are implementing Lean and discussions with one Lean project consultant of company A.

- Company B works business activities in the field of electricity - electronics, has over 7 years' experience in successfully implementing Lean manufacturing. The techniques that are employed during 5 months case study research at Company B are actual observation of Lean project and in-depth interviews with some Lean experts of the company B, and focus group discussions with staff who are implementing Lean projects.

Overall, the review of previous studies aims to find out the key elements for implementing successful Lean projects. Then, based on the result of literature review, the in-depth interviews and case study researches aim to explore the factors critical leading the success of Lean manufacturing enterprises in Vietnam.

4. Results of reviewing the previous studies on Lean manufacturing implementation

The previous studies of critical elements for the success of Lean implementation can be generated and classified into seven categories (see Table 1): leadership, communication at work, firm's financial capacity, employee's skills and expertise, organizational culture, customer and supplier management.

4.1. Leadership

The leadership commitment and the participation in the management of leadership are noted as the important

elements for Lean implementation (Larteb et al., 2015; Rose et al., 2014; Skrudupaite and Jucevicius, 2011).

Consistency in leadership commitment is highlighted as an important factor for implementing effective changes in organizations (Kotter, 2007). According to Asnan et al. (2014) successful Lean implementation requires a leadership team commit to build a Lean implementation team. Lean team includes person who have positive attitudes to promote progress of a Lean improvement projects. In addition, senior management should commit to provide the resources, time allocation and appropriate training for successfully implementing the Lean improvement projects in the organization (Larteb et al., 2015; Coronado and Antoni, 2002).

Besides, in order to succeed in the Lean implementation, management involvement is essential. Managers must involve in constructing and managing the processing system (Eckes, 2000), participate in the Lean project together with the Lean project staff, and support other functional departments to successfully implement Lean projects (Ciarniene and Vienazindiene, 2012). In which, the vision of leadership in aligning Lean strategies with the organizational business strategies is considered as the most fundamental element for business improvement (Bozdogan et al., 2000). The vision of the leadership presents in determining the need for change, launching the Lean implementation strategies, and identifying the key requirements that can support to effectively implement Lean project (Ciarniene and Vienazindiene, 2012).

4.2. Communication at work

Communication is a key element for successful Lean implementation (Kumar et al., 2009). Communication relates to establishing mechanisms for preparing people's motivation, stressing the need to change to basically everyone knows what has been, has, and upcoming in a Lean

project (Scherrer-Rathje et al., 2009), contacting information between employees and management, communicating the vision of new initiatives to all levels of the organization (Czabke et al., 2008); capturing the feedback from employees to top management for process improvement (Cotte, et al., 2008); and connecting information between all value stream (Atkinson, 2004; Worley and Doolen, 2006). Besides, communication is essential to track the training and education employees for accepting change when preparing, implementing a Lean project (Pamfilie et al., 2012). Therefore, an effective communication plays an important role in the continuous improvement, maintaining the effectiveness of new initiatives through Lean project. The organization must take notice of vertical and horizontal communication (Punnakitikashem et al., 2013).

4.3. Firm's financial capacity

Financial capacity is one of the important factors in determining the success of any project (Achanga et al., 2006). To implement a Lean project and new initiatives through the Lean, company needs to invest adequate funds in providing an appropriate infrastructure (Jeyaraman and Teo, 2011); developing human resource, training materials, statistics; purchasing licensed software; seeking advice consultancy, rewarding to nurture and sustain a Lean culture (Punnakitikashem et al., 2013).

4.4. Employee's professional skill and knowledge

The professional skill and knowledge include the ability of the employee, the learning and the training of workers (Punnakitikashem et al., 2013). The training aims at emphasizing to employees that a successful Lean transformation requires extensive changes in the company that could not previously take place (Simões, 2008).

The thinking on the skills and knowledge that the staff should be equipped to solve problems in Lean projects, as well as the experience and ability to absorb new knowledge is the challenge of selecting training plans and educating appropriate employees (Simões, 2008). Training is not only at the level of employees but also at the management level to develop the dynamics of management changes in the whole company (Asnan et al., 2014) and to help managers effectively use tools in the improvement process.

4.5. Organizational culture

Organizational culture significantly contributes to the success of the Lean implementation (Punnakitikashem et al., 2013). According to Simões (2008), structures and processes found in most organizations are incompatible with the principles and practices of Lean. The implementation of the Lean management system can force companies to restructure business processes and to develop new business processes supporting the organization's goals. When implementing Lean, problems originated from cultural difference or cultural conflicts need to be processed and resolved soon (Asnan et al., 2014). The building of organizational culture which is consistent with sustainable change, overcoming the opposition of employees is extremely important when starting a program of organizational change, namely the Lean transformation (Hines et al., 2008; Simões 2008). Accordingly, openness, cooperation, the acquisition and data sharing are important aspects of organizational culture (Punnakitikashem et al., 2013). Therefore, the company needs to focus on changing mental models, beliefs, behaviors and attitudes of the workforce (Bozdogan et al., 2000; Simões, 2008).

4.6. Customer

According to Hibadullah et al. (2014),

customer element mainly effects on the successful Lean implementation. In accordance with Lean manufacturing, a value is determined by the customer (Wilson, 2010). Upon customer's requirements, a company identifies all the necessary activities to deliver products to customers on time (Alhuraish et al., 2014). The meeting of customer requirements in terms of shorter delivery time and shortage or demand balance becomes important (Hibadullah et al., 2014). When a company gets accurate information on the number of customer orders, production planning will be better (Rose et al., 2014; Asnan et al., 2014). Activities such as setting clear communication between customers and suppliers (Spear and Bowen, 1999) demand forecasting, inventory, and supply chain responding (You and Grossmann, 2008) help companies understand the market better and improve customer service level. Therefore, the organizational approaches, such as often setting the target to increase customer satisfaction and effectively applying the Lean methodology are the approaches taken into account the increasingly long-term organization's profit (Pamfilie et al., 2012).

4.6. Supplier management

Supplier management and controlling the use of suppliers in the production process is an important issue to successfully implement Lean (Hibadullah et al., 2014). The supplier selection, customer satisfaction and operational efficiency of the company have been linked together (Hibadullah et al., 2014). Typically, the selection of suppliers based on several criteria, such as: specification and appropriate product standards (Ahmad et al., 2012), long-term relationship (Shah and Ward, 2007), close collaboration (Basu and Miroshnik, 1999), providing quality products and certified quality management system (Hibadullah et al., 2014). Long-term relationship and commitment between suppliers and companies and the continuous support of

suppliers help companies achieve the Lean project (Abdullah et al., 2008).

5. Discussing the results of in-depth interviews and case study researches

Based on the results obtained from in-depth interviewing at 8 manufacturing companies and case studying researching at two business companies, this section discusses issues relating to the key factors affecting the successful Lean implementation, specifying at leadership, communication, financial capacity, expertise, organizational culture, customer, supplier management.

5.1. Leadership

The study results show that the critical leadership aspects should be considered when implementing Lean project: clear leadership vision and clear strategic objectives of the company, leader's participation, and leader's commitment (Table 2).

Leaders must understand Lean philosophy to implement a Lean project efficiently. Before deploying a Lean project, the company needs to determine the level of understanding and the leaders' trust of Lean. If the leaders have not enough in-depth understanding of Lean, the company needs to impart knowledge, information of Lean benefits and to consolidate leaders' confidence in Lean. This suggestion is also supported by Leonard (2007), leaders need to have an understanding of Lean and to bring experience to the organization in the Lean methodology, or to undergo training in Lean methods to begin the Lean project.

Leaders should hire consultants when

implementing Lean projects. The consultant will visit and survey and assess the current status of the company. Then, leaders will set the goal of implementing the Lean project at a certain time under the advice of experts.

The involvement of the leadership and the ability to empower employees are noted as the major role of leadership in implementing Lean project. Senior managers must participate in Lean projects to express their interests in the Lean implementation and simultaneously notify the changes to employees in the organization.

The commitment of the leadership is also an important prerequisite to successfully implement Lean projects. A Lean implementation is activity in the long term; therefore, the leader must be very committed to Lean deployment. In the early stages of implementing Lean projects, there may be huge opposition at all levels, leaders must remove opposition and ambiguity and make people think the same direction. At the same time, leaders need to change employee's thoughts throughout the organization and promote the acceptance of change across the company. Besides, the company faces many difficulties in the phase of Lean implementation; once difficulty happens, leaders must absolutely commit to Lean project, do not stop at the midway. Lean is essentially a process of continuous small improvements if a company sets goals in a short term and completes that goal; then continues to set new goals and continue to implement them, and so constantly implement to lead successful Lean implementation. In addition, the top management must accept changes, advocacy for change; therefore, the company can have the ability to create great changes.

Table 2. Perspectives related leadership factor

<i>Perspective</i>	<i>Results</i>			
	<i>Literature review</i>	<i>In-depth interview</i>	<i>Case A</i>	<i>Case B</i>
Clearly understand leadership vision and strategic objectives of the company	<p>A clear and attractive vision of how companies should work, and the right development of policy / strategy can serve as the blueprint for any organization's success (Simões, 2008).</p> <p>It is also important to emphasize that successful vision can be translated into objectives and measurable targets (Ciarniene and Vienazindiene, 2012; Näslund, 2008).</p>	<p>It is necessary to understanding Lean carefully to define new destinations when implementing Lean and to orient toward the right goal.</p> <p>Understanding Lean helps to communicate Lean philosophy to the whole company. Company has to have long-term planning for Lean implementation.</p>	<p>Top management believes in Lean, and then Lean has been implemented well.</p>	<p>Leader must be certified Lean Champion level.</p> <p>Leader has experience and knowledge about Lean, thus they extensively understand the Lean.</p>
Leader's participation	<p>Leader's participation is the most important element in the Lean implementation (Larteb et al., 2015).</p> <p>Leaders should train one group who are responsible for implementing Lean, and receive all the support from the leadership (Kundu and Manohar, 2012; Skrudupaite and Jucevicius, 2011).</p>	<p>Leader participates in the Lean project, but not always be during Lean implementation.</p> <p>Leader should train and support a task force to implement Lean.</p>	<p>Leader takes part in most activities when implementing Lean.</p> <p>Leader motivates and monitors and regularly controls the progress of Lean project.</p> <p>The empowerment in the company is not well at all, many activities have been interfered by the top management.</p>	<p>The main role of leadership is to promote vision to employees.</p> <p>The main activities are performed by leaders.</p> <p>The empowerment is quite well in the company. If there are any missed something or need anything when implementing Lean, Lean team will solve by themselves.</p>
Leader's commitment	Commitment is the key factor in Lean implementation			
	<p>Commitment of leadership, top management should also work to generate interest in the Lean implementation and notification of changes to everyone in the organization (Larteb et al., 2015; Rose et al., 2014; Roslin and Shahadat, 2014).</p>	<p>Senior leaders must commit themselves to working in the Lean project for creating interests in the Lean implementation and notifying changes to everyone in the organization.</p>	<p>Leader is well committed to the Lean implementation project.</p> <p>Leader commits to facilitate Lean project, expand and improve the system application.</p>	<p>Leader has strong commitment in Lean implementation.</p> <p>Leader's commitment is an important factor to successfully implement Lean project.</p> <p>Leaders moderate in allocating resource, solving conflicts, and building the consensus.</p>

5.2. Communication at work

To implement Lean successfully, the following communication activities need to be taken: informing and communicating the vision of top management; establishing communication between employees, and between management and employees; establishing communication between the departments related to the value stream; building a management mechanism for receiving feedback from employees to the leadership and for process improvement (Table 3).

The role of the notification and communication of the leader’s vision is important because if employees’ thought changes, the Lean project will be implemented smoothly. When implementing Lean, the top management should state in the entire company that the company is implementing Lean project to pay more attention, more seriously in the Lean implementation and not hinder. Besides, the company should not be overly burdensome

exhorted the benefits of Lean implementation because even the original will not yield perfect results as expected; this will cause a huge resistance from employees.

The mechanism for receiving feedback from employees to top management and for process improvement should be noticeably constructed. A big mistake when the company only looks only at results without looking at the Lean implementation process. Therefore, building the communication among departments corresponding to the value stream is also quite important. Once a company has established value stream with the KPIs; if company correctly does right at the beginning, the next step will be right and the result will be correct. When setting up the information flow according to value stream, there are information and feedback from all levels where idea for improvements appears. The departments need to combine a variety of ways to interact and exchange information between people in the organization.

Table 3. Perspectives related communication factor

<i>Perspective</i>	<i>Results</i>			
	<i>Literature review</i>	<i>In-depth interview</i>	<i>Case A</i>	<i>Case B</i>
Informing and communicating the vision of top management	<p>Communicating expectations, emphasizing the need for fundamental changes to let people know what's ahead (Ciarniene and Vienazindiene, 2012; Kundu and Manohar, 2012; Kovacheva, 2010).</p> <p>Effective communication plays an important role for continuous improvement, maintenance and efficient initiatives (Kundu and Manohar, 2012; Kovacheva, 2010).</p> <p>Communication is essential in educating employees to accept change (Ciarniene and Vienazindiene, 2012).</p>	<p>Need company-wide communication.</p> <p>Leaders make the notices and communicate the vision.</p> <p>Should not shout more when making propaganda.</p>	<p>Should not shout more.</p>	<p>Often do not inform or exhort aggressively. When implementing Lean, leader makes notices one week prior in the company so that everyone knows that there is plan of Lean implementation</p>
			<p>Top management holds a large meeting, and then proceeds to implement Lean at company-wide.</p>	

Table 3. Perspectives related communication factor (continued)

<i>Perspective</i>	<i>Results</i>			
	<i>Literature review</i>	<i>In-depth interview</i>	<i>Case A</i>	<i>Case B</i>
Establishing communication between employees and between management and employees	Important (Punnakitikashem et al., 2013; Kundu and Manohar, 2012; Ciarniene and Vienazindiene, 2012)	Due to Lean project is implemented in whole company; the establishing communication system helps Lean implementation effectively	During Lean deployment, the functional departments involve and contact each other to obtain information and data, documents...	People in company exchange and share information sharing easily. The mutual cooperation between employees and managers is quite good. The company has a matrix organizational chart.
Establishing communication between the departments related to the value stream	Very important (Punnakitikashem et al., 2013; Kundu and Manohar, 2012)	Leader need to create comfort attitude for receiving the subordinates' feedback.	It is necessary to be exactly among information flows because production batch is damaged at all when there is bit information failed. At the end day of every day, the company plans inventory items left every stitch, and then plans tomorrow's production volume for each stage. When all products are produced, it is transferred to other orders.	Company communicates through manufacturing information system.
Building a management mechanism for receiving feedback from employees to the leadership and for process improvement.	Each new initiative should have a clear relationship to the mission and objectives (Punnakitikashem et al., 2013; Kundu and Manohar, 2012).	Leaders need to create convenience environment for the receiving the feedbacks from subordinates.	There is top-down management style in this company. Rarely have oppositions from subordinates.	Company owns opened organizational culture, thus feedback activities is done well. The company has a system to collect opinions from subordinates for process improvements.

5.3. Firm's financial capacity

The cost of management and training is extremely large. The encouraging of employees' self-directed learning is an approach to reduce funding for Lean training. The company can design Lean training programs for various levels and

internally assess the results of Lean training. The investment in infrastructure according to industry, but the company needs to prepare appropriate funding. According to the actual two case company studies, the issue of infrastructure investment is not a big issue because besides implementing Lean, the company also needs to invest machinery and

new equipment to compete on the market. In addition, funding for the reward is additional factors when implementing Lean, though forms of reward for encouraging employees

must be considered. The perspectives related firm's financial capacity are summarized in Table 4.

Table 4. Perspectives related firm's financial capacity factor

Perspective	Results			
	Literature review	In-depth interview	Case A	Case B
Funding for the reward	The importance of financial capability towards the success of Lean implementation can be considered based reward (Punnakitikashem et al., 2013).	It is not necessary; it is just additional factors to promote competition and improvements in the company.	It does not matter at the company. Only small incentives.	Does not matter, and not rewarded with cash incentives. Only rewarded with gifts and artifacts.
Funding for infrastructure investment	Important because of the need a large capital to deploy Lean (Punnakitikashem et al., 2013; Ciarniene and Vienazindiene; 2012; Coronado and Antoni, 2002)	So important; since many equipments and systems need to be equipped. The investment is not large, but necessary.	Normal. The investment in machinery is not so much; operation mainly bases on skilled workers.	Normal. Investing is not much impact on the successful implementation of Lean.
The training and materials	Important because it requires finance to maintain the culture in the company (Coronado and Antoni, 2002).	It is important for training direct employees to implement Lean.	Only few Lean training sessions for seniors are basically done. Many meetings, seminars on Lean propaganda for workers or lower level managers are usually organized.	Changing the mindset and human thinking is important to company implementing Lean; therefore, training is required, but in this company, training activities are not so much. Experts from the corporation train and share information to senior managers, but not so much. Then, leaders conduct training again for employees or workers to conduct training.
Funding for external consultants	Importantly, need external consultants (Ciarniene and Vienazindiene; 2012).	When implementing Lean, experts know that the Lean process design should be based on actual customer as compass to build model for pursuing Lean.	A consultant only provides a roadmap and advises the company, but the company fully implemented Lean. The budget for hiring consultants is not high.	Often leading major projects must be conducted by external consultants. Since the problems arise during the Lean implementation; it is necessary to have the support of consultants for deploying Lean continuously.

5.4. Employee’s skills and expertise

The perspectives related employee’s professional skill and knowledge are presented in Table 5. First, leaders need to understand Lean. The change of mindset mostly comes from the training and propaganda vision of the leader. Then, a company should establish Lean group, intensively train Lean deployment group and evaluate before and after the Lean implementation. Each project needs to identify goals towards working.

The concerned issue is the ability to perform and empower to employees. Empowerment will help companies achieve the many benefits. The leader only inspires to employees for implementing Lean and staff is empowered to self-determination. Traditionally, the decision must be approved by the top management; however, it will lead to slow and put tremendous pressure on the leader. Therefore, the ability to empower employees when implementing Lean needs to be paid the attention.

Besides, to get good results of Lean implementation, before deploying Lean, a

company needs to assess overall activities. Then, the company should set up one goal in a fixed time to implement Lean. At the end of the project, the evaluation is conducted, then Lean activities are continued and continued to improve constantly. Accordingly, the process of learning and awareness of employees is also important. When implementing Lean, the company must understand and cooperate to facilitate the Lean deployment and not having much opposition. The staff needs compulsory learning and takes the company's own certificate to save the cost of training and obtain the results as desired.

According to Simões (2008), for some organizations, they did a lot of training that never turned into action; whereas, other organizations allow employees to perform little or no training, so the necessary skills and knowledge to solve the problems when implementing Lean are not equipped. Therefore, the successful Lean transformation requires a deep understanding of the Lean principles and practical training at all levels.

Table 5. Perspectives related employee’s professional skill and knowledge

Perspective	Results			
	Literature review	In-depth interview	Case A	Case B
Training	The challenge is to choose a suitable plan for training and educating staff in order to apply Lean; organizations need to think about which skills and knowledge the individual needs (Asnan et al., 2014; Punnakitikashem et al., 2013; Ciarniene and Vienazindiene; 2012; Kundu and Manohar, 2012).	Training employees is a mandatory process.	Training employees from management level to workers is important. Management level is trained first, then workers level.	Training employees from management level to workers is important. Employee who directly implements Lean is required to learn about Lean. Workers have to learn at least 4 modules, the higher staff study at least 22 modules. KPI for Lean manager: number of Lean project, number of employees obtaining internal Lean certificate, Lean project saving (including hard saving and soft saving), training projects for departments.

Table 5. Perspectives related employee’s professional skill and knowledge (continued)

<i>Perspective</i>	<i>Results</i>			
	<i>Literature review</i>	<i>In-depth interview</i>	<i>Case A</i>	<i>Case B</i>
Training the management level and higher level.	Managers can develop their dynamic capabilities and thus be able to manage the changes in the company. The skills and knowledge gained from the training can also help them to effectively practice the concepts and use effective tools in the process of improvement (Asnan et al., 2014; Enoch, 2013).	Management training first, then to the workers, who are also important.	Company basically trains several Lean courses for senior management and the remaining levels periodically take internal training.	Often focusing on training Lean certification. When implementing Lean, leaders often have to know about Lean, support Lean deployment. However, the Lean deployment is crucially done by their subordinates.
Evaluate the effectiveness.	Measuring and evaluating the effectiveness are very important factors to ensure the success of Lean Implementation (Simões, 2008; Näslund, 2008)	Lean Assessment upon the company’s KPI measurements.	Need to assess Lean implementation periodically as 3 months/time, 6 months/time or 1 month/time to determine what achieved and what improved continuously. There are standard criteria for evaluating Lean performance.	Company has carried out reviews before and after implementing each Lean project.
Ability to implement, empower employees when implementing Lean.	Important. There should have a team to deploy Lean (Roslin and Shahadat, 2014; Punnakitikashem et al., 2013; Skrudupaite and Jucevicius, 2011; Kovacheva, 2010; Ferdousi and Ahmed, 2009).	Need to have a group to deploy Lean.	The empowering to employee is rarely. Often the director wants to implement Lean is to perform. Workers must follow, the implementation needs to be done right, and no one is opposed.	Company empowers quite good, the DMAIC team projects often deploy without informing to the highest leadership due to many projects are held by year.
The process of learning, awareness of staff	Important as staff learn and absorb Lean knowledge, then they will deploy Lean successfully (Roslin and Shahadat, 2014; Punnakitikashem et al., 2013; Skrudupaite and Jucevicius, 2011; Kovacheva, 2010; Ferdousi and Ahmed, 2009).	Should organize workshops on Lean to take the initiative, good intentions, or to exchange ideas between the different companies.	Often not very important; mainly leaders directly and promote workers to implement Lean. The amount of managers and supervisors in the factories are relatively more.	The change new thinking is important, learning is compulsory.

5.5. Organizational culture

The change of organizational culture towards continuous improvement is crucial. To change the organizational culture, the change of the human mindset through advocacy, training, learning and the acquisition of all levels need to be considered properly. A company should organize meetings between the management and senior levels. Then, leaders inform the whole company, but

should not be excessive shouting. At the same time, the company needs to build a culture of openness and collaboration across the company. Above all, the leadership needed to strongly change the whole organizational culture and mindset from top management to senior workers in order to maintain successful Lean implementation and continuous improvements in the entire company (Table 6).

Table 6. Perspectives related organizational culture factor

Perspective	Results			
	Literature review	In-depth interview	Case A	Case B
Openness and collaboration	Departments need to combine a variety of ways to interact and exchange information between people from different departments, to engage everyone in the organization (Asnan et al., 2014; Kundu and Manohar, 2012).	An open and collaborative working environment will help company implement Lean project smoothly.	The departments are linked more together through deploying Lean in the whole company.	Company has open minded culture among levels and between workers and senior management; therefore the Lean implementation is facilitated.
Coordination	Require a major change in an organization's structure, policies, processes and the way employees use to work and interact (Asnan et al., 2014; Ciarniene and Vienazindiene, 2012; Kundu and Manohar, 2012).	Important.	The cooperation between departments is not so good, difficult to share between departments. However, the cooperation between departments after implementing Lean is better than before.	The activities in the company are organized as teamwork; therefore, the high cooperation is required.
Receptive ability	Changing mindsets will help absorb Lean well (Punnakitikashem et al., 2013; Kundu and Manohar, 2012; Kovacheva, 2010).	The absorbing Lean thinking is important and depends on staff's receptive capacity.	The linkage is not high; data sharing is not good, often through top-down management. Company concerns about data security.	The implementing Lean needs to be learned and absorbed.
Data/ Information sharing	Departments need to combine a various ways to share and exchange information each other (Asnan et al., 2014; Kundu and Manohar, 2012; Kovacheva; 2010; Punnakitikashem et al., 2013; Coronado and Antoni, 2002)	The share is quite difficult, so businesses need to be wary. Besides, the culture of conservative, afraid to change, and loss of benefits exists in Vietnam businesses.	The acquisition of new knowledge into the company is carried more imposing than voluntary. The company has always carried out propaganda for implementing Lean at company-wide and forced to perform Lean.	Data sharing is not required so much among employees, due to the important data is reported to leaders and managers and is stored at departments of company. It is easy to access data if required.

Table 6. Perspectives related organizational culture factor (continued)

Perspective	Results			
	Literature review	In-depth interview	Case A	Case B
Continuous improvements	Not mentioned well	Lean implementation needs continuous improvements.	Continuous improvement activities are done upon groups to reduce cost. Lean workshops aim at promoting the good ideas and exchanged opinions among different companies.	Company builds the organizational mindset of continuous improvement.

5.6. Customer

Maintaining relationships with customers needs to be paid the attention (Table 7). Quality requirements and delivery time are also very important. When implementing Lean at a factory never having any experience of Lean practices, meeting the customer needs becomes critical. Customers are considered as direction to build models for meeting customer needs better. The identifying customer requirements (e.g.,

design, price, quality and shorter delivery time ...) are the major target so that company focuses on changing directions when implementing Lean. It is important that organizations should adopt a detailed plan based on the appropriate strategy and clear methodology. In addition, to ensure the long term business relationship with the customer, the companies have to prove that the product quality of the company is always equal to or better than other companies in the industry.

Table 7. Perspectives related customer factor

Perspective	Results			
	Literature review	In-depth interview	Case A	Case B
Customer	Satisfying customers is very important to maintain in a competitive environment (Hibadullah et al., 2014; Rose et al., 2014; Asnan et al., 2014)	To deploy Lean manufacturing, it is necessary to define customers as a direction for Lean deployment.	Company makes a strategic production plan to meet all customers' orders. Accordingly, the company schedules production plan daily.	The customer's need is important. An internal supply chain is formed in the company.

5.6. Supplier management

When implementing Lean, a company needs to establish clear communications with suppliers and to innovate manufacturing activities of vendors to suit the requirements of the plant. When producing under Lean manufacturing, pull manufacturing, supplier needs to change small amounts in delivery, regular delivery instead delivered in bulk

and long time. Activities linked with the supplier based on the customer order. Changing a chain in value chain relates to distribution activities of suppliers which help to reduce inventory and produce upon customer requirements. Therefore, in order to ensure the quality, delivery schedules according to customer requirements, the company needs to create links in the supply chain when implementing Lean (Table 8).

Table 8. Perspectives related supplier management factor

Perspective	Results			
	Literature review	In-depth interview	Case A	Case B
Supplier management	Coordinating closely with suppliers helps to manage and control the use of suppliers in the production process (Hibadullah et al., 2014; Simões, 2008; Coronado and Antoni, 2002).	When implementing Lean, the supplier has to change quantity and number of delivery times according to pull system. Activities associated with supplier on-demand of customer orders are required. It is necessary to link supply chains when implementing Lean.	Company A has many local suppliers, thus coordination with suppliers is flexible and convenient.	The quantity, quality, assurance, guarantee response time from suppliers are quite important.

6. Conclusions

As the results, this study explores the critical factors affecting successful Lean implementation, such as: leadership, communication, skills and expertise, financial capacity, organizational culture, customer and supplier management. The manufacturing companies in Vietnam can be achieved Lean implementation successfully and efficiently if they take the interests and invest the appropriate resources for the above key issues.

Moreover, this study provides the helpful suggestions for companies in Vietnam of which factors facilitate the successful Lean Manufacturing implementation; so that business managers, especially Vietnamese managers, orienting toward utilizing resource on core activities to efficiently

achieve Lean Manufacturing implementation.

Overall, this study conducts at only the manufacturing industry; lacks of links with other industries such as civil, service... The results in this study may have management implications for the manufacturing industry only. Beside, this study only explores the critical factors affecting successful Lean implementation by qualitative research techniques which helps to find out the insight in the research context; though these approaches in this study still exist limitations of generating the results. Therefore, on the basis of these results, this study also calls further studies developing other approaches, both qualitative and quantitative in order to provide more invaluable approaches in successful Lean implementation for manufacturing companies in Vietnam.

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