THE PERCEIVED EFFECT OF LEAN MANUFACTURING ON THAI GARMENT SHOP FLOOR WORKERS AND HOW TO SUSTAIN THE LEAN CULTURE

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A THEMATIC PAPER SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF MANAGEMENT
COLLEGE OF MANAGEMENT
MAHIDOL UNIVERSITY
2015

Thematic paper
entitled

THE PERCEIVED EFFECT OF LEAN MANUFACTURING ON THAI GARMENT SHOP FLOOR WORKERS AND HOW TO SUSTAIN THE LEAN CULTURE

was submitted to the College of Management, Mahidol University
for the degree of Master of Management
on
December 13, 2015

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ACKNOWLEDGEMENTS

I would like to express my gratitude towards my adviser, Asst. Prof. Nareerat Taechapiroontong, Ph.D., who provides guidance and support throughout the course of my thematic paper studies. I would like to thank Asst. Prof. Prattana Punnakitikashem, Ph.D., who is also researching in the Lean manufacturing field, particularly, those applicable in the Health Care sector, for her useful insights and expertise.

This paper would not have been completed without the unparalleled support from the staffs of Hi-Tech Apparel Co., Ltd, a Thai garment manufacturing firm, who has been practicing Lean manufacturing extensively for several years, and allows the data collection from the shop floor workers for the purpose of this study.

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ABSTRACT

This paper provides basic Lean knowledge in an easy to digest manner and illustrates some ideas for and against Lean manufacturing in various context and culture. The paper shows bottom-up approach of understanding Lean manufacturing via the case study of a Thai garment manufacturer based on the perceptions of the shop floor workers as supposed to the management's. Lean understanding of the shop floor operators were assessed to determine the successfulness of Lean implantation in any organization and to provide some of enablers that would lead to sustainable Lean implementation.

KEY WORDS: Lean/ TPS/ Manufacturing/ Garment/ Thailand

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CHAPTER I
INTRODUCTION

1.1 Origin of Lean

"An integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer, and internal variability," was the academic literation that describes Lean manufacturing (Shah and Ward, 2007).

To understand more about Lean manufacturing, we have to understand its roots, which were originated by the Toyota group, from Japan. Taiichi Ohno, changed the world of manufacturing by writing manuals of the Toyota Production System (TPS) and shared it with the rest of the world (Ohno, 1988). What was significant about it was that at the time, the Ford mass production assembly line was thought to be the best production method for the automotive industry, but later Ford lost out to a Japanese automobile maker in terms of competitiveness, whom eventually gained significant share of the US market for automobile, Toyota.

TPS, later coined as Lean by the 1990s (Womack, 1990) is what describes the innovative system that is proven to be successful inside and outside of Japan, in terms of improving delivery time, quality and cost of any organization. Lean is more like a 'LEARNING' process, which is always revolving and can be passed on to others, especially by those titled 'sensei' or teacher in Japanese language. Senseis drive for the proliferation of the Lean Culture and promote systematic thinking; especially, the root cause analysis, by encouraging the employees in the organization to become more proactive and involved, rather than just showing the solutions to the incumbent problems.

What molded TPS or Lean was the unique circumstances present in Japan at the time of the origin of Toyota corporations. Started out as a family business in the textile looming industries, employees of Toyota were led by leaders who were respectful, responsible, had continuous improvement (kaizen) mindsets, and

guaranteed life-time employment of their employees even during the troughs of the economic cycles.

1.2 Characteristics of Lean

Lean can be categorized as a systematic way of thinking that identifies the agent(s) that create the values (profits) for the company, improve them, and eliminates the deterrent of success – the wastes. The "Muda" or wastes can be classified into 7 types; overproduction, waiting, unnecessary transport, over-processing, excess inventory, motion, and defect. Lean also takes into account the production smoothing by eliminating the uneven workloads or "Mura". In addition, the overburdens of unneeded task-related activities or "Muri" must be prevented as well as Muri can lead to the creation of other forms of waste.

In essence, there are four main focuses that Lean practitioners need to take into consideration as the foundation of Lean implementation – Long-Term Orientation, Process-oriented, People/Team Development, and Root-cause analysis and Learning mindsets.

First, it is crucial that the firm must think about sustainability rather than short-term gains. Policies that could lead to a one-time windfall gain or policies aimed to get short-term market dominance should be avoided. Like Toyota, firms should not be afraid to invest for the betterment of the future such as what Toyota did to develop their fuel efficient engines.

Lean uses several tools in for improving the production systems such as the famous Just-in-time (JIT) methodology – "call only what are needed at the time they are needed, to eliminate the work-in-process (WIP)", Heijunka or production leveling or the use of 5S; Seiri, Seiton, Seisou, Seiketsu, and Shitsuke, the foundation of realizing the value-added and non-value-added components of the firm, Jidouka or Autonomation (auto-pause when defects occur), to only retain what creates values for the companies in the value-stream of production. With the right implementation, Lean would forge the right process to ensure the best possible quality, lead-time reduction and cost savings for any firm.

Third, Lean puts a lot of emphasis on training and development of the people, both in terms of individual performances and team performance, which involves Techniques such PDCA (Plan-Do-Think-Act) mentality, Ishikawa Fishbone (Root-Cause) Analysis, 5x5 analysis etc. All these techniques helped shape the culture that practice continuous improvement (kaizen) with positive mentality to drive the company towards its sustainability.

1.3 Research question

From its foundation, Lean manufacturing should lead to increase in performance of the firms. However, in several observations the implementation effects differ in various cultures, some receive positive outcomes, some receive worse than expected outcomes.

This paper aims to answer the question whether Lean manufacturing is a viable option to create a sustainable organization or not. What are the potential enablers and disablers that exacerbate or deteriorate the progress of Lean implementations, and what are the recommendations that firms should keep in mind prior to the implementation. This research uses the data from a Thai garment manufacturer, thereby, reflecting more about Thai culture and the recommendations for Thailand based manufacturers, who want to make sustainable Lean implementation.

CHAPTER II
LITERATURE REVIEW

This Chapter discusses the consequences of the implementation of Lean manufacturing systems based on previous researches in different regions. Further, the fundamentals involved in the implementation of Lean are examined, in order to investigate the possibilities for the present study to explore, including the prepositions this paper aims to evaluate.

2.1 Consequences of Lean Manufacturing

Global industries have changed drastically after the introduction of the Toyota Production System (TPS) or what more commonly known as the Lean Manufacturing system by Taiichi Ohno (Ohno, 1988). Earlier researches have pointed out that there are both positive and negative consequences of Lean implementation (Rodriguez, Buyens, Landeghem, & Lasio, 2015) such as the deterrent effect of multi-skill job autonomy, participation, and commitment (Parker, 2003), deterioration of Lean implementation in the longer run (Videla, 2006) or stress (Shah & Ward, 2007). This section aims to elaborate on the potential gains and losses to the firms employing Lean practices by investigating on the findings of the impact of Lean implementation on different cultures.

2.1.1 The positives

One facet of Lean, the Just-in-time (JIT) has found to be positively correlated with firm performance. In Mexican culture, JIT gives rise to better performance in terms of product, quality, lead time, and customer satisfaction, particularly in the job shops manufacturing nature industries (Lawrence & Hottenstein, 1995). In this connection, the management by process or the unit / modular performance in Swedish firm yields better learning and flexibility for the workers,

given that the firm knows how to focus on manufacturing i.e. throughput for repetitive processes and quality for complex products (Toni & Tonchia, 1996). Ghosh (2013) found that in India, the 80% of the 400 firm respondents adopt some dimension of Lean manufacturing, which gives rise to better operational performance and that key drivers of lean implementation are – first-pass correct output, reduced manufacturing lead time, and increased productivity. Suwadi, Wee & Yang (2013), also shows empirical evidence that Indonesian garment SMEs that adopt lean-agile operations and partnership strategies have better performances.

Lean manufacturing could also be used as a measurement of the competitiveness of the firm. Perez & Sanchez (2001) suggested 36 lean indicators, which could be classified into 6 categories – elimination of zero-value activities, continuous improvement, team work, JIT production and delivery, suppliers' integration, and flexible information system, to measure the impact on Quality, Cost, Lead time, and Flexibility. Shah & Ward (2003) proposes the more commonly used 4 indicator 'bundles' – JIT (Just-in-time), TQM (Total Quality Management), TPM (Total Preventive Maintenance), and HRM (Human Resource Management) by using the US *IndustryWeek* magazine's data to measure 22 key lean implementation practices such as production smoothing, cellular manufacturing, quick changeover etc. Matsui (2007) provides an empirical evidence of how the JIT or Lean indicators could be used to measure the competitiveness of 46 Japanese manufacturing plants, and found that efficient equipment layout contributes greatly to the competitiveness of the manufacturing plant.

Shah & Ward (2003) also found positive correlations between the contextual factor of the US plants; namely, plant size, plant age, and the presence of unionization with the operation performance. Plant size is found to be the significant factor that contributes to the successful implementation of Lean practices, which in turn leads to operational excellence.

2.1.2 The Negatives: Case of Mexico

Videla (2006) provides concrete evidence and elaborated the stages of how the lean implementation in Mexico was not sustainable leading to adverse consequences of lean manufacturing. Videla used the term 'community of fate'

describing the situation in the disclosed Mexican factory adopting lean manufacturing, which failed horribly several years after its implementation. The factory was unionized, which is common for the industry, but a strong degree of discrimination against women were present.

Initially, the lean implementation gave rise to increase in productivity in the same manner as the proponent of the lean manufacturing would argue. However, periods after its implementation, the work pace started to accelerate into abnormal rate and perceived workplace satisfaction were lowered. The case described the situation of 'surveillance augmentation' meaning that people start to doubt one another as later on the company had to fight with dissatisfied workers who were likely to participate in riots or stop working or start any commotion, company 'spies' were abundant. Personal incentives were used at the cutting table, which was predominantly men, and group incentives were used elsewhere, which received lower payment and were predominantly women. Male received better promotion opportunities than female workers.

After five years of lean implementation, the results were alarming. People started rioting as the benefits to the stakeholders of the firm were unbalanced. Absenteeism was prevalent to the extent that the company had to call for riot police as workers attempted several riots. The company that once was stable and profitable became like a war zone because of poorly planned lean implementation systems.

2.2 Implementing Lean

Many of the earlier researches' main focus are not on the HR aspect of the Lean implementation from the stand-point of shop floor workers or how to make it sustainable, as Lean is not a static process but rather a revolving process that needs to be continuously improved. Dun & Wilderom (2012), start the focus on shop floor workers, behaviors and team formation were thought to be the foundation of good lean implementation approach. The paper used the term human dynamics to represent the multi-dimensional involvement of the people in the Lean process. Lean enablers are coined to describe the effective Lean team that could lead to the proliferation of Lean implementation throughout the firm by creating the Lean Culture. Dun & Wilderom

(2012) used 3 aspects of human dynamics – Affective, Behavioral, and Cognitive to identify potential Lean enablers. Affective trait relates to motivation and conflict management, Behavioral trait described people who are resilient to changes, performance and innovation, and Cognitive referred to those who relate to task, goals, or organization commitments.

Hasle (2014) proposes a structured employee-supportive Lean practice model which identified three aspects related to the implementation of Lean – Social capital, Change management, and Psycho-social factors. To minimize the drawbacks of the Lean implementation, a firm should take into consideration of the context of the people, how to bring about and sustain change, and the psychology behind the successful implementation of the system e.g. empowerment or relationship between implementers and the employees. Rodriguez, Buyens, Landeghem, & Lasio (2015) found that lean production combined with human resource practices positively affects perceived job autonomy, job satisfaction, and operational performance using Ecuadorian high-school students' make-to-order factory simulation game. They also found that job autonomy is positively correlated with job satisfaction, and that job satisfaction is positively correlated with operational performance.

2.3 Research Framework

The majority of previous researches either focus on the measurable consequences of Lean implementation e.g. productivity, waste reduction, delivery etc. by using lean indicators as a mean to measure the successfulness or the competitiveness of the firms or how to implement a sustaining Lean systems. However, these researches are more of top-down or management or owner's points of views and evidence from the bottom-up or from the shop floor workers are quite limited; especially, for the case of Thailand.

Preposition 1: *Should existing shop floor workers know the root-cause of why the company made Lean changes, they would be more committed, leading to sustainable manufacturing.*

This research would like to find out whether the current garment shop floor workers know the reasoning behind the Lean methodologies used in the factories or not. Should the shop floor workers realize these facts and how the changes benefit them, this would create a more committed workforce, leading to sustainability in terms of low turnovers. This would be mainly measured via the use of questionnaire.

Preposition 2: *The attitude of the workers-in-training towards Lean characteristics of the firm at the beginning of the training phase is the key towards employee commitment to the firm.*

Another intriguing observation that should be studied is the perception or the attitude of the workers-in-training, since the first impression of these workers would play a pivotal role in shaping their culture or work 'DNA' to blend in with the organization of their choice. Qualitative interview will be used to evaluate this *Preposition*.

CHAPTER III
METHODOLOGY

The following Chapter describes the data collection method, the reasoning behind the chosen company and the characteristics of the data collection tools used in the research. The basis for tool selection as well as the theoretical supports for choosing such tool is also discussed here.

3.1 Data Collection

The selected company for this research is Hi-Tech Apparel Co., Ltd (HIT), a Thai garment manufacturer with more than 24 years of experience of operation in Thailand. HIT has been practicing Lean since 2008 in Thailand (almost 7 years at the time of research), and has agreed to allow the writer to conduct a study group with some of the shop floor workers for the purpose of this research.

The research would gather the information from the shop floor workers, which are classified into 2 sub-groups; the *veterans* (more than 2 years of working experience with the company, and the *new recruits* (less than 1 year working experience with HIT). The aim was to collect at least 50 veterans' samples and 50 new recruits' samples from questionnaires, and 5 veterans and 5 new recruits' interviews. The same set of questionnaire was used for both sub-groups.

The characteristics of the questions used were based on Cresswell (Cresswell, 2013)'s frameworks of the qualitative research. The questions were clearly written, easy to understand so the interviewees were not afraid of the interviewer. Negative, lengthy and multiple questions were avoided, and the questions were suitable for all audience. The interview and questionnaire were used to rule out the single-source information bias. The questions were designed based on the mixture of both inductive and deductive reasoning to assess some of the relevant aspects of the research the root-cause analysis. The interview / questionnaire were conducted on a

natural setting where the interviewees felt comfortable with; hence they were not pressured when filling out the questionnaire forms so the results were not distorted.

3.2 Questionnaires

The questionnaire will be divided into 2 parts – general information and the Lean-related questions. In the first part, the aim is to get some background information of the worker, and the relatedness to the organization. Some of the factors that might be related to work such as years of service, work experience and time spent travelling to and from home will be taken into consideration. The first section builds the foundation for the preposition proposed earlier, whether the commitment of the workers are correlated with the comprehension of Lean manufacturing or not.

The second part of the questionnaire was designed to assess the understanding of the Lean concept of the shop floor workers; it is divided into 3 sections. The first section asks about the Lean background of the shop floor workers as the prerequisite whether the result of a particular respondent should be included into the eligible respondent pool or not (Question 1 - 4). Also, it qualitatively asks about the Lean changes and the root cause analysis (Question 5 –9). Questions 10 – 19 will be related to the understanding of Lean concept in general.

3.3 Interviews

The interview questions were designed to use the qualitative interrogation to reflect the shop floor workers perspective towards the Lean manufacturing practice currently in placed by HIT, for both the *veterans* and the *workers-in-training*. The same set of interview questions were used for both set of interviewees, and the interviews were conduct in a stress-free environment, and the interviewees were kept of their anonymities (voice recording used for the purpose of transcription).

The interview questions were based on the Emic approach as defined by Helfrich (1999). Emic approach is the internal assessment of the culture from the viewpoint of the people in the culture themselves. Emic takes into account the culture-specific meaning of tasks, according to the interpretation of individuals pertained in

the group, as defined by their prior experience and background. Helfrich (1999) proposed the model ‘Triarchic Resonance’, suggesting the three factors influencing the cultural depictions; individual, task, and the culture itself. The viewpoint could also be classified into 3 perspectives – Microgenetic, Ontogenetic, and Cultural-genetic. The Microgenetic focuses when the task is imposed until some measurable performance is achieved. The Ontogenetic considers individual experience both in terms of quantity and quality. The Cultural-genetic views the culture as both a product and a process in itself i.e. what people do defines the culture, vice versa.

CHAPTER IV
ANALYSIS AND DISCUSSION

This chapter discusses and summarizes the results of this research and is divided into 3 subsections based on the findings – 4.1 Lean Proliferation contributes to sustainability, 4.2 To what degree of Lean knowledge effectively build sustainability, and 4.3 EMIT view of the corporate by new and existing workers. 4.1 and 4.2 is derived from the quantitative method and 4.3 from qualitative method.

Out of the 433 questionnaires distributed, 414 (95.6%) were taken into consideration for the data analysis, 175 of which are workers-in-training (0 – 2 years of service) and 239 are veterans. The remaining 19 questionnaires were not included as they were not at least 50% filled out. The writer received 3 complaints that the questions were too difficult to understand, but this factor was negligible as it only accounted for 0.69% of the total respondent pool.

The qualitative part of the questionnaire was 26.4% completed on average (of all available questions). 220 people (53.1%) filled in the positive impacts from Lean, 68 people (16.4%) filled in the negative consequences from Lean, and 54 people (13.0%) suggested further improvements for the company.

4.1 Lean Proliferation contributes to sustainability

In *Preposition 1*, the presumption was that Lean reasoning might be one of the contributors to sustainable Lean implementation. In this sense, the writer compared the scores in the second part of the interview (Q10-Q19), as a measurement of Lean understanding, between the populations of the study, 414 garment shop floor workers.

The score was divided into 4 categories; High Pass (8-10), Moderate Pass (6-7), Just Pass (5), and Fail (0-4). Out of the 414 workers, 377 people (91.06%) passes and 37 (8.94%) fails. 61 people (14.73%) achieves High Pass, 225 (54.35%) Moderate Pass and 91 (21.98%) Just Pass. This strongly reinforced *Preposition 1* as

more than 91.06% of the people knew about Lean manufacturing, which might help explained why HIT has been successful in maintaining Lean implementation.

One of the intriguing results was that there seems to be statistically insignificant slight positive correlation between the service years of the shop floor workers and the amount of score they receive, using Pearson Bivariate Correlations analysis, This suggested that long service years do not guarantee the degree of Lean understanding of the shop floor workers, or it does not always move in the same directions. The Pearson Correlation coefficient between service year and score attained was at +0.076, with the significance level (2-tailed) of 0.121.

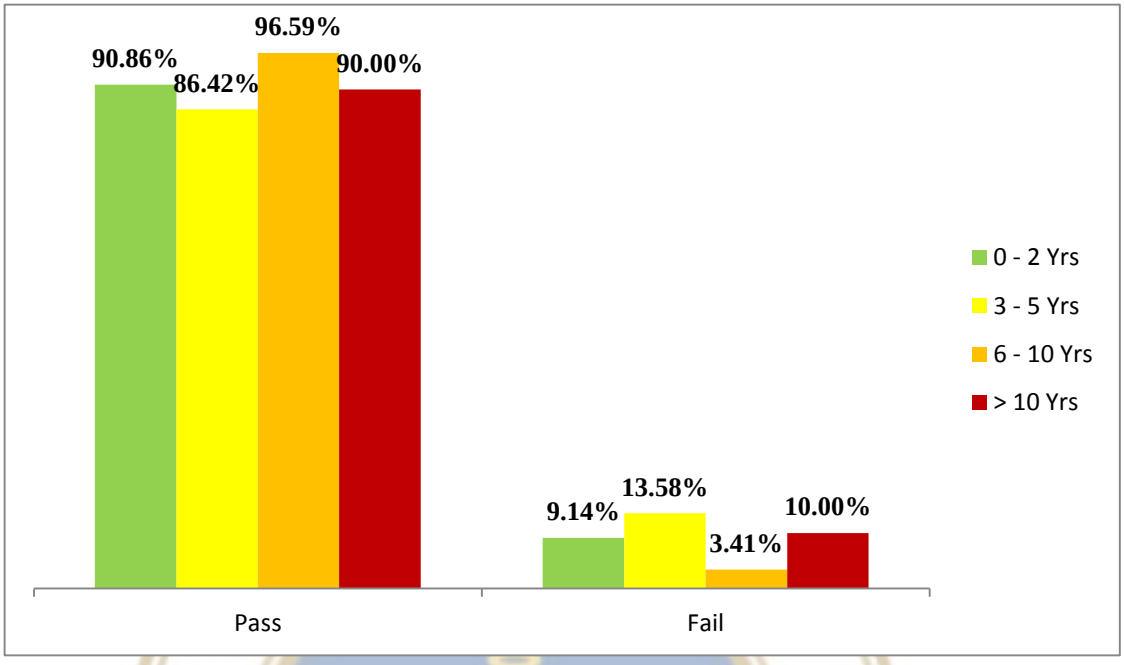
Table 4.1 Pearson Correlation Table for Service Years and Lean Score

Correlations

		Serv_Yr	Score
Serv_Yr	Pearson Correlation	1	.076
	Sig. (2-tailed)		.121
	N	414	414
Score	Pearson Correlation	.076	1
	Sig. (2-tailed)	.121	
	N	414	414

Table 4.2 summarizes the proportion of the shop floor workers passing the Lean test score (scored more than 5 out of 10). This showed that the majority of shop floor workers had some Lean understanding and that service years with the company could not imply about the degree of Lean understanding, which is the same results as we obtained using the Pearson Correlation model.

Figure 4.1 Percentage of workers passing Lean test by service year



To test out *Preposition 2*, the data of the workers-in-training (0 – 2 years of service) was considered, to test their knowledge and attitude towards Lean manufacturing. Out of 414 samples, 175 were workers-in-training (0 – 2 years of service). There were 159 people who passes the test (90.86%), 25 people (14.29%) achieved High Pass, 90 (51.43%) Moderate Pass and 44 (25.14%) Just Pass. The data indicates that the mindset of the workers-in-training towards Lean manufacturing is a positive one, which might be one of the factors contributing to the low job turnover rate for HIT.

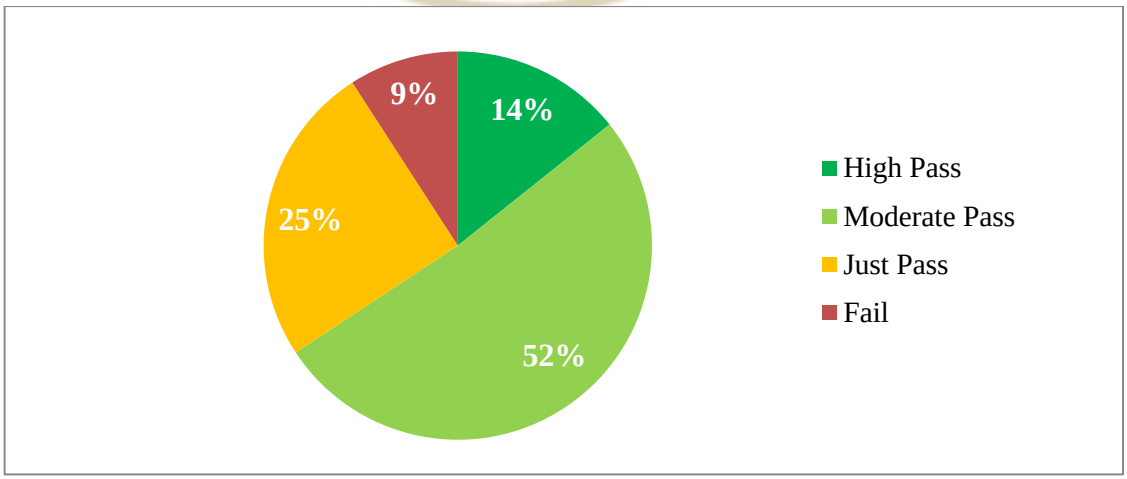


Figure 4.2 Lean scores results of Workers-in-training

4.2 To what degree of Lean knowledge effectively build sustainability

The questions in the questionnaire asked about 10 aspects of Lean manufacturing by using indirect method with the combination of inductive and deductive reasoning The summary of the questions is as follows;

Table 4.2 Summary of Lean questions and percentage of Correct Answers

Question	Topic	% of Correct Answers
10	Kaizen	34.06
11	Process	27.54
12	Value VS Non-Value	82.37
13	Self QC	41.06
14	Work-in-process (WIP)	65.94
15	Quality	86.96
16	Visual Management	91.79
17	Waste	82.85
18	Takt/Cycle Time	91.06
19	Root-cause Analysis	16.18

The results were quite clear, a Lean entity needed to create a sound background of many aspects of Lean, to proliferate and create a Lean culture. They should start with the ones closely related to the stakeholders first, to create positive mindsets for the operators, then to the more complicated aspects.

Next, the qualitative section of the questionnaire aimed to assess the root-cause analysis of the shop floor workers, which is one of the core principles of Lean but the shop floor workers seemed to have a relatively low score. This was done by asking the ordinals of the positive and adverse consequences of Lean implementation and the rationale the shop floor workers think behind such implementations.

For the positive consequences, the top 5 most common answers were; fewer defect (109), fewer WIP (90), problem raising (74), faster output (42), and systematic work (25). From the answers, only 2 were the root cause behind such

implementation, faster output and fewer defects. As for the negative consequences, most of the shop floor workers mentioned about the consequences not their causes. The top 5 most common answers were; waiting for parts (15), missing parts (14), complicated systems (10), no connectivity (8), and late andon fix (7), whereas, the cause would be error in defect detection or lack manpower to respond to andon calls.

The following part assessed the significant between getting each aspect of the Lean questions right and the effect on the scores each shop workers got, by using the Pearson Chi-Square Crosstab analysis.

Table 4.3 Crosstab between getting Question 10 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q10_C	NO	Count	32	241	273
		% within Q10_C	11.7%	88.3%	100.0%
		% within Pass	86.5%	63.9%	65.9%
		% of Total	7.7%	58.2%	65.9%
	YES	Count	5	136	141
		% within Q10_C	3.5%	96.5%	100.0%
		% within Pass	13.5%	36.1%	34.1%
		% of Total	1.2%	32.9%	34.1%
Total		Count	37	377	414
		% within Q10_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.636[a]	1	.006		
Continuity Correction[b]	6.665	1	.010		
Likelihood Ratio	8.790	1	.003		
Fisher's Exact Test				.006	.003
N of Valid Cases	414				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.60.

b. Computed only for a 2x2 table

From the above, we see that there is a significant association between understanding Kaizen, the continuous improvement aspect of Lean, and a better overall lean understanding as the Pearson Chi-Square Significance is 0.006.

Table 4.4 Crosstab between getting Question 11 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q11_C	NO	Count	34	266	300
		% within Q11_C	11.3%	88.7%	100.0%
		% within Pass	91.9%	70.6%	72.5%
		% of Total	8.2%	64.3%	72.5%
	YES	Count	3	111	114
		% within Q11_C	2.6%	97.4%	100.0%
		% within Pass	8.1%	29.4%	27.5%
		% of Total	0.7%	26.8%	27.5%
Total		Count	37	377	414
		% within Q11_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.686[a]	1	.006		
Continuity Correction[b]	6.654	1	.010		
Likelihood Ratio	9.493	1	.002		
Fisher's Exact Test				.004	.003
N of Valid Cases	414				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.19.

b. Computed only for a 2x2 table

From the above, we see that there is a significant association between understanding the Lean focus on ‘process’ and a better overall lean understanding as the Pearson Chi-Square Significance is 0.006.

Table 4.5 Crosstab between getting Question 12 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q12_C	NO	Count	15	58	73
		% within Q12_C	20.5%	79.5%	100.0%
		% within Pass	40.5%	15.4%	17.6%
		% of Total	3.6%	14.0%	17.6%
	YES	Count	22	319	341
		% within Q12_C	6.5%	93.5%	100.0%
		% within Pass	59.5%	84.6%	82.4%
		% of Total	5.3%	77.1%	82.4%
Total		Count	37	377	414
		% within Q12_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14.681[a]	1	.000		
Continuity Correction[b]	13.000	1	.000		
Likelihood Ratio	11.996	1	.001		
Fisher's Exact Test				.000	.000
N of Valid Cases	414				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.52.

b. Computed only for a 2x2 table

From the above, we see that there is a very significant association between understanding the idea of Value-added and Non-value-added and a better overall lean understanding as the Pearson Chi-Square Significance is 0.000.

Table 4.6 Crosstab between getting Question 13 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q13_C	NO	Count	31	213	244
		% within Q13_C	12.7%	87.3%	100.0%
		% within Pass	83.8%	56.5%	58.9%
		% of Total	7.5%	51.4%	58.9%
	YES	Count	6	164	170
		% within Q13_C	3.5%	96.5%	100.0%
		% within Pass	16.2%	43.5%	41.1%
		% of Total	1.4%	39.6%	41.1%
Total		Count	37	377	414
		% within Q13_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.365[a]	1	.001		
Continuity Correction[b]	9.268	1	.002		
Likelihood Ratio	11.582	1	.001		
Fisher's Exact Test				.001	.001
N of Valid Cases	414				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.19.

b. Computed only for a 2x2 table

From the above, we see that there is a very significant association between realizing the importance of Self QC (as supposed to relying on external QC) and a better overall lean understanding as the Pearson Chi-Square Significance is 0.001.

Table 4.7 Crosstab between getting Question 14 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q14_C	NO	Count	25	116	141
		% within Q14_C	17.7%	82.3%	100.0%
		% within Pass	67.6%	30.8%	34.1%
		% of Total	6.0%	28.0%	34.1%
	YES	Count	12	261	273
		% within Q14_C	4.4%	95.6%	100.0%
		% within Pass	32.4%	69.2%	65.9%
		% of Total	2.9%	63.0%	65.9%
Total		Count	37	377	414
		% within Q14_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20.315[a]	1	.000		
Continuity Correction[b]	18.710	1	.000		
Likelihood Ratio	19.068	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	414				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.60.

b. Computed only for a 2x2 table

From the above, we see that there is a very significant association between understanding the management of WIP (work-in-process) and a better overall lean understanding as the Pearson Chi-Square Significance is 0.000.

Table 4.8 Crosstab between getting Question 15 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q15_C	NO	Count	20	34	54
		% within Q15_C	37.0%	63.0%	100.0%
		% within Pass	54.1%	9.0%	13.0%
		% of Total	4.8%	8.2%	13.0%
	YES	Count	17	343	360
		% within Q15_C	4.7%	95.3%	100.0%
		% within Pass	45.9%	91.0%	87.0%
		% of Total	4.1%	82.9%	87.0%
Total		Count	37	377	414
		% within Q15_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	60.250[a]	1	.000		
Continuity Correction[b]	56.345	1	.000		
Likelihood Ratio	41.125	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	414				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.83.

b. Computed only for a 2x2 table

From the above, we see that there is a very significant association between realizing the importance of Quality and a better overall lean understanding as the Pearson Chi-Square Significance is 0.000.

Table 4.9 Crosstab between getting Question 16 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q16_C	NO	Count	12	22	34
		% within Q16_C	35.3%	64.7%	100.0%
		% within Pass	32.4%	5.8%	8.2%
		% of Total	2.9%	5.3%	8.2%
	YES	Count	25	355	380
		% within Q16_C	6.6%	93.4%	100.0%
		% within Pass	67.6%	94.2%	91.8%
		% of Total	6.0%	85.7%	91.8%
Total		Count	37	377	414
		% within Q16_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	31.619[a]	1	.000		
Continuity Correction[b]	28.189	1	.000		
Likelihood Ratio	20.765	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	414				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.04.

b. Computed only for a 2x2 table

From the above, we see that there is a very significant association between understanding the use of Visual Management and a better overall lean understanding as the Pearson Chi-Square Significance is 0.000.

Table 4.10 Crosstab between getting Question 17 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q17_C	NO	Count	20	51	71
		% within Q17_C	28.2%	71.8%	100.0%
		% within Pass	54.1%	13.5%	17.1%
		% of Total	4.8%	12.3%	17.1%
	YES	Count	17	326	343
		% within Q17_C	5.0%	95.0%	100.0%
		% within Pass	45.9%	86.5%	82.9%
		% of Total	4.1%	78.7%	82.9%
Total		Count	37	377	414
		% within Q17_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	38.946[a]	1	.000		
Continuity Correction[b]	36.146	1	.000		
Likelihood Ratio	29.574	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	414				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.35.

b. Computed only for a 2x2 table

From the above, we see that there is a very significant association between understanding the concept of Waste (in terms of Lean) and a better overall lean understanding as the Pearson Chi-Square Significance is 0.000.

Table 4.11 Crosstab between getting Question 18 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q18_C	NO	Count	14	23	37
		% within Q18_C	37.8%	62.2%	100.0%
		% within Pass	37.8%	6.1%	8.9%
		% of Total	3.4%	5.6%	8.9%
	YES	Count	23	354	377
		% within Q18_C	6.1%	93.9%	100.0%
		% within Pass	62.2%	93.9%	91.1%
		% of Total	5.6%	85.5%	91.1%
Total		Count	37	377	414
		% within Q18_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	41.700[a]	1	.000		
Continuity Correction[b]	37.891	1	.000		
Likelihood Ratio	26.997	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	414				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.31.

b. Computed only for a 2x2 table

From the above, we see that there is a very significant association between the understanding of Takt/Cycle time and a better overall lean understanding as the Pearson Chi-Square Significance is 0.000.

Table 4.12 Crosstab between getting Question 19 right and passing the Lean test

Crosstab

			Pass		
			Fail	Pass	Total
Q19_C	NO	Count	33	314	347
		% within Q19_C	9.5%	90.5%	100.0%
		% within Pass	89.2%	83.3%	83.8%
		% of Total	8.0%	75.8%	83.8%
	YES	Count	4	63	67
		% within Q19_C	6.0%	94.0%	100.0%
		% within Pass	10.8%	16.7%	16.2%
		% of Total	1.0%	15.2%	16.2%
Total		Count	37	377	414
		% within Q19_C	8.9%	91.1%	100.0%
		% within Pass	100.0%	100.0%	100.0%
		% of Total	8.9%	91.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.865[a]	1	.352		
Continuity Correction[b]	.484	1	.486		
Likelihood Ratio	.950	1	.330		
Fisher's Exact Test				.484	.251
N of Valid Cases	414				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.99.

b. Computed only for a 2x2 table

From the above, we see that there is a no association between the ability to conduct Root-Cause Analysis and a better overall lean understanding as the Pearson Chi-Square Significance is 0.352.

In summary, it is evident that Lean is a multi-disciplinary field. From the data collected, it could be viewed that in the perspective of the shop floor workers, the harder concepts to grasp are Root-cause Analysis, Kaizen, Process-oriented, and Self-QC, respectively. It could be implied that the understanding of more various aspects of Lean contributed to a more understanding of the Lean and sustaining the Lean implementation better, as supposed to the deeper understanding of each aspect of Lean.

4.3 EMIT view of the corporate by new and existing workers

Random sample interviewed was used to select the 5 workers with minimal corporate experience exposure (*workers-in-training*, < 2 years of service), and 5 workers that have stayed in HIT for quite some time, the *veterans*. Even though there might be some bias from the sample size since the workers might be hiding from speaking their minds or that their limited experience might not be a good representation of the corporate culture, but some useful observations were obtained.

Using Triarchic Resonance, from the EMIT point of view (internal individual's perceptions), the insights from 3 different aspects were being examined; Microgenetic (From task start to measurable performance), Ontogenetic (Personal experience), and Cultural (Norm).

For the *veterans*, in terms of operations, they could sense that HIT has implemented such complicated systems in the light for their own benefits. The operations at HIT encouraged people to do problem solving using PDCA or other tools such as Ishikawa diagram for the promotion of root cause analysis. This meant that once a problem occurs, people have to spend much more time thinking how to prevent reoccurrence by attending meetings and brainstorming with their teams and supervisors, than the time needed to fix the defects. Each people knew his or her role in the team as the job descriptions were clear, you need to be responsible for your working station; otherwise, the whole team would suffer. The Andon system is beneficial for calling for assistance from the supervisors or the mechanics, so the workers always felt at ease. The performance tracking system told the team at any point in time whether they were on time or delay with their schedules so that they could adjust their pace accordingly. The only downside was that once the pace was quite fast, as workers become more skilled, it was hard to 'balance' the skill level of the team. Teams that had lower skilled workers are likely to perform more poorly than the teams whose workers were at the same level.

The *veterans* were more than willing to change and improve themselves and more open to new experience as they had stayed with the firms long enough to see that such implementation might be troublesome at first, but yielded a better performance benefits in the long-run. They could sense that their prior working experience or working systems were inferior to the existing manufacturing systems

and working conditions by measuring the amount of remuneration or the amount of time spent during work. They viewed the HIT production system as efficient, fair, a little bit troublesome, but more than willing to maintain the corporate culture and change for the betterment. In terms of happiness, it was quite difficult to assess as people have different circumstances and backgrounds, but one thing was quite clear, they were quite content with the working environment they are in. Since HIT was quite a flat organization, they could raise their points of concern straight to the top management and they felt the warmth and consideration from them. There were not quite clear corporate culture but people are very understanding and open to any changes that the company might implement.

For the *workers-in-training*, the results were quite clear – people who understand the reasoning of the Lean implementation would have a very positive mindset and people who opposed it would simply view it as nuisance. The new workers were less opened to the interview, which might be due to the lack of service experience with HIT. Operation-wise, they know the reasoning behind such Lean implementation and systems and more willing to comply as their working lives become easier and more systematic. The coaching system and the Andon helped them a lot when they have difficulties as they might have been too shy to ask questions if there was no Andon system. The working environment and set-up was quite new for them as well as the working stations are connected to each other and that the work was in a continuous flow. This means that as a new worker, they are more pressured from the veterans as they working speed might just not be up to standard. The using of WIP (work-in-process) as meant that they were pressured by the WIP in their stations that were passed by from the connecting working stations. However, this would act as pressure point for them to improve themselves and be level with the rest of the team.

The new recruits working environment changed drastically from their previous workplaces. This meant that everything is new improvements for them, those who had a positive mind-set towards Lean would be grateful of this opportunity and tried their best to improve their skills and more opened to the working conditions at HIT. For those who could not understand the reasoning behind Lean, they were more likely to opt out from the company in the near future. It was difficult to assess the level of happiness for the new recruits as they were too many factors involved and that they

had not been exposed too much of HIT culture so the answers were not clear. Nevertheless, they felt that HIT was very systematic and uses lots of processes in the production and that working at HIT is more equitable and they could work-life balance themselves better.

CHAPTER V
RECOMMENDATION AND CONCLUSION

5.1 Conclusion

Lean is a multi-dimension learning process that is continuous. It originated in Japan, by the Toyota, and proliferated to the rest of the world as Toyota shared their success stories and other firms saw the results that they delivered. Lean helps an organization identifying what are the value-adding and non-value-adding assets for them, to improve in terms of delivery, cost, and performance/quality by using various tools such as 5S, Kanban, Kaizen etc. The next question is would it be sustainable for firms to implement Lean manufacturing and what are the pros and cons for starting Lean.

Videla (2006) illustrates a chronological description of how Lean enterprise could eventually fail after the introduction of Lean in Mexico due to stress, mistrust, too fast pace. Several other scholars also discuss about the possible negative Lean consequences to the people who actually had to practice Lean during their work as supposed to the management of the owner of the firms, who perhaps only see the bright side of Lean manufacturing. Traditional viewers would focus more on the positive consequences by using various Lean indicators such as reduced down-time, waste, efficiency etc., as the implied causation for the Lean sustainability or rationale behind why a firm should introduce Lean.

This research provided an alternative perspective in viewing Lean manufacturing by investigating the level of understanding of Lean from garment shop floor workers as an indicator for Lean implementation success. The research focused on HIT, a Thai garment manufacturer who has been practicing Lean manufacturing since 2008 (more than 7 years by the time of the research), and attempt to identify the enablers and disablers that give way for the sustainability of Lean implementation.

The research used the combination of interview and questionnaires to try to get the Emit (from inside perspective of the shop floor workers) answers from the workers regarding their perspective on the Lean implementation. The results were that

moderate Lean understanding strongly contributed to the Sustainability of the firm, in the sense that HIT workers understood mainly what contributed positively to their welfare, despite the complicated systems they had to implement. The majority of the shop floor workers had positive mind-set both the veterans (more than 2 years of service) and the workers-in-training (0-2 years of service), and thought that the company should keep implementing Lean.

In depth analysis indicated that multi-dimension knowledge sharing was necessary is establish the Lean understanding culture (See Table 4.3 – 4.13). Not all aspects were to be taught in depth; especially, the more difficult aspects of Lean, Root-cause Analysis, Kaizen, Process-oriented, and Self-QC. Still 91.06% of HIT shop floor workers understood Lean, which strongly suggested the association between sustainability of the firm and Lean understanding of the shop floor workers.

From the interview, it was clear that the implementation and on-going practice of Lean manufacturing helped screen ‘able’ workers since the start of their working career. The workers who see the benefits of the Lean manufacturing system would have the positive mind-sets right from the beginning of the recruitment as supposed to those who contributed negative responses. This meant that throughout the implementation, more and more of ‘Lean-able’ workers would be retained in the company, hence improving the proliferation and future improvements. Despite the lack of strong corporate culture, the strict implementation of Lean helped moulding the workers to become more positive, analytical, continuous improving, and better team.

5.2 Recommendations

HIT demonstrated a good case study for firms based in Thailand who wanted to implement Lean and think about sustaining the Lean culture. The most pivotal factor that contributes to the successful implementation of Lean culture is the understanding of the perceived benefits that the shop floor workers (Lean operator) would have obtained once they follow the systematic works of Lean. In the case of HIT, the higher knowledge of Lean such as the Root-Cause analysis skill or in depth understanding of the rationales might not be proliferated to the shop floor workers

level, but results indicated that they do not have strong significant against the overall Lean understanding.

Firms that want to establish sustainable Lean culture should be very Long-term oriented and do not think about people as ‘disposable’ expenses. Lean has its roots from the life-time employment mind-set by the Japanese automobile company Toyota. They have to think about equitable working environment, incentive, benefits, and development or participation of their workers as well, as these are vital for ensuring the sustainability of the firm in the long-run, as Lean is not a static process but one that revolves over time through the process of continuous improvement ‘culture’.

The most pivotal part of Lean manufacturing is the on-going implementation. Firms should not stop the high standard of Lean procedures but use it as the filter to screen out the people who are not suitable to be working in the Lean environment. In a sense, Lean is a culture that needs to be strictly practiced; otherwise, the benefits of the implementation might not outweigh the cost of changing from a non-Lean environment.

5.3 Limitations

The research had many limitations; especially, in terms of data collection. First, since HIT practiced equitable manufacturing, the use of interview is very limited as interview could not be done fully during work time and since the time period of the research is very short the sample size was quite small.

Second, the questionnaire questions were quite limited as time was very precious and having too many questions could deter the respondents from filling in the questionnaires, even though the questionnaire contains only 19 questions, but many of them were not completed, particularly the qualitative parts.

In addition, the nature of Thai people is that they would not be straightforward about their answers; particularly, during the interview. They might have seen this as some kind of performance-related tests and refrain from speaking their minds. They might have softened their mood or answers, as they thought it might have affected their jobs in one way or another.

The research based the sample size on only 1 firm; therefore, it might not be a good representation of the culture as a whole, and the research is very specific to the organization culture of HIT. This might mean that the results might not be applicable to other firms, or other regions in Thailand.

5.4 Future Research

Future research could involve the tracking of the perceived Lean understanding across time for the workers-in-training (0 – 2 years of service experience). This would provide a more insight how HIT transform the new recruits or how the perception of the workers changed over time.

Second, another useful insight would be to compare the expectation of Lean from the management side and the perceived understanding of Lean from the shop workers side, to evaluate the gap analysis. This is based on the preposition that a narrower gap would mean that the firm could have been more sustainable.

Third, with more time, research should be done on people who receive high scores on the Lean questions (High Pass) or the ones who have positive Lean attitude, to try to identify the specific personality or traits that could help firms screen prospective candidates better to be able to cultivate the ‘Pro-Lean’ culture.

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APPENDICES

Appendix A: Questionnaires Questions

3.2 Questionnaires to existing shop floor workers (English)

Part 1: <u>General information</u>

1. Years of service

( ) 0 - 2 years ( ) 3 – 5 years ( ) 6 – 10 years ( ) more than 10 years

2. Marital status

( ) Single ( ) Married ( ) Divorce/ Separated

3. Family background

( ) No children ( ) Have child/children

4. Work experience

( ) HIT is your first work place ( ) Worked at 2 – 3 companies before

( ) Worked more than 4 companies before

5. Garment-related experience

( ) 0 – 2 years ( ) 3 – 5 years ( ) 6 – 10 years ( ) more than 10 years

( ) Starts garment at HIT

6. Time spent travelling to work from home (1 way)

( ) < 30 minutes ( ) 30 minutes – 1 hour ( ) 1 – 2 hours

( ) > 2 hours

Part 2: <u>Lean-related questions</u>

1. Have you ever heard of Lean manufacturing?

( ) Yes( ) No

2. Where did you learn about Lean manufacturing?

( ) HIT ( ) Previous workplace ( ) Never learned before

3. Have you notice any change by Lean manufacturing since you joined HIT?

( ) Yes( ) No

4. How long have you know about Lean manufacturing?

( ) < 6 months ( ) 6 – 12 months ( ) 1 – 2 years ( ) > 2 years

( ) Never

5. Name **3** positive Lean changes that affect you directly

6. Name **3** negative Lean changes that affect you directly

7. What aspect of Lean you ***<u>like</u>*** the most, why?

8. What aspect of Lean you ***<u>dislike</u>*** the most, why?

9. How can you make aspect in (8) better?

10. Lean is a one-time process

( ) Agree ( ) Disagree

11. Lean manufacturing focuses on productivity increase only

( ) Agree ( ) Disagree

12. Lean helps identifying what are value-added or non-value-added

( ) Agree ( ) Disagree

13. We should have more QA to prevent more defects from coming out

( ) Agree ( ) Disagree

14. It's acceptable to make lots of WIPs at a time, since output depends on WIPs.

( ) Agree ( ) Disagree

15. Even when I spot minor mistake, I should press Andon to notify my leader.

( ) Agree ( ) Disagree

16. Visual management helps minimizing defects as people are more 'aware'

( ) Agree ( ) Disagree

17. Walking around to call the supervisor when faced with problem rather than using the Andon, is considered as one of the *wastes*.

( ) Agree ( ) Disagree

18. Takt time and cycle time can be used to determine on-time delivery.

( ) Agree ( ) Disagree

19. The conveyor system was removed because it was too expensive.

( ) Agree ( ) Disagree

3.2 Questionnaires to existing shop floor workers (Thai)

ส่วนที่ 1 : <u>คำถามทั่วไป</u>

1. ท่านทำงานกับบริษัทมาแล้วกี่ปี

( ) 0 – 2 ปี ( ) 3 – 5 ปี ( ) 6 – 10 ปี ( ) มากกว่า 10 ปี

2. สถานภาพ

( ) โสด ( ) แต่งงาน ( ) อย่าร้าง / แยกกันอยู่

3. ท่านมีบุตรหรือไม่

( ) ไม่มี ( ) มี

4. ประสบการณ์ทำงาน

( ) ทำงานที่นี่เป็นที่แรก ( ) เคยทำงานมาแล้ว 2 – 3 บริษัท

( ) เคยทำงานมาแล้วมากกว่า 4 บริษัท

5. ประสบการณ์การเย็บผ้า

( ) 0 – 2 ปี ( ) 3 – 5 ปี ( ) 6 – 10 ปี ( ) มากกว่า 10 ปี

( ) เริ่มเย็บผ้ากับบริษัทฯ เป็นที่แรก

6. เวลาที่ใช้ในการเดินทางจากบ้านมาที่ทำงาน (ขาเดียว)

( ) น้อยกว่า 30 นาที ( ) 30 นาที – 1 ชั่วโมง ( ) 1 – 2 ชั่วโมง ( ) มากกว่า 2 ชั่วโมง

ส่วนที่ 2 : <u>คำถามเกี่ยวกับลีน</u>

1. ท่านเคยได้ยินเกี่ยวกับการผลิตแบบลีน หรือไม่

( ) เคย ( ) ไม่เคย

2. ท่านเคยได้เรียนรู้เกี่ยวกับการผลิตแบบลีน ที่ไหน

( ) ที่บริษัทนี้ ( ) ที่ทำงานเก่า ( ) ไม่เคยได้เรียนรู้

3. ท่านได้รู้สึกถึงการเปลี่ยนแปลงใด ๆ ที่เกิดจากลีนหรือไม่ ตั้งแต่ได้เข้ามาทำงานที่บริษัท

( ) รู้สึก ( ) ไม่รู้สึก

4. ท่านได้เรียนรู้เกี่ยวกับระบบการผลิตแบบลีนมานานเท่าไหร่

( ) น้อยกว่า 6 เดือน ( ) 6 – 12 เดือน ( ) 1 – 2 ปี ( ) มากกว่า 2 ปี

( ) ไม่เคยทราบมาก่อน

5. ยกตัวอย่างการเปลี่ยนแปลงทางลีน ในทางที่ ***<u>ดีขึ้น</u>*** ที่ส่งผลกระทบกับท่านโดยตรงมา 3 ตัวอย่าง

5.1

5.2

5.3

6. ยกตัวอย่างการเปลี่ยนแปลงทางลีน ในทางที่ ***<u>แย่ลง</u>*** ที่ส่งผลกระทบกับท่านโดยตรงมา 3 ตัวอย่าง

6.1

6.2

6.3

7. ท่าน ***<u>ชอบ</u>*** สิ่งใดเกี่ยวกับการผลิตระบบลีนมากที่สุด เพราะเหตุใด

8. ท่าน ***<u>ไม่ชอบ</u>*** สิ่งใดเกี่ยวกับการผลิตระบบลีนมากที่สุด เพราะเหตุใด

9. ท่านมีคำแนะนำใดบ้างเพื่อทำให้ (8) ดีขึ้นกว่าสภาพในปัจจุบัน

10. การผลิตแบบลีนเป็นสิ่งที่ทำครั้งเดียวแล้วเสร็จสิ้น

( ) เห็นด้วย ( ) ไม่เห็นด้วย

11. การผลิตแบบลีนคำนึงถึงเฉพาะการเพิ่มประสิทธิภาพเท่านั้น

( ) เห็นด้วย ( ) ไม่เห็นด้วย

12. ลีนช่วยทำให้เราเห็นว่าสิ่งใดเป็นสิ่งที่เพิ่มมูลค่า และสิ่งใดเป็นสิ่งที่ไม่เพิ่มมูลค่า (ไม่มีประโยชน์) แก่บริษัท

( ) เห็นด้วย ( ) ไม่เห็นด้วย

13. บริษัทควรเพิ่มจำนวนคิวเอ (คนตรวจสอบคุณภาพ) เพื่อป้องกันไม่ให้มีงานเสียเกิดขึ้น

( ) เห็นด้วย ( ) ไม่เห็นด้วย

14. คนเย็บสามารถทำชิ้นงานค้างไว้ได้ทีละเยอะ ๆ (วิป) เพราะสุดท้ายก็ต้องใช้ในการเย็บเป็นตัวอยู่ดี

( ) เห็นด้วย ( ) ไม่เห็นด้วย

15. หากคุณพบเห็นจุดผิดพลาดแม้เพียงจุดเล็กน้อย ก็ควรกดไฟอันดงเพื่อเรียกหัวหน้า

( ) เห็นด้วย ( ) ไม่เห็นด้วย

16. การทำป้ายสัญลักษณ์ต่าง ๆ (วิชั่ล) เป็นการช่วยลดงานเสีย เพราะพนักงานเย็บจะมีตัวช่วยเตือน

( ) เห็นด้วย ( ) ไม่เห็นด้วย

17. การที่พนักงานเดินออกจากไลน์เย็บไปเรียกหัวหน้า แทนที่จะกดไฟอันดงถือเป็นหนึ่งใน*<u>การสูญเสีย</u>*

( ) เห็นด้วย ( ) ไม่เห็นด้วย

18. เวลาแทคไทม์ และไซเคิ้ลไทม์ สามารถใช้บอกถึงความสามารถในการส่งงานตามเวลาได้

( ) เห็นด้วย ( ) ไม่เห็นด้วย

19. การที่บริษัทได้ทำการยกเลิกระบบสายพาน (คอนเวย์เยอร์) เนื่องจากระบบสายพานนั้นแพงเกินไป

( ) เห็นด้วย ( ) ไม่เห็นด้วย

Appendix B: Interview Questions

3.3 Interview questions (English)

1. How HIT supports you when you just started a new job?
2. Please explain how HIT helps you when you have problem during work.
3. How do you feel when you finish your assigned tasks? (On-time, late, early)
4. How your previous experiences help you to work at HIT?
5. What impresses you when you work at HIT? Please give 2 examples.
6. What do you think HIT should improve on? Please give 2 examples.
7. Do you think you enjoy working at HIT? What makes you happy / unhappy the most?
8. What defines HIT work culture?
9. What kind of company is HIT?

3.3 Interview questions (Thai)

1. ทางบริษัทมีมาตรการช่วยเหลือท่านตอนที่ท่านเพิ่งเริ่มงานอย่างไรบ้าง
2. เมื่อท่านประสบปัญหาในเวลาทำงาน บริษัทช่วยเหลือท่านอย่างไรบ้าง
3. ท่านรู้สึกอย่างไรบ้างเมื่อท่านทำงานที่มอบหมายสำเร็จ (ตรงเวลา, ล่าช้า, ก่อนเวลา)
4. ท่านได้ใช้ประสบการณ์ทำงานในอดีตมาใช้ในการทำงานที่บริษัทในปัจจุบันหรือไม่
5. ท่านรู้สึกประทับใจบ้างในการทำงานที่บริษัท (ยกตัวอย่าง 2 ตัวอย่าง)
6. ท่านคิดว่าทางบริษัทควรปรับปรุงในด้านใดบ้าง (ยกตัวอย่าง 2 ตัวอย่าง)
7. ท่านมีความสุขในการทำงานที่บริษัทหรือไม่ เหตุใดท่านจึงรู้สึกอย่างนั้น
8. ท่านจะอธิบายวัฒนธรรมองค์กรของบริษัทอย่างไร
9. ตามความคิดของท่าน คิดว่าบริษัทเป็นบริษัทแบบไหน