LEAN BEHAVIOR IMPACT TOWARDS LEAN MANAGEMENT: A CASE STUDY

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ABSTRACT: Lean behavior is an essential element to create a continuous improvement culture in the service organization. Meanwhile, continuous improvement is defined as the never-ending efforts for improvement involving everyone in organization. The purpose of this study is to evaluate the changes of behavior practices after the introduction of lean tools and to discuss on how lean behavior in developing the continuous improvement culture in an office environment. This study focuses on self-administered questionnaire method to obtain the real time data for the analysis of behavior practices. Ford Questionnaire is used and distributed to the employees of different management levels in Business Development and IT department. The obtained results are analyzed using the Statistical Package for the Social Sciences (SPSS) software. The same questionnaire survey is conducted after the introduction of lean tools. The expected outcomes of this study is to determine the level of lean behavior practices in the office department and to provide a clear understanding on some lean behavior practices that need to be nurtured among the employees in order to produce a healthy work environment.

KEYWORDS: *Lean in Offices, Lean Behavior, Continuous Improvement.*

1.0 INTRODUCTION

Recently, lean as a process management philosophy has slowly gained popularity in the office-based functional areas such as research and development, administration and customer service. However, only several companies are success in implementing lean in the office environment. Implementing a lean philosophy is not easy and required culture change within the organization. The top management has always realized the necessary of developing a continuous improvement culture in the working environment.

This is important as to achieve company's vision and missions. Although several efforts of improvement has been given out, such as thousands of costs is used to provide training program or implement cost saving activities, but still no significant benefits is seen at the end of implementing. It shows that continuous improvement activities in the office department are not sustainable and it mainly due to the staffs' behaviors. Lack of management support and involvement are also the cause of the unsustainable in developing the continuous improvement culture in the office department.

Besides that, employees of which management level should fully be responsible for this no significant improvement. Is it mainly due to the bottom employees who do not follow the standard working procedures or due to the top managers who lack of management skills? Although lean behavior is important to improve the performance of employees, but it is not easy to be nurtured in employees from all level of managements in order to create a continuous improvement culture in the company.

The main objectives of this study are to identify the strength and weakness of lean behavior and evaluate the relationship between lean principles, to explore the current lean practice and proposed lean method for improvement and to analyze the critical success factors for continuous improvement. The study is conducted in the Business Development and IT department of a service company which supplies water to domestic consumers, industries and others in the whole state of Melaka as well as provides the efficient and customer-oriented services to customers. This study does not cover other office departments in the company. The data analysis is mainly based on self-administered questionnaire that will be distributed to all employees in the department.

2.0 LITERATURE REVIEW

2.1 Lean Behaviour

There are two types of behavior that normally found among the employees which are the lean behavior and fat behavior. Lean behavior is defined as behaviors that add or create value; fat behavior is defined as behaviors that add no value and can be eliminated. The first step of improvement must with recognize the waste and the next step is to find ways to eliminate waste to the greatest extent possible [1]. Lean

behavior and fat behavior always occurred in work flows where the lean behavior will promote flow between people while fat behavior will result in waste.

Behavioral change is the key factor to improve the performance of employees whether they have or without the experience of lean implementation. According to a case study on Motorola, behavior is important to change culture for sustain implementing lean concept. In addition, an environment rich in the practice of fat behavior will wear people down and make them feel as if they can never do a good enough job no matter how smart they work or how many hours they put in [2]. They may as well become stuck in their department because their attitude has deteriorated which in turn reduces their performance and lowers their potential for future raises or bonuses. The consequence of employees' fat behavior also direct felt by company as employees may not have commitment or energy to meet the demands of competition in market place. The organizational culture has to change, with front-line staff empowered by the leadership to identify problems and equipped with the tools and methodologies to resolve those problems [3].

Ultimately lean organizations become measurement-and-process-oriented with transparent management information to be able to readily identify where problems are occurring. Behavior is important to change culture to sustain implementing of lean concept. Many efforts failed due to the behavior of management and employee will follow the management's behavior if they are ordered to do new things [4]. Conventional production or mass production is more to physical production where the leader waiting for a production instruction card to arrive before starting to produce the product as a practice. The mass production practice cannot be considered as a valuable process in the production system due to the fat behavior is always in the loop. The mass production practices are strickingly tied to longstanding ways of creating to others at work while many lean practices are related to discipline adherence to defined process [5]. The behaviors in mass production are more to interpretation and action that people absorb as a practice. While the behaviors in lean production are more precise and disciplined in order to meet their promise for productivity, quality and continuous improvement.

2.2 Critical Success Factors

The critical success factors (CSF) mostly have been related with an organization goal and planning and management objective. The CSF approach was originated as a method of defining chief executive

information needs. Since then, it has been found to be applicable to any organization and to any management level within an organization [6]. The CSF technique has two main functions: First, to encourage the individual executives to focus on those issues which are the most important; and second, to help them think through their information needs in these area [7]. The CSF technique has become a cornerstone and has attained a high degree of acceptance in information system planning methodologies. In the broadest sense, CSF is a management tool to help managers define their information needs and to link those with general business needs.

CSF can be achieved thru increased employees' competence, faster work completion, reduced frustration with improved customer satisfaction and financial benefits to the organization [8]. The patient flow improved, patients treated faster, best use of capacity, cost savings, waste reduced, shorter waiting times, reduced length of stay, increased productivity, more patients treated, safer and more reliable services, standardized procedures and equipment and improved staff morale are essential key for CSF [9].

The critical success factors approach was used to identify information needs of managers and engineers in various industries [10,11]. CSF support the attainment of organizational goals, and if results in these areas are satisfactory, the organization is competitive [12]. The CSF method focuses on individual managers and on each manager's current information needs. Some CSFs may be related to the structure of the particular industry, the others are caused by environmental factors, and there are also temporal factors for a particular period of time.The potential of CSFs methodology for assessing information requirements of heads of university departments is concluded, by reviewing previous studies that the main strengths of the method are: acceptance by senior managers; consideration of all the information needed, not only that which is easy to collect; and the critical success factors point to priorities for development [13].

3.0 METHODOLOGY

Survey is one of three types of quantitative method where it is include cross-sectional and longitudinal studies using questionnaire or interview for data collection with the intent of estimating the characteristic of a large population of interest based on a sample from that population. Self-administered questionnaire is selected for conducting the survey. Self-questionnaire is a survey at where the respondents are requested

to complete the questionnaire in their own time. Ford questionnaire is used to be the self- administered questionnaire for conducting the survey.

Questionnaires that developed by Ford Motor company is stated to contain the criteria of lean behavior practices based on the literature review [14]. The answers of questionnaire were using the four-point scale and circle the appropriate number. The response scale is ranged from 1 to 4 representing the range of strongly agree, agree, disagree, and strongly disagree. A pilot test was conducted with a small sample population. Six people were involved in the pilot test embrace those understand lean concept and also those do not understand lean concept. The purpose for pilot test is to let the reviewers assessed the contents of the questionnaire to ensure that the questionnaire is able understand and being used for survey. Based on the feedback from validation and pilot test, the questionnaire was revised. Some improvements that have been made include the Questionnaire must set in both English and Malay languages as well as the questionnaire is used to survey for whole organization not for superior.

The questionnaire used for this project was validated by Ford Motor Company as they used it to survey their employees before. The questionnaire is discussed and improved after visiting the company. Both English and Malay language is provided on the questionnaire to ensure that it is able to be understood and suitable for survey. For reliability analysis, Cronbach's alpha model that measures the internal consistency was performed using IBM Statistical Package for Social Science (SPSS) Statistic version 20. Reliability is a statistical measure of the reproducibility or stability of data gathered by the survey instrument.

3.1 Index Calculation

The data collection form questionnaire is subjected to frequency analysis and relative index calculation for agreement, usage and involvement factors [15]. The frequency analysis and relative index analysis were employed to measure the sample's agreement on the importance of the empowerment activities, the extent to which the activities were being used, and the significance of the involvement of different levels of employees in performing those activities. The first analysis of index value is used to determine the strength and weakness lean behavior practices. The index value is calculated by formula such as

$$\text{Index} = [(n_1) + 2(n_2) + 3(n_3) + 4(n_4)] / [4(n_1 + n_2 + n_3 + n_4)] \quad (1)$$

Where $n_1,...,n_4$ represent the number of respondents that indicated the respective practices on the scale 1 to 4. The formula yields indices ranging from 0 to 1, where below 0.2 represent minimum strength and above 0.8 represents maximum strength [15]. The second analysis of correlation is to measure how between each principle variables are related. Before calculating a correlation coefficient, there are a few assumptions for correlation analysis which are normality and linearity [16]. Pearson's correlation coefficient is a measure of linear association with the score for each variable is normal distributed. The study is completed with the implementation and documentation stage. Ford questionnaire is first distributed to the all employees from different management level in the department.

The data obtained from survey is analyzed using the IBM SPSS statistic version 20 software. Lean tools and techniques are then introduced in order to enhance the current lean behavior of employees in the department. After that, the same Ford questionnaire is again distributed to same respondents for determining the behavior change of employees after the introduction of lean tools. The impact of lean behavior on developing the continuous improvement culture is also discussed in this study. The results of this study are documented for further reference and study.

4.0 RESULTS

4.1 SWOT Analysis

Several observations are conducted to study the applied tools in Business Development and IT department. The observation has shown that the office department is lack of visual indicator in labeling the files and document cupboards. Besides that, the department has no proper organization and orderliness such as:

a. Files and papers are not sorted appropriately in the discussion room.
b. Stack of papers and catalogs are found on the floor.
c. No specific place is prepared to stock all the stationary equipments.
d. Pieces of paper waste for decoration are found on the Table.
e. No paper basket is found in the discussion room.

The 5S visual management is the suitable lean tools and techniques to be introduced in the department. This lean tool is essential to enhance the lean behavior among employees in the department. 5S visual control is the key foundation principle for creating the lean enterprise [17]. It is a

very useful tool to achieve the cost reduction, waste elimination, zero defects, safety improvements and accident reductions.

Besides that, 5S visual management is also being the foundation of lean tools in developing the continuous improvement in the office environment [18]. SWOT analysis of 5S visual management is constructed and shown in Figure 1.

4.2 Range of Respondent

The questionnaire is assigned to 32 people and the feedback of exactly 32 respondents is collected. Figure 2, the highest percentage of respondents is from bottom level, which is 53.00%, followed by middle level with 41.00% and the lowest percentage of respondents is from top level with 6.00 % only.

4.3 Internal Consistency Analysis

An internal consistency analysis was used to assess the reliability of questionnaire. It is an indicator of how well the different items measure the same issue. The measurement of internal consistency involves the calculation of Cronbach's coefficient alpha. Alpha value should be positive and greater than 0.7 are considered acceptable for testing the reliability of factors.

As shown in Table 1, the alpha value of the three categories for February 2013 is range from 0.904 to 0.910. Meanwhile, the alpha value for May 2013 in the three categories ranges from 0.877 to 0.882. From the result, the alpha value of the three categories for May 2013 is decreased if compare with Feb 2013. However, the instrument are consider acceptable as the range value for May 2013 is still greater than 0.7. Moreover, the elimination of questions is unnecessary as the alpha value just increase slightly after eliminating [19]. Therefore, it can be concluded that this instrument is reliable since the alpha value is greater than 0.7.

4.4 Strength of Lean Behavior Practices

FromFigure3, the indices calculated for 30 lean behavior practices are ranged between 0.602 and 0.773 for February 2013. For May 2013, the range of calculated indices for all the lean behavior practices is between 0.586 and 0.805. The result obtained for May 2013 indicates that many of the lean behavior practices were improved in the department. Lean behavior practices that have shown a lot of improvement for May 2013 are:

a. Decisions are based on facts instead of opinions. +0.133
b. People focus on the problem instead of looking for someone to blame. +0.102
c. People look how the improvement impacts others areas. +0.102

However, one particular practices that needs to be given more attention as its index value dropped and showed the very low for the May 2013. The dropped indices in Table 2 are contributed from two factors which are top management involvement and inexperience employees. The biggest dropped indices is -0.094 comes from Q15 where less on encourage to search and discuss. Q15 is directed for CL&I. Encouragement by top management for knowledge seeking and discuss is become an essential element in CL&I. Thru Q15 knowledge improvement and communications among employees can be sustaining. Top management should emphasize en encouragement for employees in order to create lean culture. The top management should understand the lean concept and the principles [2]. It is because they have authority and ability to create lean environment and classified the non-value-added process successfully. Based on this, the indices dropped can be increased in short period of time in the future.

The contribution on dropped indices by inexperience employees can be seen in Q12 which is coached and training. Inexperience employees required new knowledge and skill to handle the work task towards achieving organization goals. It is showed that inexperienced employees has less coached and training and less chance to be participated in education and training conducted by HR. The organization is suggested to encourage inexperienced employees to improve their knowledge and skill for organization benefits.

The most significant category is the process and results driven which increased from 0.693 to 0.745. This is followed by respect for people and continuous learning and improvement which show improvement from 0.715 to 0.738 and from 0.712 to 0.729 respectively. In overall, the result shows that the department improved in all three categories. The department really has the initiative and efforts in practicing the lean behavior as shown in the comparison of lean behaviors in Figure 4. Therefore, it can conclude that most practices of lean behavior will enhance the problem solving capability of employees and eventually help in creating a continuous improvement culture in the department.

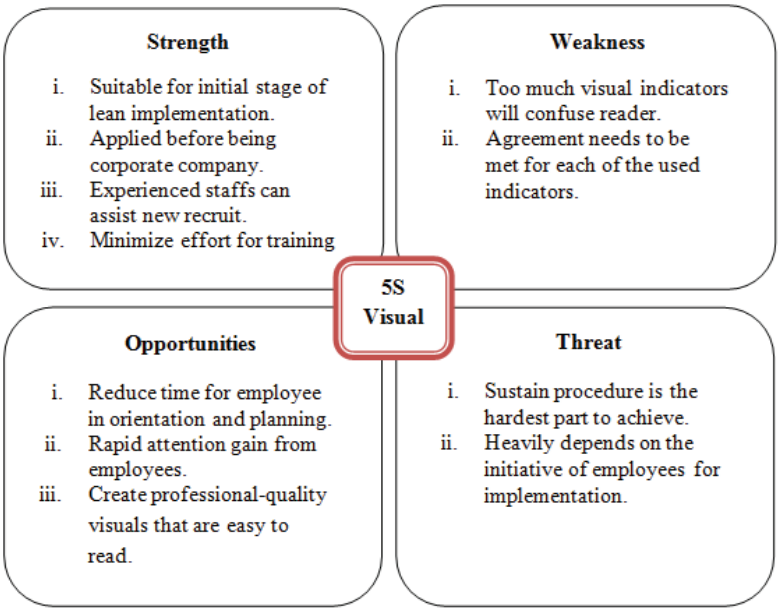

Figure 1: SWOT analysis on 5S visual management for continuous improvements

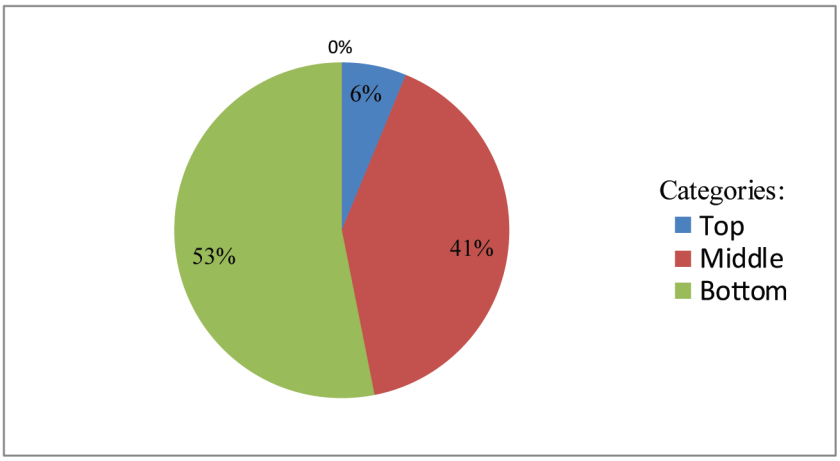

Figure 2: Respondent status (%) in the survey

Table 1: Reliability statistics for February 2013 and May 2013

Scale	No. of items	Alpha if deleted	Alpha if deleted
Respect For people Alpha (Feb= 0.910, May= 0.880)	9		
Q01		0.903	0.87 7
Q02		0.903	0.87 6
Q03		0.908	0.87 7
Q04		0.908	0.87 8
Q05		0.903	0.87 8
Q06		0.905	0.87 6
Q07		0.901	0.88 2
Q08		0.901	0.87 9
Q09		0.902	0.87 2
Continuous Learning and Improvement Alpha (Feb= 0.904, May= 0.877)	9		
Q10		0.903	0.87 8
Q11		0.901	0.87 9
Q12		0.906	0.86 9
Q13		0.909	0.87 1
Q14		0.911	0.86 9
Q15		0.901	0.90 1
Q16		0.901	0.87 7
Q17		0.903	0.87 5
Q18		0.902	0.873

Process and Result Driven Alpha (Feb= 0.909, May= 0.882)	12		
Q19		0.902	0.878
Q20		0.905	0.874
Q21		0.902	0.877
Q22		0.905	0.873
Q23		0.906	0.880
Q24		0.908	0.876
Q25		0.902	0.879
Q26		0.905	0.895
Q27		0.898	0.878
Q28		0.902	0.877
Q29		0.914	0.879
Q30		0.906	0.873

Table 2: Dropped indices on lean practices

Questions	Directions of Questionnaire	Dropped
Q4	Can participate in decisions	-0.047
Q9	Scheduled not clash with other meeting	-0.008
Q12	Coached and trained	-0.016
Q14	Encourage to improve knowledge	-0.008
Q15	Encourage to search and discuss	-0.094
Q24	Improve work	-0.016
Q26	Decision made on timely basis	-0.016

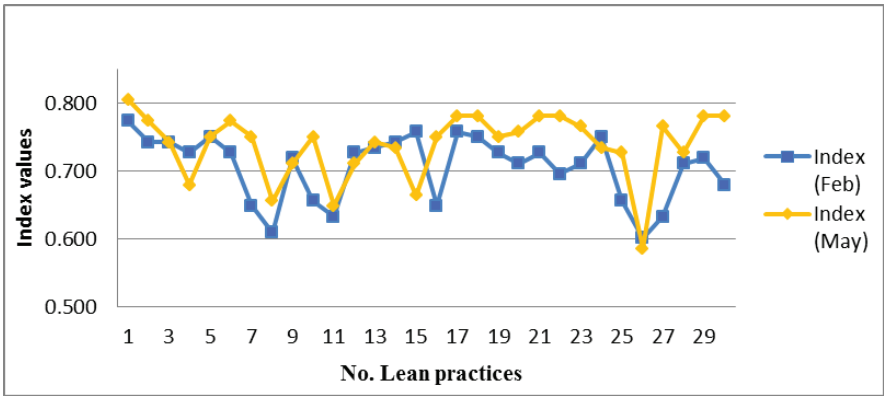

Figure 3: Strength of lean practice

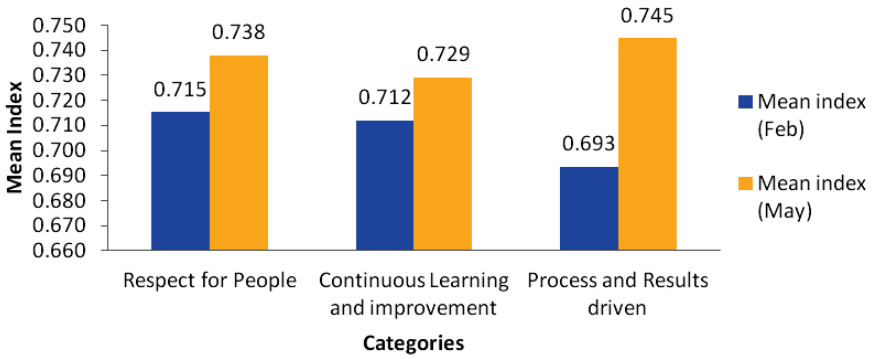

Figure 4: Mean index of lean practices

4.5 Relationship between Lean Principles

Correlation method was used to measure the relationship involving variables [19].Table 3 shows the correlation between respect for people, continuous learning and improvement and process and result driven for February 2013 and May 2013. From the result, it can be seen that there initially has a strong relationship between respect for people and process and result driven with significant value less than 0.01. Meanwhile, the correlation relationship between continuous learning and improvement with respect for people and process and result driven are weak with significant values more than 0.05. But for the May 2013, there is a slightly increase on this correlation relationship between continuous learning and improvement with respect for people and process and result driven with significant values closer to the 0.05.

Table 3: Correlation between factors for February 2013 and for May 2013

		February 2013			May 2013		
		RFP	**CL&I**	**PRD**	**RFP**	**CI&L**	**PRD**
RFP	Pearson Correlation	1.000	0.166	0.802	1.000	0.555	0.478
	Sig. (1-tailed)		0.335	0.005		0.061	0.096
	N	9	9	9	9	9	9
CL&I	Pearson Correlation	0.166	1.000	0.185	0.555	1.000	0.348
	Sig. (1-tailed)	0.335		0.317	0.061		0.180
	N	9	9	9	9	9	9
PRD	Pearson Correlation	0.802	0.185	1.000	0.478	0.555	1.000
	Sig. (1-tailed)	0.005	0.317		0.096	0.061	
	N	9	9	12	9	9	12

* $p < 0.05$; ** $p < 0.01$

4.4 Lean Behavior in Developing Continuous Improvement

The analysis of survey also shows that correlation relationship between lean principles has started to increase among employees in the department. Top manager has realized the importance of their leaderships in creating the continuous improvement culture in the department. A good leader should have the nine lean behaviors of leaderships [15]. Besides that, most business will fail to realize the benefits of the Lean management system if organization implements only lean tools and do not implement both continuous improvement and respect for people.

Behavioral change is the key factor to improve the performance of employees whether they have or without the experience of lean implementation. This is important to sustain implementing of lean concept and to meet the promise for productivity, quality and continuous improvement in the organization. Employees' behavior can be classified into two which are the lean behavior and fat behavior. Both of these behaviors always occurred in work flows where the lean behavior will promote flow between people while fat behavior will result in waste.

Employees of each level of management should be trained with the lean behavior practices parallel with the application of lean tools and techniques. This is an important initiative as to sustain the lean implementation and develop a continuous improvement culture in the organization. Respect for people and continuous learning and improvement are the main critical success factors for lean behavior practices. Every employee whether is of top manager, supervisor or technician should have the behavior of respect for people. Respect for people is such an important factor to enhance the interaction between employees and create the continuous improvement culture in the organization.

Besides that, the top manager must have always develop and provide the working environment that enables continuous learning and improvement for employees. Training and management commitment are the lean practices that enable the development of a continuous improvement culture in the organization. Training programs should be frequently provided for employees of different level of management in order to increase job skills and to enhance team working. Besides that, top management should support and initial any opportunities that enhance the lean behavior practices among the middle and bottom employees.

Besides providing training program, reward system and recognition activities can be used systematically to motivate employees to perform desired behaviors. Reward can be financial, prizes or simply "thanks" to individuals or teams that have accomplished their performance achievements. Meanwhile, recognition activities are activities that provide a powerful motivator which encourages the motivation of employees and engenders enthusiasm. Both the reward and recognition activities are important to develop a continuous improvement culture in the organization.

5.0 CONCLUSION

The importance of lean behavior in developing the continuous improvement have studied and understood based on relevant references. Based on the observation, employees in Business and IT department have lack or no significant knowledge and skills related to lean implementation. This is due to lack of visual indicator in labeling the files and document cupboards and has no proper organization and orderliness in the department. 5S visual management is the lean tools that introduced to enhance lean behavior practices in the department.

It is a foundation lean tool for achieving the cost reduction, waste elimination, zero defects, safety improvements and accident reductions. The result and analysis had shown that there is an improvement of lean behavior practices among the employees after the introduction of lean tools. Based on the strength values for February 2013 and for May 2013, the mean index value for 30 lean practices was increased from 0.705 to 0.738 which is a total incremental of 5%.

However, the improvement of lean behavior practices is not significant as the second distribution of questionnaire is too near to the first distribution. This indicates that long term efforts are required in order to implement lean behavior among the employees. Lean behavior practices such leaderships, respect for people, top management commitment, reward and recognition activities are crucial in creating a continuous improvement in the department.

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