

Continuous Improvement and its Barriers in Electrical and Electronic Industry

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Abstract. Continuous improvement is one of the core strategies for manufacturing excellent and it is considered vital in today's business environment. Continuous improvement is an important factor in TQM implementation. However, manufacturers in Electrical and Electronic Industry is facing variety of challenges such as, time constraint, quality issue, headcount issue, human issue and competition in domestic as well as the global market. This paper presents total quality management practices in Electrical and Electronic (EE) Industry. These manufacturers have to keep improving in key activities and processes to cope the challenges. Therefore, EE industry realize the importance of continuous improvement in helping the industries by setting clear goals and priorities for the area of improvement. The aims of this study are to determine the main factor in implementing continuous improvement practices, identify tools of continuous improvement that have been used and their obstacle in implementing continuous improvement practices. 200 questionnaires had been distributed to the employees in Electrical and Electronic Industry located at Bayan Lepas, Penang, Malaysia. A total of 41 questionnaires were answered which represented about 20.5% response rates. Survey result shows that teamwork and training and learning are respectively the importance factor and the most practices factor in Electrical and Electronic Industry. Most of the Electrical and Electronic Industry emphasis is on using Lean Manufacturing as the tool of continuous improvement practices. Besides that, Electrical and Electronic Industry faced the problems of lack of budget and lack of worker commitment.

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1 Introduction

Continuous improvement is planned, organized and systematic process of ongoing, incremental and company-wide change of existing practices to improve company performance. Continuous improvement is one of the core strategies for manufacturing excellent and is considered vital in today's business environment [1]. Continuous improvement has proved to be a useful way of business approach in centering low cost investment and high return improvements in both large, medium and small companies. Continuous Improvement method has become widely adopted as providing an important component for increasing company competitiveness. Continuous Improvement enables a company to be more successful in the pursuit of a specific strategy or set of objectives [2]. A well-known concept related to continuous improvement is Kaizen, which has its origin in Japan and means continuous change for the better by involving all employees [1]. Among the major potential benefits of continuous improvement are increased business performances and increased people performance [3][4].

Electrical and Electronic Industry is a leading sector in Malaysia's manufacturing sector, contributing significantly to the country's manufacturing output (29.3%), exports (55.9%) and employment (28.8%) (MIDA – Malaysian Industrial Development Authority)[5]. Nowadays, a lot of manufacturers in Electrical and Electronic Industry, especially in production department have faced heightened challenges such as time constraint, quality issue, headcount issue, human issue and competition in market. No doubt, these manufacturers are always embracing changes and improvements in their key activities and processes to cope the challenges. With that, many companies have realized the importance of continuous improvement, no matter is self-improvement or company improvement [6]. The improvement of employees themselves will be able to enhance their discipline and their knowledge [7]. Meanwhile, the improvement of company can help the company to increase the quality and productivity, eliminating the waste and reduce the headcount problems [8][9].

The following research questions will be examined in the study:

- i. What is the main Critical Success Factors (CSFs) in implementing continuous improvement?
- ii. What are the tools of continuous improvement being used?
- iii. What is the main barrier factor in implementing continuous improvement?

2 Methodology

The population is observed from Electrical and Electronic Industry in Bayan Lepas, Penang. The unit of analysis is organisation. There are total of 200 samples have been selected for this study. Random sampling is used for this research. Survey method was used in this research. Survey forms have been sent to the respondents through postal mail. Finally, 41 questionnaires were received for final study. It represented 20.5% of response rate. Statistical Package for Science Social (SPSS) was used to analyse the data being collected. Descriptive has been carried out to answer the research questions.

3 Analysis Results and Discussion

3.1 Cronbach's alpha

Cronbach's alpha [10] was used to determine the reliability of the questionnaire as shown in Table 1. Cronbach's alpha is a measure of internal consistency, which able to determine how closely related a set of items are as a group. Accepted value for Alpha value is 0.7 [10].

Table 1. Cronbach's alpha result

Variable	N	No. of items	Alpha value
Top Management Commitment	10	5	0.753
Training and Learning	10	5	0.878
Teamwork	10	5	0.923
Motivation	10	5	0.798
Resources Management	10	5	0.764

3.2 Normality Test

Based on the Table 2, the normality value is 0.710 at $p < 0.001$, means that the distribution is normal distribution. Therefore, parametric test can be used.

Table 2. Normality Test

Variable	Shapiro-Wilk	Result
	Significant	
Practices of Factors	0.710, $p < 0.001$	Normal Distribution

3.3 Extent level of Continuous Improvement

Five likert scale instrument has been used for final survey. Based on Table 3, training and learning had been rank as first. The mean score of training and learning is 3.9317. It is the highest factor. In reality, companies organized a lot of training program for their employees to enhance their knowledge. Without knowledge, employees will feel anxiety. Successful companies know that the more their employees learn about their jobs, the better they will become at every aspect of these jobs. Teamwork is ranked second important. Teamwork had contributed mean score about 3.7805. This followed by resources management, 3.7463 and top management commitment, 3.6341. Motivation is the least practiced factors, which only contributed about 3.3610. This may bring the meaning of employees were not motivated to improve their current job situation.

Table 3. Extent level of Continuous improvement

	Factors	Mean Score	Ranking
F1	Top Management Commitment	3.6341	4
F2	Training and Learning	3.9317	1
F3	Teamwork	3.7805	2
F4	Motivation	3.3610	5
F5	Resources Management	3.7463	3

3.4 Application of Tools

Based on the Table 4, lean manufacturing had high level of practices in companies among the 8 factors. The mean of degree of practices of lean manufacturing is 3.63. Lean Manufacturing is useful as well towards companies; mean score of degree of usefulness is 3.49. Instead of thinking ways to gain more profits, some manufacturers thinking to eliminate waste which also can save fund. For example, too much stock available in warehouse, it will increase the costs of storage. It should be ensure sufficient products available for customers. It is followed by ISO 9001, both the degree of practices and usefulness are rank as second. Its mean score for degree of practices is 3.41 and means for degree of usefulness is 3.32. Then, the third is FMEA. FMEA has 3.10 of the mean score for degree of practices and 3.07 of the mean score for degree of usefulness. Exceptional for the other tools, the seven-step problem solving is ranked as the seventh. The seven-step problem solving has the lower mean score for both degree of practices and degree of usefulness, which is 2.32 and 2.46. This maybe because of the processes are too tedious. Based on the means score in Table 4, Six-sigma had ranked as the fifth in both degree of practices and degree of usefulness. Means score for degree of practices is 2.63, which is lower than mean score of usefulness that is 2.78. The difference of mean is 0.14. This means that, employees found Six-sigma more useful than its being applied.

Table 4. Application of Tools

	Tools	Mean of Practices		Mean of Usefulness	
T1	The Seven-Step for Problem Solving	2.32	(7)	2.46	(7)
T2	Fish Bond Diagram	2.46	(6)	2.49	(6)
T3	Six-Sigma	2.63	(5)	2.78	(5)
T4	Lean Manufacturing	3.63	(1)	3.49	(1)
T5	Failure Mode and Effect Analysis (FMEA)	3.10	(3)	3.07	(3)
T6	Quality Control Circle (QCC)	2.98	(4)	2.88	(4)
T7	ISO 9001	3.41	(2)	3.32	(2)
T8	Others	0.24	(8)	0.32	(8)

Problems faced in Implementing Continuous Improvement have been evaluated based on 5 likert scale instrument. The result based on Table 5, there are two main causes of the problems in implementing continuous improvement are lack of budget and lack of worker commitment. It is normally difficult to get financial support and approval from top management. Top management only invests some programme that is profitable to the company. It is no doubt that, top management treat continuous improvement as an optional program. They may postpone continuous improvement program when there are a lot of workload. From the Table 5, it is obviously to know that, among forty-one respondents, there are only four continuous improvement members. Most of the respondents are engineer. This means that, engineers not only play their role as engineers, they also take part in continuous improvement activities. They need to finish their own job, at the same time; they need to help company to continuous improve to have better performance and more profitable. Most of the employees do not commit much in continuous improvement program due they do not have extra times and rewards. Employees' motivator is money or any other material wealth. It is important for top management to recognize their hard work.

Table 5. Problems faced in Implementing Continuous Improvement

	Barrier Factor	Mean Score	Ranking
B1	Failure to understand how change happen	3.32	7
B2	Lack of top management commitment / support	3.20	11
B3	Ego	3.21	10
B4	Employees resists changing	3.27	8
B5	Lack of time	3.46	3
B6	Lack of budget	3.51	1
B7	Lack of knowledge	3.37	5
B8	Lack of training	3.37	5
B9	Lack of worker commitment	3.51	1
B10	Lack of resources	3.20	11
B11	Lack of measurement	3.22	9
B12	Lack of focus action	3.44	4

4 Conclusion

Survey result shows that teamwork and training and learning are respectively the importance factor and the most practices factor in Electrical and Electronic Industry. Most of the Electrical and Electronic Industry emphasis is on using Lean Manufacturing as the tool of continuous improvement practices. Besides that, Electrical and Electronic Industry faced the problems of lack of budget and lack of worker commitment.

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