

Quality Management in Electrical-Electronics SMEs

Komson Jirapattarasilp, *Member, IAENG*

ABSTRACT The quality management also extends the application to several industries. However, the current applications of quality management gain the difference level in practices. The objective of the research is to study the characteristics of quality management practices and their implementation in Thai electrical and electronics industries especially small and medium enterprises (SMEs). The data was collected from 128 electrical and electronics SMEs. The research was done by survey on the framework of ten quality management that are Quality management policy, Quality management methodology, Top management involvement, Quality activity: Quality tool techniques, Human oriented quality management, Team working, Data collection and analysis, Process management, and Cost control and product management. The results showed that the electrical and electronics industry is found to mostly employ quality management in area of Quality management policy, Top management involvement, Data collection and analysis, and Process management.

Index Terms – Electrical and Electronics Industries, Quality Management, Small and Medium enterprises SMEs.

I. INTRODUCTION

Quality Management is the principle of management that customer requirements are met exactly and every person in the organization is involved with the fully commitment of the top management. The quality management is driven by the constant attainment of customer satisfaction through the continuous improvement of all organizational processes. The quality management involves the continuous improvement in quality, productivity and effectiveness obtained by establishing management responsibility for processes as well as output. The quality management assists business for product differentiation, fulfillment of customer requirement, and reduction of costs by preventing waste in process. This concept is a chain reaction since it involves not only the organization staff but the suppliers and customers as well. Deming, Juran, Crosby, and Ishikawa were created concepts of quality management. Deming [1] offers a theory of quality management based on his famous 14 points for quality management. Juran [2] presents a his Trilogy of quality management that quality planning, quality control and quality

Manuscript received January 5, 2008.

Komson Jirapattarasilp is with the Department of Production Technology Education, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi, Bangkok, Thailand. (e-mail: komson.jir@kmutt.ac.th)

improvement were integrated. Ishikawa [3] and Kume [4] showed successful Japanese quality management. Quality management have been characterized as: responding to customer demands; quality from the buyer's standpoint and the vendor's viewpoint; product quality and process quality; company-wide quality control; participation by all members of the organization; education and training in quality; quality control activities; quality audits; and utilization of statistical methods.

In the past decade, many researches have been studied quality management (QM) to identify a number of methods for a successful implementation. QM have been studied in many countries ; Australian industry by Sohal *et al.*[5] and by Beaumont *et al.* [6], United Arab Emirate firms by Badri *et al.*[7], Netherland by Bossink [8], China by Li *et al.*, [9], Thai Jewelry Industries by Jirapattarasilp [10], India, China and Mexico by Zhao *et al.* [11], USA, China and India by Raghunathan *et al.*[12], East and West Countries by Dahlgaard *et al.*[13], , Therefore, various studies have been carried out for the identification of those successful and well-known available methods to achieve the objective of quality management.

The quality management practice has identified many elements. All elements aim to assist and be part of basic for quality management. The ten elements of quality management practice are a framework for this study as following.

1. Quality management policy: Policy and planning for quality with documentation.
2. Quality management methodology: Work planning, Standard procedure, reword system are parts of quality management
3. Top management involvement: this is the major factor to drive quality management. Top leaders should involve in quality planning, objective setting and documenting.
4. Quality activity: The support circle to create the companywide participating in quality issues.
5. Quality tool techniques for management in organization: The scientific techniques used for problem solving and improvement
6. Human oriented quality management: The human resource management to support the people ability in quality management.
7. Team working: The basic for worker participating in working together to create and maintain quality management.

8. Data collection and analysis: The main data and information is well organized and document, in order to use for managerial decision making.
9. Process management: The process is managed properly with good plan, control, and improvement down to operating level.
10. Cost control and product management: The cost is continuously reduced and controlled. The standard of product design and new technologies and techniques are used to improve the organizations.

The quality management also extends the application to several industries. The electrical-electronics industries were selected to studied and presented because they are lead-import industry in Thailand. However, the current applications of quality management gain the difference level in practices especially small and medium enterprises (SMEs). The objective of the research is to study the characteristics of quality management practice and their implementation in SMEs of electrical and electronics manufacturer.

II. METHODOLOGY

The study focus quality management practice approach in the following areas: quality policy and administration, quality management, top management commitment, workers suggestion, quality activity, quality tools, quality oriented management, team working, data analysis, process control, human development, cost control and product management.

The data was generated through distribution of questionnaire survey among randomly selected 200 electrical-electronic companies that small and medium enterprises operating throughout Thailand. The questionnaire was divided into ten section of quality management element and based on five level of Likert-scale. The returned questionnaires were highly reliable according to the Cronbach's α coefficient 0.932. One hundred and twenty eight valid responded answers from the electrical-electronics industry were received, representing a response rate close to 64 percent, which are on the high side for survey of this type. The data was analyzed by arithmetic mean, standard deviation. The mean was interpreted as degree of implementation in quality management elements as follows: 4.50-5.00 = complete, 3.50-4.49 = most, 2.50-3.49 = moderate, 1.50-2.49 = less, 0.00-1.49 = least.

III. RESULTS AND DISCUSSION

A total of One hundred and twenty eight electrical-electronics SMEs answered the questionnaire. Table I show the percentage of the firms by employees and ages. With respect to number of employees in electrical-electronics firms, 1-50 employees is 6.3%, 51-100 employees is 12.5%, 101-200 employees is 23.4% and over 200 employees is 57.8%. Also the ages of electrical-electronics firms as flowing: 1 to 3 years is 3.1%, 4 to 6 years is 15.6% , 7 to 10 years is 27.3%, and over 10 years is 53.4 %.

Table I. Characteristics of electrical-electronics SMEs firms

Item	Amount	%
Number of employee		
1 – 50	8	6.3
51 – 100	16	12.5
101 – 200	30	23.4
> 200	74	57.8
Total	128	100
Firm Age		
1-3	4	3.1
4-6	20	15.6
7-10	35	27.3
>10	69	53.9
Total	128	100

Table II: Quality management practice results
Electrical-electronics SMEs

Description	Mean	S.D.
a. Quality management policy	3.73	- most
•Quality documentation in all process	3.83	0.75 most
•Quality management document distribution to all employees	3.63	0.79 most
b. Quality management method	3.21	- moderate
•Objective setting in all process	3.95	0.91 most
•Standard work instruction in all processes	4.34	0.75 most
•Employee training all of the year	3.53	1.09 most
•Money reward for quality output	2.75	1.40 moderate
•Recognition as reward for quality	2.72	1.44 moderate
•Quality competition between units	2.58	1.53 moderate
•Yearly bonus related to work quality	2.62	1.30 moderate
c. Top management involvement	3.67	- most
•Quality policy and objective planning	3.63	1.11 most
•Quality documentation	3.59	0.96 most
•Operation involvement such as quality system examination meeting	3.80	0.85 most
d. Quality Activity	3.15	- moderate
•Quality control operations	3.81	0.84 most
•Quality control circle(QCC)	3.13	1.03 moderate
• Job rotation for quality working	2.51	1.14 moderate
e. Quality tool techniques	2.93	- moderate
•Check sheet	3.95	1.15 most
•Histogram	2.15	1.32 less
•Pareto	3.16	1.20 moderate
•Cause/effect diagram	3.03	1.28 moderate
•Scatter Diagram	2.46	1.40 less
•Control Chart	2.84	1.26 moderate
f. Human oriented quality management	3.09	- moderate
•Self development	3.27	1.00 moderate
•On job training	3.66	0.71 most
•QCC& suggestion	3.04	1.31 moderate
•Guest lecturing and in-house training	2.55	1.00 moderate
•Training outside company	2.91	0.78 moderate

Table II: Quality management practice results
Electrical-electronics Industrials-SMEs (cont.)

Description	Mean	S.D.	
g. Team working	3.12	-	moderate
•Team working atmosphere	3.40	1.04	moderate
•Team for companywide quality improvement	3.32	1.11	moderate
•Team based reward	2.63	1.32	moderate
h. Data collection and analysis	3.81	-	most
•Customer detail	3.84	0.79	most
•Product detail	4.03	0.65	most
•Customer satisfaction	3.57	1.01	most
i. Process management	3.96	-	most
•Work procedures in all process	4.41	0.72	most
•Work reception from customer	3.96	0.78	most
•Management following policy	4.14	0.84	most
•Daily management	3.89	0.72	most
•Cooperating work improvement	3.88	0.79	most
•Work improvement in operating	3.49	0.97	moderate
j. Cost control and product development	2.78	-	moderate
•Searching for new problem solving technology and techniques	3.52	0.92	most
•Budgeting for cost control improvement project	3.10	1.22	moderate
•Report periodically checking and project evaluation as planned	3.32	1.02	moderate
•Standardization for product design	1.90	1.91	less
•Data management for product development	2.03	1.91	less

The results showed that the electrical-electronics industries are found the most implement quality management practice by the following approaches: quality management policy, top management involvement, data collection and analysis, and process management. The results of average and deviation data for quality management approaches are shown in the following Table II.

The most implementation in quality management practice of the electrical- electronics industries were mostly quality management practice in quality documentation in all process and quality management document distribution to all employees, objective setting and standard work instructions in all processes and employee training all of the year, all of detail in top management involvement, quality control operations, using check sheet, on the job training, all detail of data collection and analysis, all of detail in process management except work improvement in operating level, and searching for new problem solving. On the other hand, the companies were less implementation in using Histogram and Scatter diagram as quality tool, Standardization for product design, Data management for product development.

Then, the results were showed that Process management, Data collection and analysis, Quality management policy and Top management are the most area of application showed most implementation, respectively. On the other hand, the least QM is the Cost control and product development. It

means that the electrical and electronics SMEs should be improving processes and implementation in that area especially *Standardization for product design* and *Data management for product development* which there are weakness of SMEs.

The finding was found that most factories were on preparation section and also went on the process of quality. It was found that *Quality management policy, Top management involvement, Data collection and analysis, and Process management* made important of quality management in much level where as other variable were rate in moderate level as Deming [1] and Juran [2] commented. According to ISO 9001(2000) and Deming prize, leadership of top management, was set to be one of the requirement in the quality assurance. Thus, top management need to have much attention on these activities, to be sincere to develop the quality system and work hand in hand with personnel to promote the system and also personnel.

This study has some recommendation that the both electrical- electronics industries SMEs should be continuing improve quality management processes. The application and implementation of quality management can be used in all parts of organizations. The quality management participation and integration were required in various parts in company. Thus, not only the top management involves quality management but also needs to realize all processes that quality management will be available to improve processes and to meet the need of customer. In order to improve for implementation of quality management in company, it is important that changing needs consideration towards an organization culture.

IV. CONCLUSION

The electrical-electronics SMEs are found to implement QM element mostly by the following approaches: Quality management policy, Top management involvement, Data collection and analysis, and Process management. This industries were most QM details in Quality documentation in all process and Quality management document distribution to all employees, Objective setting, Standard work instructions in all processes and Employee training all of the year, all of details in top management involvement, quality control operations, using check sheet, on the job training, all details of data collection and analysis, all of detail in process management except work improvement in operating level, and searching for new problem solving. The less implementation of QM in The electrical- electronics SMEs were using Histogram and Scatter diagram as QC tool, Standardization for product design, Data management for product development.

REFERENCES

- [1] Deming, W.E. [1982], *Out of the Crisis*, MIT Press, Cambridge, MA, USA.
- [2] Juran J.M. and Godfrey, A.B., 1999. *Juran's Quality Handbook* (5th Edition). McGraw-Hill
- [3] Ishikawa, K. [1985], "What is total quality control?", *The Japanese Way*, Prentice-Hall, Englewood Cliffs, NJ, USA., in Lu, D. (trans.).
- [4] Kume, H. [1995], *Management by Quality*, 3A Corporation, Tokyo, Japan
- [5] Sohal, A.S., Ramsay, L., Samson, D. (1992), "Quality management practices in Australian industry", *Total Quality Management*, Vol. 3 No.3, pp.283-99.
- [6] Beaumont, N.B., Sohal, A.S., Terziovski, M.[1997], "Comparing quality management practices in Australian service and manufacturing industries", *International Journal of Quality & Reliability Management*, Vol. 14 No.8, pp.814-33.
- [7] Badri, M.A., Davis, D., Davis, D. [1995], "A study of measuring the critical factors of quality management", *International Journal of Quality & Reliability Management*, Vol. 12 No.2, pp.36-5
- [8] Bossink, B.A.G [2002], "Innovative quality management practices in the Dutch construction industry", *International Journal of Quality & Reliability Management*, Vol. 19 No.2, pp.170-186.
- [9] Li, J. H., Anderson, A.R., Skene, C.P. and Harrison, R.T. [2003] "Total quality management principles and practices in China" *International Journal of Quality & Reliability Management*, Vol. 20 No.9, pp.1026-1050.
- [10] Jirapattarasilp, K. [2006], "The Quality Management Practice in Thai Jewellery Industry" *The 4th AIMS International Conference on Management, December 28-31, Indian Institute of Management, Indore, India*, pp. 724-729.
- [11] Zhao, X., Maheshwari, S.K., Zhang, J. [1995], "Benchmarking quality practices in India, China, and Mexico", *Benchmarking Quality Management and Technology*, Vol. 2 No.3, pp.20-40
- [12] Rughunathan, T.S., Rao, S.S., Solis, L.E. [1997], "A comparative study of quality practices: USA, China and India", *Industrial Management & Data Systems*, Vol. 97 No.5/6, pp.192-200.
- [13] Dahlgaard, J. J; Kristensen, K; Kanji, G. K; Juhl, H. J and Sohal, A. S [1998], "Quality management practices: a comparative study between East and West", *International Journal of Quality and Reliability Management*; Vol. 15 No. 8, pp. 812-826.