

DEVELOPMENT OF A CONCEPTUAL MODEL OF THE FACTORS THAT LEADING TO THE PROBLEM OF USING THE QUALITY TOOLS AND TECHNIQUES: A CURRENT REVIEW

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Abstract

Quality tools and techniques (QTT) is an instrument to assist the continuous improvement activities in the industry. It is the key highlight in the element of a process improvement. There are many companies apply the same QTT but did not give a full explanation on how to use and some do not have the experience to use it. In fact, the QTT need to use in the right way because it can give negative input if it used in the wrong way. This research review and analyzes the factors that leading to the problem of using the QTT. Based on a comprehensive literature review, six constructs had been identified that consist of 25 factors. Finally, the conceptual model being developed to show the factors leading to the problem of using the QTT.

Keywords--Quality tools and techniques (QTT)

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INTRODUCTION

Quality is the degree of excellence and based on the Cambridge University Press written by Triupathi R. Chandrupatla, the customer acknowledges the quality as fit to use, finish, appearance, function and performance. This entire element is important to the customer. That is why industry takes the element as an important issue of quality. Based on Basu (2004), Quality is having many different perspectives such as "Fitness for purpose", "right first time", "conformance of the products" and "value for money".

Quality tools are defined as what method and skills that can be used to enable the improvement to achieve the quality product in manufacturing industry. Refer to Basu (2004), a single tool can be defined as a method that has a clear function. There are many tools that has been identified. For instance, histogram, Ishikawa diagram, Pareto analysis, control chart, relationship diagram and flow chart. Each of these tools has their own function. Besides, in quality tools there are seven basic Quality tools and seven new quality tools. Magar.V and Dr. Vilas B Shinde (2001) list the seven QC tools which are Pareto diagram, cause & effect diagram, histogram, control charts, scatter diagram and graphs. The seven new quality tools are affinity diagram, interrelationship diagrams, tree diagrams, matrix diagram, matrix data analysis, process decision program charts and arrow diagrams.

A technique has more spacious application than a tool. A technique needs for a better understanding, knowledge, training and skills when to use it. However, a technique can be defined as an accumulation of tools. For instance, in Statistical Process Control (SPC) there are many types of tools such as histograms, bar chart, graph and control chart. Basu (2004) has said that the example of the techniques is SPC, benchmarking, quality function deployment, failure mode and effects analysis, design of experiments and self-assessment. Besides, Dale and McQuater (1998) have described the definition of techniques. It can be defined as a clarified as a comprehensive, integrated approach to problem solving, based on the usage of several supporting tools. From the meanings that have been explained the tools and techniques are important in order to make a continuous improvement in the industry. Quality tools and techniques (QTT)

are used in industry as an integral part of a quality improvement process. The manufacturing industries implement the application of quality tools and techniques to maintain a good production in their company. Besides, manufacturing industry also implements the quality tools and techniques (QTT) to ensure that the quality improvement activities are continuously occurring in their company. However, the problem might be occurred when apply the QTT in industry and not all workers understand the concept of QTT. This study is conducted to identify the factor that leading to the problem of application of QTT.

LITERATURE REVIEW

This study was conducted to review the factor leading to problem for the implementation of quality tools and techniques (QTT) at manufacturing industry. At the end of the review, this paper will suggest the conceptual framework to show the factors from previous study.

There are 14 references found that discussed on these factors. Table 1 shows the list of factors from previous study.

Table 1. Factors from previous study

Bil	Title of Journal	Factor leading the problem of application QTT
1	Six-sigma to Operational Excellence: Role of tools and techniques. [5] (J1)	<ol style="list-style-type: none"> 1. Inadequate training 2. Management commitment of resource 3. Employee mind-set 4. Poor application of tools and techniques
2	What are the advantages and limitations of different quality and safety tools for health care?[17]	<ol style="list-style-type: none"> 1. Lack of data

	(J2)	
3	A review of Quality Engineering Tools and techniques Practices in Malaysia's and Indonesia's Automotive Industries. [16] (J3)	<ol style="list-style-type: none"> Poorly designed training and support Inappropriate use of tools and techniques Poor measurement and data handling Lack of confidence in potential benefits prevents some companies from trying to implement quality tools Problems in determining how to choose from of existing tools Lack of clear understanding by people regarding when, where and how to apply the tool
4	Structure and applicability of quality tools: decision support for the application of process control and improvement techniques. [21] (J4)	<ol style="list-style-type: none"> Lack of (top) management commitment Lack of training/skills Lack of understanding of tools and concepts Tool not appropriate for situation Unreliable data Tools used for the wrong purpose Misfit between tools and relevant functions
5	Assessing the Awareness and Usage of Quality Control Tools with Emphasis to Statistical Process Control (SPC) in Ethiopian Manufacturing Industries.[6] (J5)	<ol style="list-style-type: none"> Lack of awareness from top management Lack of motivation of top management Shortage of man power in the area
6	Classification and Application of Problem-Solving Quality Tools. [11] (J6)	<ol style="list-style-type: none"> Not knowing what quality tool to use Using a quality tool incorrectly Using a quality tool for wrong the application Not knowing when to use a quality tool Not using one of

		the quality tools when one is needed
7	Critical Success Factors for Implementing Quality Engineering Tools and Techniques Malaysian's and Indonesian's Automotive Industries: An Exploratory Study. [20] (J7)	<ol style="list-style-type: none"> Lack of knowledge about the tools Poor measurement system and data handling Sense of quality of operator still low Lack of management commitment Lack of statistical knowledge Lack of understanding of the potential benefits of the tools Lack of education and training Lack of resources Poor attitude towards quality improvement Lack of teamwork and cooperation Lack of communication Lack of awareness of tools and techniques available Lack of quality system
8	Comparison of Quality Engineering Practices in Malaysian and Indonesian Automotive Related Companies. [19] (J8)	<ol style="list-style-type: none"> Lack of understanding Top management is less active in conducting direct observations
9	The use of Quality Management tools and techniques in ISO 9001:2000 certified companies: the Greek case. [8] (J9)	<ol style="list-style-type: none"> Lack of understanding when, where and how to apply Lack of training
10	The uses of continuous improvement techniques: A survey-based study of current practices. [13] (J10)	<ol style="list-style-type: none"> The support of top management and the motivation and commitment of the work force Insufficient training,
11	Implementing Quality: A practical Guide to Tools and Technique: Enable the Power of Operational Excellence. [4]	<ol style="list-style-type: none"> Inadequate training Management commitment of resources Employee mind-set

	(J11)	4. Poor application of tools and techniques
12	Implementing Six Sigma and Lean. [3] (J12)	1. Inadequate training
13	The use of Quality Management Tools and Techniques: A study of application in everyday situations.[2] (J13)	1. Insufficient training 2. Mind-set
14	Using Quality Tools and Techniques Successfully. [15] (J14)	1. Poorly designed training and support 2. Resistance to the use of tools and techniques 3. Inappropriate use of tools and techniques 4. Poor measurement and data handling

12	Lack of understanding tools, concepts and benefit of the tools	3 (J4, J7, J9)
13	Lack of knowledge about the tools	1 (J7)
14	Inadequate training	9 (J1, J3, J4, J7, J9, J10, J11, J12, J13, J14)
15	Shortage of manpower in the area	1 (J5)
16	Unreliable data	1 (J4)
17	Poor measurement and data handling	3 (J3, J7, J3)
18	Lack of statistical knowledge	1 (J7)
19	Employee mind-set	3 (J5)
20	Lack of confidence	1 (J1, J11, J13)
21	Sense of quality of operators still low	1 (J7)
22	Poor attitudes towards quality improvement	1 (J7)
23	Lack of teamwork, cooperation and communication	1 (J7)
24	Lack of awareness of tools and techniques	1 (J5)
25	Lack of quality system	1 (J7)

There are 56 factors found from the above references. However, there are several factors are found repeated in several journals. Thus, through the screening process duplicate factors are removed. Finally, there are 25 factors left that leading to problem for the implementation of QTT. Table 2 shows the list of factors from previous study after combining the duplicate.

Table 2. Compilation of factors

No	Factors	Frequency of Occurrence
1	Management commitment of resource	2 (J1, J11)
2	Lack of resource	1 (J7)
3	Lack of top management	5 (J4, J6, J7, J8, J9)
4	Lack of awareness and motivation from top management	1 (J5)
5	Poor application of tools and techniques	2 (J1, J11)
6	Inappropriate use of tools and techniques	2 (J3, J14)
7	Problems in determining how to choose the existing tools	1 (J3)
8	Not knowing when, where and how to apply the tools	2 (J6, J6)
9	Tools used for the wrong purpose	1 (J4)
10	Misfit between tools and relevant functions	1 (J4)
11	Not using one of the quality tools when one is needed	1 (J6)

FINDINGS

From above findings, there are several factors are found to have a similar focus. For example, the unreliable data and poor measurement and data handling are mainly referring to the lack of data. Thus, the clustering of those factors apparently could narrow the focus. Therefore, all factors above had been re-arranged through the one of seven New Quality Tools called Affinity Diagram. This tool is used to systematically segregate all 25 factors into a group and a new header of that group is created as shown in Table 3.

Table 3. New header of factor

No	New header	Factor leading to problem for the application of QTT
1	People management	Inadequate training
		Shortage of manpower in the area
2	Lack of Data	Unreliable data
		Poor measurement and data handling
3	Employee empowerment and involvement	Lack of awareness of tools and techniques
		Lack of teamwork, cooperation and communication
		Poor attitudes towards quality improvement

		Sense of quality of operators still low
		Lack of confidence
		Employee mind-set
4	Resource Management	Management commitment resource
		Lack of resources
5	Management responsibility	Lack of top management
		Lack of awareness and motivation from top management
		Lack of quality system
6	Information & knowledge of QTT	Lack of statistical knowledge
		Lack of understanding tools, concepts and benefits of the tools
		Poor application of tools and techniques
		Inappropriate use of tools and techniques
		Problems in determining how to choose the existing tools
		Not knowing when, where, and how to apply QTT
		Tools used for the wrong purpose
		Misfit between tools and relevant functions
		Not using one of the quality tools when one is needed
Lack of knowledge about the tools		

J5	X		X	X		
J6					X	
J7	X	X	X	X	X	X
J8				X	X	
J9	X				X	
J10	X			X		
J11	X		X		X	X
J12	X					
J13	X		X			
J14	X				X	
TOTAL	11	4	6	5	9	3

CONCLUSION

The conceptual framework that proposed in this study is the draft for the factor that leading to problem for the application of QTT. It becomes a quick view and a guideline for the industries to refer, thus the problems can be avoided to ensure the QTT can be implemented successfully. From the framework, the questionnaire can be developed. It is to confirm the model from the perspectives of industries in Malaysia.

Finally, after going through the clustering analysis by using the Affinity Diagram and new header mapping versus sources as shown in Table 4, authors had proposed in a structured manner on a new conceptual model based on the factors that leading to the problem of using the QT as shown in Figure 1.

Table 4. Mapping the new header and sources

Journal and new header	People management	Lack of data	Employee empowerment and involvement	Management responsibility	Information & knowledge of QTT	Resource Management
J1	X		X		X	X
J2		X				
J3	X	X	X		X	
J4	X	X		X	X	

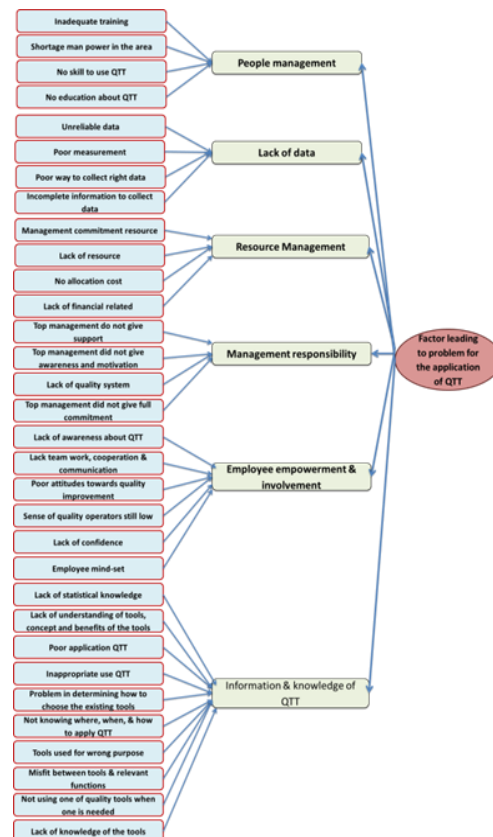


Figure 1. Conceptual Model

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