

## QUALITY MANAGEMENT SYSTEM DESIGN FOR SUSTAINABLE EXCELLENCE: AUTOMOTIVE PARTS INDUSTRY

Patchara Kriangkrai<sup>1\*</sup>, Seree Chadcham<sup>1\*</sup>, and Sarayuth Chokchaiworarat<sup>2\*</sup>

<sup>1</sup>*The College of Research Methodology and Cognitive Science, Burapha University, Chonburi 20131, Thailand*

<sup>2</sup>*Graduate School of Commerce, Burapha University, Chonburi 20131, Thailand*

### ABSTRACT

The main objective of this paper is to present current standard and tools in quality management system for automotive industry. Although TQM, Six Sigma and Lean are one of the methods for automotive parts manufacturers to reach their business goals, most manufacturers would prefer the method that focuses mainly on the clients' satisfaction. This article will suggest quality management system for particular automotive parts industries, ISO/TS 16949: 2009 and TQM, which is the standard system that is widely used and acceptable. The standard systems that are accepted in the U.S.A and EU are MBNQA and EFQM respectively. Various research studies indicated that these two standard systems are easily applied to align with technical differences for each business.

**Keywords:** Quality management system, automotive industry, TQM, MBNQA, EFQM

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\* Author e-mail address: kriangkraipat@gmail.com, Chadcham@buu.ac.th, Sarayuth\_chok@yahoo.com

## Introduction

Nowadays 'quality' is everything for a business. If a business has quality product or service, it will benefit that organization in every way. Quality control, quality development, quality product or quality service are all vital to the organization as they are the drives for improvement and production, which will result in clients' satisfaction. Then clients' satisfaction results in company's profit which will encourage human resource development within the organization at the end.

## Review of the literature

In this paper, authors reviewed research articles concerning the definition, the importance, and result of implementation of quality management system regarding to automotive industry. The Evolution of Quality Management Concept can describe as following: (Juran, 1999, Bon & Mustafa, 2013)

1. Fitness to standard – all products must adhere to high quality standards to compete in the market.
2. Fitness to Use – all products must serve the purpose.

3. Fitness to Cost – all products should fit the concept of 'low capital, high yield cash'.

4. Fitness to Implied Needs – all products are useful for the clients in the unpredicted future.

The most well known automotive industry management system is ISO/TS16949:2009 which was developed from the manufacturing management system that decreased the variance and damages in supply chain. This standard was set up based on ISO 9001 which has included other client requirements (IATF, 2009). A highly competitive market drives businesses to improve and apply

their production processes which are targeted at the technical requirement of the product. Certainly, business measurement of the production success is profit margin, not the quality. In the past 20 years, there have been more than a thousand organizations competing in Baldrige Award and EFQM Award but only 10% made and achieved it. Why? There is one theory that was based on MBNQA, EFQM (Bou-Llusar, Escrig-Tena, Roca-Puig, & Beltrán-Martín, 2009; Karastathis, Afthinos, Gargalianos, & Theodorakis, 2014). The application of TQM (Total Quality Management) increases production and client relationship competency (Agus & Hassan, 2011; Santos-Vijande, & Alvarez-Gonzalez, 2007). This idea, created after the World War II by W. Edwards Deming, was meant to improve the production process and service but it was not widely introduced in the U.S. until 1950. At that time, Japan, facing problem with their products below par, started applying TQM with their industries until their products became acceptable and sought after in the market.

## What is TQM?

Total Quality Management: TQM is a 1939 developed system based on Statistical Quality Control: SQC and Statistical Process Control: SPC. In 1950, Dr. William Edwards Deming (1946-1993) worked through the Japanese Union of Scientist and Engineers (JUSE) to establish Quality Control Circle (QCC) using the statistical methods which focused on quality and cycle time. His methods were so successful that the Deming Prize was set up in his honor for helping the country's industry (Oakland, 2014). The Deming cycle is presented below.

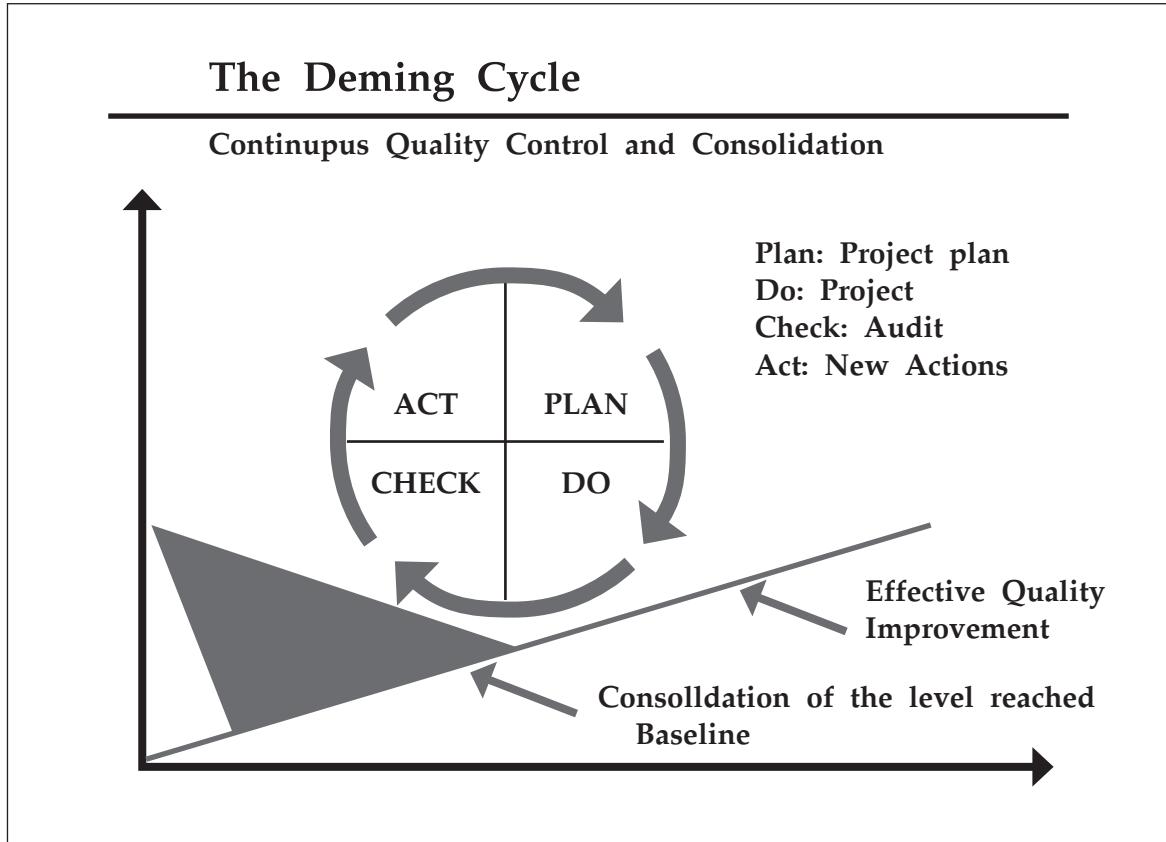


Figure 1 Deming Cycle: continuous Quality Control and Consolidation (Spalding, 2016)

Total Quality Management (TQM) is a people-focused management system because it mainly changes the way people operate in the organization. A variety of definitions of total quality management have been offered over the years. Reviewing previous contributions (Agus & Hassan, 2011; Santos-Vijande, & Alvarez-Gonzalez, 2007; Corredor, & Goñi, 2011) a dominant insight among experts seems to define TQM as an approach to management characterized by some guiding principles or core concepts that embody the way the organization expected to operate, which, when effectively linked together, will lead to high performance. The TQM has the necessary strategy and technical management system including the philosophy and tools to solve the industry problem, which was caused by production

and market volatile (DL, 2008).

Dire circumstances and competition in the world market force businesses to rethink how they should operate their industry with TQM, seeing that it has helped increase the production and client relation efficiencies in Japan and other countries around the globe (Agus & Hassan, 2011; Santos-Vijande, & Alvarez-Gonzalez, 2007; Corredor, & Goñi, 2011). Most world class standard quality systems, including TQM, are designed to prevent damages and improve productions. It can be easily adapted and applied to fit the organization needs. TQM will help organization improve their performances, production, marketing, client relation, human resource, finance, etc.

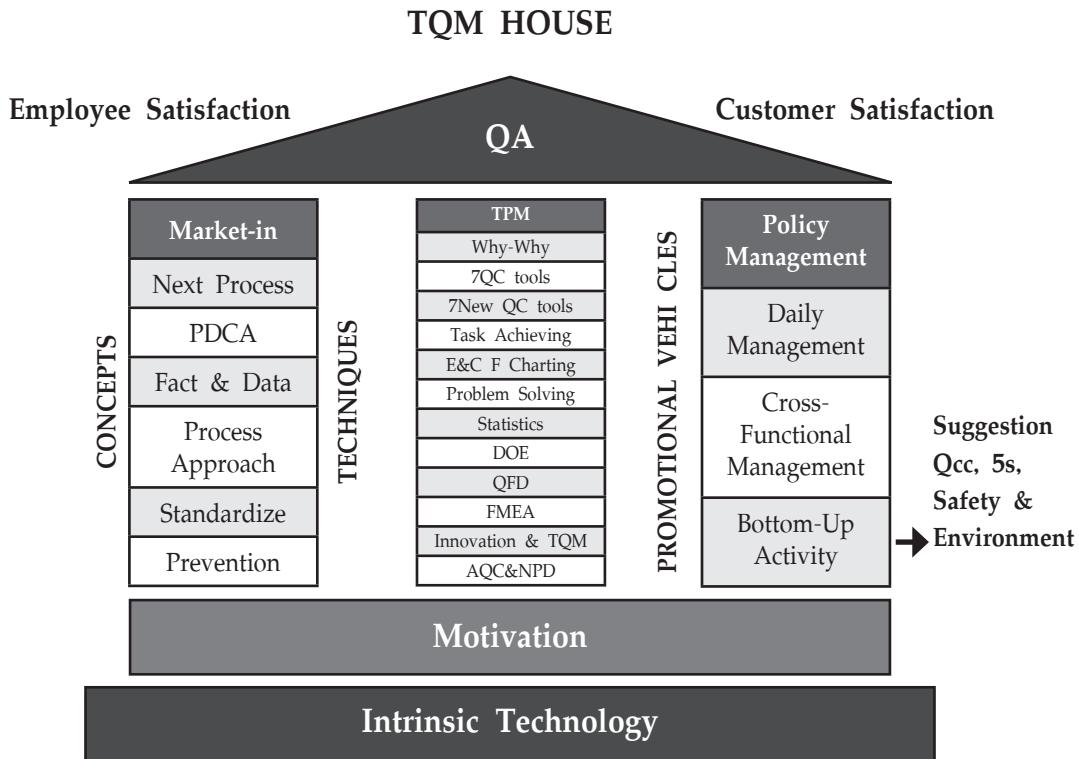


Figure 2 TQM and Supporting factors (What is TQM?, 2016)

The applications of TQM in business and industry are different because the goal and services vary and it becomes difficult for business to measure the success (Juneja, Ahmad, & Kumar, 2011). The number of participants in Thailand Quality Award (TQA) can speak of the TQM efficiency in the business. The winners of the prize usually come from businesses that have used TQM for quite some time.

#### **The Malcolm Baldrige National Quality Award (MBNQA)**

The Malcolm Baldrige National Quality Award (MBNQA) is the most well known award in 1980s when the leaders in each industry group and U.S. government emphasized the product quality to compete in the world market. MBNQA became a benchmark that linked up all the important issues into one, and it was recognized for being easily applied to private sector, education and health sectors. MBNQA is based on TQM and is a tool used to evaluate organizational performance and award top performers (Kleindorfer, Singhal, &

Wassenhove, 2005). This special prize is similar to Deming Prize of Japan which was created by the Japanese Congress in 1987 to honor the Secretary of Ministry of Commerce, Mr. Malcolm Baldrige.; Mr. Baldrige was a supporter of the quality management concept which he had foreseen that it would be the vital key to improve the country's economy. According to Prybutok, Zhang, and Peak (2011), their study examines the government sector applicability of the MBNQA 2002 criteria and contributes to the growing body of literature that addresses the need for performance metrics for organizations. This study demonstrates that local governments usually have positive leadership and data analysis skills which align with MBNQA 2012 model. These measures can enhance decision making about resource allocations because such measures allow evaluation of processes and a better understanding of the integration among these processes. In the same way, the MBNQA is being proposed and pilot tested in government organizations, and these works provide support for the transference and

application of the model to government services in a municipal government. The findings of the study show that the proposed Malcolm Baldrige National Quality Award (MBNQA) criteria-based instrument provides a viable set of measures for a municipal government to review and measure their business (organization) processes. However, this is also evidenced by Bou-Llusar, Escrig-Tena, Roca-Puig, and Beltrán-Martín (2009) who considered that technical element of MBNQA has strong relationship with component of the EFQM Excellence Model which found from result obviously improved.

**European Foundation for Quality Management (EFQM)**  
EFQM (2015) is agency that evaluates the practice of The EFQM Excellence Model and guarantees

the EFQM standard. EFQM is an organization that supports and educates other agencies in private sector and government sector. The EFQM Excellence Model is a standard to measure and evaluate an organization's capability which mainly covered:

1. Results
2. Approach
3. Deployment
4. Assessment and Review

EFQM management has 2 subcategories:

1. Enablers - working process, human resource management, leadership, organizational policies and strategies, and resources
2. Results - effects on society, clients, employees and organization

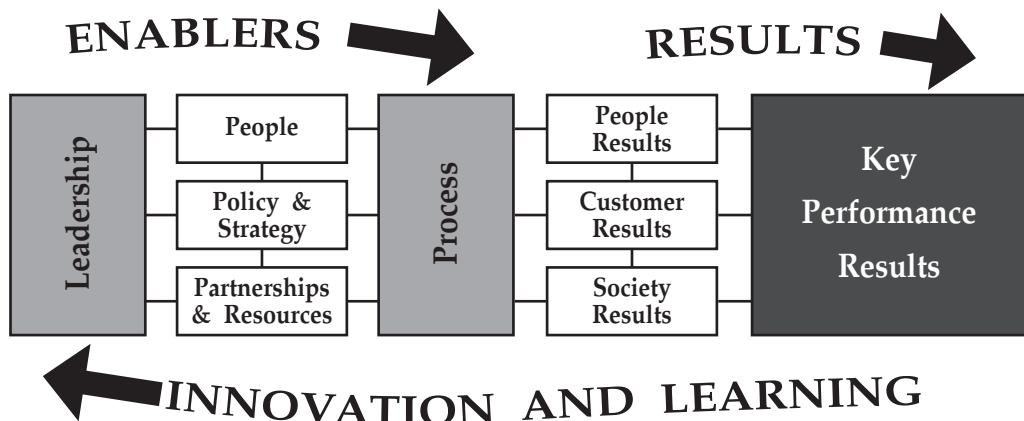


Figure 3 The EFQM Excellence Model (2015)

Any organization wishes to utilize EFQM needs to clearly determine both enablers and results in order to fully improve the management system to the level of excellence. According to Mahalli (2013) EFQM Excellence Model, only good resources and proper allocation make good management. EFQM Excellence Model is a perfect tool for organization improvement (Calvo-Mora., Picón-Berjoyo, Ruiz-Moreno, & Cauzo-Bottala, 2015). In developing countries, applying EFQM Model in a Small and medium sized enterprises (SMEs) gives a more outstanding result than large enterprises (Michalska, 2008; Ismail, Darestani, & Irani, 2011). Beside this, Bou-Llusar, Escrig-Tena, Roca-Puig, & Beltrán-Martín

(2009) have found regulation and framework to apply the MBNQA and organization relations. As a result of literature reviewed, EFQM and MBNQA can be applied in the organization in order to reach continual improvement in organization management system as a roles model.

#### **Automobile Quality Management Systems ISO/TS 16949: 2009**

ISO/TS 16949 Particular requirements for the application of ISO 9001 for automotive production and relevant service part organizations (IATF, 2009), automotive core tool such as Advance Product Quality Planning (APQP), Failure Mode and Effect Analysis (FMEA), Production Part Approval Process

(PPAP), Statistical Process Control (SPC), Measurement System Analysis (MSA) and other automobile quality management systems such as Germany's VDA 6.1, France's EAQF and Italy's AVSQ. (run on ເໝືຍນຕ່ອງໆ ໄນເມື່ອ verb ທັກ) ISO/TS 16949 focuses on client satisfaction. The ISO/TS 16949 can improve automotive parts manufacturers and suppliers in the U.S., Germany, France, Italy, England, Japan etc. The implementation of the system usually takes time to adjust but the results are worthwhile; higher quality products and higher management system. Uniting all the regulations into one single standard system

decreases the different demands and also eliminates the loss of other system implementations.

**The Principle of Quality Management system has included:**

1. Customer Focus
2. Leadership
3. Involvement of People
4. Process Approach
5. System Approach
6. Continual Improvement
7. Factual Approach to Decision Making
8. Mutually Beneficial Supplier Relationship

Table 1 Summary and Comparison of Key Elements for Each standard\*

Key Element	MBNQA: 2014	EFQM : 2015	ISO/TS 16949: 2009	TQM
Leadership	✓	✓	✓	✓
Strategic Planning	✓	✓	✓	✓
Resource Management	✓	✓	✓	✓
Customer and Market Focus	✓	-	✓	✓
Responsibility, authority and communication	-	-	✓	✓
Infrastructure	-	-	✓	-
Management of Production Tooling	-	-	✓	-
Innovation	-	✓	-	✓
Learning	-	✓	✓	✓
Teamwork	-	-	-	✓
Process Management	✓	✓	✓	✓
Partnership	-	✓	✓	✓
Systems Perspective	✓	-	✓	✓
Organizational Performance Results	✓	✓	✓	✓
Quality Management System	-	-	✓	✓
Design and Development	-	-	✓	✓
Purchasing	-	-	✓	-
Information and Analysis	✓	-	✓	✓
Business Result	✓	✓	-	-
Customer Result	-	✓	✓	✓
People Results	-	✓	-	-
Society Results	-	✓	-	-
Improvement	-	-	✓	✓
Benchmarking	-	-	-	✓
Zero-defects	-	-	-	✓

\*Author

### **Summary and Suggestion: Quality Management System Design Caution for Automotive Industry**

In the past 20 years, manufacturers have focused on the products quantity and the usage of the management system, so there has been growing pressure on businesses to pay more attention to the environmental and resource consequences of the products and services they offer and the processes they deploy. Nowadays, the higher market competition pushes manufacturers to focus on clients' requirements, implied need and future expectations. Anyway, the pressure is also from the movement towards triple bottom line reporting (3BL) including the relationship of profit, people, and the planet. In the same way, companies developed their core competencies and included them in their business processes, so the tools and concepts of TQM were applied to develop new product development and to manage supply chains, and they typically involved multi-disciplinary team. The resulting challenges include green-product design, lean and green operations, and closed-loop supply chains (Seuring, & Müller, 2008; Yang, Hong, & Modi, 2011). Therefore, to accomplish what customers need, the design of the quality management system has changed from quantity focus to customer requirements focus. Hence, the organization should focus on the selection of QMS's tools and standard by comparing e between its usefulness and organization's culture. However, ISO/TS 16949 standard is widely applied in automotive industry even in Thailand. MBNQA, EFQM and TQM should be more considered to implement in the organization in order to improve overall business management system and business results.

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