

THE JAPANESE STYLE OF PRODUCTION MANAGEMENT AFFECTING TOTAL QUALITY MANAGEMENT AND CUSTOMER SATISFACTION: A CASE STUDY ON THE BEST PRACTICE ORGANIZATION

Boonyada Nasomboon^{1*}, Boonchoo Tuntiruttanasoontorn^{1*}

¹Faculty of Business Administration, Thai-Nichi Institute of Technology,
Bangkok 10250, Thailand

ABSTRACT

The objectives of this study were: 1) to study Japanese style of production management which affected the management concerning quality, price, delivery and service and 2) to compare employees' and customers' satisfaction with management concerning quality, price, delivery, and services. Data were collected from 370 Thailand Lean Award recipients from 62 organizations using questionnaire as a tool. The statistics used were frequency, percentage, mean, standard deviation, and multiple regression.

The results showed that the 5S (X_1), JIT (X_4) and TPM (X_6) variables affected quality management and they had a 68% predictive power quality. The predicted equation was written as $Y_1 = 1.181 + 0.327 (X_1) + 0.239 (X_4) + 0.187 (X_6)$ and the variables of 5S (X_1), KAIZEN (X_3), JIT (X_4) and TPM (X_6) affected quality management concerning cost reduction, and they had 75 % predictive power quality. The equation was written as $Y_2 = 0.650 + 0.369 (X_1) + 0.175 (X_3) + 0.198 (X_4) + 0.129(X_6)$. The variables of 5S (X_1), JIT (X_4) and KAIZEN (X_3) affected on time delivery, and the predictive power was 56%. The equation was written as $Y_3 = 1.567 + 0.314 (X_1) + 0.219 (X_4) + 0.179 (X_3)$ and the variables of TPM (X_6), 5S (X_1) and JIT (X_4) affected service quality. The predictive power was 60 percent. The equation was written as $Y_4 = 1.181 + 0.327 (X_6) + 0.239 (X_1) + 0.187 (X_4)$.

In addition, the results of the comparison between employees and customers in terms of the satisfaction with the quality management showed that customers were satisfied with the overall quality management at a high level. When being compared, customers were found 10.55 % more positively satisfied than company employees were. In fact, customers were 6.50% more satisfied with service quality management than employees were. Customers were 5.69 % more satisfied with delivery quality management than employees were. Customers were 0.97% more satisfied with cost quality management than employees.

Keywords: Japanese style of production management, total quality management

*Authors e-mail address: boonyada_noi@hotmail.com, boonchoo@tni.ac.th

Introduction

Manufacturing industry especially automotive production was very important in Thailand. In the year 2016, it was found that Thailand was the world's 12th largest manufacturer of motor vehicles and equipment, and the value of exports of automotive products and equipment was over 9.2 billion. Automotive and equipment sales in 2017 were likely to be 2-7% higher than those in 2016 (Kasikorn Research Center, 2017, p. 2). This demonstrated that there was the need for more automotive parts. However, there was to the policy of trade barrier of the new President of the United States. This caused the main countries such as Mexico that imported major parts of Thailand faced a decline in production capacity. As a result, Thailand faced a contraction of export by 2% or about 255 billion baht in export value in 2017. Japan was also a major export market for Thailand. According to the latest information of April 1, 2017, Japanese companies have invested with 1,748 companies in Thailand. 336 companies have been increased since 2016. According to statistics from the Japan Chamber of Commerce, in 2017, there were 1,748 Japanese companies, 44.5% were manufacturing companies. 231 companies accounted for 13.2% were manufacturers of automobiles and their parts (Japanese Chamber of Commerce, Bangkok, 2017).

The policy of the US trade barriers caused Thailand to experience export contraction. In addition to the global automotive industry in the next eight years, automotive part manufacturers had to follow up production technology to consistently improve standards in order to compete to produce products to meet the needs of customers (Kasikorn Research Center, 2017, p. 5). As a result, competitive strategies were established to achieve profitability and survival through proven and effective Japanese manufacturing management practices which had been continuously developed. The focus was on the results which were quality, cost, delivery and service. Every factor was important for goods production and affected the image and the reputation of the company (Ono & Negoro, 1990, p. 46)

Lean operation can be more sustainable and beneficial

to the environment. Lean applications and performance were intertwined (Piercy & Rich, 2014). Lean-Kaizen also helped organizations reduce time in selection of human resources and employment processes (Barraza & Pujol, 2009) while the concept of 5S and the requirements for holistic use were related to lean management. Lean was successful and efficient use of space for continuous organizational development (Randhawa & Ahuja, 2015). In the guidebook, successful organizations using the Lean Quality Management System (LQMS) stated that there had been no major mistakes and no customers' complaints within two years after using these systems (Bacoup, Michel, Habchi, & Pralus, 2017).

Objective of the Study

1. To study the influence of Japanese production management on quality management.
2. To compare employees' and customers' level of satisfaction with quality management.

Literature Review

Lean Management

Lean Management is a way to manage waste. It has been recognized globally as an obvious approach which can be used to develop organizations to be able to compete in the fast changing world. The Thailand Lean Award recognizes outstanding organizations with Lean Management Excellence. The distinctive features of the award are as follows:

1. It is the highest award for operational excellence in Thailand.
2. It is a widely accepted award, especially for the manufacturing and service sectors.
3. It is an award which has the criteria and the correct judging criteria based on Lean Thinking.
4. It is a rewarding process that encourages organizations to continually improve their quality, cost, and speed of delivering products systematically. Lean management is based on the concept of Japanese production management and it is a systematic working style in Japan that helps the customers get an effective and satisfactory products. It also helps to continuously improve and develop processes and products so that the organizations can use resources most effectively

(Boonprasert, 2010). Most Japanese organizations increase their productivity by utilizing Japanese production management tools (Boonget & Nasomboon, 2016, pp. 1394-1396). Japanese organizations focus on corporate growth and long-term performance. They do not just focus on short-term gains. As a result, they have to develop and improve production technology to reduce costs and to strengthen the organization (Lertnaisat, 2015). The components of Japanese style of production management were as follows:

Japanese Style Production Management (Monodzukuri)

It is a systematic Japanese thinking and working style to provide customers effective and satisfactory products and to continuously improve and develop processes and products. As a result, the organizations utilize resources most effectively (Boonprasert, 2010).

5S Activities

These activities are to improve the company's working condition and to facilitate work safety and effectiveness so that the company has quality work. It is the basis for increasing the productivity of the company. (Toyota Motor Thailand Co., Ltd., 2007)

5GEN Principles

They are working principles of Japanese organizations and are used for analysis, planning and problem solving. They are basic management of the facts when problems arise. The staff must first go to the actual place where the operation or activity is taking place. As a result, they obviously know the real situation and can find the causes and solutions to the problems. These should be routinely carried out in the organization (Japan Institute of Plant Maintenance, 2014). They include the GENBA (Actual Place), the GENBUTSU (Actual thing), and the GENJITSU (Actual Condition), GENRI (Basic Theory), and GENSOKU (Fundamental Rules or Regulations)

MUDA

It is a waste in the production process that exceeds the consumers' needs. It is non-value-adding in the production and unnecessary for end-customers. It causes the increase in production cost. It is divided into 7 types: 1) MUDA of over-processing, 2) MUDA of waiting, 3) MUDA of transportation, 4) MUDA of improper movement of employees, 5) MUDA

of storing goods and raw materials, 6) MUDA of motion and 7) MUDA from production or defective work (Saelim, 2010).

Just in Time Production (JIT)

It aims to improve the production process by eliminating MUDA, resulting in continuous resource flow. It creates delivery value to the customers. It utilizes the utmost labor and machine resources. It will produce only what it needs. Just in time is in line with the MUDA concept to eliminate waste. (Sawada, 2007, p. 9)

KAIZEN

It is a concept to change and improve the way we work in the company. It emphasizes the three principles: quit, reduce and change unnecessary steps. The key is to constantly improve the efficiency of management (Buddharacha, 2009).

Total Productive Maintenance (TPM)

It is a system that prevents the waste by making Genba-Genbutsu (actual place and actual thing). The goal of TPM is to drive all waste to zero: Zero Accidents, Zero Defects, and Zero Failure. It is activities in which every sector has to participate. No matter they are senior executives or the real workers, they have to achieve Zero Waste Control of the 8 pillars of TPM which include 1) Focused Improvement, 2) Autonomous Maintenance, 3) Planned Maintenance, 4) Early Equipment Management, 5) Quality Maintenance, 6) Education and Training, 7) Management Efficiency, and 8) Safety and Environmental Management (Japan Institute of Plant Maintenance, 2014).

Total Quality Management (TQM)

Its goal is to focus on quality first because nowadays more and more organizations are competing. "Quality" becomes an important strategic point to strengthen the competitiveness. It is acceptable in both the enterprise level and the national level under the economic environment in the present world (Lueprasitsakul, 1998: p. 1). Making a difference is a stronger competition strategy. It's not just about making products different from competing companies, but it's also making the difference in quality concerning delivery as well as customer service (Ono & Negoro, 1990, p. 48).

Customer Satisfaction

Satisfaction is a process resulting from the recognition of the management quality as what the service users expect from the service. The ways to satisfy customers are as follows: 1) adequately manage the service to satisfy the needs of the service recipients, 2) provide fair service and equitable arrangements, 3) continuously manage the service

without any interruptions or stoppage, resulting in users' inconvenience, 4) continuously provide service timely according to the urgency and the need of the service. (The heart of the service is the time. When there is mistake, it will hurt business), 5) progressively develop the service in term of quality and quantity in order to improve service quality (Millet, 1954, pp. 397-400).

Conceptual Framework

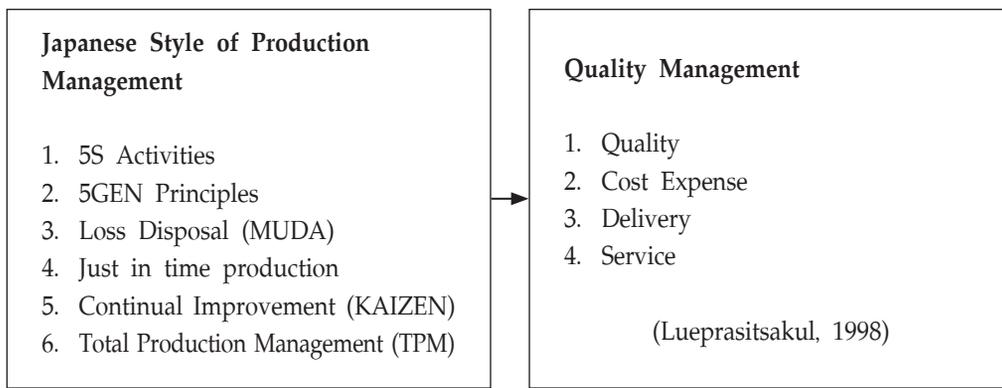


Figure 1 Research framework

Hypotheses

1. Japanese style of production management affects quality management.
2. Satisfaction with quality management of customers and employees is at the high level.

Methodology

The samples used in this study were divided into 2 groups. The first group was all 370 employees in the organizations. The researcher was allowed to collect the data by cooperating with Human Resources Department to distribute the questionnaire in a sealed envelope. A total of 370 copies of questionnaires or 100 % were collected by the researcher. The second group was customers from 69 organizations which purchased products from the company for more than 5 years. Researchers were allowed to collect information by submitting questionnaires to customer relations. Only 62 respondents or 89.85% returned the questionnaires. The questionnaires were prepared under the concept

of theory and review of relevant researches. 5 point Likert Scale questionnaires were approved by 3 experts. The correlation coefficient was found at 0.95-1.00. The correlation coefficient value should be at 0.50 (Pongwichai, 2013). The reliability of the questionnaire was tested with 50 samples and the reliability was found at 0.751 to 0.963. The reliability of questionnaire should be higher than 0.70 (Santos, 1999). Two sets of questionnaires were invented. The first set was questionnaires for employees used to measure Japanese production management concerning 5S, 5GEN, Muda, Just in Time, Kaizen, Total Productive Maintenance, and Quality Management of price, delivery, and services. The second set was questionnaires for customers to measure their satisfaction with quality, cost of delivery and services.

The data analysis was done through statistical packages and the statistics used were Frequency, Percentage, Mean, Standard Deviation, Pearson's Correlation Coefficient and Multiple Linear Regression at the significance level of 0.05.

Results

Hypotheses 1. Japanese style of production management affects quality management.

Hypotheses 1.1 Japanese Style of Production Management affecting Quality.

The results in Table 1 showing that the variables

with the highest regression coefficients were 5S (X_1), JIT (X_4) and TPM (X_6) respectively. These variables can predict the Quality (Y_1) at the significance level of 0.01. The predictive power (R^2) was 47.30%. The correlation coefficient (R) was 0.688. The equation could be written as follows:

$$Y_1 = 1.181 + 0.327 (X_1) + 0.239 (X_4) + 0.187 (X_6).$$

Table 1 The results of the analysis of good predictive variables of Japanese Style of Production Management affecting Quality.

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	b	SE _b	β			Tolerance	VIF
(Constant)	1.181	0.171		6.923	0.000**		
5S	0.327	0.044	0.334	7.374	0.000**	0.700	1.429
JIT	0.239	0.046	0.267	5.218	0.000**	0.551	1.815
TPM	0.187	0.043	0.224	4.345	0.000**	0.540	1.851
R = 0.688 R ² = 0.473 SE _{est} = 0.420 F = 109.496							

Remark : ** 0.01 level of significance

Hypotheses 1.2 Japanese Style of Production Management affecting Cost.

The results in Table 2 showing that the variables with the highest regression coefficients were 5S (X_1), KAIZEN (X_3), JIT (X_4) and TPM (X_6) respectively.

These variables can predict the Cost (Y_2) at the significance level of 0.01. The predictive power (R^2) was 56.30%. The correlation coefficient (R) was 0.750. The equation could be written as follows:

$$Y_2 = 0.650 + 0.369 (X_1) + 0.175 (X_3) + 0.198 (X_4) + 0.129 (X_6)$$

Table 2 The results of the analysis of good predictive variables of Japanese Style of Production Management affecting Cost.

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	b	SE _b	β			Tolerance	VIF
(Constant)	0.650	0.166		3.920	0.000**		
5S	0.369	0.043	0.356	8.554	0.000**	0.691	1.448
KAIZEN	0.175	0.048	0.202	3.623	0.000**	0.386	2.593
JIT	0.198	0.046	0.208	4.286	0.000**	0.507	1.973
TPM	0.129	0.050	0.145	2.582	0.010**	0.379	2.639
R = 0.750 R ² = 0.563 SE _{est} = 0.406 F = 117.568							

Remark : ** 0.01 level of significance

Hypotheses 1.3 Japanese Style of Production Management affecting Delivery.

The results in Table 3 showing that the variables with the highest regression coefficients were 5S (X_1), JIT (X_4) and KAIZEN (X_5) respectively.

The predicted quality of delivery (Y_3) was statistically significant at 0.01. The predictive power (R^2) was 31.50%. The correlation coefficient (R) was 0.561. The equation could be written as follows:

$$Y_3 = 1.567 + 0.314(X_1) + 0.219(X_4) + 0.179(X_5)$$

Table 3 The results of the analysis of good predictive variables of Japanese Style of Production Management affecting Delivery

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	b	SE _b	β			Tolerance	VIF
(Constant)	1.567	0.225		6.970	0.000**		
5S	0.314	0.058	0.278	5.373	0.000**	0.700	1.429
JIT	0.219	0.060	0.211	3.620	0.000**	0.551	1.815
KAIZEN	0.179	0.057	0.185	3.158	0.000**	0.540	1.851
R = 0.561 R ² = 0.315 SE _{est} = 0.552 F = 56.175							

Remark : ** 0.01 level of significance

Hypotheses 1.4 Japanese Style of Production Management affecting Service.

The results in Table 4 showing that the variables with the highest regression coefficients were TPM

(X_6), 5S (X_1) and JIT (X_4) respectively. At the significance level of 0.01, the predictive power (R^2) was 36.10%. The correlation coefficient (R) was 0.601. The equation could be written as follows:

$$Y_4 = 1.181 + 0.327 (X_6) + 0.239 (X_1) + 0.187 (X_4).$$

Table 4 The results of the analysis of good predictive variables of Japanese Style of Production Management affecting Service

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	b	SE _b	β			Tolerance	VIF
(Constant)	1.181	0.171		6.923	0.000**		
TPM	0.327	0.044	0.334	7.374	0.000**	0.700	1.429
5S	0.239	0.046	0.267	5.218	0.000**	0.551	1.815
JIT	0.187	0.043	0.224	4.345	0.000**	0.540	1.851
R = 0.601 R ² = 0.361 SE _{est} = 0.531 F = 68.993							

Remark : ** 0.01 level of significance

Hypotheses 2 Results of the comparison between employees' and customers' satisfaction with quality management

The results of comparison of the level of satisfaction

between the company's employees and the company's customers showed that customers had higher levels of satisfaction with quality management than employees did. The details are shown in Table 5.

Table 5 The comparison of the means of employees and customers' satisfaction with quality management.

TQM	Employees (\bar{X})	Customer (\bar{X})	Difference	
			\bar{X}	%
Quality	4.17	4.61	0.44	10.55
Cost	4.12	4.16	0.04	0.97
Delivery	4.39	4.64	0.25	5.69
Service	4.31	4.59	0.28	6.50
Total	4.24	4.45	0.21	4.95

Discussion

1. To the Japanese style of production management influencing quality management, it was found that the quality management was influenced by 5S activities (0.327), JIT (0.239) and TPM (0.187), with the predictive power (R^2) of 47.30%. Cost quality management was influenced by KAIZEN (0.175), JIT (0.198) and TPM (0.129) and they had a predictive power (R^2) of 31.50%. The delivery quality management was influenced by 5S activities (0.314), JIT (0.219) and KAIZEN (0.179) and they had a predictive power (R^2) of 31.50% and the service quality management was influenced by TPM (0.327), 5S Activity (0.239) and JIT (0.187) and they had a predictive power (R^2) of 36.10%. It was concluded that Japanese management system consisting of 5S activities, JIT, KAIZEN and TPM significantly affected the quality management. In fact, 5S activities and JIT were activities that influenced the quality management in every aspect. While KAIZEN was activities that reduced production costs and the process of delivering goods to customers, TPM activities were involved in the organization managing its services and its product quality.

The research findings were consistent with Kittisommanakhun (2007) who found that the factors that promoted the participation of employees of Berli Jucker Foods Co., Ltd. were 5S activities,

and KAIZEN were related to the staff's participation and the quality of management throughout the organization. The findings were also consistent with Satittham's research (2015) on total productive maintenance participated by all staff contributing to operational performance. It was found that Kaizen and 5S activities had the most effect on quality efficiency.

In addition, Boonget and Nasomboon (2016) studied Japanese management and Japanese production culture (Monodzukuri) and found that 5S activities and Kaizen significantly influenced performance. This was consistent with the results of Kaewbangkapom (2013), who studied the improvement (increase) of production capacity by implementing KAIZEN to reduce waste in the production process. It was found that KAIZEN had an effect on timely delivery and cost reduction in customer context. While Tovisitchai (2013) studied the participation of employees in TPM of Beer Thip Breweries Limited (1991), he found that 5S activities and 5GEN which contributed to employee engagement and to improve quality management were key factors for the success of total productive management in the organizations.

2. The results of the averages of the levels of satisfaction with quality management between employees and customers of the company showed that the average of customers' satisfaction with

overall quality management was 4.95% higher than that of the staff. The customers' satisfaction with quality was 10.55 % higher than that of the staff. Customers had 6.50% higher satisfaction with service quality management than employees did. Customers had 5.69 % higher satisfaction with delivery quality management than employees did. To cost quality management, the customers' satisfaction level was 0.97% higher than that of the employees.

Recommendations

The organization should plan training and encourage staff to conduct 5S activities regularly in order to make employees aware of the importance and benefits of 5S activities, so that they can analyze necessary thing from unnecessary thing which causes the loss of production process itself. Employees should be encouraged to be aware of the bad results and consequences of the wastes that are in the production process by involving every employee to participate in the search, improvement, or change to eliminate those wastes out of the continuous process.

Japanese Quality Management does not only help the organization to get the relevant information, but it also helps organizations to prevent waste in the process from happening in the future. As a result, organizations can reap the benefits of the most available resources. In addition, every aspect of the quality management can be improved. This will bring high level of customer satisfaction in a sustainable manner.

Limitations and recommendations for further study

This research focused on the organizations awarded the Thailand Lean Award, and these organizations utilized production management activities, including 5S, 5GEN, MUDA, JIT, KAIZEN and TPM to satisfy customers' needs. If other organizations use the practice as a guideline, they need to systematically learn how to use this tool step by step.

This research also lacked the linkage of human resource management, which was an important element in the application of such tools. Consequently,

researchers or interested people should include it to extensively study for the full range of both management and administration.

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