

DESIGNING STRATEGIES FOR IMPROVING TOTAL QUALITY MANAGEMENT IN MANUFACTURING INDUSTRIES

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ABSTRACT

This research was aimed at designing strategies for improving total quality management at CV XYZ and PT HIJ. The research locations were selected intentionally with the consideration that the company is a middle class company that started to apply a study in line with the research topic. The experts were chosen using an approach method. This research used a descriptive approach and quantitative analysis through questionnaires using purposive sampling. The stages began with data processing, i.e. testing the questionnaire quality through validity and reliability tests, making a causality diagram, evaluating the implementation levels of each company by giving evaluation scales based on the existing condition, making House of Quality (HOQ) using QFD methods, and then analyzing the problem solutions produced from the QFD methods with 5W + 1H analysis, and finally determining the improvement priorities using Fuzzy AHP methods. The results were the strategies for improving total quality management /TQM of CV XYZ, namely the factor that plays the most important role was improving the quality management performance. The actor that has the competence to carry out the TQM improvement is the director. The prioritized goal to be achieved is a commitment to improve the quality of goods and services. The prioritized strategy used in improving TQM is carrying out SOP consistently.

Keywords: strategies, improvement, TQM, manufacturing company, fuzzy AHP

ABSTRAK

Penelitian ini bertujuan merancang strategi peningkatan manajemen mutu terpadu pada CV XYZ dan PT HIJ. Pemilihan lokasi penelitian dilakukan secara sengaja dengan pertimbangan bahwa perusahaan tersebut merupakan perusahaan kelas menengah yang mulai menerapkan kajian sesuai dengan topik penelitian. Penentuan pakar dilakukan dengan metode pendekatan secara sengaja. Adapun penelitian ini menggunakan pendekatan deskriptif dan analisa kuantitatif dengan menyebarkan kuesioner secara sengaja (purposive sampling), dengan tahapan pengolahan data yaitu menguji mutu kuesioner melalui uji validitas dan reliabilitas, kemudian menyusun diagram sebab-akibat, menilai tingkat implementasi dari masing-masing perusahaan dengan memberikan skala penilaian berdasarkan kondisi yang ada, menyusun House of Quality (HOQ) dengan menggunakan metode QFD, kemudian analisa penyelesaian masalah yang dihasilkan dari penyusunan QFD menggunakan analisa 5W + 1H dan setelah itu menentukan prioritas perbaikan dengan menggunakan metode Fuzzy AHP. Hasil dari penelitian ini yaitu strategi peningkatan manajemen mutu terpadu/TQM di perusahaan CV XYZ dirumuskan sebagai berikut. Faktor yang paling berperan adalah peningkatan kinerja manajemen mutu. Kemudian aktor yang memiliki kompetensi dalam menjalankan peran peningkatan TQM adalah direktur. Kemudian tujuan yang prioritas harus dicapai adalah komitmen meningkatkan kualitas barang & jasa. Kemudian untuk strategi prioritas yang digunakan dalam peningkatan TQM adalah melaksanakan SOP dengan konsisten.

Kata kunci: strategi, peningkatan, TQM, perusahaan manufaktur, fuzzy AHP

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INTRODUCTION

One of the industries in Indonesia that applies manufacturing system in its business activities is an automotive industry. Automotive industries in Indonesia have become the mainstay because they can provide employment and contribute to the country's foreign exchange growth. The rapid development, along with higher demands from Indonesian community, has made automotive industries one of necessities. The development trend of production and sales of spare parts will keep increasing in line with the increase of motor vehicle production in Indonesia. The supporting industries for automotive spare parts also develop, one of which is spare parts industry whose raw materials is rubber. The development of motor vehicles according to BPS (2016) until the year 2014, is very significant, especially motorcycle. It has been noted that from 2000 to 2014 there was a 13% increase in its average growth; the highest was in 2007, that is 22%. However, in 2008 it decreased, only 12%. The development of the number of motor vehicles can be seen in Table 1.

In Indonesia there is a company that competes in the automotive world, namely PT ATR. PT ATR produces not only motor vehicles but also spare parts for the motor vehicles. PT ATR also produces rubber-based components that are not produced by the company alone. One of the companies that belong to PT ATR group and produces spare parts of rubber-based components is PT TUV. PT TUV produces rubber molded parts, rubber extruded parts/hoses, and rubber vibration insulation parts (cushion/mounting). In producing the components, PT TUV shares the process to some subcontracts. Two of the subcontracts of PT TUV are CV XYZ and PT HIJ. The production activities of CV XYZ and PT HIJ are carried out using manufacturing systems.

Horngren et al. (2000) says that the key success that can enhance a company to have a competitive power is determined by four factors, namely cost, quality, time delivery, and innovation. This meaning is in line with Fromkin's opinion (Fromkin et al. 1976) who defines quality as a capacity of goods and services to satisfy the customers. The management accounting system appears to maintain the company performance in its economic environmental change that brings in the

main tendency to consumer's orientation, Total Quality Management (TQM) application, time as a competitive element, growth in information technology, growth in production environment, growth in service industry, and global competition (Hansen and Mowen, 2000). The emergence of quality improvement from period to period can increase profitability and customers' satisfaction. This needs an appropriate innovation to be carried out to meet the customers' needs, of course, by improving the quality of services and products (Hurley and Hult, 1998). It is believed that to win the competition, a company needs to focus on the quality; or if a company applies TQM it is a compulsory for the company to make products and services of high-quality in order to survive in a tight business-competition (Deming, 2002).

TQM is an approach that is oriented to customers by introducing management changes systematically and continuous improvement on the process, product and services of an organization in order to achieve certain qualified target (Talavera and Gloria, 2004). The benefits of TQM for a business body are improved services, reduced cost, and customers' satisfaction. Progressive improvement in the management system and service quality will increase customers' satisfaction. In addition, TQM can increase the employees' expertise, spirit, self-confidence; improve accountability and transparencies; and increase productivity and process efficiency in fulfilling the customers' satisfaction (Margareth, 2004). For those reasons, to reach high-performance of the company and to give great satisfaction, a company needs to have a commitment and continuous efforts in quality development. As has been said by Evans and Lindsay (2008), modern quality management comes from manufacture; therefore, its application is mostly found in manufacturing industries. A manufacturing company can easily measure the quality, especially product quality that it produces, and the quality is the one that can meet the standard. This is because a manufacturing company produces goods that are real, so measurement on the quality of the product is carried out in a real way too. In the business world, someone's commitment to an organization or a company has often become an important issue. The form of commitment on the quality management can be applied through the certification of ISO 9001:2008.

Tabel 1. Development of the number of motor vehicles

Year	Motor vehicles (Unit)	Growth (%)
2000	13.563.017	-
2001	15.275.073	11%
2002	17.002.130	10%
2003	19.976.376	15%
2004	23.061.021	13%
2005	28.531.831	19%
2006	32.528.758	12%
2007	41.955.128	22%
2008	47.683.681	12%
2009	52.767.093	10%
2010	61.078.188	14%
2011	68.839.341	11%
2012	76.381.183	10%
2013	84.732.652	10%
2014	92.976.240	9%

Source : BPS (2016), processed

There are two studies that have become the bases for this research. Firstly, Farisi (2006) conducted a research on the Study of Total Quality Management at CV XYZ. The goal of the research was to study the implementation levels of the TQM factors, to assess the importance level of standard certification of ISO quality 9001:2008 in carrying out TQM, to study TQM, to analyze the strategies to improve TQM in CV XYZ. The methods used are the fish bone diagram, QFD, TQM principles, and AHP. The conclusion of the research is most TQM implementations in CV XYZ are in the average position so it is considered to be good. The importance of standard certification of ISO quality 9001 is it can give a positive impact on the TQM implementation. The performance of quality management on three attributes are product quality, manufacturing process quality, and performance of quality control cost. Secondly, Carolina (2012) did a research on the effects of TQM implementation and organization's commitment towards the company's performance and organization culture as a modernization variable (survey on a manufacturing company in West Java listed in BEI). This research was aimed at collecting data/information that shows a description of TQM application, which contains three stages, namely implementation, and management commitment, and explains its effects on the company's performance that has been strengthened with organization culture. The methods used are multiple regression analysis and it is

total with TQM implementation. This research produces a conclusion that TQM implementation consists of three stages, namely preparation stage, planning stage, and implementation stage; and the company's commitment has a significant effect on the manufacturing company's performance in West Java, which has been enlisted in BEI and it has a positive ROA value in 2008.

The research is entitled 'Designing the Strategies to Improve Total Quality Management in the Manufacturing Companies'. The goal of the research was to study the implementation level of TQM factors in CV XYZ and PT HIJ, to assess the importance level of the certification of ISO 9001:2008 quality standard in carrying out TQM in the companies, to study the TQM performance in the manufacturing companies, to analyze problems and critical determining factors of TQM implementation and to formulate the strategies to improve TQM.

The research was focused on the implementation of the total quality management in CV XYZ and PT HIJ. The scope of the research was on the demand for the needs of ISO 9001:2008 certification, the implementation level of the total quality management in the organization and the performance of total quality management of each division in the organization. The research is based on the respondents' perception in which the respondents for this research are experts that are related to handling the quality management in CV XYZ and PT HIJ as well as PT TUV which also becomes the consumer of CV XYZ and PT HIJ. The research has primary as well as secondary data that are based on the condition in 2015 for the interview of all respondents and other related data; therefore, everything related to recent conditions is not effective in this writing.

METHODS

The research was carried out in CV XYZ and PT HIJ as companies whose benchmark is located in Sukabumi, West Java. The location has been chosen using purposive sampling with the consideration that the companies are middle-class companies that started to implement study in line with the topic of the research and it is also for companies that have become benchmark companies and have been considered as well-qualified companies in terms of management or products. The research was carried out from September to December 2015 and

continued up to February 2016.

The research used a descriptive approach and quantitative analysis by distributing questionnaires (purposive sampling). Data used in this research are primary data and secondary data in the form of direct interview with the aid of questionnaires. The technique for collecting data and formulating hierarchy for TQM improvement strategies was taken using FGD method (Focus Group Discussion). The secondary data are data of the companies CV XYZ and PT HIJ in the form of daily delivery, and then QCPC form, and SOP handling on the customer claim or calendar claim as frequency barometer on the manufacturing of Not Good (NG) products. Other secondary data are in the form of literature related to quality management concept such as journals about TQM concept and ISO 9001:2008 quality management system.

The research respondents were divided into two groups: internal respondents as the company's experts and general respondents as external experts. Internal respondents in the research are management and supervisors of CV XYZ, while external respondents of the research are management and supervisor of PT HIJ, customers and suppliers of CV XYZ ND PT HIJ. Respondents of each company are:

1. CV XYZ: Production manager, PPIC manager, marketing manager, finance management, HRD and GA, administration of production and archives, PPIC control and PPIC Finish Good & Quality Gate, Purchasing & Invoicing, Re-Engineering, Leader Pressing, Leader Finishing, Leader Subcontract, Leader Checking.
2. PT HIJ: Director, Management Representative, Re-Engineering, Production Manager, Marketing Manager, Purchasing Manager, PPIC Manager, Engineering Manager, HRD Manager, and Quality Control Manager.
3. PT TUV: Manager and Head subcontract Development.
4. Academician: Mr. Dr. Dadi R. Maspanger, MT

Experts are determined using an expert adjustment method or an intentional approach, the division relation in the company and the topic of the research. In addition, easiness as well as access to obtain related data is also considered because it is the PIC that is

always related to operational decision-making about related topics. Experts are also PICs that are related to the management and product quality in each company. Data analyzing method that is used descriptively to test the questionnaire quality can be carried out using validity and reliability tests (Sekaran, 1992), and then using fishbone diagram for causality. QFD method is used to set the House of Quality, while 5W+1H are used to analyze problems, and fuzzy AHP is used to determine priority scales. Problem solving is carried out by making a research instrument first so that the targets of the research can be reached. The description of the research instrument is as follows: Self-assessment instrument for the fourteen chosen TQM principles; Instrument for measuring the certification importance level of ISO quality on TQM implementation; Instrument for measuring the quality management performance in the company; Instrument for measuring the certification importance level of ISO quality in influencing the quality management performance; Instrument for identifying TQM attributes that become the customers' expectation; Instrument for determining the strategies to increase TQM in F-AHP.

The frame of thought on the research that is described in Figure 1 is a bases for the research flow is carried out through the similar interest to get certification of ISO 9001:2008 and to combine TQM concepts and values using self-assessment 14 of TQM principles. The writer is expected to be well-informed about the quality management performance in each company. The performance of quality management can be known through statistic method (mean).

Later the writer discusses the problems arising during the TQM implementation in each company using a fishbone diagram. After evaluating it, the writer then assess the key attribute and critical factor to find out the priorities needed by the customers in each company in order to know the key attributes and critical factors of each company to be further improved from the present condition. The finishing analysis using 5W+1H method is expected to be able to answer problems of the customers' expectation that is not optimal. By doing further analysis using 5W+1H, it is expected that hierarchy formulation of fuzzy AHP can be more effective and suitable with the expected targets to increase TQM strategies in each company.

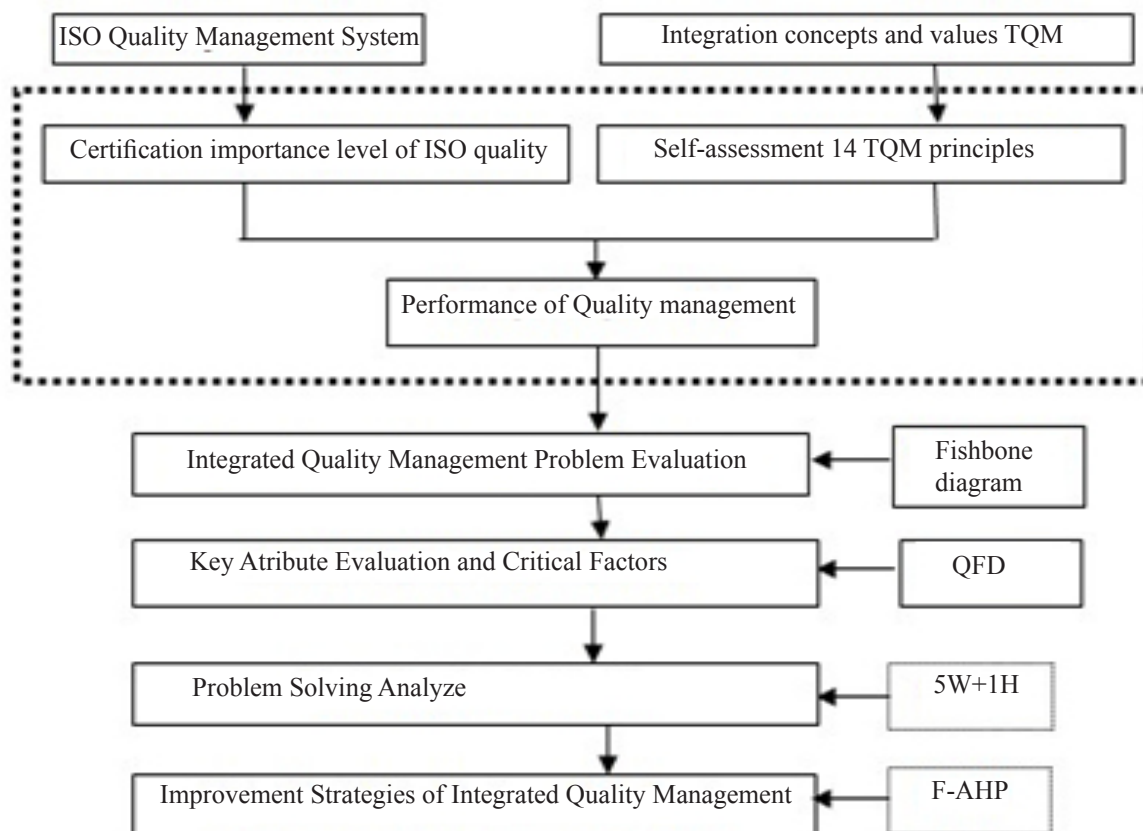


Figure 1. Research framework

RESULTS

Implementation Levels of TQM Factors

According to Farisi (2006), the method to measure TQM implementation level and total quality management performance can be carried out using data range statistical method, where the conversion weight is determined using this method because of the insignificant differences of the weight values produced from geometric average calculation. From the results weighting can be done based on three value categories, namely maximum, moderate and minimum. Based the calculating results obtained from CV XYZ, it shows that there are three classes in which the maximum index value is 7.00 and the minimum index value is 3.56 and the data range 3.44 while the length of the class is 1.14. Thus the interval classes can be formed as follows: Bad (3.56–4.70); Average (4.71–5.85); and Good (5.86–7.00). The calculation result of TQM implementation at CV XYZ in presented in Table 2.

TQM performance calculation at CV XYZ shows that there are three classes, in which the maximum index is 9.00 and the minimum index is 5.80, and the data range is 3.20 with length of class 1.06. Thus, the interval class can be made as follows: Bad (5.80–6.86); Average (6.87–7.93); and Good (7.94–9.00). The calculation result of TQM performance at CV XYZ is presented in Table 3.

Implementation level of total quality management at CV XYZ can be seen in Table 2. Based on the calculation result in Table 2, it can be concluded that the implementation level of total quality management of CV XYZ is average leading to good. Since the proportion of category ‘average’ and category ‘good’ is equal, the assessment on the implementation level of total quality management at CV XYZ in general is already good. It only needs to be improved. As for the performance level of total quality management, the category ‘average’ consists of product quality and manufacturing process quality, while the quality for customer service and quality cost control at CV XYZ is at category ‘good’. The results are shown from the

calculation result in Table 3. The calculation of this implementation level is determined by to what extent the effectiveness of TQM implementation level and TQM performance works in a company. Later on description of the existing problems about why each criterion does not work optimally will be discussed. Therefore, later on the discussion will focus on problem evaluation and determination of TQM critical factors in each company.

Problem Evaluation and Determination of TQM Critical Factors

Evaluation on TQM problems can use a causal diagram analyses (fish bone) to map the causes of the problems and short description of problem solution. The structured mechanism to determine the critical factors of customers’ desire and expectation towards TQM can be translated into technical needs (technical response) using a Quality Function Deployment (QFD) analysis.

Analyzing the Causal Diagram (Fish Bone)

The main problem that can be found at CV XYZ and PT HIJ is TQM implementation that has not been optimal. According to Aghazadeh (2002) in Farisi (2006), TQM implementation factors consist of soft and hard element. The TQM implementation problems can be grouped easily and systematically into four main parts, namely leadership, process management, human resources and strategic planning. However, the researcher does not do his research based on them, instead based on factors that cause actual problems in the field. The following is a description of various problems discussed in fishbone diagram at CV XYZ.

The first problem that appears at CV XYZ especially in team work section is there is no special group formation outside the existing organization. This can be seen from the individual ignorance in the company to form a small organization to help them solve various problems in the company. Feigenbaum in Susetyo et al. (2011) says that to face business challenges an organization is expected to produce a qualified output that can satisfy its customers.

The second problem that happens at CV XYZ is in the education and training section, one of which is lack of response towards employees’ progress from the management. This happens when an employee makes use of the training facility; when he has finished with

the training, the management gives no response on whether there is an effect given by the employee after he has used the facility. Thus, the effect of this problem is lack of working spirit from the employees who have got training, because they do not feel appreciated and they do not have any difference before and after the training activities. Based on the previous analysis, CV XYZ must carry out improvement on the four attributes of the 14 attributes of the Total Quality Management.

Quality Function Deployment (QFD) Analysis

According to Cohen (1995), QFD (Quality Function Development) is a method to plan and develop products structurally which enables developing team to set the desire and needs of the customers clearly and then evaluate the product or serve systematically in order to meet the customers’ needs. Soota et al. (2011) also explains that quality house is provided to meet the customers’ demand. This enables the organization/ company to prioritize the customers’ needs, to meet innovative response for the needs, and to improve the process so that maximum effectiveness can be reached.

Table 2. Level of TQM implementation at CV XYZ

TQM Implementation	Average Value	Note
Focus on customers	6.01	Good
Top Management Leadership	6.15	Good
Employees Participation	5.82	Average
Team work	5.59	Average
Education and Training	5.74	Average
Continuous Improvement	5.88	Good
Supplier Management	5.66	Average
Goal Orientation	5.85	Average
Strategic Planning	5.90	Good
Commitment on Quality	6.00	Good
Benchmark	5.86	Good
Processing Management	5.81	Average
Freedom Control	5.70	Average
Long-term Commitment	6.14	Good

Table 3. Level of TQM performance at CV XYZ

Performance of Total Quality Management	Average Value	Notes
Product Quality	7.40	Average
Quality of Manufacturing Process	7.90	Average
Quality of Customer Service	7.95	Good
Quality Cost Control	8.03	Good

The results of the calculation are presented as follows:

1) Relationship Matrix

Relationship matrix between voice of customer and technical response in the design of House of Quality (HOQ) was built to see to what extent the technical response having the strongest relationship with TQM attributes from the customers' expectation get the main priority. The relationship matrix is shown with number 10 to show a strong relationship, number 5 shows average relationship, and number 1 shows weak relationship. Relationship matrix between TQM attribute of customers' expectation and technical response is shown in Table 4.

Table 4 shows that relationship matrix between voice of customer and technical response in general has an average and strong relationship. There are also some parts that do not show relationship, or the value is nil. This means TQM attributes of customers' expectation with technical response does not have a significant direct relationship, although basically the TQM concept is a system that includes all aspects in the company's activities. Therefore, the nil-valued relationship in a certain attribute shows that of the two attributes the relationship is very weak, or it has no direct mutual effects.

2) Benchmark towards other competitors

The method used in this research is a benchmark competitive to TQM attributes of customers' expectation, in which CV XYZ is compared to PT HIJ and PT TUV, similar companies involved in rubber-based material manufacture. This assessment uses a scaling weight: (1) very unsatisfactory, (2) rather satisfactory, (3) average, (4) satisfactory, (5) very satisfactory.

Table 5 shows that CV XYZ has owned similar or more target standard than other similar companies that is PT HIJ and PT TUV on attributes that have number 1 ratio value. Attributes that have ratio value more than 1 mean that CV XYZ customers' satisfaction is less than that of PT HIJ and PT TUV. This means that some attributes that have lower ratio value than other companies need to be improved.

From Table 6 above it can be seen that technical response of CV XYZ has a ratio of 1.0 which means that technical response in those attributes have the same ratio as the comparison companies. Technical response that has a ratio of 1.3 means that the technical response on those attributes is below the target compared to that of the comparison companies. Technical response that has a ratio of 2.0 means that technical response in those attributes is far below the target if it is compared with that of the comparison companies.

Table 4. Relationship matrix between voice of customer and technical response

	Focus on the customer	Top Management Leadership	Employees' participation	Team work	Education and Training	Continuous Improvement	Supplier Management	Goal Unity	Strategic Planning	Commitment on Quality	Bench Mark	Process Management	Freedom Control	Long-term Commitment
Efficiency of labor cost	10	10	10	10	5	10	-	1	10	10	5	10	1	10
Efficiency of working time	10	10	5	5	10	10	-	5	5	10	1	10	1	5
Efficiency of basic materials	5	5	-	1	-	10	10	1	1	10	5	10	-	5
Increasing production	10	10	10	10	10	10	5	5	10	5	5	10	1	10
Optimized machine/equipment	5	10	1	1	-	10	-	1	5	10	5	10	-	10
Minimize defects	10	10	10	10	10	10	10	5	10	10	10	10	10	10
Punctual delivery	10	10	10	10	1	5	10	-	1	1	1	10	5	10
Standardized System/procedure	10	10	5	5	10	10	5	1	10	10	10	10	10	10
Reduced repair	10	5	10	10	5	10	10	5	5	10	5	10	5	10
Information transfer	10	10	10	10	5	10	10	5	5	10	5	10	5	10
Efficiency of production process	10	10	10	10	5	10	5	10	10	10	5	10	10	10

Table 5. Benchmark voice of customer

Voice of Customer	CV XYZ	PT HIJ	PT TUV	Target	Ratio
Efficiency of labor cost	2	3	3	3	1.5
Efficiency of working time	2	3	3	3	1.5
Efficiency of standard materials	3	3	3	3	1
Improving product results	4	4	4	4	1
Optimizing machines/equipment	4	4	4	4	1
Minimizing defects	3	4	4	4	1.3
Punctual delivery	3	3	4	4	1.3
Standard system/procedures	4	4	4	4	1
Reducing corrections	3	3	4	4	1.3
Transferring information	4	3	4	4	1
Efficiency of production process	4	3	4	4	1

Tabel 6. Benchmark technical response

Technical response	CV XYZ	PT HIJ	PT TUV	Target	Ratio
Focus on customers	4	4	4	4	1
Top Management Leadership	4	4	4	4	1
Employees participation	2	3	4	4	2
Team work	2	3	4	4	2
Education and Training	3	4	4	4	1.3
Continuous Improvement	3	4	4	4	1.3
Supplier Management	3	3	4	4	1.3
Goal Unity	3	4	4	4	1.3
Strategic Planning	3	3	4	4	1.3
Commitment on quality	3	4	4	4	1.3
Benchmark	3	4	4	4	1.3
Process management	3	4	4	4	1.3
Freedom Control	2	3	4	4	1.3
Long-term commitment	3	4	4	4	1.3

3) Customer Satisfaction Rating

The formula for customer satisfaction rating is obtained through questionnaire distribution of CV XYZ customers to some internal experts. All respondents are considered to have known the concept of total quality management that is implemented by CV XYZ so that it can give an appropriate satisfactory judgment. To determine the satisfaction rating modus method is used. In this method every expert interviewed gives their evaluation, and then the evaluation is taken based on the most results chosen.

Table 7 shows that the satisfaction rating of CV XYZ customers have dominant judgment average. The attribute that needs a lot of attention from the management is the one that has score 3 or predicate 'average'. This can be seen from the dominant result

given in each attribute 'average'. The attribute that needs a lot of attention from the management is the one that score 3 or predicate 'average'. This must be carried out so that the company will not lose competing in quality management performance with other similar companies.

4) Technical Correlation Matrix

Correlation matrix between technical response (technical correlation matrix) is correlation between one technical response and another in which the correlation is described on the upper part (trade roof) Quality house through rotation: "+++" to describe "strongly positive" relation and "++" to show "positive average" and "+" to show "weak positive", whereas those with "-" notation means "no correlation".

Table 7. Evaluation on satisfaction rating of CV XYZ customers

Voice of Customer	CV XYZ	PT HIJ	PT TUV	Modus	Satisfaction rate
Efficiency of labor cost	3	3	3	3	Average
Efficiency of working time	3	3	4	3	Average
Efficiency of standard material	3	3	4	3	Average
Improving product results	3	4	4	4	Satisfactory
Optimizing machines/equipment	3	3	3	3	Average
Minimizing defects	3	3	4	3	Average
Punctual delivery	3	3	4	3	Average
Standard system/procedures	3	3	4	3	Average
Reducing correction	3	3	4	3	Average
Transferring information	3	3	4	3	Average
Efficiency of production process	3	4	4	4	Satisfactory

Based on Figure 2, attribute ‘focus’ on the customers has a strong correlation rate with the top management leadership. This can be explained with, if CV XYZ has commitment to focus on the customers based on the top management leadership that is firm and straightforward in conveying and implementing quality concept. As for the attribute focus on the customers based on Figure 2 above, there is no correlation with freedom control. This is based on whether there is a basis correlation if CV XYZ has a good commitment on the focus on customer’s management activities which is based on freedom control when doing all the operational as well as quality administration activities.

5) Absolute Importance and Relative Values

The absolute importance value is a prioritized scale from the attribute ‘technical response’ that must be initiated by considering the TQM attribute of customers’ expectation. The selected attribute ‘technical response’ becomes the main focus or priority to improve the quality management system performance that has not been optimal. The relative importance, however, is a value from the absolute importance that is expressed in cumulative percentage. The calculation result of absolute importance and relative importance is shown in Table 8.

Based on Table 8, it can be seen that the first priority of technical response of TQM implementation in CV XYZ and PT HIJ is the attribute process management with a relative importance 0.101. The second priority is continuous improvement with a relative importance 0.098. The third priority is the attribute focus on customers with the relative importance 0.092. the above

results are different from what has been put forward by Hamidah (2003), who says that TQM development can be focused on three subsystem, namely (1) customer focus, (2) Process management, (3) continuous improvement, in which the three subsystems have been explained and mentioned to have a correlated working method.

Problem solving Formulation and TQM Improvement Strategies

To determine the strategies to improve total quality management at CV XYZ and PT HIJ, the Fuzzy Analytical Hierarchy Process (Fuzzy AHP) is used. Software used to calculate and analyze the Fuzzy AHP is microsoft excel 2014. All the experts’ opinions are combined after the assessment consistency test for each expert. Consistent assessment is combined using geometric average (Erni and Marimin, 2005).

Hierarchy F-AHP Formulation

The hierarchy to determine strategies to improve total quality management at CV XYZ and PT HIJ consists of five levels. The first level is the goal of this research is strategies to improve total quality management. The second level is factors that play an important role in the strategies to improve total quality management, among others quality management performance, the importance of obtaining ISO 9001 certificate, and implementation of TQM principles. The third level is the actors that are competent in the strategies to improve total quality management, i.e. directors, managers, supervisors, employees and suppliers. The fourth level is the goal that needs to be reached in the strategies to

improve total quality management, i.e. commitment to improve the quality of goods and services, to increase competitiveness and market share, to reduce costs for defective goods, and to increase the process and internal procedures of the company. The fifth level is

strategies used to improve total quality management, among others carrying out SOP consistently, reforming TQM policies, applied in the company at present, and carrying out TQM benchmark of other companies.

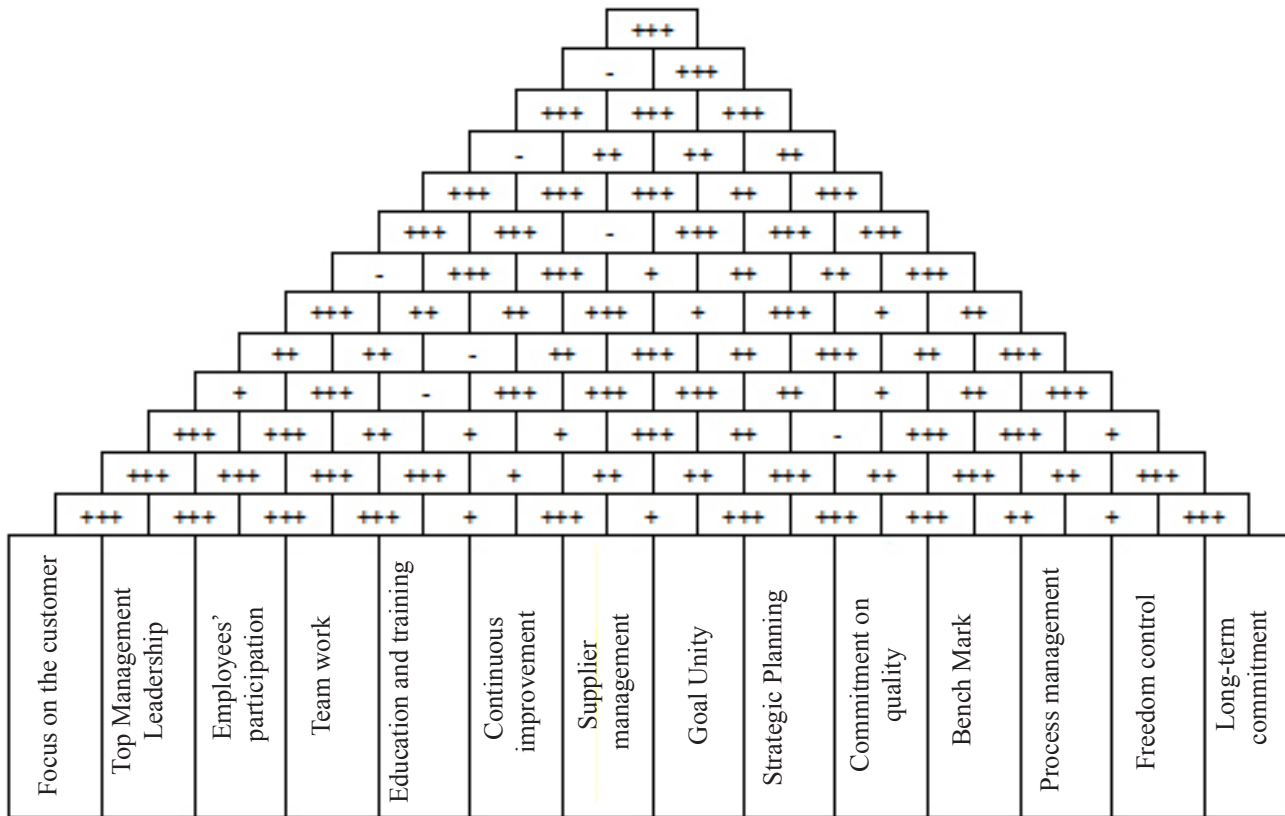


Figure 2. Technical Correlation Matrix HOQ

Table 8. The absolute importance and relative importance

Technical response	CV XYZ	PT HIJ
Process management	180	0.101
Continuous improvement	175	0.098
Commitment on quality	166	0.093
Focus on customers	165	0.092
Top management leadership	165	0.092
Long-term commitment	160	0.089
Team work	133	0.074
Employees participation	131	0.073
Strategic planning	128	0.072
Education and training	101	0.056
Benchmark	93	0.052
Supplier management	80	0.045
Freedom control	63	0.035
Goal unity	50	0.028

Analyzing results of Fuzzy AHP Method

Based on the analyzing results of fuzzy AHP as has been shown in Figure 3, the following analysis can be obtained: the first priority as a factor element (second level) that plays a role to improve total quality management/TQM is quality management performance with 0.505 weight, whereas for the second priority is implementation of TQM principles with 0.342 weight. The third priority is the importance of getting an ISO 9001:2008 certificate. This indicates that CV XYZ at present does not necessarily prioritize getting an ISO 9001:2008 certificate for the strategy to improve the company's TQM. This is because the company at present is still a company that is involved in the service of making products. The ISO certificate is therefore not yet needed.

Managerial Implication

In order to improve the company's quality, CV XYZ and PT HIJ need to carry out operational activities by carrying out SOP consistently, since the strengthening of the existing basic working pattern will become a strong base to improve the existing system. This must certainly be based on TQM benchmark on other companies, and then followed by conducting a company's internal reform. This approach is a series of process of understanding the basic concepts, identifying shortages, making improvement planning, carrying out reparation and applying monitoring system on the repaired or improved activities, and then making a job standard that must be implemented and obeyed by the peers in every activity (Banker et al. 1993). Achieving quality standard that has been formed through TQM reformation simultaneously is more effective on the existing working patterns because it is formed through management awareness and followed-up together. This will mature the organization so that it is ready to go forward to become an organization of continuous growth (Rahardja, 2010).

Top management commitment on the quality policy has a strategic position to set, communicate, and make sure that the policies are related to quality. Effective top management leadership must be able to instill and articulate clearly the vision and mission of the company so that each employee in the company will have the same goal to improve quality management performance. Top management must be able to empower its employees, for examples: to seek employees' input, consider the input, and take action based on the input; to provide facilities and infrastructure for employees' education and training; to give support or motivation to employees to apply TQM culture in their job.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

In terms of TQM implementation levels at CV XYZ and PT HIJ, of the fourteen attributes chosen, each has different results in each company. CV XYZ especially has the same implementation levels between 'average' and 'good', that is 7 attributes are 'good' and 7 others 'average'. As for the implementation results, PT HIJ has more 'average' positions, except the attribute top management leadership which is in the position of 'good'.

The importance of ISO 9001:2008 standard quality certificate does not give significant effect on the TQM improvement to the manufacturing companies of rubber-based materials that have manufacturing business bases such CV XYZ that is service. From the analyzing results through fuzzy AHP method, it can be seen that the highest factor score is improving the quality management performance. Thus, when designing the strategies to improve TQM in the company of rubber-based materials that is still service-based, the ISO 9001:2008 certificate is not that important. However, this must be considered if the company wants to increase its market share.

Analyzing the problems of TQM improvement resulting from QFD method, it is found out that there are five main problems in each company, i.e. process management, continuous improvement activities, focus on customers, top management leadership, and commitment on the quality of the products produced. The three big priorities that become customers' expectation on the quality attribute that has impacts on the customers, i.e. labor cost efficiency, working-time efficiency, and system/procedure standardization. Therefore, it is important to increase the customers' concentration on the improvement of the five problems so that the customers' expectation can be reached.

The strategies to improve TQM at CV XYZ are formulated as follows. The prioritized factor is improving the quality management performance; the actor that has competence to carry out TQM improvement is director; the goal to be reached is commitment to improve the quality of goods and services; and the strategy used to improve total quality management/TQM based on the priority order is carrying out the SOP consistently.

Recommendations

In order to improve TQM implementation and quality management performance, all employees or management carry out the existing Standard Operational Procedure (SOP), whether it is the one issued by the company or the one given by the customers consistently as the main strategy. Consideration to give reward to those who have got achievement on quality management performance must be given so that the company can carry out continuous improvement.

In terms of writing this scientific work, it is recommended that respondents understand the condition of the

company and that of other similar companies and also understand the concept of TQM thoroughly so that there will not be any bias on the data during the decision-making process. Besides, depth-interview is needed to get accurate data because the qualitative data obtained might not be the real final results. There might be other factors that make certain respondents answer with certain responses. It is not recommended to make decision on the respondents' direct answers.

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