Analysis of Quality Management
by Implementing Total Quality Management Based on Deming Prize

Enny Aryanny¹, Iriani²
Department of Industrial Engineering, Universitas Pembangunan Nasional “Veteran” Jawa Timur
Surabaya, Indonesia
enny.ti@upnjatim.ac.id, sri4tk@yahoo.com

Abstract—A company needs to improve its performance, especially in terms of quality, in an effort to assure its survival in the business competition with other companies. Therefore, the company needs to measure its performance so that it can find out its current position in the competition and how to improve said position and achieve its goals. Nowadays, many companies try to improve themselves by putting more emphasis on product quality, which is an external kind of quality, instead of on the internal quality of the company. This strategy will not yield the best result in the long run because the internal quality affects the quality of the resulting products. One of management systems that put emphasis on the internal quality and consumer satisfaction is Total Quality Management, which involves all members of the organization. One approach to the aspects included in Total Quality Management is to use the Deming Prize, which reviews the internal quality based on several categories. Based on the results and data analysis, it can be seen that the score for organizational variables is 3.41; standardization of 3.00; control of 2.81; analysis of 2.59; and influence of 3.30. However, there are several categories in the variable that are lower than the target score, among others, job analysis, organizational goals, work tools, measurement, employee input, and rewards.

Keywords—Deming Prize, Employee Perception, Performance, Quality, Total Quality Management

1. Introduction

Quality of product and services offered by a company decides the fate of company as the buying decides of the customers depends only on the quality of the output delivered from company, (Rajashekharaiah, 2014). A company needs to improve its performance, especially in terms of quality, in an effort to assure its survival and compete with other companies.

CV. Mutiara Bahari Surabaya faces problems related to its internal quality, which are caused by unclear job descriptions, lack of promotions for its employees, lack of visions and missions, and corporate ignorance of its employees' perceptions of the organization they work for. To remedy the situation, we set to analyze the management quality of the company by applying Total Quality Management (TQM) based on Deming Prize to the company.

One of the management systems that puts the quality as an important business strategy and is consumer satisfaction-oriented by involving all members of the organization is Total Quality Management. Improvements in Total Quality Management relate to all organizational functions, which concern the strategic, marketing, and human aspects of the organization. One way of approaching such aspects is to use the Deming Prize, which is more focused on improving the internal quality of the company. The implementations of Deming Prize include improving the quality of the company, organizational structure, employee perceptions of the company, etc.

By applying the Total Quality Management based on Deming Prize in CV. Mutiara Bahari, it is expected that the company's internal quality condition can be improved, which ultimately affects the company's own progress. Objectives to be achieved from this research are to know the quality level of the company and to plan proposed improvement to the company's quality.

2. Literature Review

2.1 Total Quality Management (TQM)

Total Quality Management has been attempted with varying degrees of success since it became the management buzzword in the late 1980s and early 1990s. By applying the philosophy and principles of TQM, many companies (e.g., Xerox, Motorola, IBM, Baldrige winners) have improved both competitiveness and profitability, (E Ross, 2017). TQM has two major attributes. First, the customer is final judge of quality and second, that quality is built into design of a product rather than...
merely having it inspected after the product has been manufactured, (Mishra, K K Garg and Naru, 2013).

2.2 **Deming Prize**

Deming Prize is one such award and ever since it is open for companies from outside Japan, maximum number of winning companies are from India, with 20 companies winning the Deming Prize and four among them also winning the Deming Prize, (Rajashekharaiah, 2014).

2.3 **Identifying Variables**

The variables in this study consisted of three variables taken from Deming Prize category, which are as follows: (Taddese and Osada, 2010)

a. **Organization**
   The state of organization or company in general here among other characteristics of employee tasks, social interaction between employees/departments, employee division of labor, etc.

b. **Standardization**
   This observation covers the problem of how a company applies technology in its work process or organization, which includes work tool problems, as well as problems of standard employee application by employees.

c. **Control**
   Control shall be undertaken to ensure that procedures are applied for quality control or problems that may occur from time to time.

d. **Sampling Method**
   The population of this research is the employees of production and marketing in CV. Mutiara Bahari Surabaya. If the population is known, then in determining the number of samples used Taro Yamane formula, with a predetermined precision level of 10%. With the following formula:

\[ n = \frac{N}{N + d^2 + 1} \]

Where:
- \( n \) = number of samples
- \( N \) = total population
- \( d \) = precision level specified

2.4 **Method of Collecting Data**

In collecting the data, the type of data collected in this study are two, namely:

a) **Primary data**
   That is the real data that can be obtained from the observation or measurement directly to an object of research conducted. The other can be collected through:
   1. Interview
      The process of collecting data by asking directly about the problem or data needed with the help of a list of questions posed by researchers to respondents.
   2. Observation
      Methods of data collection by holding a direct observation of activity on the object.

b) **Secondary Data**
   That is data obtained indirectly from the object of research, but has been compiled in the form of documents/written records that have been owned by the company.
   1. Organizational structure along with job description.
   2. Current management data, strategies and targets, etc.

2.5 **Data Analysis Method**

Data analysis phase is the most important stage in this study, which uses Deming Prize-based Total Quality Management (TQM) method. At this stage, the score obtained from the questionnaire is then matched with the target score on Deming’s management. From here it will be known whether it is appropriate or not with the criteria Deming Prize and will know what deficiencies owned by the
Broadly speaking the questionnaire consists of five parts and the results can be seen in Table 1 to 5.

**Table 1. Questions on Organization**

| No | Category                      | Target Score |
|----|-------------------------------|--------------|
| 1. | Involvement                   | 3.50         |
| 2. | Collaboration                 | 3.50         |
| 3. | Training                      | 3.50         |
| 4. | Organization/ work structure  | 3.50         |
| 5. | Staffing                      | 3.50         |
| 6. | Highest authority             | 1.50         |
| 7. | Job analysis                  | 1.50         |
|    | **Total (score divided by 7)** | **2.93**     |

Organizational Variables, the average total score of the company is 2.93

**Table 2. Questions on Standardization**

| No     | Category                          | Target score |
|--------|-----------------------------------|--------------|
| 1.     | Goal of work unit                 | 3.50         |
| 2.     | Goal of organization              | 3.50         |
| 3.     | Employee task characteristic       | 3.50         |
| 4.     | Awareness of productivity         | 3.50         |
| 5.     | Limiter consequence               | 3.50         |
| 6.     | Work tool definition              | 1.50         |
| 7.     | Organization progress             | 1.50         |
| 8.     | Plan of quality implementation    | 1.50         |
|        | **Total (score divided by 8)**    | **2.75**     |

Standardization variables, the average total score of company is 2.75

**Table 3. Questions on Control**

| No     | Category                          | Target score |
|--------|-----------------------------------|--------------|
| 1.     | Improvement method/ process       | 3.50         |
| 2.     | Quantitative/amount               | 3.50         |
| 3.     | Quality improvement structure/ system | 3.50       |
| 4.     | Strategy plan                     | 1.50         |
| 5.     | Analysis process/ measure         | 1.50         |
| 6.     | Measurement                       | 1.50         |
|        | **Total (score divided by 6)**    | **2.50**     |

Control variables, the average score of total company is 2.50

**Table 4. Questions on Analysis**

| No     | Category                          | Target score |
|--------|-----------------------------------|--------------|
| 1.     | Awareness of productivity         | 3.50         |
| 2.     | Improvement method/ process       | 3.50         |
| 3.     | Analysis process/ measure         | 1.50         |
| 4.     | Evaluation                        | 1.50         |
| 5.     | Improvement definition            | 1.60         |
|        | **Total (score divided by 5)**    | **2.32**     |

Analysis variables, the average total score of company is 2.32

**Table 5. Questions on Influence**

| No     | Category                          | Target score |
|--------|-----------------------------------|--------------|
| 1.     | Ingredients supply                | 3.50         |
| 2.     | Quality survey to customers       | 3.50         |
| 3.     | Reliability                       | 3.50         |
| 4.     | Equipment                         | 3.50         |
| 5.     | Facility                          | 3.50         |
| 6.     | Improvement method/process        | 3.50         |
| 7.     | Employee input                    | 1.40         |
8. Appreciation  
| Total (score divided by 8) |
|--------------------------|
| 1.50                     |

Influence variables, the average total score of company is 2.99

To find out whether or not the implementation of management according to Deming, it is necessary to re-observation to the field to see the previous Total Quality Management (TQM) policy with real conditions in the field. The results of the questionnaire will be processed by:

a) Validity Test
To perform validity testing, the most common way is to use Product moment correlation, the formula is as follows:

\[ r_{hitung} = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}} \]

Where:
- \( r \) calculate = Correlation coefficient
- \( \Sigma x_i \) = Number of item scores
- \( \Sigma y_i \) = Total total score
- \( n \) = Number of respondents

Data is said to be valid if \( t \) count is greater than \( t \) table

b) Test Reliability
Reliability can be defined as an instrument used in research to obtain the desired information can be trusted (reliable) as a data collector and able to reveal the actual information in the field.

The technique used to test reliability in this research is Spearman-Brown method:

\[ r_{11} = \frac{2r_b}{1 + r_b} \]

Where:
- \( r_{11} \) = Internal reliability coefficient of all items
- \( r_b \) = Product Moment Correlation between parts (odd-even) or (start-end).

If \( r \) table, it can be concluded that the instruments used are reliable and research using the same instrument can proceed.

3. Methods
3.1 Data Collection

Data were collected based on the questionnaires that the researcher submitted for the respondents. Sample taken from the employee population CV. Mutiara Bahari Surabaya.

The number of population in this case employees CV. Pearl Bahari has been known, the number of production and marketing employees of 126 people, the researchers used the sampling technique using the formula Taro Yamane, namely:

\[ n = \frac{126}{126(0.1)^2 + 1} = 55.75 \approx 56 \]

So with that, then the number of samples taken as much as 56 respondents.

Table 6. Production and Marketing Employees Education Level of High School to University

| Department | Education level | Sum |
|------------|-----------------|-----|
|            | High school     |     |
| Production | 89              | 94  |
| Marketing  | 17              | 19  |
| Total      | 106             | 113 |

Production department respondent = \( \frac{94}{113} \times 56 = 46.58 \rightarrow 47 \)
3.2 Test Validity For Organizational Variables

There are 9 questions in the questionnaire, it will appear 9 product moment correlation. Then the correlation coefficient of each item is compared the critical number value \( r \) (\( r \) table) at a significant level of 5\% and \( n = 56 \) is 0.2630. A question is considered valid if the correlation coefficient is greater than the critical value (\( r \) table). Test results validity, there are 9 questions declared valid.

3.3 Test Validity For Standardization Variables

There are 9 questions in the questionnaire, it will appear 9 product moment correlation. Then the correlation coefficient of each item is compared the critical number value \( r \) (\( r \) table) at a significant level of 5\% and \( n = 56 \) is 0.2630. A question is considered valid if the correlation coefficient is greater than the critical value (\( r \) table). Test results validity as listed in the table above, there are 9 questions declared valid.

3.4 Test Reliability For Control Variables

There are 14 questions in the questionnaire, it will appear 14 product moment correlation. Then the correlation coefficient of each item is compared the critical number value \( r \) (\( r \) table) at a significant level of 5\% and \( n = 56 \) is 0.2630. A question is considered reliable if the correlation coefficient is greater than the critical value (\( r \) table).

4. Result

There are two main issues that are serious problems for the company. The problem in question here is the problem of the lack of employee involvement in the company's activities, as well as the issue of bonuses or promotions that felt less by some employees of the company. In the proposed improvement plan for the company, will be explained briefly about the solution of the two problems that exist within the company. One of the principles of Total Quality Management is the empowerment and employee engagement (KDP). Successful implementation of KDP requires a change of corporate organizational culture.

Company issues where the company score is less than the target score due to lack of employee involvement in the organization of the company, among others on the item job analysis, organizational goals, the definition of tools / tools, measurement, and employee input. The issue of awareness will be discussed in the next section. There are various tools that can be used to encourage employees to give their input and channel it to decision-makers.

The next discussion concerns the issue of appreciation that is still lacking by the employees at CV. Mutiara Bahari Surabaya. In the TQM model, the role of rewards and recognition of employee performance, such as job appraisal, compensation, achievement recognition programs, and promotion systems, is a motivation to achieve company goals.

5. Conclusions

Internal quality in CV. Pearl Bahari in general is quite good, this is evident from the score-score obtained from 3 variables, namely:

- Organizational Variables, the average total score of the company earned is 3.41, already exceeds the average total target score set is 2.93. Where there is one category that the score of the company is still below the target score
- Standardization variables, the average total company score is 3.00. This score exceeds the average total score of the target score that has been set at 2.75. Where there are two categories that the company score is still below the target score.
- Control variables, the average total company score of 2.81. This score has exceeded the average total target score set that is 2.50. Where there is one category that the score of the company is still below the target score.
6. References

[1] Alhusaimi, Muteb, The Implementation of Total Quality Management in King Saud University, International Journal of Independent Research and Studies, Vol. 1, No. 2, 2012, pp. 80-88.

[2] Awan, M Usman, Raouf, Abdul and Ahmad, Niaz, Total Quality Management in Developing Countries, International Journal of Pharmaceutical and Healthcare Maketing, Vol. 3, No. 4, 2010, pp. 363-380.

[3] Bon, A Talib, Recent and Influential Studies on TQM-Innovation Relationship: A Review, International Journal of Management Studies, Statistics & Applied Economics (IJMSAE), Vol. 2, No. 2, 2012, pp. 147-162.

[4] C C Chang, C M Chiu and C A Chen, The Effect of TQM Practices on Employee Satisfaction and Loyalty in Government, International Journal of Total Quality Management and Business Excellence, Vol. 21, Issue 12, 2010, pp. 1299-1314.

[5] Galati, Francesco and Bigliardi, Barbara, The Implementation of Total Quality Management in R & D Environments, Journal of Technology Management & Innovation, Vol. 9, No. 2, 2014.

[6] E Ross, Joel, Total Quality Management, 3rd Edition, Taylor and Francis Group, New York, 2017.

[7] Fasil, Taddese and Osada, Hiroshi, Multiple Dimensions of TQM Success in Developing Countries: an Empirical Study on Deming Prize Winners from India and Thailand, International Journal of Innovation and Learning, Vol. 9, Issue 2, 2011.

[8] Hoang, Dinh Thai, Igel, Barbara and Laosirihongthong, Tritos, Total Quality Management (TQM) Strategy and Organisational Characteristics: Evidence from a Recent WTO Member, International Journal of Total Quality Management and Business Excellence, Vol. 21, Issue 9, 2010, pp. 931-951.

[9] Kuei, Chua-hua and LU Min H, Integrating Quality Management Principles into Sustainability Management, International Journal of Total Quality Management and Business Excellence, Vol. 24, Issue 1-2, 2013, pp. 62-78.

[10] Madu, Christian N., Total Quality Management, Springer Science & Business Media, New York, 2012.

[11] Mehralizadeh and Safaeemoghaddam, The Applicability of Quality Management Systems and Models to Higher Education: A New Perspective, International Journal of The Total Quality Management, Vol. 22, Issue 2, 2010, pp. 175-187.

[12] Mishra, Pranav and K Garg and Naru, Amit, The Deming Prize-The Route Improving Performance, International Journal of Advanced Research in Management and Social Sciences, Vol. 2, No. 9, 2013.

[13] Phomas, Evangelos and Vouzas, Fotis, Quality Management Benefits Through the “Soft” and “Hard” Aspect of TQM in Food Companies, International Journal of The Total Quality Management, Vol. 26, No. 5, 2014, pp. 431-444.

[14] Rajashekharaiah, Jagadeesh, Quality Leaders-Learning from the Deming Prize Winners in India, International Journal of Quality Research, Vol. 8, No. 3, 2014, pp. 431-446.

[15] Sallis, Edward, Total Quality Management in Education, 3rd Edition, Taylor and Francis Group, London, 2014.

[16] Singh, Hardeep and Sinha, Pujashree, Total Quality Management: Today’s Business Excellence Strategy, International Journal of International Letters of Social and Humanistic Sciences, Vol. 9, No. 32, 2014, pp. 188-196.

[17] Soon Ng, Kim, Quality Management and Practices, In Tech Janeza Trdine, Rijeka, Kroasia, 2012.

[18] Taddese, Fasil and Osada, Hiroshi, Process Techno-Innovation Using TQM in Developing Countries Study of Deming Prize Winners, International Journal of Technology Management Innovation, Vol. 5, No. 2, 2010.

[19] Talib F, Rahman and M N Qureshi, The Relationship Between Total Quality Management and Quality Performance in The Service Industry: A Theoretical Model, International Journal of Business, Management and Social Sciences (IJBMSS), MultiCraft, Vol. 1, No. 1, 2010, pp. 113-128.

[20] Tari, Juan Jose, Research into Quality Management and Social Responsibility, International Journal of Business Ethics, vol. 102, Issue 4, 2011, pp. 623-638.