Effect of Total Quality Management on the Quality and Productivity of Human Resources

I Siregar 1 *, A A Nasution 2, R M Sari 1

1 Department of Industrial Engineering, University of Sumatera Utara, Almamater Street Campus USU, Medan – North Sumatera, 20155

2 Department of Accounting, University of Sumatera Utara, Almamater Street Campus USU, Medan – North Sumatera, 20155

*ikhsan.siregar@usu.ac.id

Abstract. Human resources is the main factor in improving company performance not only in industrial products but also services. Therefore, all of the organization performers involved must work together to achieve product quality services expected by consumers. Educational institutions are the service industries which are educators and instructor involved in it. Quality of product and services produced depends on the education organization performers. This study did a survey of instructors in public and private universities in North Sumatra to obtain the factors that affect quality of human resources and productivity of human resources. Human resources quality is viewed by the elements of TQM. TQM elements that are discussed in this study are leadership, communication, training and education, support structure, measurement and reward and recognition. The results of this study showed a correlation numbers across the exogenous variables on endogenous variables relationships tend to be strong and be positive. In addition, elements of TQM are discussed except the support structure which has a direct influence on the quality of human resources. Variable leadership, reward and recognition and quality of human resources have a significant effect on productivity.

1. Introduction

Total Quality Management (TQM) is based on; all organization staff should collaborate with each other for purposes of producing high quality products and services in order to meet customers’ demands. (1). Total Quality Management consists of several quality instruments and techniques, in addition to various values and beliefs that all staff within the same organization shares (2). TQM can be defined as a strategy that aims to generate and transfer more efficient and superior services, through achieving cooperation between organizational members. (3). Such studies indicated that there are positive relation between the effective implementation of TQM and the organizational performance, in which when one organization applies total quality management practices in effective way then it’s organizational and employees’ performance will largely enhanced.(4). Leaders in a TQM system view the firm as a system; support employee development; establish a multipoint communication among the employees, managers, and customers and use information efficiently and effectively. In addition, leaders encourage employee participation in decision-making and empower the employees. Previous studies have found that leadership improves operational performance. TQM firms should give necessary training to all their employees to improve their proficiencies in their tasks. Effective training in management and improvement in quality bring success for the firms. Employees’ effective
knowledge and learning capability will provide sustainability of quality management in the firm. Some studies report that training is positively related to operational performance (3). Reward and recognition, employee reward systems refer to programs set up by a company to reward performance and motivate employees on individual and/or group levels. Communication is an important means of realizing quality. There is strong relationship between good communication and successful quality implementation. Communication is an important means of realizing quality. There is strong relationship between good communication and successful quality implementation.

2. Methods
This research is a correlation descriptive research, a study investigating the presence or absence of a relationship between exogenous variables influences the endogenous variables. The dependent variable in the analysis of pathways called endogenous variable. The independent variable called exogenous variables. Variables were investigated in relation to Human Resources Quality (Y1) are leadership (X1), communication (X2), training and education (X3), support structure (X4), measurement (X5) and reward and recognition (X6), and job satisfaction (Y1). Variable leadership (X1), Reward and recognition (X6), and Human Resources Quality (Y1) also investigated the relationship on labor productivity. This study will look at the influence of each factor on the productivity of human resources will be formulated in associative hypothesis partially or simultaneously.

The population is all instructors in the public education institutions and one private education institution in North Sumatra. The sample is based on probability sampling which is simple random sampling with the sample size of 43 peoples. This study used an enclosed questionnaire with the research scale using a Likert scale from 1-5 can be seen in Table 1.

| Value | Scale            |
|-------|------------------|
| 1     | Very disagree    |
| 2     | Disagree         |
| 3     | Neutral          |
| 4     | Agree            |
| 5     | Very Agree       |

Table 1. Research Scale

The research instrument (questionnaire) tested the validity and reliability by distributing questionnaires to 30 respondents that were chosen based on the rule of thumb. The test results demonstrate the validity of the value of correlated items ratio is greater than the value of r-table = 0.362 so that all the questions fit for use as a research instrument. Coefficient of alpha cronbach (0.860) is greater than the value of r-table 0.362 so that the research instrument is reliable (consistent) to reveal the expected data.

Correlation analysis is used to analyze the strength of the relationship between exogenous and endogenous variables. Path analysis is used to see the influence of exogenous variables on endogenous variables. The equation for the track path analysis equation Y1 and Y2 as follows:

\[
Y_1 = \gamma_{11}X_1 + \gamma_{12}X_2 + \gamma_{13}X_3 + \gamma_{14}X_4 + \gamma_{15}X_5 + \gamma_{16}X_6 + e_2, \quad \ldots \ldots \ldots \ldots \ldots \ldots (1)
\]

\[
Y_2 = \gamma_{21}X_1 + \gamma_{26}X_6 + \rho_{11}Y_1 + e_1, \quad \ldots \ldots \ldots \ldots \ldots \ldots (2)
\]

According to Nawawi, the correlation value of 1 indicates perfect correlation, 0.900 to 0.999 show very high correlations, from 0.700 to 0.899 indicates a high correlation, 0.400 to 0.699 indicates moderate correlation, 0.200 to 0.399 indicates a low correlation, and less than 0.199 showed no correlation.
3. Research Result

3.1. Correlation Analysis

Correlation analysis is used to determine the relationship between endogenous variables with each of the exogenous variables. The correlation coefficient indicates a strong or weak relationship between the endogenous and exogenous variables as well as the direction of the relationship. The whole correlation coefficient is positive; it means there is a direct relationship between endogenous and exogenous variables.

| Exogenous Variable                       | Endogenous Variable       |
|-----------------------------------------|---------------------------|
| Leadership (X₁)                         | Quality of human resources (Y₁) |
|                                          | 0.677                     |
| Communication (X₂)                      | Productivity of human resource (Y₂) |
|                                          | 0.668                     |
| Training and education (X₃)              |                           |
| Support structure (X₄)                   |                           |
| Measurement (X₅)                         |                           |
| Reward and recognition (X₆)              |                           |
| Quality of human resources (Y₁)         |                           |
|                                          | 0.813                     |

Table 2. Shows the variables of leadership, communication, support structure, and reward and recognition has a moderate correlation to the quality of human resources. Training and education variable has the strong correlation measurement of the quality of human resources. Leadership variable has a moderate correlation to the productivity of human resources. Reward and recognition variable as well as the quality of human resources have a strong correlation to the productivity of human resources. Throughout the exogenous variables have a direct relationship to the endogenous variables means that each increment on exogenous variables will increase the value of endogenous variables.

3.2. Path Analysis

This paper shows the TQM variables (leadership, communication, training and education, support structure, measurement, and reward and recognition) on the quality of human resources and productivity of human resources. Path analysis shows the results that can be seen in Figure 1. The results obtained the variables of leadership and reward and recognition has direct and indirect influence on the productivity of human resources. While the variable of communication, training and education, and measurement have indirect influence on the productivity of human resources. Support structure variable does not have a significant effect on the quality of human resources.

Y₁ path shows the relationship between TQM to the quality of human resources and the equation as follows:

\[ Y₁ = 0.213X₁ + 0.177X₂ + 0.271X₃ + 0.202X₅ + 0.231X₆ + 0.567 \]

In educational institutions there are no significant influences between the support structures on the quality of human resources. Y₂ path shows the relationship between the variables of leadership, quality of human resources, and reward and recognition on the productivity of human resources, the equation as follows:
\[ Y_2 = 0.237 \, X_1 + 0.345 \, X_6 + 0.420 \, Y_1 + 0.240 \]

The coefficient has a positive value, which means that each variable have a direct relationship with the human resources productivity.

![Figure 1. Path Analysis](image)

3.3. Discussion

In educational institutions there are no significant influences between the support structures on the quality of human resources.

William Glasser (1990) said that: “if you want quality schools, we have to revise the way we manage students. He suggests that we use the quality management concepts pioneered by W. Edwards Deming, the man who taught the Japanese how to manage workers so that they did the quality work that all people want and, in going so, have made Japan the most powerful economic force in the world. To do this, however, it is necessary that both students and staff learn the control theory that underlies this change and Glasser is the world’s leading exponents of this new theory”. In Indonesia, education not only depends on that criteria mention above, there is another variable that called human resources who helped institution to run the administration of bureaucracy. This variable be affected depends on leadership, communication, training & education, support structure, measurement, and reward & recognition.

4. Conclusion

All that organization staff should work together to produce high quality products and services in order to meet customers’ demands. Leadership and reward and recognition have a direct and indirect influence on the productivity of human resources. Communication, training and education, and measurement have an indirect influence on human resources productivity. In the education institutions there are no significant influence between the support structures on the quality of human resources.

Acknowledgment

This research was supported by University of Sumatera Utara. We thank our colleagues from Information System Center who provided insight and expertise that greatly assisted the research. All the faculty, staff members and lab technicians of Industrial Engineering Department, whose services turned my research a success. Dr. Himsar Ambarita, my mentor, whose reminders and constant motivation encouraged me to meet the deadlines. My Wife, Kartika Widya Astuty and children, Omaar Al Faridzi Siregar and Alisha Rizki Siregar, family members and friends, without whom I was nothing; they not only assisted me financially but also extended their support morally and emotionally.
References

[1] Lu-J, 2007. Anthropometric measurement of Filipino manufacturing workers. International Journal of Industrial Ergonomics 37 (2007) 497–503.

[2] Klamklay J., Sungkhapong A., Yodpijit N, Patterson P. E, 2008, Anthropometry of the southern Thai population, International Journal of Industrial Ergonomics, Volume 38, Issue 1, January 2008, Pages 111–118.

[3] Chuan T. K, Hartono M, Kumar N, 2010, Anthropometry of the Singaporean and Indonesian populations, International Journal of Industrial Ergonomics, Volume 40, Issue 6, November 2010, Pages 757–766.

[4] Nadadur G., Raschke U, Parkinson M.B., 2016, A quantile-based anthropometry synthesis technique for global user populations, International Journal of Industrial Ergonomics 53 (2016) 167-178.

[5] Sutalaksana I.Z., Widyanti A., 2016, Anthropometry approach in workplace redesign in Indonesian Sundanese roof tile industries, International Journal of Industrial Ergonomics 53 (2016) 299-305.

[6] Wibowo R.K.K,Soni P, 2016, Farmers’Injuries, Discomfort and Its Use in Design of Agricultural Hand Tools: A Case Study from East Java, Indonesia, Agriculture and Agricultural Science Procedia 9 (2016) 323 – 327.

[7] Widyanti A, Susanti L, Sutalaksana I.Z., Muslim K, 2015, Ethnic differences in Indonesian anthropometry data: Evidence from three different largest ethnics, International Journal of Industrial Ergonomics 47 (2015) 72-78.

[8] Wibowo R.K.K,Soni P, 2014, Anthropometry and Agricultural Hand Tool Design for Javanese and Madurese Farmers in East Java, Indonesia, APCBEE Procedia 8 (2014) 119 – 124.

[9] Shahida M.S.N, Zawiah M.D.S, K. Case, The relationship between anthropometry and hand grip strength among elderly Malaysians, International Journal of Industrial Ergonomics 50 (2015) 17-25.

[10] Deros B.Md, Hassan N.H.H, Daruis D.D.I , Tamrin S.B.M, 2015, Incorporating Malaysian’s Population Anthropometry Data in the Design of an Ergonomic Driver’s Seat, Procedia - Social and Behavioral Sciences 195 (2015) 2753 – 2760.

[11] Mahoney J.M, Kurczewski N.A, Froede E. W, 2015, Design method for multi-user workstations utilizing anthropometry and preference data, Applied Ergonomics 46 (2015) 60-66.

[12] Hemy N, Flavel A, Ishak N.I, Franklin D, 2013, Sex estimation using anthropometry of feet and footprints in a Western Australian population, Forensic Science International 231 (2013) 402.e1–402.e6.

[13] Chall S, Satyaprasad J, 2013, Hamstring graft size and anthropometry in south Indian population, Journal of Clinical Orthopaedics and Trauma, Volume 4, Issue 3, September 2013, Pages 135–138.

[14] Kim S.G, Ko K.D, Hwang I.C, Suha H. S, Kay S, Caterson I, Kim K.K, 2015, Relationship between indices of obesity obtained by anthropometry and dual-energy X-ray absorptiometry: The Fourth and Fifth Korea National Health and Nutrition Examination Survey, Obesity Research & Clinical Practice (2015) 9, 487—498.

[15] McCrindle B.W, 2014, The Contribution of Anthropometry, Adiposity, and Adiposopathy to Cardiometabolic Disturbances in Obese Youth, The Journal Of Pediatrics Vol. 165, No. 6.

[16] Haines, M. 1998. Health, height, nutrition, and mortality: Evidence on the ‘antebellum puzzle’ from Union army recruits for the New York State and the United States. In The Biological Standard of Living in Comparative Perspective, ed. J. Komlos and J. Baten. 155–80. Stuttgart: Franz Steiner.

[17] Roscoe, J.T. (1975) Fundamentals Research Statistics for the Behavioural Sciences, 2nd edition. New York: Holt Rinehart & Winston.

[18] Uma Sekaran, 2006, Metodologi Penelitian untuk Bisnis, Edisi 4, Buku 2, Jakarta: Salemba Empat.
[19] Cuff, T. 2005. *The Hidden Cost of Economic Development: The Biological Standard of Living in Antebellum Pennsylvania*. Aldershot, Hants, England: Ashgate.

[20] Craig, L. and T. Weiss. 1998. Nutritional status and agricultural surpluses in the antebellum United States. In *The Biological Standard of Living in Comparative Perspective*, ed. J. Komlos and J. Baten, 190–207. Stuttgart: Franz Steiner.