

The Impact of Soft Factors on Quality Improvement in Manufacturing Industry

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Abstract. Nowadays, soft factors have become the key factors of success in quality improvement of an organisation. Many organisations have neglected the importance of soft factors, this may influence the organisational performance. Hence, the purpose of this research is to examine the impact of soft factors on quality improvement in manufacturing industries. Six hypotheses were examined while considering six dimensions of soft factors including management commitment, customer focus, supplier relationship, employee involvement, training and education, and reward and recognition that have a positive impact on quality improvement. In this study, eighty one managers from the quality department were randomly selected in the manufacturing industry in Batu Pahat, Johor. The questionnaires were distributed to them. The researcher analysed the quantitatively collected data using descriptive analysis and correlation analysis. The findings of this study revealed that all soft factors are correlated to the quality improvement in an organisation with a high significant value but the regression analysis shows that the supplier relationship and employee involvement has more significant impact on quality improvement as compared to other soft factors which contributes of this study.

1. Introduction

The soft factors are the “human factors” or the behavioral traits of management, for instance human resource management (HRM), leadership, empowerment and employee involvement [1]. Several researchers have determined that the soft factors have an impact on quality improvement [2]. Zbaracki [3] explained that the soft factors are the characteristic aspects of management or the —human factors, such as leadership, human resource management (HRM), employee involvement, empowerment, and so forth. Zaini, et al. [4] had conducted a research that is related to the rate of product rejection was increased from 2012 to 2013, which was caused by poor product quality. Besides that, an analysis showed that the rate of share in the food processing industry was decreased from 1991 to 2008 in the Malaysian manufacturing industry, which means that the rate of rejection of export products to other countries has increased. This happened because the quality standard does not meet the standard requirement from other countries and need to be improved. This problem may be influenced by the six dimensions of soft factors, namely management commitment, customer focus, supplier relationship, employee involvement, training and education, supplier relationship, and reward and recognition, as were found in a study by Abdullah, Uli & Tari [5]. Besides that, there is a limited study for the impact of soft factors on quality improvement in Malaysia. Most of the studies were carried out in the



Electrical & Electronics industry, service sectors, and etc. Hence, the purpose of this study is to examine the impact of soft factors on quality improvement in the manufacturing industry.

Employee involvement, a soft factor example, must be considered to understand how it can affect quality improvement. For instance, strike behaviour of worker from Bank of Ghana, Ghana Railways Company, Barclays, and etc. These actions were caused by the dissatisfaction of employees about some separate decisions made by the organisations' management and Board members without the worker' body participation. Those decisions were observed by the employees as unfavourable to their welfare, development, sustainability, and organisational stability. Employees who are not involved in the decision-making process could cause job dissatisfaction, which would finally result in man hours lost, low productivity, and a detrimental effect on the organisational fate and also the gross domestic product of the country [6]. Lack of commitment from the management and too restricted focus on quality management has become the obstacles for the implementation of quality improvement activities [7]. Moreover, most of the officers punished employees for their mistakes rather than recognising or rewarding for outstanding work of the employees [8].

There are a few studies that were conducted on the relationship between soft factors and quality improvement. For instance, Abdullah, Uli & Tari [5] conducted a study that aims to determine the direct, indirect, and total effect of critical soft factors on quality improvement and organisational performance. The research findings revealed that the six critical soft factors, such as quality improvement, and organisational performance are positively interrelated. Besides that, there was a study by Abdullah, Uli & Tari [5] which aimed to examine the influence of four selected soft factors (i.e., management commitment, employee involvement, training and education, and reward and recognition) in the E&E firms. The result showed that the four soft factors have significant and positive influence on quality improvement. Furthermore, another similar study by Abdullah, Tari & Akhtar [10] had analysed the relationships among the soft factors, such as quality improvement, and organisational performance and examined quality improvement as an organisational development practice in mediating the relationship between the soft factors and organisational performance. The results indicated that the six soft factors have a significant positive relationship with quality improvement. Thus, the objective of this study is to identify the impact of soft factors on quality improvement in the manufacturing industry.

2. Literature Review

2.1 Soft Factors

The soft factors are related with the creation of customer consciousness and human resources management. The soft factors are the characteristic aspects of management or the human factors, such as leadership, human resource management (HRM), employee involvement and authorisation, and so on [11]. Samson & Terziovski [12] have endorsed in their studies that beneficial use of these soft quality factors (e.g. executive commitment, employee involvement, customer focus, and employee focus), can bring quality improvement in an organisation.

Top management commitment is displayed by creating the elements of quality management structure [13]. Brah & Lim [14] said that the impact of top management in leadership commitment has an effect on other quality attributes. When top management is committed to quality, adequate resources will be allocated to quality improvement efforts. Hence, this effort can be one for top management commitment performance to quality [15]. Furthermore, some researchers define customer focus in terms of customer relationship practices, such as organisational procedures, systems, and practices that deal with customer needs (e.g. [16]). Customer focus is important because it is the starting point of any quality initiative [17]. Wright & Grant [18] stated that the product quality should be focused on customer wants and demands basis rather than theoretical standards. Hence, qualities that have been recognised and defined from the customer's viewpoint have always achieved the most successful quality improvement plans [19].

Supplier relationship refers to chances to build on the success of strategic sourcing and traditional procurement initiatives. It consists of developing supplier relationships with key suppliers to reduce

costs, innovate with new products, and create value for both parties, based on a mutual commitment to long-term collaboration and shared success [20]. Developing and maintaining a supply relationship can be achieved either by collaboration or agreement. Specifically, trust provides a basis for achieving collaboration, while power acts as a mechanism for achieving an agreement [21]. Poor quality of supplier products causes extra costs that need to be purchased more [22]. Moreover, employee involvement is defined as the level at which employees have a sense of control over their work [23]. Employee involvement provides chances for employees to enhance their skills and provide direction in their jobs and enjoy their work [24]. Several research have shown the successfulness of employee's involvement practices on quality improvement [25].

Besides that, training is an effort to develop knowledge and skills of an employee in performing a particular job [26]. Training is best supplemented with practical and hands-on experience [27]. The Manpower Services Commission [28] defined education as activities or functions that aim in developing the knowledge, skills, moral values, and understanding that are required in all aspects of life rather than having only knowledge and skill relating to a limited field of activity. On the other hand, reward and recognition are consistently recognised by organisations and managers as an important part in motivating an individual employee. Employee of the month schemes, profit sharing, and monetary payment for higher productivity or commission on sales revenue are widely used [29]. Reward and recognition can be used to improve relationships by encouraging cooperation and working towards achieving common goals. Reward and recognition strategies can also encourage development and learning by encouraging risk taking and trying new initiatives [29].

2.2 Quality improvement

Based on Adam et al. [30], quality improvement is defined as all activities that contribute to defining, evaluating, monitoring, and improving quality. Quality improvement can be measured by using 11 scales, which are customer involvement, feedback, interfunctional design process, new product quality, process control, process management, quality improvement rewards, quality leadership, supplier involvement, selection for teamwork potential, and teamwork. Customer involvement is a feedback that is important for offering quality products and services, sample survey, opinion polls, or by soliciting individual customer's opinion on the preferred product quality and service dimensions [31]. In addition, feedback is defined as sharing information with co-workers about the impact of their behaviour on the team's process, results, or relationships [32]. It can build trust, remove interpersonal barriers, and guide people in the team to improve performances by giving and receiving feedbacks [33].

Bartosek & Tomaskova [34] said that interfunctional is in different approaches, such as management, marketing, logistics or information technology science. He also said that the optimal level of interfunctional can be found by managing it in the present business conditions. Design process means a multidisciplinary process of creating new products and the involvement of different functional units [35]. Furthermore, according to Sethi [36], new product quality was found to have a significant impact on the market success and profitability of a new product and therefore, firms are increasingly using cross-functional teams to improve product quality in product development process. Factors that influence a new product's market success and profitability are its quality, in the dimension of appearance, performance, workmanship, life or durability, features, conformance, reliability, serviceability, aesthetics, and customer-perceived quality [37].

Moreover, Awaj, Singh, & Amedie [38] said that process control is significant because it could improve process performance by reducing product changeability and improves production efficiency by decreasing waste and rework. Data are collected and appropriate action is taken to control the quality process and the product through the basis of analysis measurements in process control [39]. Besides that, Bawden & Zuber-Skerritt [40] stated that process management is a part of managing the whole organisation. While Lee & Dale [41] explained that process management is a set of tools and techniques for improving processes and a method for integrating the whole organisation. Rewards can

be defined as awards granted to employees on the basis of tasks performed, which meet or exceed the expectations that were initially established [42].

On the other hand, Feigenbaum [43] explained that quality leadership is where quality principles become a basis for guiding, empowering, and supporting the constant pursuit of excellence by the employees throughout the organisation. Leadership styles such as transformational and transactional leadership have a positive correlation with quality management practices [44]. Additionally, Ferrie et al. [45] explained that supplier involvement refers to the resources, (i.e., capabilities, investments, information, knowledge, and ideas that are provided by the suppliers), the tasks they accomplish, and the responsibilities they assume regarding the development of a part, process, or service for the benefit of a buyer's current or future product development projects. Primo & Amundson [46] argued that supplier involvement has contributed to short-term project performance by improving product quality and reducing development time and in development and product costs.

Selection is often presented as a planned rational activity, comprising certain sequentially-linked phases within a process of employee resourcing [47]. Teamwork involves functional cooperation, which is working together towards a practical purpose [48]. While for potential team, there is an important and incremental performance need, and it tries to improve its performance, it requires more clarity about purpose, goals, or work products, and more discipline in hammering out a common working approach [49]. Besides that, teamwork is also defined as a cooperative process that allows ordinary people to achieve extraordinary results [50].

3. Methodology

In this study, the targeted population is 400 managers in the manufacturing industry in Batu Pahat, Johor. 196 from a total of 400 managers were chosen randomly from the population. Survey method was carried out in this study and questionnaire was used to gather data which were made up of two sections. Example of items was demonstrated in the Table 1. The first section of the questionnaire gathers six soft factors that are involved in management commitment, customer focus, employee involvement, training and education, reward and recognition, and supplier relationship. While the second section gathers data on quality improvement, which includes eleven scales of measuring and quality improvement strategies. The eleven scales of quality improvement include customer involvement, feedback, interfunctional design process, new product quality, process control, process management, quality improvement rewards, quality leadership, supplier involvement, selection for teamwork potential, and teamwork. The measurement of these two instruments uses the ten-point Likert Scales which rank from 1 = Strongly disagree until 10 = Strongly agree.

Table 1: Example of items for questionnaire

Section	Example of items
First section	<ul style="list-style-type: none"> • Top management strongly encourages employee involvement in quality improvement activities. • Our company always conducts market research in order to collect suggestions for improving our products. • Employees are actively involved in quality related activities. • Resources are available for employee education and training in our company. • Recognition and reward activities effectively stimulate employee commitment to quality improvement.
Second section	<ul style="list-style-type: none"> • We are frequently in close contact with our customers. • Information on quality performance is readily available to employees. • Manufacturing engineers are involved to a great extent before the introduction of new products. • In the new product development process, schedule concerns are more important than quality (R). • A large percentage of the processes or equipment on the shopfloor are currently subject to statistical quality control procedures.

Pretesting was conducted with 30 managers from different manufacturing companies from the sample to test the suitability of the questionnaire. After the pretest was done, questions which were ambiguous were eliminated and changed to qualified questions. The Cronbach's Alpha for the soft factors and quality improvement which include eighty one items achieved 0.968. Then, the questionnaires were distributed to 196 managers in the manufacturing industry. After the data were collected and analysed using the Statistical Package for Social Science (SPSS) version 22.0. The data generated were used to examine the degree of six dimensions of soft factors and 11 scales in measuring the degree of quality improvement. Correlation analysis and regression analysis were employed to examine the impact of soft factors on quality improvement in the manufacturing industry.

4. Findings and Discussions

Correlations between two or more variables can be measured using different indices which are coefficients [51]. Since the data are not normally distributed, the non-parametric tests were conducted by using the Spearman's rho correlation test in order to do hypothesis testing based on the research's objective. The strength of the correlation coefficient value was measured according to Rumsey [52]: +1 / -1 – Perfect; +0.70 / -0.70 – Strong; +0.50 / -0.50 – Moderate; +0.30 / -0.30 – Weak; 0 – No relationship.

Table 2: Summary for the Results of Hypothesis

Hypothesis	Spearman's rho correlation	Result
H ₁ : There is a significant positive impact of management commitment on quality improvement.	0.750**	Accepted
H ₂ : There is a significant positive impact of customer focus on quality improvement.	0.777**	Accepted
H ₃ : There is a significant positive impact of employee involvement on quality improvement.	0.870**	Accepted
H ₄ : There is a significant positive impact of training and education on quality improvement.	0.657**	Accepted
H ₅ : There is a significant positive impact of reward and recognition on quality improvement.	0.830**	Accepted
H ₆ : There is a significant positive impact of supplier relationship on quality improvement.	0.848**	Accepted

From Table 2, the significance value of management commitment towards quality improvement is $0.000 < 0.05$ which is statistically significance. Hence, the H_0 is rejected because the significant value is less than 0.05 and the H_1 is accepted. There is a strong correlation coefficient between commitment management and quality improvement which is 0.750. Table 2 shows the significance value of customer focus towards quality improvement is less than 0.05 which is $p = 0.000$ that is statistically significance. Therefore, the H_0 is rejected and accept H_1 . The strength of relationship between customer focus and quality improvement is strong because the correlation coefficient is 0.777. Besides that, Table 2 also displays the significance value of employee involvement towards quality improvement is less than 0.05 which is $p = 0.000$ that is statistically significance. Thus, the H_0 is rejected and accept H_1 . The strength of relationship between employee involvement and quality improvement is very strong because the correlation coefficient is 0.877. Table 2 demonstrates the significance value of training and education towards quality improvement is less than 0.05 which is $p = 0.000$ that is statistically significance. Hence, the H_0 is rejected and accept H_1 . The strength of relationship between training and education with quality improvement is moderate because the correlation coefficient is 0.657. In Table 2, it indicates that the significance value of reward and recognition towards quality improvement is less than 0.05 which is $p = 0.000$ that is statistically significance. Hence, the H_0 is rejected and accept H_1 . The strength of relationship between reward and recognition with quality improvement is very strong because the correlation coefficient is 0.830.

Furthermore, Table 2 also reveals the significance value of supplier relationship towards quality improvement is less than 0.05 which is $p=0.000$ that is statistically significance. Hence, the H_0 is rejected and accept H_1 . The strength of relationship between supplier relationship and quality improvement is very strong because the correlation coefficient is 0.848.

Ritzema [53] stated that regression analysis is used to discover a relationship between the values of two or more variables. To test whether the relationship is statistically significant or not, at least one is subject to random variation. Since the research has one dependent variable and six independent variables, multiple regression analysis will be used to analyse the relationship between the variables. Regoniel [54] defined multiple regression analysis as a powerful statistical test that is used in finding the relationship between a given dependent variable and two or more of independent variables. Table 3 shows $R=0.928$, $R^2 = 0.849$. For R^2 of 0.849, it implies that the two predictor variables explained 84.9% of the variations are in quality improvement. Hence, the model is a good model.

Table 3: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.928 ^a	.860	.849	.25843

In Table 4, it displays the ANOVA results of the 6 independent variables. The multiple regression model with six predictors produced $R^2 = 0.860$, $F(6,73) = 75.043$, $p = 0.000 < 0.05$. It can be seen that the results show the F-statistics value is large and the corresponding p-value is highly significant (0.000) which is lower than the alpha value of 0.05. The F-value or F-ratio is the test statistic used to decide whether the model as a whole has statistically significant predictive capability and whether the regression is big enough [55]. A high value of F means that there are more probability of the null hypothesis to be rejected. Since the F-statistics value is high, the H_0 is rejected. This indicates that the slope of the estimated linear regression model line is not equal to zero which proves that there is a linear relationship between quality improvement and the two-predictor variables. In addition, the significant p-value is the confidence level (1-significant) to accept alternative hypothesis which means that $(1-0.000 = 1)100\%$ confident the alternate hypothesis is accepted, therefore, soft factors have significant positive impact on quality improvement.

Table 4: ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.071	6	5.012	75.043	.000 ^b
	Residual	4.875	73	.067		
	Total	34.947	79			

Multiple regression analysis was conducted to examine the relationship between quality improvement and soft factors such as management commitment, customer focus, employee involvement, training and education, reward and recognition, and supplier relationship. Based on the stepwise regression method used, only two predictor variables were found to be significant in explaining quality improvement. They are employee involvement (X_3) and supplier relationship (X_6) which show the significance ($t = 3.772$, $p = 0.000$), ($t = 4.877$, $p = 0.000$). The smaller the value of significant and the larger the value of t, the greater the contribution of that predictor [56]. It means that the greater the magnitude of t, the lower the significance of the evidence against the H_0 . Hence, these results show that supplier relationship. As described in Table 5, the estimation of

the model coefficient bar b_0 is 2.133, b_3 is 0.270, b_6 is 0.233. Therefore, the estimated model is as follows:

$$Y (QI) = 2.133 + 0.270(X_3) + 0.233(X_6) + e \quad \text{Where } e = \text{Error}$$

Field [56] said that the b values are the relationship between quality improvement and each soft factor. If the value is positive then there is a positive relationship between the predictor and the outcome, whereas a negative coefficient represents a negative relationship. From the data in Table 5, 5 out of 6 soft factors have positive b values which indicate that 5 soft factors have positive relationships on quality improvement, excluding management commitment. Moreover, the standardised versions of the b values are easier to be interpreted. The standardised beta values are all measured in standard deviation units and therefore, they have better insight into the importance of a predictor in the model. The beta value for employee involvement is 0.270, and for supplier relationships is 0.233. This means that employee involvement has a slightly more impact in the model.

Table 5: Regression Coefficients of Critical Soft Factors with Quality Improvement

Model	t	Significance level	B values
Management Commitment	-0.720	0.474	-0.034
Customer Focus	0.347	0.729	0.026
Employee involvement	3.772	0.000	0.270
Training and Education	1.679	0.098	0.104
Reward and Recognition	0.839	0.404	0.052
Supplier Relationship	4.877	0.000	0.233

The findings indicate that all of the soft factors are correlated with quality improvement. In other words, all of the soft factors have a strong correlation with quality improvement especially for employee involvement which has the highest correlation among others. According to Abdullah, Uli, & Tari [5], the six soft factors have a positive correlation with quality improvement practice and therefore, the six soft factors can give impact on quality improvement and company performance. Moreover, a research based on Habtoor et al. [57] found a similar result which revealed that the six soft factors (management commitment, customer focus, employee involvement, training and education, reward and recognition, and supplier relationship) are significantly related to quality improvements. Based on Abdullah, Uli, & Tari [5], employee involvement is the most highly correlated with quality improvement which can be explained as more influential factor for quality improvement practices. There are only two soft factors that have more impact on quality improvement which are employee involvement and supplier relationship with sig and beta values of (0.000, 0.270) and (0.000, 0.233). Since the beta value of employee involvement is higher than supplier relationship, the employee involvement has more impact on quality improvement compared to supplier relationship. Nevertheless, the result found by Abdullah, Uli, & Tari [5] is different from the aforementioned result which is only supplier relationship that did not contribute significantly.

5. Conclusion

The study reveals that all of the soft factors are correlated to the quality improvement in an organisation but the regression analysis shows that the supplier relationship and employee involvement has more significant impact on quality improvement compared to other soft factors that are not supported by the previous study due to most of the companies are more focused on reducing product's cost rather than the quality of product. This illustrates that the companies should pay more attention on supplier relationship and employee involvement and not only focusing on other soft

factors that may influence the quality improvement of a company. Moreover, future studies should look into the possible inclusion of several other soft factors such as communication, quality culture, and teamwork that are related to quality improvement. This study serves as the guideline and information for the managers in the manufacturing industry and other sectors.

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