



The Importance of Soft Factors for Quality Improvement: Case Study of Electrical and Electronics Firms in Malaysia

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Abstract

This study examines the influence of four selected soft factors (management commitment, employee involvement, training and education, and reward and recognition) on quality improvement within 255 Malaysian electrical & electronics (E&E) firms. Despite extensive research on quality management and quality improvement, very little empirical research has examined this area of study specifically in the E&E sector. The results of this study revealed that management commitment, employee involvement, training and education, and reward and recognition are significantly positively associated with firms' quality improvement practice. Also, employee involvement was perceived as a dominant soft factor for quality improvement; it was associated with significant improvements in firms' quality improvement. This study contributes to a better understanding of the influence of soft factors on organizational quality improvement among firms within the context of the Malaysian E&E sector. Suggestions for future research are discussed.

Keywords: Soft factors, Malaysia, Electrical and electronics firms, Quality improvement

1. Introduction

Business firms all over the world including the Malaysian firms have to maintain and enhance their competitiveness in the face of fierce global competition, changing markets and technological break through. Also, since the implementation of ASEAN Free Trade Area (AFTA) agreement in 1992, competition has become intense among the ASEAN countries (Zadry and Yusof, 2006). Facing this challenge, manufacturing and service firms should produce high-quality goods and services (Evans and Lindsay, 2002). Therefore, Malaysian firms would lose ground to competitors if they do not responsive to the global changes. To compete in this global market, Malaysian manufacturers have long realized that they need to produce quality goods and services (Agus and Abdullah, 2000). Quality improvement (QI) has been recognized by many firms as a strategy to compete in the market. Higher quality implies lower costs and increased productivity, which in turn gives the firm a greater market share and better competitive advantage (Deming, 1982; Evans and Lindsay, 2002). Literature has shown that quality improvement has been applied as a way of improving activities and performance either in small or large firms using both factual data (Easton and Jarrell, 1998; Hendricks and Singhal, 2001) and perceptual data (Powell, 1995; Samson and Terziovski, 1999; Kaynak, 2003; Prajogo and Sohal, 2006). Several other empirical researches have also supported the proposition that high quality has a positive relationship with firm performance (Flynn et al., 1997; Heras, 2006; Sharma, 2006, Sila, 2007; Chung et al., 2008). Whereas these empirical studies devoted to quality improvement focused on manufacturing firms, service sector or a combination of manufacturing and service firms, only a few studies have analyzed quality improvement practice in Electrical and Electronics (E&E) firms (Ismail et al., 1998; Agus, 2001; Eng Eng and Yusof, 2003). Moreover, the quality process and

performance among the E&E firms in Malaysia is still below the level expected to generate the required economic national growth in realizing to be a high tech industrial nation by 2020 (Idris et al., 1996; Best and Rasiah, 2003).

At present, there is very little empirical literature on quality improvement within the context of the Malaysian E&E industry; particularly on how quality improvement among these firms are affected by other factors that have attracted considerable attention in the quality literature. Because the E&E industry is considered to be one of the major contributors to the global economy, quality improvement is strategically and tactically important for gaining a competitive advantage. Moreover, this industry differs from other industries in its organizational structures, responses to the environment, and managerial styles, as well as in how firms compete. Accordingly, more empirical research should be conducted on the factors that can truly promote and enhance the successful QI practices in these firms. Thus, QI plays an important role towards the productivity and performance of organizations and for the continuous survival of Malaysian E&E firms. This paper aims to examine the influence of selected four soft factors (SF), namely management commitment, employee involvement, training and education, and reward and recognition on quality improvement (QI) in 255 E&E firms in Malaysia. This study examines: (i) the relationship between the four SF and QI and (ii) to what extent the four SF collectively explain QI.

2. Quality improvement

According to quality literature, theory of quality management has been developed from three sources: (i) contribution from quality leaders (Juran, 1951; Crosby, 1979; Deming, 1986), (ii) measurement studies (Saraph et al., 1989; Flynn et al., 1994; Anderson et al., 1995) and (iii) evaluation models (Deming prize, MBNQA, ISO 9000). Deming (1986) is widely regarded as the master who developed Japan's "road map" to quality improvement. The road map is basic, simple, consists of readily available technology, and relies on common sense. He defines quality as "satisfying the customer, not merely to meet his expectations, but to exceed them". It is very clear to us that Deming's philosophy thus focus on the customer. His main ideation is that quality starts from the customer and it also finishes with them. His "chain reaction" theory suggested that improvement in quality lead to lower costs because they result in less rework, fewer mistakes, fewer delays and snags, and better use of time and resources. Lower costs, in turn lead to productivity improvement and therefore with better quality and lower prices, a firm can achieve higher market share and thus stay in business.

Crosby (1979) defines quality as conformance to requirements and the requirements of a product need to be defined and specified clearly so that they are properly understood. His philosophy is that higher quality reduces costs and raises profits to the organizations and it is similar to the theory that was proposed by Deming. Juran (1951) considers quality management as three basic processes (Juran Trilogy): quality planning, quality control, and quality improvement. Juran defines quality, as "quality is customer satisfaction" or "fitness for use". Feigenbaum (1983) from USA defines quality as the total composite product and service characteristics of marketing, manufacture and maintenance through which the product and service in use will meet the expectations of the customer. He also stresses that total quality management (TQM) covers the full scope of the product and service "life cycle" from product conception through production and customer service. In other words, quality improvement is a continuing process to improve the product and service quality of the firm in order to meet customer satisfaction.

2.1 Soft Factors of Quality Improvement

Literature has identified the key factors for successful quality improvement implementation. These factors have been provided by contributions from quality leaders (Deming, 1982; Juran, 1982), formal evaluation models (EQA, MBNQA, Deming Award) and measurement studies (Flynn et al., 1994; Saraph et al., 1989). This theory has identified the quality improvement practices. The soft factors are the behavioral aspects of management or the "human factors", such as leadership, human resource management (HRM), employee involvement and empowerment (Rahman, 2004).

Several scholars have identified the soft factors or group soft factors of quality improvement which have a positive influence on quality improvement (Lu and Sohal, 1993; Shin et al., 1998; Yusof and Aspinwall, 1999; Rahman and Bullock, 2005). Alongside with these studies, there were also some other general studies that carried out specifically in Malaysian context which has also identified the soft factors of quality improvement such as leadership, employee training, communication, employee reward and supplier relation (Idris et al., 1996; Agus, 2001; Eng Eng and Yusof, 2003). Besides, the quality improvement models such as Malcolm Baldrige, European Foundation for Quality Management, and the Deming Prize have also identified soft factors such as leadership, process management, training, communication, teamwork, learning as the key aspects for effective quality improvement. These soft factors are key to quality improvement because they may have a positive impact on firm performance.

2.1.1 Management Commitment

Chrusciel and Field (2003) defined top management commitment as an active and visible support or commitment from the management of the organization, often in the form of a champion for the application. These authors have also cited this factor as a critical (important) for performance excellence-an organizational change strategy (critical success

factors). Top management support or commitment is the most frequently cited factors for a successful implementation of quality improvement (Atkinson and Naden, 1989; Van der Wiele and Brown, 1998) and leadership of top management have also appeared with diverse variants in different researchers in the quality field.

Top management and the entire staff of an organization must be committed to the improvement of quality in all aspects of their operations because the commitment of top management especially is crucial to the success of organization (Barczyk 2000). Successful implementation of quality improvement strategies requires effective leadership from upper management in the organization and the leadership and upper management support would be the ultimate drivers of quality improvement practices in any organizations (Deming, 1986; Juran, 1989; Sashkin, 1993; Waldman, 1994). Saraph et al., (1989), Flynn et al., (1994), Anderson et al., (1995), Black and Porter (1996), Ahire et al., (1996), Rao et al., (1997), and Forza and Fillipini (1998) have researched leadership as one of the key dimension of quality management in their studies. Leadership enables an organization to engage in continuous improvement and facilitate the organization's quality improvement efforts (Gibson, 1990; Gryna, 1991). Thus, we propose the following hypothesis:

H1: Managers perceive that management commitment will be positively related to the quality improvement in their organizations.

2.1.2 Employee Involvement

Employee involvement (EI) refers to any activity by which employees participate in work-related decisions and improvement activities, with the objectives of tapping the creative energies of all employees and improving their motivation (Evans and Lindsay, 2002). By total involvement, employees at all levels in the organization are empowered to improve their outputs by coming together in new and flexible work structures to solve problems, improve processes, and satisfy customers (Tenner and DeToro, 1992).

Employee empowerment is essential to improve quality control (Ahire et al., 1996). Empowerment means to enable others to act by giving power to them to take charge (Hitt, 1995) and this empowerment occurs when people are involved in setting, owning and implementing a joint vision, responsibility is distributed close to decision making so that people are motivated to learn what they are held accountable (Watkins and Marsick, 1999; Karia & Ahmad, 2000). It also means giving people authority to make decisions based on what they feel is right, to have control over their work, to take risks and learn from mistakes, and to promote change (Evans and Lindsay, 2002). Empowered workers are encouraged to prevent and detect errors early in the production process itself rather than relying on final inspection at the final stage. Therefore, empowerment leads to significant savings by reducing defects and the need for rework (Barker and Cagwin, 2000). Therefore, we propose the following hypothesis:

H2: Managers perceive that employee involvement will be positively related to the quality improvement in their organizations

2.1.3 Training and Education

Training refers to a planned effort by a company to facilitate employees' learning of job-related competencies and these competencies include knowledge, skills, or behaviors that are critical for successful job performance (Noe, 2008). Therefore, training and education is important for continual updating and improvement in organizations (Deming, 1986). Many research results revealed that training and education is one of the most important elements (factors) in a successful implementation of quality improvement (e.g., Mann, 1992).

Training and education is also an integral part of the quality initiative and investment in training and education is vitally important for the success of quality improvement effort. Employees should be regarded as valuable, long-term resources worthy of receiving education and training throughout their career (Zhang, 2000). Educating and training all employees provides the information they need on the mission, vision, direction, and strategy of the organization as well as the skills they need to secure quality improvement and resolve quality problems (Tenner and DeToro, 1992). For a continuous improvement process like quality improvement, employee-both management and workers require the proper tools and knowledge. People are an organization's most valuable resource; they want to do a good job, but they do not know how, therefore management must take responsibility for helping them and companies that committed to quality improvement will invest heavily in training and education of their employees (Evans and Lindsay, 2002). Thus, we propose the following hypothesis:

H3: Managers perceive that training and education will be positively related to the quality improvement in their organizations.

2.1.4 Reward and Recognition

Reward and recognition can be defined as benefits—such as increased salary, bonuses, and promotion—which are conferred as public acknowledgement of superior performance with respect to goals (Juran and Gryna, 1993). Recognition and reward activities in organizations should effectively stimulate employee commitment to quality improvement activities otherwise these activities are failures and working condition improvements, salary promotions,

position promotions, financial awards for excellent suggestions are good methods for recognition and reward (Zhang, 2000).

An important feature of any quality improvement program is showing due recognition for improved performance by any individual, section, and department or division within the company (Dale and Plunkett, 1990) and to effectively support their quality efforts, management of the organizations need to implement an employee compensation system that can strongly links quality and customer satisfactions with pays. Many other writers have also highlighted the importance and criticality of the rewards and recognitions in the quality improvement process (Martinez-Lorente et al., 1998; Rao et al., 1999; Dayton, 2001; Li et al., 2001; Everett, 2002). Thus, we propose the following hypothesis:

H4: Managers perceive that reward and recognition will be positively related to the quality improvement in their organizations.

3. Methodology

3.1 Population and Sample

The target population of this study is made up of all 676 E&E firms from West Malaysia. The sample firms were drawn through simple random sampling from the list obtained from the Federal Malaysian Manufacturers (FMM) (FMM-MATRADE, 2003). A total of 550 structured questionnaires with closed questions were mailed to the selected firms. Firstly, a pre-test was carried out with 15 firms. This pre-test helped to improve the structure and content of the questionnaire. Finally, the research is based on data from 255 respondents and this made the final sample. The questionnaire was answered by the managers in charge of the quality area in E&E firm.

3.2 Measurements

The measures for the soft factors (SF) were based on Zhang (2000). The quality improvement practices (QI) was based on the instrument developed by Flynn et al. (1994). The questionnaire contains information on both, the soft part of quality improvement practices (soft quality practices) and as well as the hard aspects (hard quality practices) which make up the overall quality improvement in the manufacturing firms. Each was assessed on a ten-point Likert's scale continuum.

4. Results

A principal component factor analysis with varimax rotation was employed to validate the construct validity and the results are presented in Table 1. There was no cross loading of items in the factor analysis. The factor analysis matrices showed that all the five constructs were uni-factorial. The eigenvalues ranged from 3.02 to 4.54. The item loading for each factor is rather high with a minimum loading of 0.61. The factors accounted for 57% to 62% of the variance observed in the respective data. The Cronbach's alpha varies from 0.83 to 0.89 and considered to be good (Peterson, 1994). Bartlett's test for sphericity results indicate that data do not produce identity matrix and are thus considered approximately multivariate normal and acceptable for factor analysis and other multivariate statistical tests. The Kaiser-Meyer-Olkin (KMO) values are all above than 0.70 indicating that the distribution of values is adequate for running factor analysis (Peterson, 1994).

Table 2 provides the descriptive analysis and the correlation matrix for all the variables that incorporated in the study. The correlation coefficients indicate the strength of the association between the variables. A coefficient is considered significant if the p-value is less than 0.05. There is significant correlation between all the independent variables. Out of 13 correlations, all coefficients are larger than .40. There are no high correlations of 0.90 or above. Hence, collinearity and multicollinearity do not present data problems in this research (Hair et al., 1998).

Our results show that the dependent variable—firms' quality improvement—was most highly correlated with employee involvement, with a coefficient of 0.54 (see Table 3). This shows that employee involvement was perceived as a dominant factor for quality improvement practice. In sum, our findings indicate that managers who perceived a greater awareness of soft factors exhibited more positive reactions towards organizational quality improvement. Based on the ten-point scale used, the overall mean QI rating was 6.41 (see Table 3) implying that the overall level of QI was fairly good in the sampled firms. The findings in Table 3 also indicated that the mean ratings for the independent variables in descending order of high to low were management commitment (8.25), training and education (6.97), reward and recognition (6.72), and employee involvement (6.37). Table 3 also shows that all the four SF (four independent variables) were significantly positively associated with the dependent variable (QI) (see figures in bold). These results showed that the four SF have a positive correlation with QI practice. Therefore, the four SF have an impact on quality improvement. In this sense, organizational QI will increase when the firms emphasize more on the four SF.

4.1 Relationship between the Soft Factors and Quality Improvement

To find out the best set of predictors of QI, a four predictors multiple linear regression model was proposed. The four-predictor variables are management commitment (X_1), employee involvement (X_2), training and education (X_3), and reward and recognition (X_4). The criterion variable is quality improvement (Y). The equation of the proposed

multiple linear regression model was as follows:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e$$

Where: b_0 = Constant, e = Error

To determine the best set of predictor variable in predicting QI, a stepwise regression method was used. Based on the stepwise method used, all the four predictor variables were found to be of significance in explaining Y or QI. They are management commitment (X_1), employee involvement (X_2), training and education (X_3) and reward and recognition (X_4). The Durbin–Watson of 1.83 (see Table 3) falls within the acceptable range ($1.5 < D < 2.5$), indicating that there is no autocorrelation problem in the data and that the error term is independent. The results indicate no multicollinearity problem: the multicollinearity statistics show that the tolerances for all elements of corporate culture are greater than 0.10 and that the Variation Inflation Factors (VIF) is all less than 10 (Hair et al., 1998). Histogram and normal P-P plots of the standardized residuals also indicate normality of the error term, while a scatter plot shows consistent variance of error terms (homoscedasticity). A partial regression plot indicates linearity of the relationship between independent and dependent variables. From these analyses, it can be concluded that the multiple regression analysis model generated in this study meets the five assumptions required to ensure validity of its significance test (Ooi et al., 2005). Thus, there is a statistically significant relationship between the four soft factors and firms' quality improvement.

The R-square of .88 implies that the four predictor variables explain about 87.6% of the variance/variation in the QI. This is a very good and respectable result. The ANOVA table revealed that the F-statistics (148.34) is extremely large and the corresponding p-value is highly significant (0.0001) or lower than the alpha value of .05. This indicates that the four-predictor variables have a significant impact on QI. As depicted in the Table 3, the estimated final model is as below:

$$QI = 1.99 + 0.16 (\text{MComt}) + 0.48 (\text{EI}) + 0.06 (\text{T\&Ed}) + 0.20 (\text{R\&R}) + e$$

The results indicate that the four soft factors—management commitment ($b = 0.16$, $p < 0.05$), employee involvement ($b = 0.48$, $p < 0.05$), training and education ($b = 0.06$, $p < 0.05$), and reward and recognition ($b = 0.20$, $p < 0.05$) are positively associated with firms' quality improvement. Thus, hypotheses H1, H2, H3, and H4 of the study are supported. Therefore, it can be argued that all these four soft factors are directly involved in improvements in firms' quality improvement. This also suggests that the greater the extent to which these soft factors are present, the greater will be the quality improvement in the firms. Moreover, the findings also indicate that the most important soft factor for quality improvement is employee involvement, which was significant at the 0.0001 ($p < 0.05$) levels.

5. Discussion

The overall objective of this study was to investigate the influence of four soft factors on quality improvement within the context of the Malaysian E&E firms. The results indicate that employee involvement was perceived as a dominant soft factor for quality improvement in the sampled firms since there was a strong association with firms' quality improvement. By personally involving or participating in quality improvement activities, employees in the organization can acquire new knowledge, see the benefits of the quality disciplines, and obtain a sense of accomplishment by solving quality problems. This finding supports the studies of Bullington et al. (2002), Al-Omair et al. (2003), Baidoun (2003), and Baidoun and Zairi (2003).

The results of this study also reveal that managers' perceptions of the four soft factors are positively related to firms' quality improvement, with those perceiving a greater degree of awareness of the soft factors exhibiting more positive reactions towards their quality improvement. Besides employee involvement, the findings also indicate the importance of management commitment, training and education, and reward and recognition for predicting organizational quality improvement. Top management commitment is the key to continuous improvement and the internal driver of the company quality improvement efforts because they create, disseminate, and sustain clear and visible quality values along with systems and processes to guide all activities of the company toward the delivery of added value to customers. This finding is consistent with the previous findings of Deming (1982), Juran (1989), Saraph et al. (1989) and Forza and Fillipini (1998). In addition, training and development was also found to have a positive contribution towards quality improvement. This suggests that training and educational programs in the firms help to enhance their employee's knowledge, skills and behaviors which ultimately improve the quality of products and services. This findings support the previous empirical studies that have found training and education as a critical factor for the successful quality improvement implementation in organization (Thiagarajan and Zairi, 1997; Quazi and Padibjo, 1998; Yusof and Aspinwall, 1999; Zhang et al., 2000; Calisir et al., 2001; Dayton, 2001; Pun, 2001). Finally, reward and recognition also was found to have significant positive contributions towards quality improvement in the sampled firms. This indicates that both recognition and rewards have motivating effects on people at workplace. An appropriate system of recognition and reward is critical to any company's quality improvement implementation program; particularly the quality improvement process since it offers greater involvement to ordinary working people. The present result is consistent with the findings of Easton and Jarrell (1998), Rao et al. (1999), Dayton (2001), Li et al. (2001) and Everett (2002).

6. Implications

6.1 Implications for Managers

The study results suggested that soft factors such as management commitment, employee involvement, training and education, and reward and recognition are significantly positively associated with overall QI. This implies to the managers that by focusing and implementing the four soft factors in E&E firms, it would promote overall QI in the firms. Thus, the managers should understand that effective implementation of the SF will lead to greater quality improvement. The implication is that managers need to focus more on the SF to achieve for higher QI. This study shows that strong and committed leadership in an organization is essential for the successful and enduring quality programs. Therefore the managers should play an important role in the entire firm's QI implementation. In terms of customers, firm managers must also take the initiative to make adjustments to improve continuously the quality of their products, which is necessary for increasing self-confidence and pride of the workforce in serving the customers. In order to achieve this, managers have to increase awareness—their own as well as all employees—of the changing needs of customer demands and markets, as well as heightened worldwide competition for better quality products.

In relation to employee involvement, firm managers should realize that to empower employees and to develop an appropriate culture for continuous QI requires training the employees to improve their interactive skills (such as communication, effective meeting, empowerment and leadership skills), and training in problem identification and solving skills, quality improvement skills, and other technical skills. Managers must also ensure that employees in the organization should be continually developed and given adequate training and education on prescriptions, methods and the concept of quality that usually included quality improvement principles, team skills, communication skills and problem solving skills. In this sense, the firm must provide the employees with continuous training and education in work related and statistical techniques so that problem identification and problem solving abilities of them at all levels are enhanced and improved continuously. In terms of reward and recognition, the managers must realize that employees in organization are more likely to share their ideas for work improvements when managers give them credit and recognition for their contributions to the organizations. Employee recognition programs can enhance effective employee relations by communicating to all employees that the organization cares about their ideas and is willing to reward them for their initiatives and efforts.

6.2 Theoretical Implications

This study contributes to the discipline of quality management by showing that there exist a strong relationship between SF and QI, and that the proposed multiple linear regression model may be generalizable in Malaysian firms for effective QI implementation. Based on these ideas, managers can prepare themselves, their employees, and their organizations for the consequences of changes, to the benefits of all stakeholders in the organization. The managers by using the proposed framework would be able to gauge the amount of variances in quality improvement which can be accounted by the identified determinants (SF) which are the independent variables in the study. It can then serve as a guide for the organizations to take the necessary steps to improve the current management practices by concentrating more on the soft factors which will facilitate and enhance QI.

7. Limitations and future research

This study is subject to several limitations: (1) the cross-sectional nature of the data, (2) the sample in the study included only the private E&E firms in West Malaysia, and (3) several other SF may have been not considered. Given these limitations, further research might be carried out in three directions. First, a longitudinal research would complement this work to support these relationships on a longitudinal basis. Second, other member countries in ASEAN such as Singapore, Brunei and Thailand could be included in order to make comparisons in terms of QI practices. Also, it may be replicated in the service sector which would provide further validation and reinforcement to the model proposed in this study. Third, future studies could look into the possible inclusion of several other soft factors such as communication (Black and Porter, 1996), quality culture (Ahire *et al.*, 1996) and teamwork (Yusof and Aspinwall, 1999; Karia and Ahmad, 2000) in relation to QI.

8. Conclusion

In sum, this paper reports the empirical results showing the relationship between SF and QI based on the responses of quality managers from 255 E&E firms in Malaysia. Building on previous studies in this area, this paper presents new results evidencing the importance of the soft factors in quality improvement, namely employee involvement, reward and recognition, management commitment and training and education. All four SF in this study have shown to significantly and positively influence quality improvement practices in the E&E firms.

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Table 1. Summary of factor matrix

Constructs	Item Loading	Eigen value	% of Variation Explained	Cronbach's alpha	KMO	BTS	p-value
Management Commitment	0.68-0.85	4.06	57.96	0.88	0.89	905.80	0.0005
Employee Involvement	0.61-0.85	3.09	61.77	0.83	0.82	598.57	0.0005
Training and Education	0.70-0.82	3.53	58.75	0.86	0.86	768.57	0.0005
Reward and Recognition	0.74-0.83	3.02	60.31	0.83	0.82	565.46	0.0005
Quality Improvement	0.70-0.80	4.54	56.70	0.89	0.87	102.35	0.0005

Note: BTS – Bartlett's Test of Sphericity

Table 2. Descriptive Statistics and Pearson Correlations between SF and QI

Variables	Mean	SD	1	2	3	4	5
Quality Improvement	6.41	0.89					
Management commitment	8.25	0.79	0.48				
Employee Involvement	6.37	1.04	0.54	0.56	0.51		
Training & Education	6.97	1.03	0.41	0.42	0.57	0.68	
Reward & Recognition	6.72	1.32	0.42	0.46	0.43	0.57	0.43

Notes: Zero-order coefficients $p < 0.05$, Benferroni adjusted alpha = 0.0125 (0.05/4)

Table 3. Estimates of Coefficients for the Model

SF	B (Unstandardized Coefficients)	Std. error	Beta (Standardized coefficients)	t-value	p-value
Constant	1.99	0.15		13.14	0.0001
Mcomt (X_1)	0.16	0.03	0.14	6.110	0.0001
EI (X_2)	0.48	0.04	0.56	13.06	0.0001
T&Ed (X_3)	0.06	0.03	0.06	2.020	0.0340
R&R (X_4)	0.20	0.02	0.29	9.670	0.0001

$R = 0.94$; $R^2 = 0.88$; Adj. $R^2 = 0.88$; $F = 148.34$, $p = 0.0001$; Durbin-Watson = 1.83