Assessing the Impact of Internationally Recognized Quality Standards on the Business Performance of Firms

by
Chathurika Rajapaksha, Jagath Edirisinghe
Wayamba University of Sri Lanka
chathu8809@yahoo.com, jagathed@yahoo.com

Abstract. Internationally recognized quality standards are obtained by many firms with the intention of enhancing their corporate reputation. A question prevails whether this decision ultimately addresses the establishment's main financial objective of shareholder wealth maximization. The objective of this study is to examine the impact on the business performance of firms through certification and also to identify the factors that influence a firm to obtain international quality standards. Secondary data obtained from 606 firms from Sri Lanka is analysed using a Treatment Effects Model. The results reveal that obtaining quality standards has a significant positive impact on business performance of firms. We find higher probability of adoption of quality standards for firms in the food industry. Experience of the top management, firm size, investment on research and development, new technology, new logistic and business processes also increases the probability of obtaining certification.

1 Introduction

A quality system could be defined as a set of fixed procedures and rules aiming to ensure that a product, process or service follows a predetermined and widely accepted set of standards (Tsekouras et al., 2002). Adherence to such procedures could improve productivity as well as employee motivation in an establishment (Corbett et al., 2005).

The most popular ISO (International Organization for Standardization) standards adopted by firms in order to certify quality management systems are ISO 9000, 14000, 22000, 26000, 50001, etc. Hazard Analysis Critical Control Point (HACCP) is also an internationally recognized standard for food safety which is commonly adopted by firms all over the world. International Electrochemical Commission (IEC) international standards are developed for all electrical, electronic and related technologies and CODEX standards are considered as food standards issued by World Health Organization (WHO) and Food and Agriculture Organization (FAO).

A highly competitive environment is observed in the present business context as a result of globalization, technology advancement and dynamics of the market. Therefore, customer satisfaction through quality products and services has become vital for every firm to survive in their positions (Mezher et al., 2004). Adaption of internationally recognized quality standards is considered as the most accepted method to enhance firms' corporate reputation as a persistent quality product or service provider (Wu and Chen, 2011).

Even though each and every firm attempts to obtain certification in order to be competitive and use it as a marketing tool, a question arises whether this decision ultimately addresses the main financial objective which is to maximize shareholder wealth (Roe, 2001). Therefore, it is important to examine whether there is a significant impact on the performance through certification.

The objective of this research study is to identify whether there is a significant impact of adoption of international quality standards on the business performance of firms in Sri Lanka and also, to identify the factors that influence an entity's decision to obtain such standards.

2. Model
2.1 Performance Indicator

Many previous studies have attempted to study the benefits of adopting international quality standards on firm performance. To do so, we must first define how performance is measured. For example, Tsekouras et al (2002) attempts to measure the impact of adoption of ISO 9000 on growth of return on investment, the growth of returns on equity, the growth of leverage and the simple growth of equity. Wu and Chen (2011) argues that previous studies limits themselves to financial measures of performance and develops a performance measurement by a balanced score card. But many have used financial performance (Sharma, 2005; Morris, 2006; MartÃ¬nez-Costa, and MartÃ-nez-Lorente 2007). Because our data is limited, we are confined to use business profits as a measure of performance.

2.2 Treatment Effects Model

Literature suggests that there are three main methods of studying the impacts of certification on firm performance; purely descriptive measures (Mezher et al., 2004) matching methods (Corbett et al., 2005) and regression with dummy variables (Tsekouras et al., 2002). However, those who used regressions to relate certification to an indicator of performance ignored the fact that the decision to certify may be endogenous to the model. If not corrected, it may create biases in estimation. We circumvent this problem by using a treatment effect model.

2.3 Estimation

The treatment effects model is used to minimize the endogeneity bias of an outcome which is observed in single equation estimation due to the existence of endogenous regressors. The principle of treatment effects model is to estimate two regression equations simultaneously. The first estimation is a probit regression predicting the probability of treatment which is expressed as a dummy variable. The second equation is a linear regression for the outcome of interest as a

function of the treatment variable (Brown and Mergoupis, 2010).

The primary regression equation of interest in the present study is

$$y_j = X_j\beta + \delta z_j + \varepsilon_j \tag{1}$$

where, X_j is a matrix of independent variables believed to be affecting profits (y_j) of the firm j. The vector β includes coefficients related to each column of the covariate matrix, X_j. Our main interest is on z_j, which is a binary decision variable (choice of having an international quality standard) that is assumed to stem from an unobservable latent variable depicted as;

$$z_j^* = W_j\gamma + u_j \tag{2}$$

We observe the decision, whether the firm has adopted a quality standard ($z_j=1$) or not ($z_j=0$) based on the rule;

$$z_j = \begin{cases} 1, & if \ z_j^* > 0 \\ 0, & otherwise \end{cases} \tag{3}$$

Where ε and u are bivariate normal with mean zero and covariance matrix;

$$\begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix} \tag{4}$$

Maddala (1983) derives the likelihood function for this model and a two-step estimator. Here we use the Maximum Likelihood Estimation (MLE).The log likelihood function for each observation j used in MLE is (Maddala, 1983);

$$lnL_j = \begin{cases} ln\Phi\left\{\frac{w_j\gamma + (y_j - X_j\beta - \delta)\rho/\sigma}{\sqrt{1-\rho^2}}\right\} - \frac{1}{2}\left(\frac{y_j - X\beta - \delta}{\sigma}\right)^2 - ln(\sqrt{2\pi\sigma}), & z_j = 1 \\ ln\Phi\left\{\frac{-W_j\gamma + (y_j - X_j\beta - \delta)\rho/\sigma}{\sqrt{1-\rho^2}}\right\} - \frac{1}{2}\left(\frac{y_j - X_j\beta}{\sigma}\right)^2 - ln(\sqrt{2\pi\sigma}), & z_j = 0 \end{cases} \tag{5}$$

Where, Φ (.) denotes the cumulative distribution function of the standard normal distribution. We used STATA version 11 for estimation.

2.4 Variable and Data

We used data extracted from the Enterprise Survey conducted by the World Bank in 2011, The World Bank. This survey is conducted by the World Bank in client countries to get feedback from enterprises on the state of the private sector. Data collection is by using a stratified random sampling technique. Information pertaining to all manufacturing sectors according to the group classification of ISIC Revision 3.1: (group D), construction sector (group F), services sector (groups G and H), and transport, storage, and communications sector (group I) are available in the data set. The total sample size is 606 firms.

We use two sets of variables in the treatment model (Table 1) and the outcome model (Table 2). There are 8 variables that may impact the adoption decision of a quality standard. We hypothesize those firms in food industry to have a higher probability in adoption of a quality system. Further, we assume that experience in the top management of the firm play a key role in adopting a quality system. We expect experience to reduce transaction costs (such as search costs, dealing with certification firms/authorities, dealing with extensive paper work necessary, etc) involved implementing such systems in firms. Therefore, we presume that this will have a positive effect on the probability of adoption. We also feel that if firms are involved in supplying to the international market, they would have a higher tendency to implement a quality system. Our next assumption is that those firms that innovate will tend to adopt quality systems more than those that are less likely to innovate. To verify this we incorporate three types of innovations: new technology ($W6$), logistical ($W7$) and marketing ($W8$). We expect all three to have a positive impact on the probability of adoption (Table 1).

Table 1. Description of variables that influence the decision of adoption of a quality standard

Variable	Description	Expected Sign
W_1	Industry of the firm- food=1 otherwise=0	Positive
W_2	Years of experience of top management	Positive
W_3	Size of the firm - employee number	Positive
W_4	Investment on Research & Development, yes=1, otherwise =0	Positive
W_5	Main market- if international=1 otherwise=0	Positive
W_6	Investment on new technology licensed from foreign owned companies=1, otherwise = 0	Positive
W_7	Investment on new logistical or business support process, yes=1 otherwise=0	Positive
W_8	Investment on new marketing methods, yes=1 otherwise=0	Positive

In the outcome regression, we use 7 variables as controls to study the impact of the quality standard on firm performance (Table 2). We hypothesize that firms that introduced new product and services would be performing well. We treat a firm that has introduced a new product or a service during the last three years, as a firm that has a product or a service innovation. We also expect for firms that invest in Research and Development (R&D) to perform well. If an establishment has reported that it had invested on formal research and development in the last three years, we treat that firm as a firm invested in R&D. We also include vintage of the firm as a control. We assume that firms established some time back may be performing better than the firms that are established more recently. Legal status of the firm may have implications on profitability. Therefore, we control for that in our model. We include three dummy variables to relating to three legal structures: sole proprietorship, partnerships and listed companies. There is no a priori sign expectation regarding the firms' legal status. Each legal status may have positive or negative impact on the performance. We expect a positive impact on performance due to formal training of employees in an organization because a human capital is a key resource for any establishment to perform well. The variable, 'employee turnover' measures the number of workers who were terminated or left

the organization within the year. Our knowledge is limited on the possible sign of this variable, but we expect this to influence the firm performance significantly. We also incorporate a variable depicting the time period from formal registration of the firm.

Table 2. Description of variables that affect the performance of an establishment

Variable	Description	Expected sign
X_1	New product & services introduced in the last three years=1, otherwise =0	Positive
X_2	Formal investment in R&D in the last three years=1, otherwise=0	Positive
X_3	Years from the establishment	Positive
X_4	Legal status of the firm- Listed, Partnership, Sole or limited partnerships	Positive/Negative
X_5	Availability of licensing & permits	Positive/Negative
X_6	formal training programs for employees	Positive
X_7	Employee turnover within the year	Positive/Negative
X_8	Time period from the formal registration of the firm	Positive

3. Results and discussion
3.1 Descriptive Statistics of the Sample

Out of the 606 firms in the sample 100 firms have obtained at least one internationally recognized quality standard and it is in the order of 17% of the total respondents (Table 3).
Twenty per cent of the total sample belongs to the food industry and 22% in the food industry has obtained quality certification as indicated in Figure1. Twenty per cent of the sample is publicly listed establishments where as 58% are sole proprietorships. Out of the listed entities 42% has obtained quality certification which demonstrates a significant participation. Thirteen per cent of the total sample has invested in research and development and majority (47%) of them has obtained certification (Figure 1). Majority of the sample's main market is the local market. But

37% of the firms whose main market is international have obtained certification.

Table 3. Description of the total sample

Variable categories		Freq	%
Quality Standard	Yes	100	17
	No	506	83
Industry	Food	121	20
	Non food	489	80
Legal status	Listed	122	20
	Partnership	87	14
	Sole	357	58
Main Market	International	62	17
	Local	300	83
New product Introduction	Yes	189	31
	No	419	69
Research & Development	Yes	76	13
	No	526	87
Investment in new technology	Yes	33	9
	No	329	91
Investment on new logistic or process	Yes	237	39
	No	371	61

Note: Freq= Frequency of the variable category in total sample, %= Freq. as a percentage

3.2 Results of the Treatment Function

The outcome of the treatment function as shown in Table 4 demonstrates the significance of the variables that determine the decision of whether to adopt quality standards or not.

Results reveal that firms in the food industry have a very high significant positive influence to obtain quality standards than the other industry sectors. Increase of public awareness on food safety, government regulations and high competition would have influenced the food sector to adopt standards.

One important finding is the influence of top manager's experience on certification. Results indicate that firms with experienced top management have a higher probability of obtaining quality standards than firms with less experienced managers. Similar results are reported by Pekovic (2010) where they report that experience with similar standards make probability of firms adopting ISO 9000 higher.
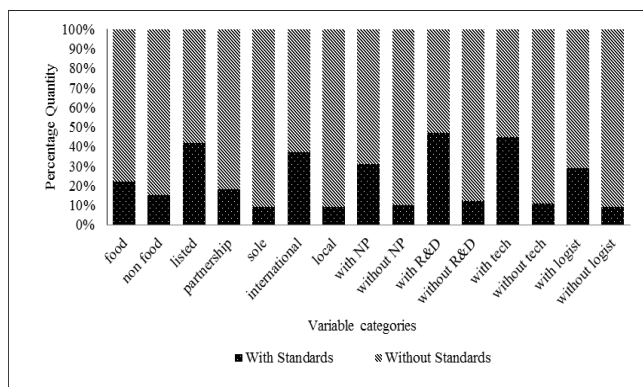
Figure 1. Percentages of variable categories with and without quality standards

Size of the firm is also a highly significant factor that has influenced obtaining standards. This reveals that larger firms have a higher propensity to obtain quality standards with the intention of maintaining their corporate reputation globally. This is also evident in previous studies in many countries (Tsekouras et al., 2002; Pekovic 2010).

Firms that have invested on research and development activities and new technology from foreign companies demonstrate a higher positive tendency to obtain certification than the others. Investment in new logistical and business processes also points out a significant influence towards certification. However, the main market where the establishment is functioning and the investment in new marketing methods have not shown any significant influence on obtaining internationally recognized quality standards.

Table 4. Estimated coefficients of the treatment function

Variable	Coefficient	P value
Z_1 –food industry	0.71	0.008**
Z_2 –experience	1.39	0.020*
Z_3 –size	25.58	0.000**
Z_4 – R & D	1.21	0.001**
Z_5 –main market	0.16	0.632
Z_6 – new technology	1.24	0.000**
Z_7 –new logistic	1.05	0.024*
Z_8 –new marketing	-0.27	0.517

α_0 –constant	-4.13	0.000**

*Note: **significant at 99%, *significant at 95%*

3.2 Results of the Final Outcome Regression

The effect on firm performance as a result of certification is analyzed through the regression equation (2) and the results are shown in Table 5.

The coefficient of the dummy variable 'D' which is used to indicate the presence of a quality standard is positive and highly significant. This concludes that profit of the firms who have adopted internationally recognized quality standards, is higher than the profit of firms who have not adapted any standard by 6.39 million Rupees, Ceteris Paribus. Therefore, it is clear that the presence of quality standards has a profit effect and thus a significant impact on business performance, which is the central hypothesis tested in this research. Similarly, Corbett et al., (2005) report three years after certification, certified firms show abnormal performance in the United States. Tsekouras et al., (2002) report that adoption of an ISO 9000 certification is beneficial in the long term but does not improve financial ratios in the short term. They reason that this is because ISO 9000 quality assurance system is a continuous process of improvement.

Table 5. Estimated coefficients of the final outcome regression

Variable	Coefficient	P value
D –Quality Standard	6.39	0.000**
X_1 – new product	2.27	0.006**
X_2 – R & D	4.27	0.001**
X_3 –years from establishment	-7.68	0.305
X_4 –Legal status		
Listed	4.33	0.017*
Partnership	4.20	0.027*
Sole	2.46	0.154
X_5 –license	5.92	0.036*
X_6 –training	5.47	0.542

X_7 –employee turnover	-2.03	0.044*
X_8 –years from formal registration	7.09	0.162
β_0 –constant	-4.07	0.025*

Note: **significant at 99%, *significant at 95%

Firms that have introduced new products to the market and invested in research and development demonstrate a 2.3 and 4.3 million Rupees increase in profit accordingly with compared to firms that have not introduced new products, and not invested in research and development, Ceteris Paribus. This clearly indicates that investment on research and development and introducing new trends to the market attract the customers and ultimately affect the business performance of a firm positively.

The effect of legal status to the performance of a firm is as follows. In comparison to limited partnerships, publicly listed companies demonstrate 4.3 million Rupees higher profit while partnership firms demonstrate 4.2 million Rupees, Ceteris Paribus. Sole proprietorships have not demonstrated a significant impact on performance. Publicly listed companies are highlighted in the results and this could have been resulted due to undertaking many positive NPV generating projects because they have a broad access to capital markets.

Employee turnover is significant in terms of assessing business performance as shown in Table 5. It is measured through the number of full time employees who left the establishment within a year. The results indicate a negative relationship between the profit and employee turnover. This demonstrates that de-motivation of employees and lack of employee loyalty to the establishment directly affects the business performance negatively.

Obtaining licensing and permits also indicate a significant positive effect on firm performance. But investment on training for employees, time period from the establishment and formal registration has not revealed any significant impact on firms' business performance in this study.

4 Conclusions

This research study examines the impact of internationally recognized quality standards on the business performance of firms in Sri Lanka. Results reveal that there is a significant positive impact on performance in firms who obtained certifications than the firms who did not. The significant factors identified as influencing determinants on the decision of whether to obtain certification or not are being in food industry, experience of the top management, firm size, investment on research and development, new technology, new logistic and business processes. The significant factors influencing on performance identified other than adopting standard are new product introduction, research and development, legal status, licensing and employee turnover.

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Author description

Chathurika Rajapacksha, is a research student at the Department of Agribusiness Management at the Wayamba University of Sri Lanka. Her interest is in financial management and marketing

Jagath Edirisinghe, is a senior lecturer in the Department of Agribusiness Management at the Wayamba University of Sri Lanka and he lectures in marketing