DETERMINANTS OF POST HACCP IMPLEMENTATION BEHAVIOR IN TERMS OF WILLINGNESS TO ADOPT NEWER FOOD SAFETY METASYSTEMS: CASE OF SRI LANKAN AGRI-FOOD PROCESSING SECTOR

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INTRODUCTION

The decision on adoption of food safety controls by firms will depend on perceptions of internal costs and benefits of adoption versus non-adoption (Caswell *et al.,* 1998), as well as the potential for improvements in industrial performance, for example market share, profitability etc. In turn, this will reflect, for example, the characteristics of the firm, its objectives, the type of product it manufactures, and the environment in which it operates (Herath *et al.*, 2007; Jayasinghe-Mudalige, 2009).

Prior to adoption of enhanced food safety metasystems such as HACCP (Hazard Analysis and Critical Control Points), firms are guided by number of "intended benefits", which the decision-makers within the firms believe, will be obtained as an outcome of adoption. Firms vehemently target enhancement in operational performance as well as strategic growth within the sector through the implementation of a food safety control system. During the post-implementation period, however, firms evaluate whether the intended benefits of adoption have been "realized" or whether unexpected costs have risen in comparison. This evaluation and subsequent judgments are critical factors that will influence firms' decisions on whether to continue with the certification into the future and also decisions that might arise upon upcoming or novel quality assurance systems in the long term. In light of this, this study was aimed at assessing whether HACCP certified agri-food processing firms in Sri Lanka wish to continue the same metasystem or opt for an advanced and more stringent food safety controls, for example ISO 22000 (Jayasinghe-Mudalige *et al*., 2013).

METHODOLOGY

Theoretical Framework

We propose that a HACCP certified firm's decision to continue with the metasystem (i.e. "*Stayer*") or to adopt an enhanced newer system like ISO 22000 (i.e. "*Advancer*") is triggered by a number of firm and market-specific characteristics that can be expressed as follows:

$$D_i = \beta_0 + \beta_1 (SAI) + \beta_2 (MCB) + \beta_3 (OPB) + \beta_4 (GMP) + \beta_5 (ICS1) + \beta_6 (ICS2)$$

$$+ \beta_7 (VIN) + \beta_8 (REV) + \beta_9 (EMP) + \beta_{10} (MKT) + \beta_{11} (HTI) + \varepsilon_i$$

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Where, in D_i (i = 0 for Stayer and i = 1 for Advancer). The right-hand side variable SAI represents the overall corporate view of the firm towards this decision, which is augmented by five strategic aspects, namely: profitability, competitive advantage, organizational growth, legal protection, and social responsibility, all of which act as motivators for firms private action on HACCP implementation, and is estimated using the equation given below (the value of SAI ranges from 0 to 1).

$SAI_{ik} = (\sum X_{ik}) / M$

Where: SAI_{ik} = Strategic Aspect Index of k^{th} strategic aspect for the i^{th} respondent; X_{ik} = Scores given by i^{th} respondent to k^{th} strategic aspect *(Very important =1, if not 0;* M = Maximum Potential Score for all k^{th} strategic aspect (see, Table 1 below for description of other variables).

Perceived benefits to the firm by adoption of HACCP (i.e. post adoption experience) are reflected in two other variables: (1) Market Capacity Benefits (MCB) (i.e. reflects the firm's ability to deal with market forces), and (2) Operational Proficiency Benefits (OPB) (i.e. enhanced internal operational efficiency of the firm) (Jayasinghe-Mudalige *et al*., 2013). The scores given by respondents on four-point likert scale for a set of statements explaining these phenomena (see, Figure 1) were used to derive values for each variable. Data Collection and Analysis

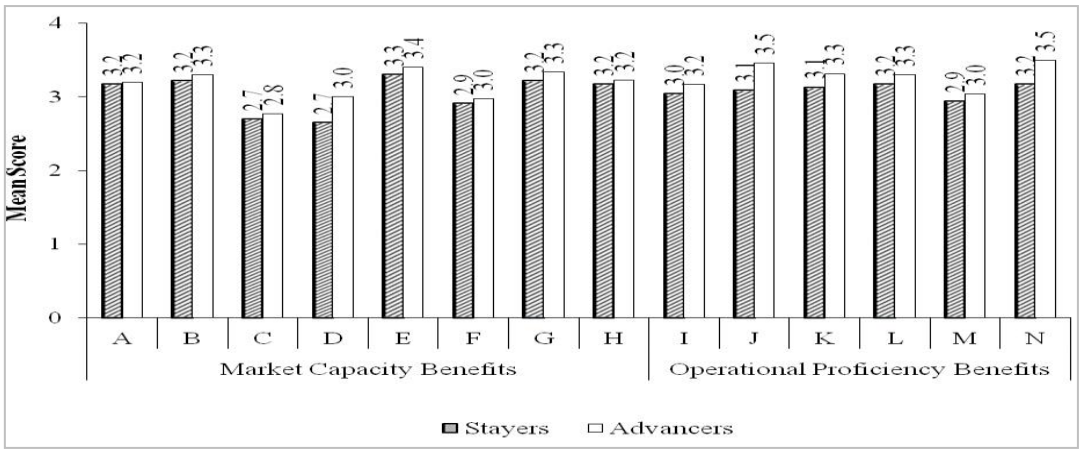
A structured questionnaire-based survey was carried out with the owner/quality assurance manager of agri-food processing firms (n= 51), which have obtained HACCP certification through the Sri Lanka Standards Institution, to collect data during January to March 2013. Given the dichotomous nature of dependent variable (i.e. Stayers, Advancers), the Probit Regression technique (Ashford and Sowden, 1970) was employed to estimate the coefficients of variables of the empirical model using *Stata* statistical software (Ver. 11.2).

RESULTS AND DISCUSSION

Descriptive Statistics of the Sample

Nearly 40% of firms wish to stay with the certified system at present (i.e. "Stayers"), while other 60% have already taken steps or possess a plan to go ahead with an enhanced newer system (i.e. "Advancers"). In fact, a majority of "Advancers" are dealing with export markets (83%), earning higher revenue (64%), and employ a relatively higher number of employees (66%) in the firm as compared to the Stayers.

Figure 1 reports the Mean Scores of the statements used to derive MCB and OPB. It was found that overall mean score of MCB is 3.04 ("Stayers") and 3.15 ("Advancers"), while that is for OPB is 3.09 ("Stayers") and 3.29 ("Advancers"). The ISO 9000 and ISO 14000 environmental management system was implemented by 68 and 23 percent of Stayers and 54 and 31 percent of Advancers, respectively.



Note: A= Increased sales, B= Reduction in customer complaints, C= Obtain a higher price for products, D= Access to new markets, E= Satisfaction of current customer requirements, F= Differentiation, G= Improvement in company image, H= Ability to meet anticipated customer requirement, I= Prolonged shelf life of products, J= Improved ability to meet government requirement, K= Improved efficiency of the firms, L= Minimizing product related problems, M= Reduced interference of stakeholders groups, N= Meeting industry / trade association standards

Outcome of Probit Regression

The estimates of coefficients of variables used in the model and their marginal effects are reported in Table 1.

Table 1. Outcome of the Probit Regression

Variable	Description	Estimate of Coeff.	Standard Error	Marginal Effect
Perceived Benefits of HACCP system				
SAI	Strategic Aspect Index	12.710	0.973*	0.249
MCB	Market Capacity Benefits	0.922	0.673	0.119
OPB	Operational Proficiency Benefits	6.791	0.817*	0.180
Presence of Other System in Place				
$ICS1_{D2}$	ISO 9000 *(Yes = 1, No = 0)*	-0.644	0.509	0.201
$ICS2_{D2}$	ISO 14000 *(Yes = 1, No = 0)*	-1.110	0.715	0.070
GMP_{D2}	GMP (Good Manufacturing Practices) *(Yes = 1, No = 0)*	2.064	0.524	0.014
Firm Specific Characteristics				
VIN	Vintage of the firm	1.541	0.007	0.129
REV_{D2}	Revenue of the firm *(<50 Million = 0 Small; 51-100 Million=1 Medium; >100Million = 2 Large)*	8.415	0.787	0.054
REV_{D3}		9.327	0.632*	0.286

EMP	No of employees in the firm	10.490	0.001*	0.250
MKT_{D2}	Type of the market *(Domestic = 0; Export = 1)*		0.673*	0.324
HTI	Time duration with HACCP	0.501	0.060*	0.110

**Significance at 5%*
Note: SE=Standard error, $ICS1_{D2}$ Implemented ISO 9000, $ICS2_{D2}$ Implemented ISO 14000, GMP_{D2} Implemented GMP, REV_{D2} 50-100 Million, REV_{D3} >100 Million, MKT_{D2} Export market

The variables MKT_{D2}, REV_{D3} and *EMP* were significant at ρ=0.05 and possess a relatively higher marginal effect. The results show that the probability of "Stayer" becoming an "Advancer" increases by 32.4% and 28.6% as a firm moves towards export markets [compared to domestic market] and into the larger revenue category (>100 Million) [compared to lower revenue category (<50 Million)]. Similarly, as the number of employees increase, the probability of "Stayer" being an "Advancer" is increased by 25%.

The results suggest that a firm which deals with the export market (as EU and China) and who gains larger revenue shows a tendency towards adopting a newer food safety system which may be due to their potential for investment with the extra capital earned. Further, over time, as a firm realizes more benefits, this drives the firm towards a newer system as they intend to be more internally efficient as an "Advancer". Moreover, the vintage of the firm *(VIN)*, other systems in place (i.e. GMP, ISO 9000, ISO 14000) and Market Capacity Benefits *(MCB)* did not make a significant contribution in explaining why a "Stayer" becomes an "Advancer".

CONCLUSIONS/RECOMMENDATIONS

The outcome of the analysis suggests that firms who have adopted HACCP wish to implement a newer food safety system as it would provide them with competitive advantage, including their ability to act strategically on profitability, competitive advantage, organizational growth, legal protection, and social responsibility as well as internal efficiency of the firm.

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