

HACCP Certified Agri-Food Processing Firms in Sri Lanka: Do They “Stay” or “Advance” with the Metasystem?

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ABSTRACT

The specific objective of this study was to examine, using the data collected from agri-food processing firms in Sri Lanka that already possess a system of Hazard Analysis of Critical Control Point (HACCP) in place, whether they wish to stay with the HACCP metasystem (“Stayers”) or wish to adopt more stringent food safety controls in the near future (“Advancers”). The primary data collected from 51 HACCP certified firms by means of a structured questionnaire, which was administered as a mail survey as well as series of face-to-face personal interviews with the owner/quality assurance managers (n = 51) during January to March 2013, was analyzed using a number of quantitative techniques. The results show that 40% of firms wish to stay with current HACCP system in place, while other 60% has already taken steps or possess a plan to advance. The results from the Probit Regression model estimated through Stata statistical software(version 11)revealed that firms’ dealing with export markets, earning higher revenue and higher number of employees were the key factors determining whether firms “stay” or “advance”. The outcome of analysis, overall, suggests that food businesses with sound financial portfolio and sustainable business practices tries to gain a comparative advantage in the market over the others by implementing more stringent food safety controls in the firm.

KEYWORDS: Agri-food processing sector, Food safety, HACCP, Perceived benefits

INTRODUCTION

In the current world context, there exists an increasing demand and pressure created by various institutions to ensure higher standard of safety and quality of food and agricultural products.

Parallel to the reform of food safety regulation, private enterprises themselves implement new forms of food safety controls in response to the demands of the market and internal economic and management pressures. In recent years, a number of countries have integrated Hazard Analysis and Critical Control Point (HACCP) food safety metasystem in to their regulatory food safety requirements. HACCP is an effective and economically efficient approach to food safety control, being based on risk assessment and process control rather than end-product testing (Ropkins and Beck, 2000; Mortimore and Wallace, 1998).

The agri-food industry of Sri Lanka is one of the strong pillars of its economy and the issue of food safety is one among the seriously discussed in the sector. The role of quality assurance, in general, and food safety, in particular, as strategic orientation for economic development has long been established by economists and trade experts. Given that a number of food-borne illnesses and deficiencies are related to the inefficiencies

associated with the food system, agri-food processing firms have a great responsibility in providing food that is safer for human consumption (Jayasinghe-Mudalige, 2009).

Private enterprises can adopt a range of alternative food safety controls, either individually or in combination, that differ in their efficiency and effectiveness according to specific circumstances (Henson and Caswell, 1999). Prior to adoption of such enhanced food safety metasystems, 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 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 firm decisions on whether to continue with the certification into the future and also decision that might arise on upcoming or novel quality assurance systems in the long term.

In light of this, this study was aimed to assess whether HACCP certified agri-food processing firms in Sri Lanka wish to stay with

the same metasystem or go for an advanced and more stringent food safety controls such as ISO 22000.

METHODOLOGY

Theoretical Framework

We propose that a firms' decision to continue with the current food safety system (HACCP in this case) or its decision to adopt an enhanced newer system will depend on a number of factors as shown in Equation 1 below.

$$D_i = \beta_0 + \beta_1 (SAI) + \beta_2 (MCB) + \beta_3 (OPB) + \beta_4 (GMP) + \beta_5 (ICS1) + \beta_6 (ICS2) + \beta_7 (VIN) + \beta_8 (REV) + \beta_9 (EMP) + \beta_{10} (MKT) + \beta_{11} (HTI) + \epsilon_i \quad (1)$$

Table 1 summarizes description on variables in the model.

Table 1. Description of variables

Variables	Description
D_i	1 "Advancers" (firms wish to implement a newer food safety system) 0 "Stayers" (firms wish to stay with the current food safety system)
$\beta_0 - \beta_{11}$	Regression coefficients
Gained perceived benefits of HACCP system	
SAI	Strategic Aspect Index (see below)
MCB	Mean Score of Market Capacity Benefits
OPB	Mean Score of Operational Proficiency Benefits
Availability of other systems in place	
ICS1	ISO 9000 implemented Yes = 1 No = 0
ICS2	ISO 14000 implemented Yes = 1 No = 0
GMP	GMP (Good Manufacturing Practices) implemented Yes = 1 No = 0
Firms' specific characteristics	
VIN	Vintage of the firm
REV	Revenue of the firm Small <50Million = 0 Medium 51-100Million = 1 Large >100Million = 2
EMP	Number of employees of the firm
MKT	Market which firms' operated Domestic = 0 Export = 1
HTI	Time duration with HACCP
ϵ_i	Error term

The variable SAI represents the overall corporate view of the firm (Equation 2). There were five strategic aspects, namely: profitability, competitive advantage, organizational growth, legal protection, and social responsibility, were considered to develop it, and the value of SAI ranges from 0 to 1.

$$SAI_{ik} = (\sum X_{ik}) / M \quad (2)$$

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

Data Collection and Analysis

The list of HACCP certified firms maintained by the Sri Lanka Standard Institution (SLSI), which contains the contact details of 75 agri-food processing firms were used as the sampling framework. First, a series of Key Informant Surveys and Focus Group Discussions were conducted with the relevant experts, including academics, researchers and industrialists to extract their views, perceptions and ideas on this matter (Jayasinghe-Mudalige *et al.*, 2012).

Then a structured questionnaire was formulated to represent those views and perceptions, which was pretested using on-site visits to several agri-food processing firms. Both mail survey and personal interviews with the owner/quality assurance manager of the firm was used to collect data during January to March 2013. At the end of this process, we could gather data from 51 respondents yielding 68% response rate.

Perceived benefits based on post adoption experience with HACCP implementation were found as Market Capacity Benefits (MCB) and Operational Proficiency Benefits (OPB) (Jayasinghe-Mudalige *et al.*, 2013) shown in Figure 2. Each statement of MCB and OPB were modification to the existing four - point Likert scale, by including "yes" (completely realized) and "no" (poorly realized) field; this enabled the obtaining of numerical scores that range from 4 to 1 based on conceptual meaning of the statements and the underlying phenomenon to which the respondents were asked to score which were used to develop Mean Score of MCB and OPB.

Probit Regression

By taking into account the dichotomous nature of the dependent variable (i.e. Stayers, Advancers), the Probit regression technique (Ashford and Sowden, 1970) was used to estimate the coefficients of variables included in the empirical model using Stata statistical software (version 11). The estimates of marginal effect of explanatory variables, specially relative size and sign were used to interpret nature and impact to decision of whether HACCP implemented firms wish to continue with current food safety system or advanced with a newer system (i.e. ISO 22000).

RESULTS AND DISCUSSION

Descriptive Statistics of the Sample

Out of 51 respondents, 20 firms wish to stay with the current system (i.e. "Stayers") (40%), while other 31 firms have already taken steps or possess a plan to go ahead with an enhanced newer system (i.e. "Advancers") (60%). Figure 1 shows that "Advancers" are those who mainly dealing with exportmarkets (83%), earning higher revenue (64%), and with a relatively higher number of employees (66%) in compared to the "Stayers" in the sample.

The Mean Score of each statement of MCB and OPB were summarized (Figure 2).

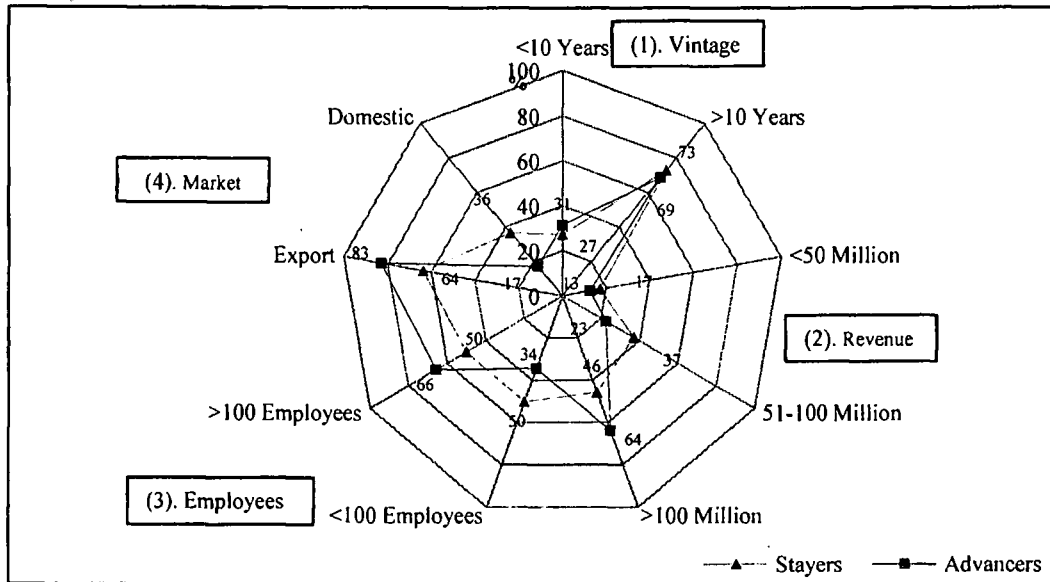


Figure 1. Descriptive statistics of the sample

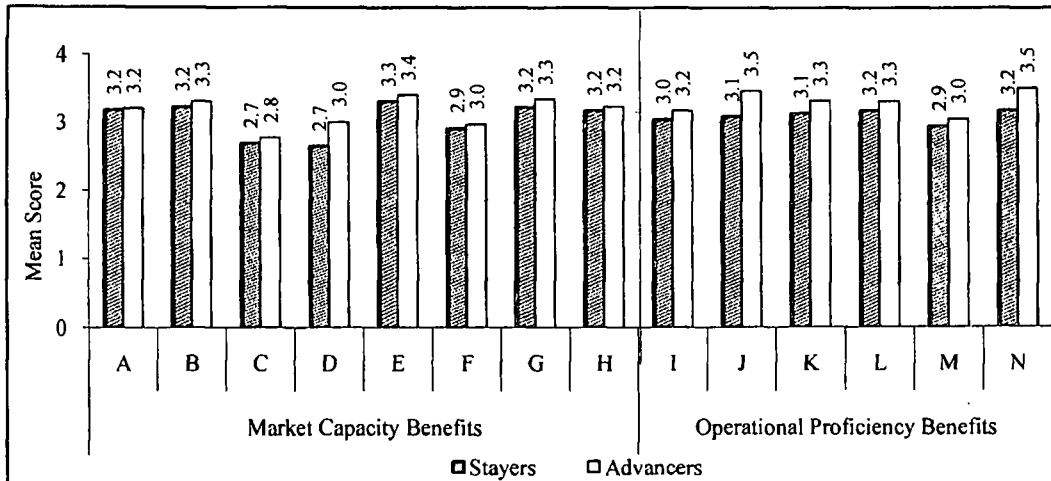


Figure 2. Mean Benefits Score of the sample

Note: A= Increased sales, B= Reduction in customer complaints, C= Obtain a higher price for products, D= Access to new export 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

Mean Score of overall MCB for Stayers and Advancers were 3.04 and 3.15 respectively. Mean Score of overall OPB for Stayers and Advancers were 3.09 and 3.29 respectively. Comparatively higher Mean Score can be observed in both MCB and OPB for Advancers.

Figure 3 illustrates any other management systems (i.e. GMP, ISO 14000, ISO 9000) implemented by the firms. It shows about 68% and 54%, respectively, Stayers and Advancers possess a system of ISO 9000. Further, ISO 14000 environmental management system was implemented by about 23% and 31%, respectively, Stayers and Advancers.

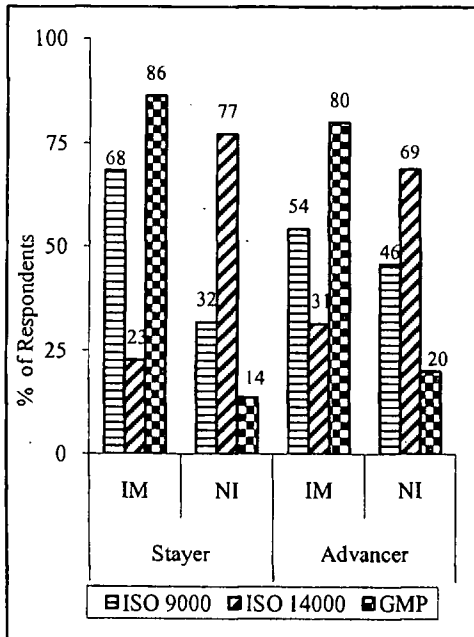


Figure 3. Percentages of other implemented systems in place

Note: IM= Implemented, NI= Not implemented

Comparatively higher average of SAI can be noticed in Advancers (0.65) than Stayers (0.44) (Figure 4). It shows that Advancer has capacity to implement a newer food safety system with perceived benefits gained by prevailing food safety system (HACCP).

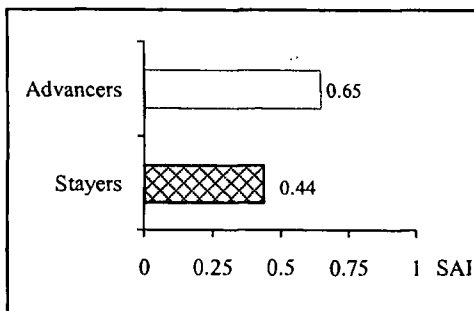


Figure 4. Mean SAI value of the sample

Outcome of Probit Regression

The outcome of the Probit Regression analysis is reported in Table 2.

Among all independent variables, certain perceived benefits gained by HACCP system and firm specific characteristics have significant impact on willingness to implement an advanced food safety system compared to continuation with the current system (HACCP).

Namely SAI , MKT_{D2} , REV_{D3} variables show higher marginal effect at the significance level of 0.05. It is evident that when SAI is increased by one unit, the probability of a Stayer moving towards an Advancer is increased by 35.2%.

Compared to domestic market, a firm which engages in the export market and compared to lower revenue category (<50 Million), as a firm moves in to the larger revenue category (>100 Million), it shows a probability of being an Advancer by 32.4% and 28.6% respectively. It is proved by the results obtained from descriptive statistics of the sample reported in Figure 1 and Figure 4.

Two other variables, namely OPB and HTI have a desirable impact on decision of being a Stayer or an Advancer. As a firm's operational proficiency increases, it has an 18% probability of being an Advancer while the number of years a firm has been having HACCP in place increase the potential probability of being an Advancer by 11%. Interestingly, as the number of employees increase, the firms are 1% more likely to become an Advancer.

This 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 experiences more realized benefits, this gives the firm all the more reasons to move towards a newer system as they intent to be more internally efficient as an Advancer. Further research is required to prove these matters.

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.

The result indicated that all significant explanatory variables have positive impact on their decision to implement an enhanced newer food safety system.

Table 2. Outcome of the Probit Regression

Variable	Estimated Coefficient	SE	Marginal Effect
Perceived benefits of HACCP system			
SAI	12.710	0.973*	0.352
MCB	0.922	0.673	0.119
OPB	6.791	0.817*	0.180
Presence of other system in place			
ICS1 _{D2}	-0.644	0.509	0.201
ICS2 _{D2}	-1.110	0.715	0.070
GMP _{D2}	2.064	0.524	0.014
Firms' specific characteristics			
VIN	1.541	0.007	0.129
REV _{D2}	8.415	0.787	0.054
REV _{D3}	9.327	0.632*	0.286
EMP	10.490	0.001*	0.010
MKT _{D2}	5.582	0.673*	0.324
HTI	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

CONCLUSIONS

The article empirically examined whether agri-food processing firms in Sri Lanka that already possess a system of Hazard Analysis of Critical Control Point (HACCP) in place, whether they wish to stay with the HACCP metasystem ("Stayers") or wish to adopt more stringent food safety controls in the near future ("Advancers").

Overall, the results suggest firms already with HACCP food safety system wished to implement a newer food safety system (i.e. ISO 22000) caused by certain perceived benefits gained by HACCP food safety system, including SAI, Operational Proficiency Benefits. Interestingly firms of dealing with export markets and earning higher revenue (large firms), availability of higher number of employees with in current plant, and time duration with HACCP were significantly influenced factors to Stayer being an Advancer.

The outcome of analysis, overall, suggests that food businesses with sound financial portfolio and sustainable business practices tries to gain a comparative advantage in the market over the others by implementing more stringent food safety controls in the firm.

Finally it can be suggest that, developing a more market friendly environment for these firms mainly characterized by the provision of accurate information and training from reputed institution (i.e.SLSI) to improve Stayer towards an Advancer.

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