

# Economic Impact of Adoption of the *Sri Lankan Standards (SLS)* on Plant and Product Exit in the Fruit Processing Sector in Sri Lanka

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## ABSTRACT

This study assessed the factors affecting the adoption of the *Sri Lankan Standard (SLS)* by fruit processing firms in Sri Lanka, especially whether such an adoption would lead to a plant and/or product exit. It used the primary data collected through a questionnaire based survey that was conducted during May to July 2005, with a sample of 36 of these firms located in the Western Province of Sri Lanka. The empirical model explains the potential factors influencing adoption of the SLS which was estimated using Logit Regression techniques. The results suggested that although firms may exercise a product exit due to the constraints they faced in this process, there was no strong evidence to say that a plant exit is possible. However, the results indicate that these firms were less likely to invest on modifying the current facilities to accommodate the SLS. The outcome of the analysis in turn highlights a need for an extensive empirical work on this area before attempting to implement advanced quality standards on agri-food processing firms mandatory without taking into account of their position in the market.

**KEY WORDS:** Adoption, Sri Lankan Standards, Plant and Product Exit, Fruit Processing Industry in Sri Lanka

## INTRODUCTION

The Sri Lanka Standard Institution (SLSI) Act No.6 of 1984 and the regulations made empowering the SLSI to issue permits to manufacturers for the use of a certification mark (SLS mark) in respect of those commodities or products which conform to the relevant Sri Lankan Standards. Primary purpose of this scheme is to convey to the purchaser a guarantee that the goods have been tested and certified by the third party, independent government institution and that these may therefore be purchased with a reasonable assurance of quality.

Under this scheme manufacturers are required to develop their quality management system in line with twelve elements prescribed in GP-CP-01 (Quality system required for the "SLS" marks scheme) document or all the requirements given in ISO 9001: 2000 standard (Directory of Certified Products, 2003). In the fruit processing sector separate SLSs are implemented for each category. In addition to that SLS 143 is essential to test the factory hygienically condition as "Code of Practices for General Principles of Food Hygiene". Among these processed fruit products, standards for fresh fruit cordials, fruit cordial concentrates, fruit squash concentrates, fruit syrup concentrates, ready-to-serve fruit drinks, synthetic cordials are mandatory under section 6 (1) (c) of the Consumer Protection Act No.1 of 1979, issued by the Commissioner of Internal Trade.

Table 1 indicates the current position of the canning fruits and vegetables industry in which with the years, output value and the value addition have been decreased even though there is a slight increase in 1999 with respective to both criteria.

The Sri Lankan fruit processing sector being a developing country's position, there is a difficulty in obtaining quality raw materials due to poor post harvest handling techniques. The poor quality assurance programmes, use of outdated equipments and machinery due to high cost, lack of technically qualified and skilled people, ineffective dissemination

of updated market information, and lack of potential required products can also be observed. Besides as causes of failure for small and medium enterprises, general problems (8.5 Percent), production problems (15.9 Percent), market problems (25 Percent), financial problems (17 Percent), management problems (29.5 Percent) are found and it reveals that the production and market problems are crucial (40.9 Percent) which are highly related with the quality (Dissanayaka, 1996). Hooker *et al.*, (2002) conducted a research on the impact of Hazard Analysis Critical Control Point (HACCP) on costs and product exit of meat industry in US and found that very small plants incur high compliance costs and probability and number of products discontinued are positively related to the current range of items produced and the need for facility modification.

A quality assurance standard targets four sources of benefits other than food safety. The sources of benefits are (1) protection of consumers from the fraudulent sale of low-quality goods, (2) the reduction of consumers' cost of acquiring information about product quality, (3) the reduction of sellers' costs through uniformity of regulatory requirements for product contents and labels, and (4) gains to sellers of high quality products. The costs are (1) suppression of cheap products which there are willing buyers and sellers, (2) a damper on innovations in food marketing and flexibility in changing food ingredients, (3) the imposition of increased cost of product testing and labeling by sellers, (4) the government's cost on of promulgating and implementing regulations, and (5) in the case of mandatory minimum quality standards, the creation of market power for sellers by eliminating rivals and influencing standard setting to favor those producers (Gardener, 2003).

The *ex ante* (theoretical) issue of a regulation approach is, the benefits of implementing the quality standards are higher than the costs incurred for implementation. In this paper producers' point of view is emphasized. In Sri Lankan context being fruit

**Table 1. Principal indicators of canning fruit and vegetables industry (1996-1999)**

Year	No. of Establishments	Persons Engaged	Value of Output (Rs.)	Value of Input (Rs.)	Value Added (Rs.)
1996	18	1,115	386,128,876	240,516,995	145,611,881
1997	13	986	348,635,454	220,038,305	128,597,149
1998	14	424	192,066,528	134,611,824	57,454,704
1999	14	637	246,872,412	131,805,877	115,066,525

Source: Census and Statistics (1999)

processors, they face either of two different lines of problems by making their decision regarding the SLS implementation. By implementing the SLS, post implementation issues like difficulty of covering the SLS compliance costs are faced with no significant increase of sales after implementing the SLS. As the ultimate result exit wholly from the industry or remain in the industry with less number of products, *i.e.* partial exit is anticipated. On the other hand, without implementing the SLS, another two extremes of problems are emerged. With the mandatory requirement of having the SLS for some processed fruit products, those are illegal by the regulation to remain in the industry. With voluntary SLS standards, producers face a market test. If buyers and sellers do not find a significant difference of reputation in certified products, market failure occurs. Again it affects to the exit wholly or partial exit. In this paper, factors affecting for the willingness of the SLS adoption and the probability of product withdrawal are examined.

**METHODS**

This section explains the theoretical framework used to examine the problem and methods used to collect and analyze data.

**Theoretical Framework**

The empirical study by Hooker *et al.*, (2002) was used to guide the formulation of the two models. According to this literature and the information of the industry it was hypothesized that the exportation of the products, ownership of the firm, prevalence of other standards than the SLS, performance of the firm and the presence of mandatory SLS compliance products affect the willingness for the adoption of the SLS (Model 1).

$$WSLS = \beta_0 + \beta_1 EXPORT + \beta_2 OSHIP + \beta_3 OSTDS + \beta_4 PERFOR + \beta_5 MANDAT \tag{1}$$

In Model 2 it was hypothesized the same mentioned factors (except presence of mandatory SLS compliance products), the requirement for physical modification of the plant and new labour affect the probability of product withdrawal (Model 2). The model variables are described in data collection section.

$$DISCONT = \beta_0 + \beta_1 MODFAC + \beta_2 NEMP + \beta_3 EXPORT + \beta_4 OSHIP + \beta_5 OSTDS + \beta_6 PERFOR \tag{2}$$

**Data Collection**

In order to examine the impact of the SLS upon fruit processors, a survey questionnaire was developed. This questionnaire was pre-tested by means of on-site visits to five fruit processing firms beginning first week of May 2005. Following revisions of the pre-testing, a final questionnaire was surveyed. For that mail, e-mail and telephone calls were used as additive tools. This survey was carried out in Western Province for 54 firms from the total population of 71 according to the Department of Census and Statistics register. Sampling was done under the cluster sampling technique. In total, from 54 firms, 9 firms were unrelated as they were vegetable processors. From the rest, only 30 firms completed the questionnaire and only 27 were effective. Thus, effective response rate was 60 percent. Due to inadequacy for the analysis, information was collected from 9 other firms in three other districts.

Table 2 presents the two dependent variables examined. One of the dependent variable is the firm's willingness for adoption of the SLS (WSLS). This variable was determined by the firm's willingness for the future adoption of the SLS and the firms that are already adopted were also assigned to that variable. The second dependent variable was a binary variable reflecting the probability of product withdrawal due to the SLS or not (DISCONT). The value for this binary variable was assigned on the basis of the mandatory compliance standards for compulsory products. Hence, for firms without the SLS for mandatory products = 1, and firms having SLS for mandatory products = 0 were assigned.

The independent variables are also exhibited in Table 2. A number of dummy variables were included. The requirement for the modification of the current facility of the plant (MODFAC) and new labour force due to the SLS (NEMP) were included. As an indicator of risk taking behavior of the entrepreneur, ownership of the firm, as single proprietorship or not (OSHIP) was incorporated. The prevalence of other standards than the SLS (OSTDS) was incorporated as a reflector of present quality condition of the firm while to find out the marketing scope, exportation or not (EXPORT) was incorporated. Presence of mandatory SLS compliance products in the sales mix (MANDAT) was included to reflect the product scope of mandatory compliance requirement of the SLS. Another continuous variable (PERFOR) was included and it was highly linked with the management and the scale of production of the firm. This value was calculated using following formula.

Table2. Definitions for model variables

Variable Name	Variable Description
<b>Dependent Variables</b>	
1. WSLS	1 if the SLS was implemented or willing to implement ; 0 otherwise
2. DISCONT	1 if there is a probability for product withdrawal ; 0 otherwise
<b>Independent Variables</b>	
1. MODFAC	1 if current facility is modified; 0 otherwise
2. NEMP	1 if new staff is hired; 0 otherwise
3. EXPORT	1 if exporting; 0 otherwise
4. OSHIP	1 if single proprietorship; 0 otherwise
5. OSTDS	1 if other standards; 0 otherwise
6. PERFOR	* Performance Index
7. MANDAT	1 if SLS mandatory products available in the firm; 0 otherwise

\* See the calculation formula in data collection section

$$PERFOR = \text{Sales} / (\text{No. of products} * \text{Existing No. of employees})$$

Sales were taken as the annual sales of the main processed fruit products of the firm. By this, sales per one product, for one employee were taken as an index to measure the performance and the productivity of the firm. This eliminates the scaling effect to the models by incorporating small, medium, large-scale producers together.

**Data Analysis**

The stated models were estimated using logit regression model. The dichotomous nature of the dependent variables suggests logit or probit models (D’Souza *et al.*, 1993, Fernandez-Cornejo., 1994, Boorah., 2002 and Ippolito, 2003) and logit regression model was used in this study.

**RESULTS AND DISCUSSION**

This section explains descriptive statistics and the outcome of the statistical analysis.

Being a small sample of 36 firms, sample had a vast variation within it. From the sample, 75 Percent of the firms were willing to adopt the SLS and only 9 firms (25 Percent) did not like it. From those unwilling firms, 2 of the firms (5 Percent) were reluctant to implement the SLS as they were not marketing their products in domestic market. That portion of the sample reflected the entrepreneurs’ perception of non-importance of the SLS for export market.

Figure 1 reflects the distribution of 6 dummy variables. Legend “Yes” indicates the positive condition of the variables discussed in data collection (Table 2) and “No” as the negative condition. Compared to other three variables, prevalence of other standards and exportation of products are low in number within the sample (16 Percent and 28 Percent, respectively). As other standards, mainly ISO (International Standards Organization) and HACCP were adopted. Majority of the firms were subjected to the mandatory compliance of the SLS (86 Percent) due to the nature of their product range. Concerning the ownership of the firms, “No” indicates the other ownership types than single proprietorship like limited liability companies and the partnerships.

Sales had a drastic variation within it (Figure 2). The firms numbered as 10, 11, 35 and 36 had higher sales values than the sales range of other firms (Rs. 0-50 million). This has created a higher standard deviation and misled the real nature of the distribution of the sales. As discussed in the data collection section, this nature of the graph suggested using a performance index to minimize the effect of the scale of production as a result of incorporating a few large scale firms with small and medium scale firms together. Hence, a measure for productivity and performance was incorporated (PERFOR) to the models instead of sales as a pure measure.

Figure 3 shows the sample distribution based on sales mix of which most firms produce more than one product (around 61 Percent) as a whole and the

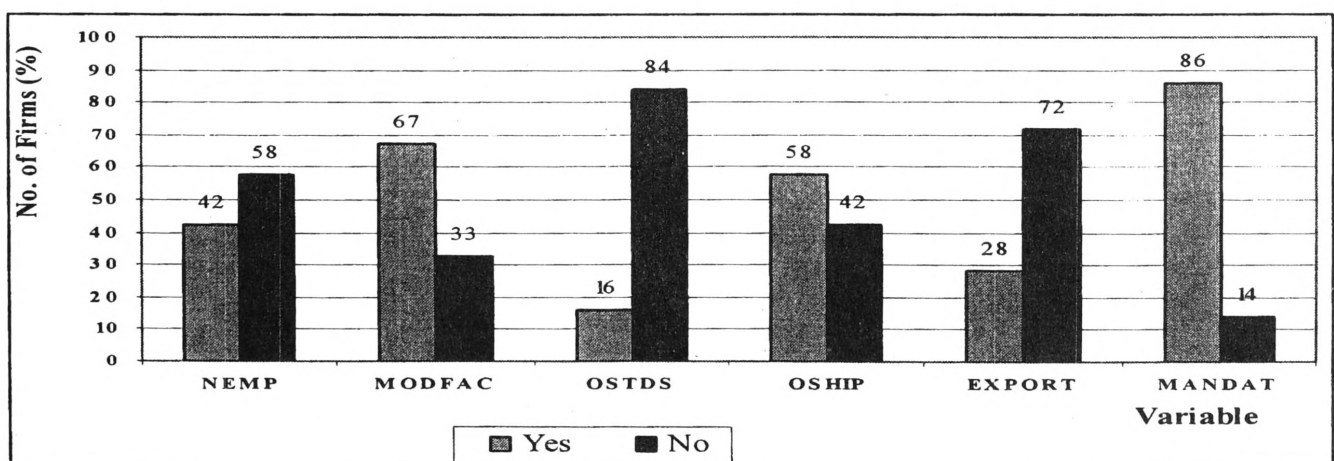


Figure1. Sample distribution based on firms' characteristics

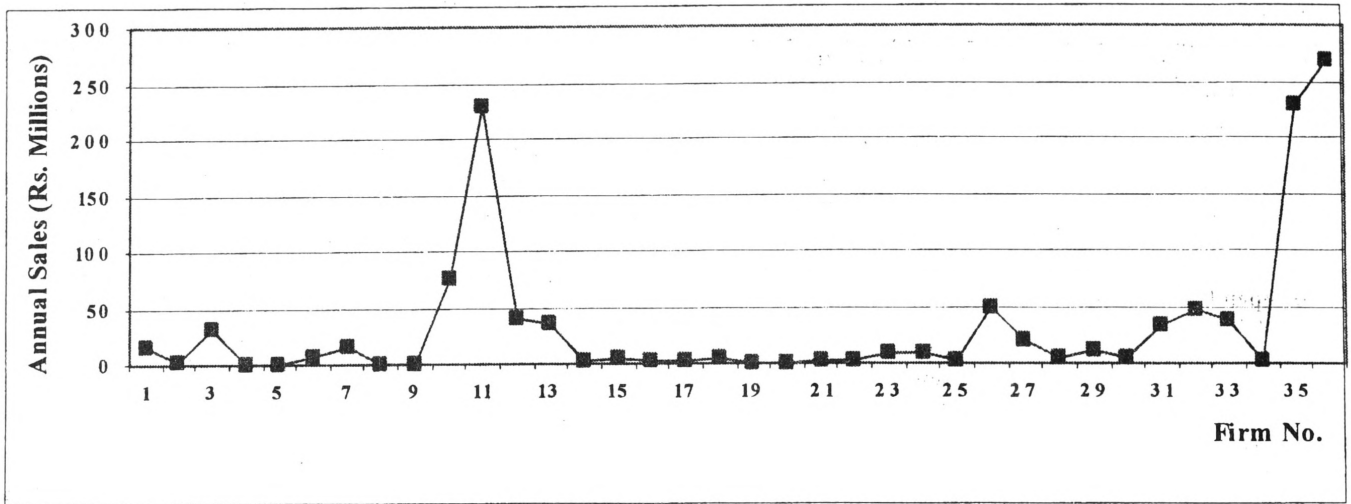


Figure2. Annual sales of the firms

percentage of the one product producing firms is around 39 percent. This reflects that 61 percent of the firms require complex SLS compliance plans as separate SLS must be implemented to each product.

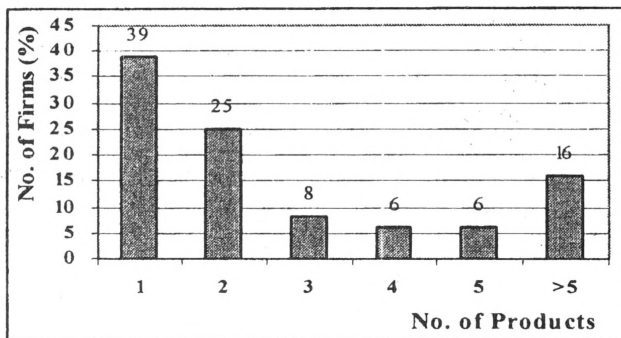


Figure3. Sample distribution based on sales mix

Figure 4 demonstrates the main product of the firms, of which 18 firms' main product was ready-to-serve (RTS) fruit drinks (50 Percent of the sample). As other main products, dehydrated fruit and vegetables and frozen fruit juice packets are referred.

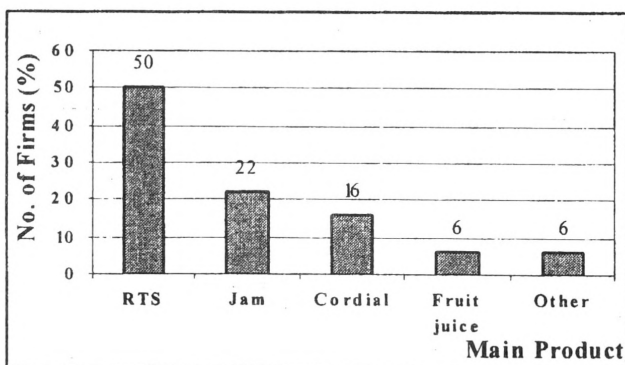


Figure4. Sample distribution based on main product

The descriptive statistics and the parameter estimates are presented in Table 3.

None of the independent variable was significant in model 1 at 5 percent level. Concerning model 2, among the six independent variables MODFAC, OSTDS and PERFOR variables were significant at 5 Percent level. As overall, Model 2 was significant as the likelihood ratio probability was

below 0.05, rejecting the assumption of that all independent variables were set to zero. The firms which facility modification was pressurized, over, the firms which facility modification was not pressurized to comply the SLS, the probability of product withdrawal due to the SLS was reduced by 0.016 times. If the firm had other standards other than the SLS, the probability of product withdrawal was reduced by 0.004 times than not having another standard. Even though by probability, performance of the firm had a negative effect for the product withdrawal, being the odd ratio equals 1; the change of the probability of product withdrawal due to performance is negligible. These results are contrary to the results obtained by Hooker *et al.*, (2002) which showed that probability of product withdrawal is positively related to the current range products and the need for facility modification. This difference may be due to the uniqueness of the food safety standard and the industry they concerned, as those were HACCP and meat processors respectively.

**CONCLUSION**

Data from a survey on fruit processors in the Western Province of were used in two logit models to determine economic impact for the willingness of the adoption and the probability of product withdrawal due to the SLS. None of the variables was found as significant determinants of the willingness for adoption of the SLS. However, as hypothesized, facility modification of the plant, prevalence of the other standards and performance of the firm were found to be negatively related to the probability of product withdrawal.

These generally support that the product withdrawal due to SLS (partial exit) can be minimized by the facility modification of the plant. As prescribed by the regulation, if the producer is ready for the modification of the plant, it suggests that the regulation implementation is easy and as a result product withdrawal due to the SLS will be low. The prevalence of the other standards suggests that it will lead to implement the basic food standard regulation, the SLS as its compliance requirements are already

**Table3. Descriptive statistics and regression results**

Variable	Mean	Standard Deviation	Model 1		Model 2	
			Parameter Estimate	Odds Ratio Estimate	Parameter Estimate	Odds Ratio Estimate
Intercept	-	-	2.0427 (1.5068)	-	5.2762 (2.3842)	-
MODFAC	0.67	0.48	-	-	-4.1056** (2.0856)	0.016
NEMP	0.42	0.50	-	-	0.7506 (1.1133)	2.118
EXPORT	0.28	0.45	-	-	0.3415 (1.3163)	1.407
OSHIP	0.58	0.50	-0.7250 (1.0522)	0.484	-0.4196 (1.0901)	0.657
OSTDS	0.14	0.35	-1.0094 (1.9209)	0.364	-5.4762** (2.6663)	0.004
PERFOR	578440	773131	-1.02E-6 (6.247E-7)	1.000	-1.5E-6** (7.419E-7)	1.000
MANDAT	0.86	0.35	0.2563 (1.2853)	1.292	-	-
<b>Likelihood Ratio Test</b>			<b>4.4084</b>		<b>14.8021**</b>	

\*\* Indicates significance at the 5-Percent level

covered in implementing other international standards like ISO or HACCP.

Concerning the performance of the firm according to the above mentioned factors, it may be profitable to a producer to modify the factory facilities as prescribed by the SLSI in the most profitable product where a decision is demanded of which product is to be first if the SLS is adopted. Being a producer, making a decision in correct time is important in long term strategic planning of a firm in presence of range of products and a financial constraint in a highly competitive environment. This outcome is also important for consumers to obtain an idea about "partial exit" firms with related to the firm's performance and factory condition. This leads to change the consumer's buying behavior of a firm's products, when at least one product offer has already been discontinued, as finally it is the consumer's choice of buying a product based on his perceived value of the product.

The SLS being the primary and the basic standard for the food safety in Sri Lanka, it is important to review the policy making process. Concerning the mandatory SLS compliance products, the SLS must be implemented within three months to be in the market. It has discouraged the producers in this industry as it seems as a risky investment for the SLS mandatory products launch to the market. Besides, these products are categorized under non-essential goods. Thus it has already driven to a high competition among the firms to obtain a higher market share from the existing segment of the consumers because the industry growth is very low when compared with the fast moving consumer goods industry's growth. So as policy makers the government must consider these issues and regulations may be amended to encourage the new entrants to the industry. Some new developed product lines like dehydrated

fruits there are no separate SLS. So that their quality control maintenance is questionable. On the other hand the exporters, who play a main role in the industry, are not bound to have the SLS and their quality maintenance is regulated by other bodies. As a result their product withdrawal may be linked with another set of problems and it is worthy to link SLSI with those regulatory bodies for effective regulation reinforcement.

This survey was conducted with a small sample of 36 fruit processing firms. With a large variation of the data within the sample, the real economic impact of the SLS could not be explained accurately. Even though control was done to minimize the scaling effect from the different sizes of the firms, those are not sufficient to have a normally distributed sample. Thus further researches may be conducted to eliminate these errors. It is worthy to carry out a research with a large sample by expanding the concerned area for the survey and examine the effects for small, medium and large scale firms separately. By that unique features of each category can be identified clearly. Being confidential nature of data, availability of data is lacked. In addition to that, lack of finance played as another constraint. Considering the willingness for the adoption of the SLS, the firms which have already implemented the SLS and those which intended to implement the SLS were examined together and it might lead to prediction errors of the entrepreneurs and this must be eliminated. It is important to reconsider the variables concerned for estimating models. To eliminate the canceling off of the effects by correlated variables, factor analysis can be carried out to group the related variables together. As further, cluster analysis can be conducted to examine the SLS adoption characteristics of the firms. Clearly, further researches are needed to understand the full impact of the SLS on fruit processing firms.

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