

Exploring Constraints and Motivations of HACCP Adoption in the Virgin Coconut Oil and White Edible Copra Industries of Sri Lanka

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ABSTRACT

The Hazard Analysis Critical Control Point (HACCP) system has been proposed to the coconut processing sector to address twin goals of acquiring better product quality and safety and becoming more competitive in the international market. This study deals with Virgin Coconut Oil (VCO) and White Edible Copra (WEC) industries, with the objective of identifying constraints and motivations to implement HACCP system. A survey was conducted using a pre tested structured questionnaire, with ten respondents from each industry in Western and North Western provinces. Data were analyzed using Principal Component Factor Analysis technique with SPSS software.

Regarding constraints of HACCP adoption in two industries a three factor solution resulted, with the factors being labeled as *internal environment*, *organizations structural barriers* or *external environment and management attitudes*. It revealed that barriers associated with internal environment have showed a significant impact on HACCP adoption. Among those barriers to WEC industry, the belief among producers that "the current food safety controls are sufficient", has been the major barrier. Among the other barriers "resistant to change by employees" and "greater priority given to other issues" were found. With respect to VCO industry the major mis-belief of "scale of operation is too small to have HACCP" is the major barrier. "Difficulties found in getting help and advice, for implementation of HACCP system" and "lack of skills necessary to implement the system" were found as major barriers associated with *management attitudes* and *external environment* respectively in the VCO industry.

With regard to motivations, three factor solutions resulted, with the factors being labeled as *profit oriented*, *reputation and market driven* in WEC industry and *Internal environment*, *strategy related motivations* and *Market driven motivations* in VCO industry. In VCO industry major motivational drive to adopt HACCP was related to the expectation of producers that their customers may request HACCP certification in future, which is much profit oriented. Training programs on basic food safety, HACCP and export market to support of HACCP in these two industries were suggested.

KEYWORDS: Coconut industry, Constraints, HACCP system, Motivations, Virgin coconut oil, White edible copra

INTRODUCTION

Coconut is composed of four main component parts namely husk (35%), kernel (28%), water (25%), and shell (12%). Each and every component part of coconut forms a separate industry but the major economic value of coconut lies in its kernel. It is mainly due to its rich food value. Kernel consists of moisture (45%), oil (37%), carbohydrate (10%), proteins (4%) and minerals (4%) (Thampan, 1982). Based on its food value, the kernel is subjected to industrial processing to manufacture various products that include edible copra, oil and desiccated coconut. Coconut kernel is a highly perishable by nature mainly due to its composition. Therefore, in its raw form, during processing, or in its final product stage, it needs to be handled hygienically; otherwise it might get affected easily by bacteria and fungi (Thampan, 1982).

Quality is a key issue in any kind of food processing operation. In the literature, there are many reports dealing with quality related problems of coconut kernel industry. Some of the studies have already indicated that prevailing practices of copra processing are not satisfactory and do not

fulfill the minimum requirements of the modern food processing operation (Rodrigo *et al.*, 1996). For example, copra is processed improperly under unhygienic conditions could be susceptible to microbial invasion and insect attack. According to a past study, as many as six different insects were connected with copra due to poor manufacturing practices (Anon, 1975). Similarly, microbes such as *Rhizopus* spp, *Aspergillus* spp and *Penicillium* spp were reported to be responsible for spoilage of copra (Samarajeewa, 1975). The economic losses incurred to the coconut industry by these quality related problems were discussed much (Nathanel, 1960). In addition, there are health related safety issues associated with these problems. For instance, aflatoxin in copra which is produced by *Aspergillus flavus* is carcinogenic and may adversely affect human and animal health (Scott, 1991). The aflatoxin deposited in copra could be passed on to coconut oil via the oil extraction and a part of it may be left behind in the defatted kernel residue (Samarajeewa, 1975).

Infact, these quality problems are a great challenge for survival in the competitive marketing system. Over the years, public health concern has

increased considerably and international food regulations, therefore, be come more and more stringent. Hence, the Sri Lankan food manufacturing sector should give more emphasis for food quality and safety strategies. For this purpose quality management systems are required. In quality management, there are different kinds of systems namely, Good Agricultural Practices (GAP), Good manufacturing Practices (GMP), and Good Hygienic Practices (GHP). The HACCP which is abbreviated for Hazard Analysis and Critical Control Point is a safety management system initially introduced to the NASA space programs in the USA (Mortimore and Wallace, 1994). The principal objective of HACCP is to control the production process from farm to table. It will have a deeper look on to the operation specifically for food safety and takes controls measures on those steps which are vulnerable. Thus, it can reduce the chance for food-borne illness and food contaminations by way of eliminating physical, chemical and biological hazards.

HACCP based food safety system is not widely adopted by the Sri Lankan coconut processing industries, even though it has so many benefits. Until now, HACCP system has been introduced only for desiccated coconut industry (Anon, 2005). There may be several reasons which should be identified through systematic surveys. Additional cost involvement, lack of commitment by the management, no effective team work, lack of infrastructure, resistance for change by the workforce are usually common hurdles in the implementations of HACCP in developing countries.

In response to increasing awareness of food born illnesses by overseas quality conscious consumers and the severe competition from other producing countries, it is necessary to develop HACCP based food safety systems to all edible product related industries which are coming out of coconut in Sri Lanka. In particular, Virgin Coconut Oil (VCO) and White Edible Copra (WEC) are two products which enjoy good international market. Therefore, in this study, these two products are selected for investigation. This study offers the first information about the constraints and motivational factors of HACCP adoption by VCO and WEC product industries. The main objective of this study was to asses the constraints and motivations of HACCP adoption by those two selected product industries.

METHODOLOGY

A survey was conducted as a cross sectional study using a semi structured questionnaire in the Western and North Western provinces of Sri Lanka, during the period of May to August 2007. This questionnaire was prepared using the existing literature and experience on the implementation of

HACCP system and further changes were made after discussions with few producers. Informal discussions were also held with Sri Lanka Standard Institute (SLSI) officials with regard to the format and contents of the questionnaire. Pre-defined constrains and motivations were included in the questionnaire using a five-point likert scale ranging from 5 to 1 (5: very important; 1: very unimportant). Although fifteen respondents were targeted initially, the study had to be limited to ten respondents due to lack of response from the other five. Most of the selected respondents participated in this survey were small scale producers. Data were analyzed using Principal Component Analysis technique with Statistic Package for Social Sciences (SPSS) software, version 13.

RESULTS AND DISCUSSION

To get a preliminary indication of constrain for adopting HACCP, an attempt was made to identify the HACCP status of the respondents. It revealed that no any WEC producers had found, in the process of implementing or already implemented HACCP in the sample. Only 20% of the respondents have established plan to implement it (Figure 1).

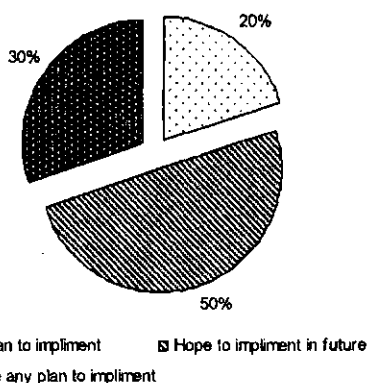


Figure 1. HACCP status of WEC industry

This reflects that the WEC industry is presently not ready for HACCP implementation. At the same time most of the respondents, who had no idea to implement and not familiar with “What is HACCP”. But most of them had better attitude towards the implementation of HACCP in future. In VCO industry 10% of respondents had no any plans to implement HACCP where as 20% respondents had established plan to implement HACCP (Figure 2).

Constraints for WEC and VCO Industries

Pre-defined fifteen constraints were presented to the respondents and three factor solutions resulted with those being labeled as (1) Internal Environment (2) Organizations structural barriers and (3) Management attitudes by the Principal Component Factor Analysis (Table 1). The major

Table. 1 Constraint in WEC industry

Variables	Factor 1	Factor 2	Factor 3
1. Not sure whether the implementation would meet our customer requirement	0.579		
2. Current food safety controls considered sufficient	0.904		
3. Considered that cost of implementing of HACCP likely to get cheaper over time	0.445		
4. Did not really see HACCP as suitable for factory	0.870		
5. HACCP would reduce the flexibility in our production	0.787		
6. HACCP goes against all the way in which we have traditionally done things	0.692		
7. Difficult to implement because of internal organization of the company		0.680	
8. Uncertain about the potential benefits of implementing HACCP		0.666	
9. Difficulty in getting help and advice on the implementation of HACCP		0.604	
10. Did not have skills necessary to implement HACCP		0.708	
11. Resistant to change by employees		0.860	
12. Greater priority to other issues by neglecting food safety controls			0.796
13. Lot of changes to our current food safety controls needed before implementation of HACCP			0.541
14. Scale of operation is too small to have HACCP			0.715
15. Wide scale factory up grading needed for HACCP implementation			0.727

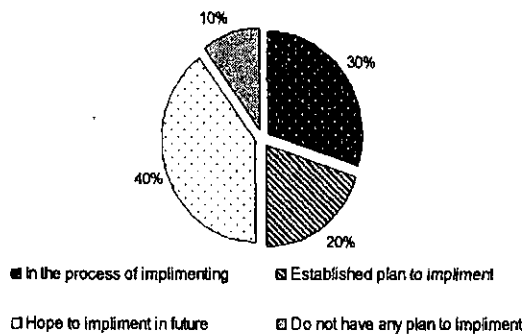


Figure 2. HACCP status of VCO industry

constraints related to each of the above factor were identified based on the highest factor loading. It revealed that barriers associated with *internal environment* have showned a significant impact on HACCP adoption in both industries. Among those barriers to WEC industry, the belief among producers that “The current food safety controls are sufficient”, has been the major barrier under the factor *internal environment*. Among the other barriers under the same factor two believes namely “Did not really see HACCP as suitable for their factories” and “HACCP would reduce their flexibility in their production” were found. “Resistant to change by employees and greater priority given to other issues” were found as the main barriers associated with other two factors viz. *organizational structure* and *management attitudes* respectively in the WEC industry.

According to Table 2, pre defined sixteen constraints were presented to respondents of VCO sector. They were reduced into three key factors and labeled as (1) Internal environment (2) Management attitudes and (3) External environment by using Principal Component Factor Analysis. Based on factor 1 “Scale of operation is too small” and “Did not really see HACCP suitable for factory” are found as major constraints associated with internal environment. This shows less knowledge and negative attitudes of employees about HACCP. Based on factor 2, “Greater priority to other issues by neglecting food safety control” and “Difficulty in getting help or advice on the implementation of HACCP” are major constraints associated with management attitudes of factories. Intact, without knowing the technical aspects of HACCP by the management, it may be impossible to implement HACCP. Issues related with attitudes of management can create an unfavorable situation on HACCP implementation. In addition, there should be incentives to motivate the employees. In factor 3, “better to learn from the experience of other HACCP implementers” and “did not have skills necessary to implement HACCP” were found as major constraints associated with external environment. According to this, respondents have some hesitation to implement HACCP due to the lack of awareness of the benefits.

Motivations for WEC and VCO industries

According to Table 3, pre defined twenty motivations were presented to the respondents of WEC. They were reduced into three key factors and

Table 2. Constraints for VCO industry

Variables	Factor 1	Factor 2	Factor 3
1. Difficult to implement because of internal organization of the company	0.568		
2. Lot of changes needed to food safety before implementation of HACCP	0.747		
3. Uncertain about the potential benefits of implementing HACCP	0.736		
4. Considered that cost of implementing of HACCP likely to get cheaper over time	0.445		
5. Scale of operation is too small to have HACCP	0.787		
6. Did not really see HACCP as suitable for our factory	0.774		
7. Wide scale up grading of the factory needed before HACCP implementation	0.621		
8. HACCP goes against all the way in which we have traditionally done things	0.573		
9. Resistant to changes by employees	0.724		
10. Greater priority to other issues by neglecting food safety controls		0.742	
11. Current food safety controls considered sufficient		0.728	
12. HACCP would reduce the flexibility in our production		0.740	
13. Difficulty in getting help and advice on the implementation of HACCP		0.820	
14. Not sure whether the implementation of HACCP would meet our customer requirement			0.132
15. Better to learn from the experience of others of HACCP implementers			0.762
16. Did not have skills necessary to implement HACCP			0.952

labeled as (1) profit oriented (2) reputation and (3) market driven by the Principal Component Analysis. The major motivations related to each of above factor were identified based on factor loadings. Based on factor 1, major profit oriented motivational drives include "Our customer may request HACCP certification in the future" followed by "With HACCP we can manage our labor force", "HACCP reduce our liabilities for court cases" and resulting fines/compensations". Based on factor 2, the major motivational drives associated with reputation include "HACCP helps the company to reduce product rejections" and "HACCP is request by trade organizations to retain membership". Usually product rejections due to lack of desired quality standard is a major issue that affects the reputation of a company. Also trade organizations' request is a better motivational drive for adoption of HACCP. Based on factor 3, "With HACCP, the company sale or market share will increase" and "Retain local customers" were identified as major market driven motivations. It is because HACCP mark on the product label or in the company name board symbolizes better quality to win customer confidence.

According to Table 4, pre defined twenty one motivations were presented to respondents of VCO sector. They were reduced into three key factors namely (1) Internal environment (2) strategy related motivations and (3) Market driven motivations by using Principal Component Factor Analysis. The major motivations related to each of above factor

were identified based on factor loadings. Based on factor 1, "With HACCP we can manage our labor force effectively" and "We need HACCP to business with existing government regulations" are the major motivations related with *internal environment*. That shows HACCP implementation improves the effectiveness of labor management and government regulations create motivation to HACCP implementation. Based on factor 2, "We believe that HACCP is a good practice for follow" and "Our major competitors succeed by adopting HACCP" were found as major motivations associated with *strategy oriented* motivations. This shows that respondents mostly motivated with practices that increase the profit but due to lack of awareness still HACCP is not popular in VCO sector. Thus creating a competition among producers has become a potential to implement HACCP. Based on factor 3, "Retain existing local customers" and "Attract new local customers" are the major motivations associated with market driven factor. Respondents mostly motivated due to favorable market for the product.

C ONCLUSION AND POLICY IMPLICATION

The constraints found in WEC industry towards HACCP adoption is mostly related to problems associated with *internal environment*. Further the top most severe constraints identified under this factor

Table 3. Motivations for WEC industry

Variables	Factor 1	Factor 2	Factor 3
1. Our customer may request HACCP certification in future	0.841		
2. HACCP reduces our liabilities for court cases and resulting fines / compensations	0.733		
3. HACCP will become a mandate in future / future government regulations	0.549		
4. With HACCP, we can manage our labor force effectively	0.801		
5. Our major competitors succeed by adopting HACCP	0.439		
6. HACCP will help the company to reduce the operating cost	0.712		
7. Reduction of insurance premium	0.398		
8. We need HACCP to do the business with existing government regulation	0.641		
9. HACCP provides a greater control over the production process		0.815	
10. HACCP helps the company to reduce product rejections		0.854	
11. HACCP enhances the reputation of our company.		0.611	
12. With HACCP in place, the shelf life of our products increases		0.644	
13. HACCP helps the company to access into new overseas market.		0.546	
14. HACCP is request by trade organizations to retain membership		0.839	
15. Government help and bank (funding)		0.759	
16. With HACCP, the company sales / market share will increase			0.877
17. Our customers pressure us to have a HACCP type of food safety controls			0.572
18. Higher price to product (i.e. price premium)			0.667
19. HACCP helps to attract new local customers			0.764
20. Retains local customers			0.818

which could act as a mechanism to avoid future possible risk and good survival mechanism in the highly competitive international market. Other constraints related to the factor internal environment are more or less associated with lack of knowledge in international market.

Based on constraints loaded under the factor 2, i.e. organizational structure it can be concluded that the lack of skilled persons and negative attitude associated with work force made it reluctant to implement HACCP.

Constraints toward HACCP adoption found in WEC industry are more or less similar to the VCO industry. Accordingly most similar barriers to HACCP adoption is associated with factor related to internal environment. These barriers reflect the immoral attitude towards HACCP implementation for its future prospect. In addition, negative management attitudes towards HACCP adoption also contributing to its implementation decision making in VCO industry which is similar to the WEC industry.

Among the motivating factors towards the implementation of HACCP system for both

industries, the factor associated with profit play a leading role. Government and responsible authorities should try to understand those existing difficulties and take necessary measures to rectify them to implement HACCP in coconut processing sector. Since lack of knowledge on HACCP and wrong attitudes towards HACCP and its outcomes among producers is more apparent, priority should be given to educate the people who are involve in this business. In addition government should plan and implement an incentive scheme to motivate the producers and finally promote this system.

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Table 4. Motivations of VCO industry

Variables	Factor 1	Factor 2	Factor 3
1. With HACCP in place, the shelf life of our products increases.	0.598		
2. Our customer will request HACCP certification in future	0.508		
3. Reduces our liabilities for court cases and resulting fines / compensations	0.573		
4. HACCP will become a mandate in future / future government regulations.	0.648		
5. With HACCP, we can manage our labor force effectively	0.811		
6. HACCP will help the company to reduce the operating cost.	0.648		
7. Higher price to product (i.e. price premium)	0.766		
8. We need HACCP to do the business with existing government regulation	0.865		
9. HACCP provides a greater control over the production process		0.507	
10. HACCP helps the company to reduce the risk of product return / recall		0.661	
11. We believe that HACCP is a " good practice " to follow		0.746	
12. With HACCP, we will increase sales / market share.		0.642	
13. HACCP helps the company to access into new overseas market		0.639	
14. Our customers pressure us to have a HACCP type of food safety controls		0.693	
15. HACCP is recommended by trade organizations to be or retain membership		0.495	
16. Our major competitors succeed by adopting HACCP		0.715	
17. HACCP enhance the reputation of our company.			0.508
18. Attract new local customers			0.931
19. Retain existing local customers.			0.931
20. Government help and bank (funding)			0.838
21. Reduction of insurance premium			0.572

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