FACTORS INFLUENCING ON EFFECTIVE HANDLING OF WASTAGE OF THE VEGETABLE MARKETING SYSTEM IN DAMBULLA DEDICATED ECONOMIC CENTRE

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ABSTRACT The vegetable marketing system in a country should be effective and efficient one to the country's economy because the food is important need for the human beings. Due to the perishable nature of the vegetables, it has high probability to damage and going as wastages. Metrics tons of vegetable from the annual production is going as wastages in Sri Lanka. In Dambulla Dedicated Economic Centre, there are huge quantity of vegetables are going as wastage in every year and some season. The main problem of the Dambulla Dedicated Economic Centre is that normally 30 % of vegetables going on as wastage in daily. But in some season the damage is high. It is differ from season to season. As a main vegetable distribution hub, the good conditions for the vegetable marketing is require in order to increase its quality while satisfying the customers by minimizing the wastages. Based on the vegetable wastage problem, the objective of this research is to identify the main factors influence on effective handling of the wastages of vegetable marketing system in Dambulla Dedicated Economic Centre and its impact on the effective handling of wastage. Mainly, five factors were identified for the vegetable wastage problem. Those factors were considered as independent variables such as transportation, packaging, storage condition, communication of information and excess supply. Sample was selected as 300 farmers from convenience sampling in a structured questionnaire method. Data has analysed by using Descriptive statistics, Bivariate and Multivariate analysis and data evaluated through the SPSS version 21.0.0.0. Based on the analysis all the variables are having the moderate level and positive relationship. Under the 52.6% variation of the variables, contribute to the effective handling of wastages of the vegetable marketing system.

Keywords: Wastage, Vegetable Marketing System (VMS), Dambulla Dedicated Economic Centre(DDEC)

1. INTRODUCTION

Vegetable Marketing System is the collection of farmers, collectors, traders, distributors, customers, and facilitators that join together to sell and buy product or service. The main aim of these parties is to increase the satisfaction level while making optimal decision around their environment. VMS is doing lot of functions for vegetables such as farming, delivering, packaging, sharing information, warehousing and manage the stock, forecasting, trading, pricing, exchanging and other facilitating functions. Wastage refers any things that happen for some things and it cannot be got for the usage purposes. The vegetable wastage, it reflects some damages for the vegetables and it cannot be used for the selling, buying or consumption. Due to the perishable nature of the vegetables, it has high probability to damage and going as wastages.

Agriculture marketing is sequence of business actions instead of simply buying and selling that provides value added agriculture commodities to end

consumers. It starts as soon as commodities leave the farm gate and ends as the final product reaches the ultimate customers (Siddique, 2015). Agriculture is the most common livelihood of Sri Lankans and it provides the more benefits for the customers and also for the producers. Sri Lanka produces around 710,000 metric tons of vegetables annually (Sri Lanka Export Development Board, 2013). Geographically cultivated vegetable are distributed by using the dedicated economic centre to the consumer for their needs. Lady's fingers, Capsicum, Bitter gourd, Snake gourd, Pumpkin, Long beans, Luffa, Turkey Berry, Winged beans, Lime and others are identified as low country vegetables. Up Country Vegetables are Beans, Carrot, Leeks, Cabbage, Knol khol, Radish, Tomatoes, Butter beans, Cauliflower, Bell pepper and others.

The Dambulla Dedicated Economic Centre project was started in 1998 with the worthy vision of improving the productivity of the agriculture marketing channels and it was expected to be done through modern efficiencies in backward and forward integration. DDEC is the main trade hub for fresh vegetable and fruit distribution in Sri Lanka and also it is working 24 hours.

Marketing of vegetables is more complex because of its special characteristics like highly perishable nature, seasonality, bulkiness etc.(Verma et al, 2002). Some hill country and low country vegetables production going as wastage in the Dambulla Dedicated Economic Centre. In 2011, the authorities say that 20% of the harvest is wasted while being transported using improper delivery techniques. In 2012, the Ministry of Internal Trade and Cooperatives has found that over 30% of the harvest of vegetables and fruits get wasted in Dambulla Economic Centre. In 2016, the article of Sunday Leader newspaper was published on 02nd December, 2016 by Waruni Karunarathne that mentioned about " in recent past, at Dambulla Economic Centre, they had thrown away a vegetable stock worth Rs.15 lakhs to Habarana forest". As well as Mr. Christy Perera (2016) explained that the main problem of the DDEC is that, normally 30% of vegetables going on as wastage in daily. But in some season the damage is high. It is differ from season to season. Therefore, based on this problem, this research will be conducted and provide the basis of further research and solution for the wastage problem of the vegetable marketing in DDEC.

1.1 Research Questions

The research questions are:

01. What are the factors influences on Wastages of Vegetable Marketing in Dambulla Dedicated Economic Centre?

02. What is the relationship of each factor towards the effective handling of the wastages of vegetable marketing system?

03. What are the strategies to solve the vegetable wastage problem?

1.2 Objectives of the Study

01. To identify the main factors influencing on effective handling of the wastages of vegetable marketing system in Dambulla Dedicated Economic Centre.
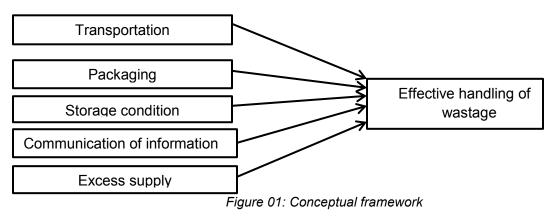
02. To examine the relationship of each factors towards the effective handling of the wastages of vegetable marketing system.

03. To provide the strategies to solve the problem.

2. METHODOLOGY

This research aims to identify the influential factors for the wastages of vegetables in DDEC. In order to that, the conceptual framework was developed by logically analysing the previous research related with the study area. The effective handling of wastage is considered as the dependent variable and transportation, packaging, storage facilities, communication and information, excess supply are considered as the independent variables.

2.1 Conceptual Framework

Figure 01: Conceptual framework

(Source: Literature Review)

a. Transportation

Justin White, 2015 defined the transportation is "the activities involved in moving supplies from point of origin to internal customers or beneficiaries". Sri Lankan vegetable sector was experienced around 30% to 40% post-harvest losses and studies have been shown that 48% postharvest losses are occurred during transportation and distribution process (Ekanayake et al. 2009).

Lorries that can hold 5,000 kg of vegetables are loaded with 10,000 kg of vegetables, leading to a lot of spoilage" Said by Trade minister Johnston Fernando. (The Sunday Times,18 December 2011).

Therefore, hypothesis 1 (H1) was designed for transportation factors to determine whether or not transportation significantly influence on effective handling of wastage of the VMS in DDEC.

H1: Transportation significantly influence on effective handling of wastage of the vegetable marketing system in Dambulla Dedicated Economic Centre.

b.Packaging

Somjate Sirivatanapa (2006) said that packaging plays a very important role in protecting fresh produce like vegetables. The researcher Arivazhagan et al., (2012) expressed that damage of vegetable is getting increase due to the improper packages. Abeygunasekara (2015) mentioned that however in Sri Lanka, 75% of total post-harvest loss is due to improper packaging such as tight packing and overloading. Generally poly-sack bags are used for packing vegetables for transportation in Sri Lanka. Therefore, hypothesis 2 (H2) was designed for packaging factors to determine whether or not packaging is significantly influence on effective handling of wastage of the VMS in DDEC.

H2: Packaging is significantly influence on effective handling of the wastages of the vegetable marketing system in Dambulla Dedicated Economic Centre.

c. Storage condition

Tamil Nadu Agricultural University, 2015 mentioned that storage is an important marketing function, which involves holding and preserving goods from the time they are produced until they are needed for consumption. India is short by 10 million tons of cold storage capacity due to which over 30% of agricultural produce goes waste every year, more than 20% of produce from fields is lost to poor post-harvesting facilities and lack of cold chain infrastructure. (Rais and Sheoran, 2015). Fruits and vegetables losses in developing countries is 10-35% including Sri Lanka which also true even for lime owing to lack of storage facilities.(Jayawardene, 2015).

Therefore, hypothesis 3 (H3) was designed for storage condition to determine whether or not it is significantly influence on effective handling of wastage of the VMS in DDEC.

H3: Storage condition is significantly influence on effective handling of wastage of the vegetable marketing system in Dambulla Dedicated Economic Centre.

d. Communication of information

According to the Keyton in 2011 defined the communication as the process of transmitting information and common understanding from one person to another. Fernando and Fernando (2013) explained that availability of accurate and reliable information at the right time is vital for supply chain members as they depend on this information in making decisions. According to the current scenario in Sri Lankan vegetable and fruit supply chain, there is no proper

information and communication system visible. Miscommunication and lack of information is one of the major issues that lead to vegetable and fruit wastage in Sri Lanka.

Therefore, hypothesis 4 (H4) was designed for communication of information factors to determine whether or not it is significantly influence on effective handling of wastage of the VMS in DDEC.

H4: Communication of information is significantly influence on effective handling of wastage of the vegetable marketing system in Dambulla Dedicated Economic Centre.

e. Excess supply

Hettiarachchi (2013) expressed that excess supply is basically due to the fact that farmers are particularly not aware of the expected demand and produce whatever vegetables that they are capable of cultivating with no concern about the possible demand or the supply of the vegetables they cultivate. The Secretary of the Traders' Association of the Dambulla Economic Centre, Wijeynanda. I.G, 2013 says the vegetables are going to waste due to the excessive supply and the lack of consumers at the centre at present. Fernando et al., (2013) revealed that when there is a market condition where lack of ability to sell the excessive stock of certain vegetables and fruits at DDEC thus causing massive wastage (throw away) of vegetables and fruits.

Therefore, hypothesis 5 (H5) was designed for excess supply to determine whether or not it is significantly influence on effective handling of wastage of the VMS in DDEC.

H5: Excess supply is significantly influence on effective handling of wastage of the vegetable marketing system in Dambulla Dedicated Economic Centre.

2.2 SAMPLE SELECTION
Farmers were selected by using the non- probability sampling method. The DDEC not specifically measure number of farmers who came to the DDEC per day. Due to this limitation and number of difficulties of the DDEC, the researcher use convenience sampling method for data collection. The sample size is taken as three hundred (300) farmers of the DDEC.

3. DISCUSSION AND RESULTS

Table 1: Descriptive analysis

Factors	Mean	Standard deviation	Decision Criteria
Transportation	3.34	1.064	Moderate
Packaging	3.39	0.597	Moderate
Storage condition	3.48	0.766	Moderate
Communication of information	3.19	0.933	Moderate
Excess supply	3.41	0.475	Moderate

(Source: Survey data)

Based on the descriptive analysis, respondent of the DDEC moderately agreed with the five variables.

3.1 Reliability test

The reliability test has been done to measure the consistency of the study. Kelly (1983) has defined reliability as "the degree to which measures are free from error and therefore yield consistent results." The reliability was measured by using Alpha. Cronbach's Alpha coefficient varies between 0 and 1 and the cut-off point is 0.6 (Anderson, 1998). Based on that, the Cronbach's Alpha value should be greater than 0.6 to fulfil the requirement standard of the study.

Table 2: Reliability test

Cronbach's Alpha	N of Items
0.610	6

(Source: Survey data)

The Cronbach's Alpha value is 0.610 with respect to 44 statements.

3.2 Correlation Analysis

Table 3: Correlation analysis

Variables	Correlation coefficient	Significance	Hypothesis results
Transportation	0.631	.000	Accepted
Packaging	0.437	.000	Accepted
Storage condition	0.138	.017	Accepted
Communication of information	0.187	.001	Accepted
Excess supply	0.489	.000	Accepted

(Source: Survey data)

Correlation Coefficient values from the tests are presented in above table. Received values from the tests between independent variables and dependent variable show a high to medium correlation of the transportation, excess supply, packaging, communication of information, and storage condition.

3.3 Multivariate Analysis
a. Multiple Regressions Analysis
Table 4: Coefficient of Multiple Determination

R	R Square	Adjusted R Square
.725[a]	.526	.518

(Source: Survey data)

The R Square statistic indicates that 52.6 % of the variation in the effective handling of the wastage of vegetables is explained by the transportation, packaging, storage condition and communication of information and excess supply.

b. Multiple Regression Model
Table 5: Multiple Regression Model

Model	Unstandardized Coefficients	Sig.
	B	
(Constant)	-.834	.006
Transportation	.368	.000
Packaging	.185	.003
Storage condition	.091	.035
Communication of information	.094	.010
Excess supply	.454	.000

(Source: Survey data)

The unstandardized constant statistics -0.834 indicate that model would predict if the independent variable was zero. The B Coefficient for transportation is 0.368. It indicates that on average, if go up 1 point on the transportation scale, effective handling of wastage of the VMS will improve by 0.368 units. The B Coefficient for packaging is 0.185. It indicates that on average, if go up 1 point on the packaging scale, effective handling of wastage of the VMS will increase by 0.185 units. The B Coefficient for storage condition is 0.091. It indicates that on average, if go up 1 point on the storage condition scale, effective handling of wastage of the VMS will increase by 0.091 units. The B Coefficient for communication of information is 0.094. It indicates that on average, if go up 1 point on the communication of information scale, effective handling of wastage of the VMS will improve by 0.094 units. The B Coefficient for excess supply is 0.454 and indicates that on average, if go up 1 point on the excess supply scale, effective handling of wastage of VMS will improve by 0.454 units.

Based on that, equation for multiple regression line is:

Y = (-0.834) + 0.368 (Transportation) + 0.185 (Packaging) + 0.091 (Storage condition) + 0.094 (Communication of information) + 0.454 (Excess supply)

4. CONCLUSION

This research was identified the main factors influencing on the effective handling of wastage of the VMS in the DDEC. Those factors are transportation, packaging, storage conditions, communication of information and excess supply. When conducting the research and analysing the final results of the research, it has created a feeling that the vegetable wastage is happened in the DDEC and it create big issues.

Based on this research finally some solutions were able to identified for each factors. Farmer education programs regarding the transportation methods, the way of vegetable transportation methods (load produce in centre line loading pattern, avoid bumping pallets during handling) need to avoid the environmental impacts and maintain the temperature level and humidity condition. The good transportation infrastructures around the DDEC should be developed to avoid the heavy traffic around the DDEC. As well as the use of cushioning material between vegetable layers while transportation should be done and package of vegetables should be loaded in rivers order (last on, first off).Then, Flexible crates can be used to avoid the extra transportation cost. When discuss about the packaging, it is need to use the natural packaging methods such as woven strips of leaves, bamboo, is help to maintain the moisture level of vegetables. Usage of the some natural things to the package may help to avoid the wastage. Therefore the farmers want to put some leaves, dried banana leaves, straw, chaff to the package before put the vegetables. It helps to reduce the wastage. Equipment for Measuring Oxygen Concentration in the packaging is important within the DDEC. It can be introduced by the government.

The cold storage system will greatly help to introducing the wastage of perishable goods. Therefore the government want to allocate the facilities for storage of vegetables within the DDEC. Expansion of the available store rooms in the DDEC is very much need for the potatoes and onions. Refrigeration equipment needs to control the humidity and temperature level of vegetable which brings to the DDEC. Workshop and training programmes can be conducted to give awareness regarding the storage condition of various vegetables to farmers.

When discuss about the communication of information, it is need to provide effective and efficient quality extension services in order to equip farmers with important skills in the areas of vegetable production and supply of useful marketing information for the farmers. It is necessary to identify the existing role of agricultural authorities/personnel as well as availability of facilitating information and communication systems. Information system for better coordination among different stakeholders from farmers to consumers is need. The internet and mobile communication can also be used to enable information and financial transfer between the stakeholders. To manage the excess supply of vegetables on the DDEC, the perishable vegetable can be used as the animal feeds. Complementary industries are essential to take the benefits from the damage vegetables such as jams, juices, sauce, pickles and ketchup. For an example, Tomato paste, Chilli sauce, Carrot juice. Damaged vegetables can be used as the organic

fertilizer. The government or DDEC can reuse vegetables to produce the organic fertilizer for the agriculture industry and it can be sell for low price to farmers. It may help to protect the human health also. Tunnel Farming can be used for vegetables sector. Tunnel Farming is a technique that continues farming even during off-seasons as well as any other weather conditions.

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