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K. Mukhamedjanova

Tashkent State University of Economics

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LOSSES IN FRUITS AND VEGETABLES SUPPLY CHAIN IN CASE OF UZBEKISTAN: DESCRIPTIVE STATISTICS

Mukhamedjanova Kamola

PhD. Researcher Tashkent State University of Economics

E-mail:mukhamkam@gmail.com

Abstract: *Food losses refers to the reduction in edible food mass in various segments of the food supply chain - production, post-harvest processing, processing, distribution and consumption. The exact causes of food loss vary around the world and depend greatly on the specific conditions and local situation in a given country, region or production area. The purpose of this article is to clarify the cause of losses through the lens of growers. The research is carried out in three stages. This paper provides the results of the first stage that is, conducting a survey with growers. A quantitative research method (survey) was used. The data were tabulated in the software STATA, version 15. Based on the results obtained, it was proposed to introduce cold supply chain systems to reduce losses.*

Key words: *fruits and vegetables, supply chain, post-harvest, loss, cold chain*

Introduction

While meeting the food needs of a growing population remains a major global challenge, more than one third of food is lost or wasted in post-harvest operations. Reducing post-harvest losses, especially in developing countries, could be a sustainable solution to increase food availability, reduce pressure on natural resources, eliminate hunger and improve farmers' livelihoods. Food loss refers to the decrease in edible food mass in various segments of the food supply chain - production, post-harvest processing, agricultural processing, distribution (wholesale and retail trade), and consumption. The exact causes of food loss vary around the world and are highly dependent on the specific conditions and local situations in a given country, region or production area. The objective of this study was to analyse the causes of fruits and vegetables losses in post-harvest stage, their determinants and potential solutions to minimize the problem.

Literature Review

Food loss and waste (FLW) has become a growing concern in developing countries(Chaboud & Moustier, 2020). It is estimated that about one third of all production lost, reaching 1.3 billion tons worldwide(Blakeney, 2019). Losses can be quantitative and qualitative. Quantitative food losses mean a decrease in the mass of edible food available for human consumption in various segments of the supply chain(FAO, 2016b). In relation to fruits and vegetables, a classic term is also used – post-harvest losses – which refers to the losses throughout the food chain, from the harvest to the moment of consumption(Ferreira et al., 2020). It is in this context that, the term post-harvest losses was utilized in this study. Fruits and vegetables account for 40 to 50% of the world's losses, of which 54% occur during the production stage, after harvest, processing and storage, and 46% in processing, distribution and consumption(FAO, 2013). Among the main causes of post-harvest losses in both developed and developing countries are poor packaging, a lack of planning of the quantity to purchase, and excessive handling by producers, traders and consumers(Blakeney, 2019). Governments, humanitarian agencies and the private sector have recognized that food losses and waste reduction play an important role in improving food security and nutrition, maintaining environmental sustainability, using natural resources, and reducing food production costs.

Methodology

This was a cross-sectional, descriptive study conducted with members of supply chain of fruits and vegetables in Uzbekistan, between the months of July and August 2020. Data was performed as questionnaire survey, which is conducting in three stages, using research methodologies in supply chain management (). The entire supply chain of fruits and vegetables consist of mainly three chain actors (grower, exporter, and intermediary). (see Fig. 1)

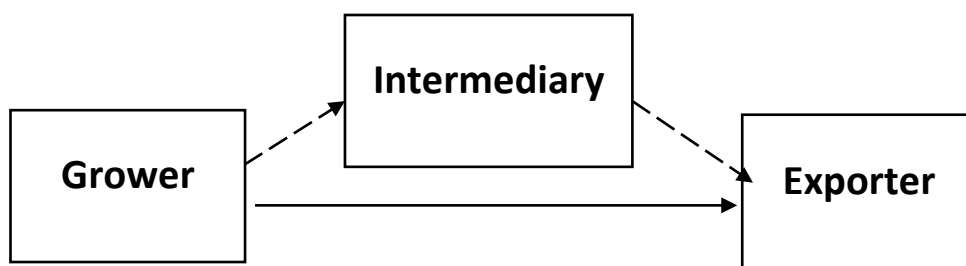


Fig. 1. Schematic representation of fruit and vegetable Supply Chain

In the first stage, the survey conducted among growers. Survey consist of multiple choice, Likert scale, and matrix, open-ended and demographic questions. Questions covering the following dimensions: Socio-demographic state; information about assets of growers; whether they have quality standards certificates; what markets do they mainly work for; who are their intermediary buyers; mainly what kind of fruit or vegetable they grow (costs, yield, income, etc.); obtaining opinions on the causes of losses. So far, we have completed the first stage, the next stages in the process, their results are going to be published in the following research papers. The data were tabulated in the software STATA, version 15.

Main results

Survey conducted across Republic of Uzbekistan. There are 207 growers were participated with following distribution: Tashkent city 3,4%; Tashkent region 6,7%; Samarkand 9,6%; Bukhara 2,9%; Kharezm 14,4%; Karakalpak 11,1%; Surkhandarya 4,3%; Jizzakh 1,9%; Navai 1,4%; Sirdarya 1,4%; Andijan 9,6%; Fergana 9,6%; Namangan 17,8%; Kashkadarya 5,8%. The results of the socio-demographic profile of the sellers are presented in Table 1.

Table 1.

Descriptive Statistic

Characteristics	Distribution
Gender (n (%))	
Male	182 (87.92)
Female	25 (12.08)
Age (n (%))	

19-28	49(23.67)
29-38	86(41.55)
39-48	40(19.32)
49-58	19(9.18)
59-68	13(6.28)
Education (n (%))	
Higher	129(62.32)
Secondary	78(37.68)
Quality Certificate (n (%))	
Yes	8(3.86)
No	199(96.14)
Refrigerated transport (n (%))	
Yes	28(13.53)
No	179(86.47)

Variable	Obs	Mean	Std. Dev.	Min	Max
harvest stage	207	.609	.489	0	1
sorting stage	207	.188	.392	0	1
transport stage	207	.048	.215	0	1
storage stage	207	.092	.289	0	1
processing stage	207	0	0	0	0
consuming stage	207	.068	.252	0	1

Fig.2. Summary statistics of the growers who answer the question about the stage at which the loss occurs. Uzbekistan, Tashkent, July - August 2020.

The main causes of crop loss are weather conditions, a lack of inappropriate harvesting methods, the most common are mechanical damage, followed by damage caused by workers during harvest, and poor storage.(FAO, 2016a).

Discussion

What does the cold chain have to do with this? Fruits and vegetables are living things, and if they are cut off from the root, they will start to "die", which means that the fruit must be delivered anywhere, keeping its freshness. To do this, the same cold chain system must be well established. There is a lot of talk today about the three main challenges to implementing a cold chain:

crop diversity;

sorting and packaging in the field;

refrigerators do not specialize in sorting and packaging.

Variety of harvest. There are 7-8 types of products in a garden or field, which means that the intermediary who comes to pick up the product, whether he wants to or not, has to make a collection to meet a single demand. The time required to harvest a single type of product based on demand will be large, for a product whose quality is rapidly deteriorating, such as fruits and vegetables, this will lead to large losses, violation of food safety norms. This "assembly" process does not apply to the cold chain system at all. For example, 10 tons of one type of product are collected throughout the day, put in a cold room, refrigerated for 24 hours, the second batch comes at a temperature of 27, we have to heat the first batch whether we like it or not.

Field sorting and packaging. After the product is harvested, its sorting and packaging is usually done in the field. This, in turn, indicates an increase in losses and the fact that the main income of refrigerators remains in the field. Refrigerators do not specialize in sorting and packaging. Refrigerators are mainly storage, sorting and packing, as well as hubs, ie logistics centers located in transit zones. As mentioned above, as Uzbekistan is a producer country, as a rule, it is advisable to build sorting and packaging refrigerators near the growing areas and in general. In fact, most existing refrigerators are not designed for sorting and packaging.

Existing refrigerators are far from harvest fields. The nearest growing area is 100-200 km. The proportion of available refrigerators is not properly distributed. The location of refrigerators has not been adapted to the production, transit and consumption zones. The cold chain is the supply of these foods is a system that reduces losses in the chain.

Conclusions

Uzbekistan is a producer country, i.e. it is grown for sale rather than for consumption. It is often said that our fruit and vegetable products do not meet the

demand, that is, do not meet world standards. One of the main reasons for this is the lack of cold chain in Uzbekistan. The cold chain of perishable products is a system of collection, packaging, storage and marketing of products at the specified low temperatures during the post-harvest value chain stages, including during delivery to the final consumer.

The cold chain has four main components, each of which must work flawlessly to ensure the safe transport and storage of cold chain products: Temperature-controlled storage — specialized refrigerated facilities where cold chain cargo is stored until it's shipped out to a distribution center or its destination. Temperature-controlled transport — customized insulated cold containers that help transport goods via airways, waterways, roadways, or railways. Trained and diligent personnel — who are familiar with the complexities of handling sensitive cold chain cargo. Efficient operational and management procedures — to minimize risk during day-to-day operations as well as contain it in case of unexpected incidents.

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