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**Conference Paper — Published Version**

## Post-harvest losses of fruit and vegetables in value chain

*Suggested Citation:* Eshmatov, Sirojiddin K. (2019) : Post-harvest losses of fruit and vegetables in value chain, In: Zaynalov, Jahongir R. (Ed.): Institutional development of socio-economic and financial systems: national economy in a global environment ; the materials of XI International Scientific-Practical Conference, May 16-17, 2019, ISBN 978-9943-5373-3-0, Samarkand Institute of Economics and Service, Samarkand, pp. 347-350

This Version is available at:

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**POLTAVA UNIVERSITY OF ECONOMICS AND TRADE**

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**INSTITUTIONAL DEVELOPMENT OF SOCIO-  
ECONOMIC AND FINANCIAL SYSTEMS: NATIONAL  
ECONOMY IN A GLOBAL ENVIRONMENT**

*the materials of XI international scientific-practical conference*

**May 16-17, 2019**

**SAMARKAND – 2019**

**УДК: 36(575.1)**  
**ББК 65.011.6**  
**И 26**

**Institutional development of socio-economic and financial systems: national economy in a global environment.** The materials of XI International Scientific-practical Conference.Samarkand. SamIES. May, 16-17. 2019

Responsible Editor: Doctor of Economics, Professor Jahongir R.Zaynalov

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ISBN 978-9943-5373-3-0

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йуналтирилиши, яъни имтиёз такдим этилиши натижасида ишлаб чиқаришни ошириши, янги иш ўрнини яратилиши, ракобатбардош ва экспортбоп маҳсулотларни ишлаб чиқариш каби мезонларда ижобий ўзгаришларидан келиб чиққан ҳолда такдим этилиши мақсадга мувофиқ бўлади.

2. Асосий ишлаб чиқаришни янги қурилиш шаклида кенгайтиришга, ишлаб чиқариш мақсадида фойдаланиладиган бинолар ва иншоотларни реконструкция қилишга солиқ солинадиган фойданинг 30 фоизидан кўп бўлмаган миқдорда базасидан камайтириш белгиланган.

Ишлаб чиқилган илмий таклиф ва амалий тавсиялар амалда қўлланилиши келажакда солиқ тўловчиларни ишлаб чиқариш фаоллигини оширишда, ишлаб чиқаришни янада кенгайтиришда, имтиёзлар ҳисобига корхоналар ихтиёрида қоладиган маблағлар мақсадли йуналтирилишида ва солиқ тушумларини оширишда сезиларли натижаларга эришилади деган умиддамиз.

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### **POST-HARVEST LOSSES OF FRUIT AND VEGETABLES IN VALUE CHAIN**

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**Abstract:** The problem of food security and loss reduction has become a global aspect of global efforts to fight hunger and improve food security. Half of all food produced in the world and half of all fruits and vegetables are subject to damage and are not consumed. This situation leads to a sharp decline in the incomes of participants in the value chain.

*This article describes the damage to the harvest of fruits and vegetables after harvest, its causes, stages, and the loss of value chains.*

**Keywords:** food loss, post-harvest processing, waste, fruits, vegetables, value chain.

**Аннотация:** Озиқ-овқат маҳсулотлари нобудгарчилиги ва исрофини камайтириш масаласи глобал миқёсда очликка қарши кураш ва озиқ-овқат хавфсизлигини яхшилаш бўйича жаҳон миқёсидаги саъй-ҳаракатларнинг бир қисмига айланди. Дунёда ишлаб чиқарилган барча озиқ-овқат маҳсулотларининг учдан бир қисми ҳамда барча мева-сабзавотларнинг ярми нобуд бўлади ва истеъмол қилинмайди. Бу ҳолат қиймат занжири иштирокчилари даромадларини кескин камайишига олиб келади.

Ушбу мақолада мева-сабзавотларнинг йигим-теримдан кейинги нобудгарчилиги, унинг сабаблари, босқичлари ва қиймат занжири бўйлаб нобудгарчиликни ҳисоблаш ёритилган.

**Калим сўзлар:** Озиқ-овқат нобудгарчилиги, йигим-теримдан кейинги босқич, исрофгарчилик, мева, сабзавот, қиймат занжири.

**Аннотация:** Проблема продовольственной безопасности и сокращения потерь стала глобальным аспектом глобальных усилий по борьбе с голодом и повышению продовольственной безопасности. Половина всех продуктов питания, произведенных в мире, и половина всех фруктов и овощей подлежат порче и не потребляются. Такая ситуация приводит к резкому снижению доходов участников цепочки создания стоимости.

В этой статье описывается порча урожая фруктов и овощей после сбора урожая, его причины, стадии и потеря цепочек создания стоимости.

**Ключевые слова:** потеря продуктов питания, послепосевная обработка, расточительство, фрукты, овощи, цепочка создания стоимости.

### **INTRODUCTION**

Fruit and vegetables loss and waste occur during five key post harvest management stages of the food supply chain: production, postharvest handling and storage, processing, distribution, and consumption. Despite the high post-harvest losses in many developing countries, the fruit and vegetable sector is still important source of income, poverty reduction, food security and creation of new jobs.

Food losses refer to the decrease in edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption. Food losses take place at production, postharvest and processing stages in the food supply chain [9]. Food losses occurring at the end of the food chain (retail and final consumption) are rather called “food waste”, which relates to retailers’ and consumers’ behavior [9]. The loss of quantity means a decrease in the volume of output and it is related to the developing countries [6]. In medium- and high-income countries food is to a significant extent wasted at the consumption stage, meaning that it is discarded even if it is still suitable for human consumption. In low-income countries food is lost mostly during the early and middle stages of the food supply chain; much less food is wasted at the consumer level. Product loss occurs at different stages such as collection, transportation, sorting, storage, processing, marketing etc. Based on estimations, per capita food waste by consumers in Europe and North-America is 95-115 kg/year, while this figure in sub-Saharan Africa and South/Southeast Asia is only 6-11 kg/year [4].

To improve the food supply, it is not only necessary to increase amount of production, but also important to reduce its loss rate [1].

## **MATERIALS AND METHODS**

Many scientists and experts believe that the amount of product losses must be calculated exclusively for products intended for human consumption. Post harvest loss occurs based on external and internal factors [3]. External factors arise from mechanical contamination (collection time, packing, loading, descent and physical damage during transportation) and parasitic (fungi, bacteria, insects) diseases.

**Quantification and economic losses.** The decline in quality or quantity of products, regardless of the stage of the value chain leads to a decreasing of profit. The main goal is not only to increase production, but also supply high quality products in large quantities to the consumers [2]. Bourne considers the "chain" from the production to the final consumption phase (collection, transport, storage, processing, packaging and marketing) and introduces the term of "food pipeline". In his opinion, if there are mistakes in "food pipeline", then final consumers get less products at the end of the pipe.

To make loss rate zero is a very difficult issue, but it is possible to reduce its level. Reducing the loss of fruit and vegetable products in turn will bring additional advantages. For example, all season availability of products to consumers, reduction of imports and price stability. Consuming fruit and vegetables all year round increases the beneficial vitamins in the human body and serves to reduce various types of diseases.

Applying survey methods and using a multifactor regression formula it is possible to analyze the economic losses [7]:

$$Y = A + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + \dots + B_nX_n$$

$Y$  = amount of loss, kg per hectare (bound variable)

$A$  = constant

$B_1, B_2, B_3, B_4, B_5, B_n$  = coefficients of variables  $X_1, X_2, X_3, X_4, X_5, X_n$  = various factors affecting or causing losses.

The advantage of the regression method is the determination of the importance and connectedness of the participation of economic factors on an equal footing with social factors (age, education, labor, experience) to losses.

## **RESULTS AND DISCUSSION**

Even quantity of food loss is so actual issue, there is not precise answer yet. The number of losses is variable due to different approaches, storage of products and different management in other countries [2]. According to FAO: 1) There is no single universal method for collecting information; 2) Dependency of loss information to weather, crop types, place, etc.; 3) Not conducting survey or inaccurate filling of the forms; 4) Various interpretation and assessment of the quantity and quality loss; 5) There is no national organization for monitoring fruit and vegetable losses.

In some scientific publications and mass media, the information of losses is not reliable because of the unreasonableness to the present calculations and the estimated evaluation. They tend to show the problem more “dramatic”. In some cases, information is shown with a reduction or exaggeration with the benefit of politics, economics and trade to get additional support, privileges and other purposes [2].

Due to arithmetic errors, loss information can be calculated incorrectly. That is, the sum of loss percentages arising at different stages of the value chain does not mean the level of total losses. Let's look with the example (table 1) of 1000 kg of fruit and vegetable products.

**Table 1. Fruit and vegetable loss in value chain (in case of 1000 kg product)**

Stages	Loss %	Loss amount, kg	Remaining product, kg
Before harvest	-	-	1,000
Harvest	15	150	850
Sorting	10	85	765
Transport	6	46	719
Packaging	5	36	683
Storing	20	137	547
Processing	5	27	519
Marketing	10	52	467
<b>Total</b>	<b>71</b>	<b>533</b>	

Source: Calculation of the author

If you add the percentages of all the stages, the total loss is 71%. The 3 and 4 pillars of the table reflect the amount of real loss and the balance in each stage. In this case, the total weight loss after all stages is 533 kg. Based on this, the percentage of total losses is **53.3%** of the total yield of 1000 kg which existed before harvesting from the field, rather than 71% as shown in the table.

Here, the amount of a crop suitable for consumption is 915 kg (1000-85). It is determined by separating the unsuitable (poor-quality) part of the total crop from total available crop during the sorting for consumption. The remaining 467 kg of products after all stages are suitable for consumption after all stages. We determine that the quantity of production losses suitable for human consumption is  $(915-467)/915 \times 100 = 49\%$ . As shown, the difference of loss rates between the table and the above calculated two losses is great.

The case of a 20% post harvest loss it is required increase additional production by 25% to compensate for losses. Let's imagine that the quantity (necessary quantity) of fruit and vegetable production intended for domestic consumption and export for the whole year is 100 tons. There are two ways to save the whole amount:

1) Prevention of loss (-20%)

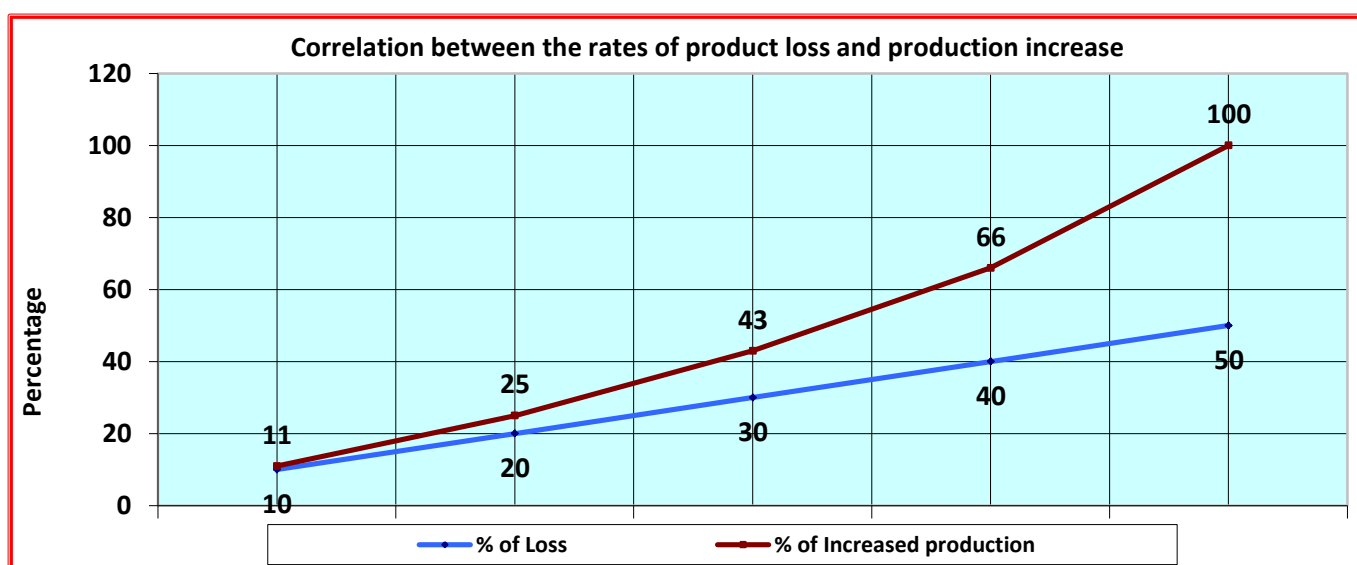
2) Reaching production up to 125 tons (by 25% increase) in case of 20% loss. Is so, 100 tons of production will remain after loss. If the loss rate is 50%, then it is required to increase the amount of production by 100%.

Based on following formula, it is possible to determine how much production should be increased to recover (compensate) for losses:

$$\text{Increase of production} = \text{needed production amount} \times \frac{100\%}{100\% - \% \text{ of Loss}}$$

Chart-1 shows production increase to recover (compensate) lost amount of the products.

**Chart 1**



Source: Calculation of the author

As shown, reducing post harvest losses is so crucial to maintain food security and to increase the profit of the value chain actors. To compensate of losses by increasing production requires additional expenditures such as natural (land, water) and human resources (labor), materials and etc [11].

### **Measures reducing loss to maintain food security**

In developed countries, the strategy to reduce the post harvest loss of fruit and vegetable products includes the following measures [5]: (1) apply modern knowledge and experience in harvesting, packaging, storing and shipping to ensure the high quality; (2) upgrading infrastructure, marketing strategies and socio-economic conditions; (3) strengthening cooperation among value chain actors.

The most appropriate way to reduce losses is to produce with consideration of demand for each type of product and a systematic analysis of the post harvest quality management. It is also important on time harvest, post-harvest management, proper marketing and fairly sharing of profits among participants [5].

### **CONCLUSIONS**

Reduction of fruit and vegetable loss maintains food security, cheap and high quality products in markets and increases profit of actors. Establishing strong cooperation between producers, researchers, practitioners, manufacturers, economists, process engineers, marketers and other parties is key factor to manage product loss.

### *References*

1. Aulakh, J. and Regmi, A. (2013) Post-Harvest Food Losses Estimation-Development of Consistent Methodology. In: Selected Poster Prepared for Presentation at the Agricultural & Applied Economics Association's 2013 AAEA & CAES Joint Annual Meeting, Washington DC.
2. Bourne, M.C. 1977. Post-harvest food losses- the neglected dimensions in increasing the world food supply. Cornell University International Agriculture Mimeograph No. 53.
3. FAO. 2006. Postharvest Management of Fruit and Vegetables in the Asia-Pacific Region. Japan.
4. FAO. 2011. Global food losses and food waste – Extent, causes and prevention. Rome
5. Kader, A.A. 2005. Increasing food availability by reducing postharvest losses of fresh produce. *Acute horticulture*, 682:70-80
6. Kader, Adel. (2002). Quality Parameters of Fresh-cut Fruit and Vegetable Products. 10.1201/9781420031874.ch2.
7. Kughur, P.G., Iornenge, G.M., and Ityonongu, B.E. 2015. Effects of Postharvest Losses on Selected Fruits and Vegetables Among Small-scale Farmers in Gboko Local Government Area of Benue State, Nigeria. *International Journal of Innovation and Scientific Research*. Vol. 19 No.1 pp.201-208
8. Parfitt, J., Barthel, M. & Macnaughton, S. 2010. Food waste within food supply chains: quantification and potential for change to 2050, *Phil. Trans. R. Soc.*, vol. 365, pp. 3065-3081
9. Parfitt, J., Barthel, M., & Macnaughton, S. (2010). Food waste within food supply chains: quantification and potential for change to 2050.
10. Porat, R., Lichter, A., Terry, L., Harker, R., Buzby, J. 2018. Postharvest losses of fruit and vegetables during retail and in consumers' homes: Quantifications, causes, and means of prevention. *Postharvest Biology and Technology*, ISSN: 0925-5214, Vol: 139, Page: 135-149.
11. Umurzakov, U., Eshmatov, S. Meva-sabzavotchilikda qiymat zanjiri tahlili [Value chain analysis in fruit and vegetable production]. *Uzbekistan Iqtisodiy Axborotnomasi Jurnal*. Tashkent, 2017. No. 1. (in Uzbek).

## ***THE MAIN DIRECTIONS OF PRIORITY DEVELOPMENT OF ENTREPRENEURSHIP IN THE REPUBLIC***

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*Termez State University, Uzbekistan, Termez*

**Аннотация:** Ушбу мақолада иқтисодийни модернизациялаш шароитида хусусий тадбиркорликни қўллаб-қувватлаш, ишбилармонлик муҳитини яхшилаш, кичик бизнес ва хусусий тадбиркорлик фаолиятини такомиллаштириш бўйича амалга оширилиши лозим бўлган масалалар ёритилган.

**Калит сўзлар:** бизнес, тадбиркорлик, инновация, фойда, иқтисодий фаолият, жамиятнинг ўсиши ва ривожланиши, жавобгарлик.

**Аннотация.** В данной статье рассматриваются актуальные вопросы развития «предпринимательство», характерные черты предпринимательство, развития малого бизнеса в стране в условиях либерализации экономики, перспективы поддержки малого бизнеса и частного предпринимательства государством.

**Ключевые слова:** бизнес; предпринимательство; инновационность; прибыль; экономическая деятельность; рост и развитие общества; риск; ответственность.

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**III. FINANCIAL REGULATION OF ENTERPRISE'S INNOVATION ACTIVITIES OF BASED ON THE CLUSTER, IN RELATION TO THE AREAS OF PRODUCTION AND SERVICES**

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