

## PRODUCTION EFFICIENCY OF VEGETABLES GROWN IN GREENHOUSES

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Vegetables grown in greenhouses are characterized by the specialization of the market according to the form of social division of labor, priority production of certain types of products and have specific aspects determined by the characteristics of the network.

Greenhouse vegetable growing is important in providing the population with vegetables in the late autumn, winter and early spring months of the year. The quality of the currently produced films is good, strong, and these films can be used for 3-5 years. Also, instead of glass, plastic windows, which are much cheaper and several times lighter, are used for covering greenhouses.

It should be noted that unlike other countries, mostly small-scale greenhouse complexes with an area of 6 hectares have been built in Uzbekistan. In addition, many small greenhouses with an area of 50 m<sup>2</sup> to 500 m<sup>2</sup> are being built in our republic to provide our families with vegetable products and for commercial purposes.

Improving the efficiency of vegetable cultivation in greenhouses depends on the increase of varieties planted in them, the use of new varieties and maintenance methods. In the following years, new varieties of tomatoes for planting in greenhouses were created at the Scientific Research Institute of Vegetables, Field Crops and Potatoes, and the preparation of their seeds was started. It is possible to supply greenhouse plants with seeds. Including, the newly created varieties of tomatoes such as gulkand, Tashkent teplichnyi and AVE-maria, subhidam are widely used in practice.

All varieties of tomatoes grown in greenhouses are divided into 2:

- indeterminate varieties or unrestricted varieties, the petals of which grow continuously, the inflorescence is located after every 3 leaves;
- determinant varieties or varieties whose growth of the leaf ends with the appearance of the inflorescence, the inflorescence appears after every 1-2 leaves.

Varieties belonging to both of the above-mentioned groups are widely used in greenhouses. However, indeterminate varieties of tomatoes are mainly planted in glass greenhouses during winter-spring and intermediate planting periods, and determinant varieties are quick-ripening and have the same ripening, so they are planted in film greenhouses during autumn-winter, winter-spring and spring planting periods.

Also, one of the issues that will be discussed in order to improve the quality of the environment within the framework of the measures to be implemented until 2030 is to "ensure the research of the vulnerability of natural systems and sectors of economic activity in relation to global and regional climate changes that may occur, to identify environmental risks. development of scientific foundations" was defined.

As can be seen from the above mentioned measures, it is necessary to improve land reclamation of greenhouse farms, diversification, agrotechnical methods, promotion of planting leguminous crops that increase soil fertility.

Such specialization is explained by efficient land use and soil composition. It should be noted that the credit score of land in Andijan region is 57. This indicator is in Bukhara region - 50, Fergana - 56, Jizzakh - 50, Khorezm - 53, Namangan - 59, Navoi - 52, Kashkadarya - 51, Republic of Karakalpakstan - 41, Samarkand - 57,

Syrdarya - 51.5, Surkhandarya - 56 , and in Tashkent region it is equal to 59. However , this indicator fluctuates around 55 points in the republic, and the credit rating of land in our country is 55 points on average<sup>1</sup>.

Studies show that the production of basic agricultural products in the cross-section of regions has its own characteristics. For example, we can see that the share of Tashkent (2244.3 thousand tons), Samarkand (1767.9 thousand tons) and Andijan (1596.2 thousand tons) regions is high in growing vegetables (Table 1).

**Table 1**  
**Production potential of vegetable products, sales dynamics**  
**and productivity indicators (2018)<sup>2</sup>**

Provinces	production potential			sales dynamics			sales performance		
	ekin area, g a	Yield ts/ha	production, thousand t.	2017	2018	growth, %	sales value, mln. soum	Value of 1 ton of product, thousand soums	Value corresponding to 1, thousand soums
Republic of Uzbekistan	206	6291.7	11272.5	1 90 4	2 20 3	115.7	2202.9	195.4	10693.7
Republic of Karakalpakstan	10.9	190.7	256.3	45.7	58.2	127.5	58.2	227.1	5339.4
Andijan	19.4	302.0	1596.2	93.7	94.2	100.5	94.2	59.0	4855.7
Bukhara	9.5	260.3	658.2	94.6	113	119.0	112.5	170.9	11842.1
Jizzakh	8.8	209.5	420.5	89.0	10 3	115.3	102.5	243.8	11647.7
Kashkadarya	17.1	291.8	562.6	103.0	12 4	122.0	125.7	223.4	7350.9
Navoi	4.2	272.0	258.0	45.6	776	169.8	77.5	300.4	18452.4
Namangan	15.1	285.2	721.7	89.2	118	132.2	117.9	163.4	7807.9
Samarkand	29.9	447.2	1767.9	137.8	179	129.9	179	101.3	5986.6
Surkhandarya	15.1	213.5	966.8	128.4	13 5	105.0	134.8	139.4	8927.2
Syr Darya	4.5	274.7	318.0	13.9	16.5	118.9	16.5	51.9	3666.7
Tashkent	36.8	281.4	2244.3	170.3	19 8	116.2	197.9	88.2	5377.7
Ferghana	19.5	279.5	867.1	206.2	2 50	121.1	249.7	288.0	12805.1
Khorezm	15.2	246.5	634.9	56.6	65.5	115.7	65.5	103.2	4309.2

As can be seen from the table, when we analyzed the volume of sales of vegetable products by regions, it was found that the volume of sales corresponding to 1 hectare of land and 1 ton of product was in Navoi (18452.4 and 300.4 thousand soums, respectively), Fergana (12805, 1 and 288.0 thousand soums), Bukhara (11842.1 and 170.9 thousand soums), Jizzakh (11647.7 and 243.8 thousand soums) regions were observed to be high. It should be noted that these indicators are higher than the general indicator of the republic.

In order to ensure the stability of the domestic consumer market, the volume of production of agricultural products in our country is increasing every year. One of the main factors of this is the increase in the area of crops devoted to vegetables and the increase in crop productivity due to the introduction of high-yielding varieties identified as a result of selection work.

Currently, the following crops are grown in greenhouses: cucumbers, tomatoes, peppers, eggplants, greens, mushrooms, lemons, flowers and other crops. Tomatoes and cucumbers are grown in more than 90 percent of greenhouse areas (Table 2).

Cucumbers and tomatoes are mainly grown in all large greenhouses . All greenhouse The main product type of farms is odrin g, which gives the main share of profit .

Vegetable growing is a labor-intensive process compared to fruit growing . Low yield of vegetables, the high prices of selection works, varieties, and biochemical drugs have a negative effect on the level of profitability . But recently , vegetable products in greenhouses in addition to the traditional types , vegetables,

<sup>1</sup> Soliev A. , Nazarov M. Villages of Uzbekistan ( geography of rural areas) . - T.: "Science and technology", 2009, - 212 p.

<sup>2</sup> Author's calculations based on the information of the State Statistics Committee of the Republic of Uzbekistan.

peppers , various types of greens , champignons Cultivation has begun. This helps to satisfy the need of consumers for vitamin products .

**Table 2**  
**Vegetables in greenhouses**  
**production structure a si d dynamics i , %<sup>3</sup>**

<b>M a h sulat type/ years</b>	<b>1990</b>	<b>2005</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Total:	100	100	100	100	100	100	100	100	100	100	100
tomato	60.7	60.9	69.5	69.9	68	70	71	67	64.2	68.8	67.0
cucumber	34.5	32.7	20.9	21	23	20.9	22	25	28	24.6	25.3
pepper	3.57	2.3	4.2	3.2	3	3.2	1.5	3	3	1.8	1.6
greens		3.8	4.8	5	5.1	5.1	5	4.2	4	2.3	2.1
others	1.23	0.3	0.6	1.2	0.9	0.8	0.5	0.8	0.8	2.5	4.0

Greenhouse The efficiency of product production is largely determined by economic conditions . Work release is successful development is related to the level of provision of labor force, transport routes for product transportation, guaranteed sales markets .

The profitability of vegetable production in farms close to the city is higher than in farms far away. Farms near the city sell a large amount of products through direct contacts, have specialized production.

Currently, the agrogeographic location of industrial greenhouses remains in accordance with the territorial location during the first stage of the plan. In the past, the main factor in the construction of greenhouses was not the cost of the product, but the availability of consumers.

In general, all the largest greenhouses are located near large cities, but their climatic conditions are not always optimal for growing vegetables. In particular, the costs of lighting and heating have a significant impact on the cost of the product.

The results of the analysis of financial and technical-economic indicators show a decrease in the efficiency of material, technical and labor resources of large greenhouse farms. Because despite the positive growth of the gross indicators, the low yield increase, the increase in the cost and the low profitability index lead to an increase in costs per unit of cultivated area.

It is known that today, when analyzing the profitability indicator of greenhouse farms, the vegetable yield from 1 m<sup>2</sup> of open land is less than 1.5 kg, and under protected land conditions, from 1 m<sup>2</sup> to 50 kg in greenhouse farms. It is possible to obtain ecologically clean products with high and stable yield in the off-season only in protected land conditions. Therefore, the cultivation of vegetable products in protected land conditions is becoming more and more widespread in the world.

Therefore, we consider the geographic - logistic possibility of the product of the joint venture "Bek cluster" LLC , located in the Syrdarya region .

products at the greenhouse combine We will consider the mechanism of geographical differentiation for development , potential consumers of vegetable products and its competitive environment .

Issykkhana Kombinat's social competitors In Samarkand, Jizzakh, Valley and Oasis regions located greenhouse farms . Let's look at the specific features of the competitive environment in these regions. According to him, JV "Bek cluster " LLC is located in the second light zone nevertheless, it can compete with "Green capital" LLC located in Samarkand district . (Table 2.10).

To choose a competitive strategy , to ensure the unique features of the product or its relatively low cost, it is necessary to use the resources of "Bek cluster " LLC .

<sup>3</sup>The calculation was made by the author based on the information of the State Statistics Committee of the Republic of Uzbekistan.

**Table 3**  
**Analysis of the competitive environment at "Bek cluster " LLC JV**  
(year 2019)

Region	Jizzakh	Oasis	Tashkent	Valley	Good luck _
F AN light zone depending on the current	5	5	3	3	3
Company name	Agro Invest production LLC	Eco Poultry LLC	Nature grow LLC	Lighthart bloembollen VOF LLC	Green capital LLC
Product	Cucumber, tomato , greens, lemon	Cucumbers, tomatoes , greens, flowers	Tomatoes , cucumbers, greens, peppers, mushrooms , radishes , berries	Tomato , cucumber, greens, spices, onion , flower ( tulip, rose )	Tomatoes , cucumbers, greens , cabbage
Production volume , ton a	15500	6000	32500	6000	4500

1 kg of vegetable products , taking into account the costs of transportation of products grown at " Bek cluster " LLC JV to neighboring regions the cost is presented in table 4.

Summarizing the results of the analysis showed that, based on the expansion of the geographical and logistic boundaries of the markets , that is, based on the diversification scheme , we determine the direction of the formation and implementation of the diversification strategy . For this purpose, "geography and logistics diversification and efficiency " we use the index word . According to it, when the predicted retail price of greenhouse cucumbers is 7,000 soums /kg , we will calculate the strategic model , taking into account the market capacity of neighboring regions .

**Table 4**  
**Evaluation <sup>5</sup> of the cost of the product ( cucumber ) at the expense of the costs of transportation of the product to the neighboring regions at "Bek cluster " LLC JV**

Indicators	Jizzakh	Oasis	Tashkent	Valley	Good luck _
Distance from settlement , km _	391	536	341	393	278
Transportation costs of 1 kg of product , soum	46.6	46.6	46.6	46.6	46.6
1 kg of product including transportation, soums	55.2	58.4	54.1	55.2	52.7

We will analyze the issue of interregional production and logistics for the sale of greenhouse products . In this case, we choose the minimum value of product production and transportation costs as a criterion of optimality. The interregional production, marketing-logistics model of selling greenhouse products envisages the minimization of production and transportation costs in order to meet the needs of consumers and deliver the product to the consumer.

greenhouse farms with the opportunity to ship products to neighboring regions every year - "Bek cluster " LLC JV (V), "Green capital " LLC (Z) , "Agro Invest production " LLC In (K) , we create an interregional balanced production - logistic model of selling cucumbers .

mathematical model of this problem has the following form :

$$F = 53x_{11} + 55x_{12} + 54x_{13} + 55x_{14} + 58x_{15} + 60x_{21} + 57x_{22} + 47x_{23} + 55x_{24} + 50x_{25} + 56x_{31} + 48x_{32} + 58x_{33} + 63x_{34} + 61x_{35} \rightarrow \min$$

<sup>40</sup> It was developed by the author on the basis of information from JV "Bek cluster " LLC.

<sup>5</sup> Calculated by the author.

of this calculation are Samarkand from Sirdarya region 1100 tons per city in the amount of Jizzakh to the city - 186 tons , and to the city of Tashkent - 114-200 tons of greenhouse products .

After the calculation results, a sales plan is drawn up . Table 2.12 shows the results of calculating sales of products in the protected area based on the interregional balanced production -logistics model . According to him, 2200 tons of JV "Bek cluster " LLC will be sold to Samarkand, Jizzakh, Tashkent, Valley and Oasis regions . We can see that "Green capital " LLC delivered 2,000 tons, "Agro Invest production " LLC delivered 1,700 tons, in total, 5,900 tons of cucumbers.

**Table 5**  
**Interregional balanced production of greenhouse product sales to calculate the output- logistic model basic information (2019)<sup>6</sup>**

Enterprises _	Volume of delivery , t	Production costs for sale, soums				
		Good luck _	Jizzakh	Tashkent	Valley	Oasis
JV "Bek cluster " LLC	2200	53 00	55 00	54 00	55 00	58 00
"Green capital " LLC	2000	60 00	57 00	47 00	55 00	50 00
"Agro Invest production " LLC	1700	56 00	48 00	58 00	63 00	61 00
Total	5900	169 00	160 00	159 00	173 00	169 00

Greenhouse the production- logistic model of inter - chain balanced production and sale of products as a result of the calculation, the production and distribution costs of "Bek cluster " LLC JV are 6.8 million soums , the average selling price is 7 thousand soums / kg , and the income is 10,630 million soums . it was determined to be soum (table 6) .

**Table 6**  
**Results <sup>7</sup>of sales of greenhouse products at "Bek cluster " LLC JV based on interregional balanced production - logistics model**

Enterprises	Total , t	Shot volume i , tn.				
		Good luck _	Jizzakh	Tashkent	Valley	Oasis
JV "Bek cluster " LLC	1286	1100	0	0	186	0
"Green capital " LLC	714	0	0	400	114	200
"Agro Invest production " LLC	400	0	400	0	0	0
Total :	1 4 00	400	400	300	200	100
	Regional needs	1100	400	400	300	200
Enterprises	Delivery, t	Transportation costs from the enterprise to the consumer , soums /kg				
JV "Bek cluster " LLC	2200	53	55	54	55	58
"Green capital " LLC	2000	60	57	47	55	50
Agro _ Invest production " LLC	1700	56	48	58	63	61
Production cost , thousand soum	122800	58300	19200	18800	16500	10000

positive effect of geographic-logistic diversification in hot households helps to increase the profit and market value of the enterprise , reduce risk , balance costs and income , make full use of opportunities, make full use of resources , reduce the effect of seasonality , inter - sectoral cooperation of production . connections, organization of complex processing of raw materials and allows to reduce dependence on supply . In addition to create additional jobs, allows to increase the amount of wages .

<sup>6</sup> Calculations were made by the author based on the data.

<sup>7</sup> Calculated by the author

greenhouses for growing vegetables have been built on 3,298 hectares of land in our country, of which tomatoes are grown on 1,944 hectares, cucumbers on 872 hectares, greens on 189 hectares, cauliflower on 192 hectares, sweet peppers on 78 hectares, and hot peppers on 32 hectares. A total of 296,900 tons of vegetable products were grown in these greenhouses (Appendix 1).

Of this, 204,200 tons of tomatoes, 73,000 tons of cucumbers, 6,700 tons of greens, 7,600 tons of cauliflower, 4,400 tons of sweet pepper and 1,000 tons of hot pepper were grown. Tashkent, Bukhara, Navoi, Samarkand, Surkhondarya regions are leaders in the cultivation of vegetable products in these greenhouses. Cauliflower and hot pepper are mainly grown in greenhouses in Tashkent and Samarkand regions.

According to the Ministry of Agriculture of the Republic of Uzbekistan, 169,970 tons were grown in greenhouses

31751 tons of products were exported to foreign countries for 66014 thousand dollars, 138911 tons were worth 1094.9 billion. sold to the domestic market for soum. Tomato, cucumber and lemon products were mainly exported abroad. About 81.7% of products exported abroad are tomatoes, 16.3% are cucumbers, about 0.2% are lemons, and 1.8% are other products (Appendix 2).

Tomatoes, 27.2% of cucumbers, 4.6% of lemons, 0.04% of strawberries, and 4.96% of other products make up 63.2% of the products of greenhouse farms sold on the domestic market.

According to the results of the survey on the cultivation of citrus fruits and vegetables in greenhouses, 29 of 200 participants (14.5%) more, 51 (25.5%) less, and 120 (60%) grow citrus fruits (lemon, orange, tangerine, etc.) answered that they do not grow (Table 7).

**Table 7**

**Analysis of the results of a survey on the cultivation of citrus fruits and vegetables in greenhouses**

No	Product name	yes, more		yes, less		no, grow it - I don't	
		the number	percentage	the number	percentage	the number	percentage
1	Citrus fruits	29	14.5	51	25.5	120	60.0
2	Tomato	69	34.5	124	62.0	7	3.5
3	Cucumber	69	34.5	121	60.5	10	5.0
4	Cabbage	34	17.0	98	49.0	68	34.0
5	Greens (chivet, basil, coriander, celery, etc.)	51	25.5	87	43.5	62	31.0
6	Flowers	22	11.0	62	31.0	116	58.0
7	Potatoes	28	14.0	74	37.0	98	49.0
8	Other plants	17	8.5	76	38.0	107	53.5

As can be seen from the table, it was pointed out that they do not grow this type of products due to the lack of experience in growing citrus fruits, the price does not correspond to the income of consumers and other reasons. 69 out of 200 participants answered the question about growing tomatoes more (34.5%), 124 less (62%), and 7 (3.5%) did not grow.

In general, the volume of production of greenhouse products in our country has been increasing year by year for the last 10 years. But the volume of production is 3 times less than the potential of the domestic and foreign markets. Analyzing the level of competition in the market of greenhouse products, it was found that internal competition between manufacturers is very weak. Competition between greenhouses is mainly carried out in local markets, it is desirable to expand the logistics geography of these products.

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