

DEVELOPMENT PROSPECTS OF THE VEGETABLE FARMING SECTOR IN THE  
REPUBLIC OF UZBEKISTAN

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**Abstract.** In recent years, systematic measures have been implemented in the Republic of Uzbekistan to reform the vegetable farming sector, introduce resource-saving technologies, and provide agricultural producers with modern machinery. As a result, by 2030, it is planned to increase the annual growth rate of value added in agriculture to 5%, expand agricultural and food exports to 20 billion US dollars, and raise labor productivity in agriculture per worker from the current USD 3,960 to USD 6,500 per year.

This article substantiates the priority directions for the sustainable development of the vegetable farming sector under conditions of a free market economy, based on the example of enterprises with various forms of management. It highlights the economic significance of modern intensive methods in the development of vegetable production and examines the mechanisms for applying state economic incentives in the development of the sector. Additionally, recommendations are proposed for further development through the expansion of cooperative relations, and forecast indicators for the gross output value of the vegetable sector up to 2030 are developed.

**Keywords:** vegetable farming, resource-saving technologies, annual growth, value added, export, intensive methods, economic incentives, policy instruments, competition, crop varieties, economic measures, digital economy.

## INTRODUCTION

Vegetable production and consumption have been steadily increasing worldwide in recent years. This trend is primarily driven by the fact that vegetable products serve as an essential source of vitamins, minerals, and phytoncides necessary for the human body. According to forecasts by the Food and Agriculture Organization of the United Nations (FAO), global food consumption is expected to increase by an average of 1.3% annually by 2032. Within the framework of a healthy diet, the share of vegetable products is also projected to grow further.

In the context of intensifying competition in the global food market, reducing the volume of imported vegetable products and ensuring domestic demand through internal production capacities has become one of the key strategic priorities for the country. Therefore, in recent years, significant organizational, legal, and economic measures have been implemented, including the expansion of vegetable cultivation areas due to the reduction of cotton fields, as well as the introduction of high-yield and export-oriented vegetable varieties.

At the same time, despite the steady growth in vegetable production, certain types of vegetable products continue to be imported. This situation highlights the importance of further improving post-harvest processes. In particular, approximately 30% of domestically produced vegetables are subject to losses during harvesting, transportation, and storage. Addressing these challenges through the adoption of modern agro-technologies, the use of high-yield and early-maturing varieties, increased mechanization of production, and the introduction of resource-efficient storage and processing technologies will significantly enhance overall efficiency and reduce costs.

It is important to note that issues related to the sustainable development of the vegetable sector—such as organizational-structural, institutional, and socio-economic transformations—require deeper scientific and practical analysis. In particular, areas such as digitalization of the economy, transition to a green economy, and the implementation of innovative technologies remain promising directions for further research. The need to develop effective solutions to these challenges

and to consistently apply them in improving the efficiency, quality, and competitiveness of vegetable products has determined the relevance of this research topic.

### LITERATURE REVIEW

In the process of production modernization, forecasting the vegetable production system, increasing future yields, and predicting the growth dynamics of production volumes are among the most relevant scientific and practical tasks of the present time. It should be emphasized that the development of the vegetable sector depends on multiple factors; therefore, the application of mathematical modeling methods, alongside effective economic analysis tools, enables a more accurate and reliable assessment of sectoral development dynamics.

At present, there is a growing need to strengthen long-term confidence in land use among farmers and agricultural clusters. Analytical observations indicate that approximately 7,000 farmers have been managing land plots for an average period of about one and a half years [9, p. 137]. This situation highlights the importance of further improving land tenure mechanisms. Ensuring longer-term land use arrangements would enhance farmers' sense of ownership and encourage them to invest in soil fertility improvement, the adoption of intensive vegetable farming practices, and overall productivity growth.

The Republic of Uzbekistan, particularly the Tashkent region, has significant potential to expand joint ventures with foreign capital participation for the sustainable development of the vegetable sector. This, in turn, contributes to the creation of new jobs, the introduction of modern digital technologies, and the expansion of both fresh and processed vegetable production that meets international standards in global markets.

At the same time, improving product quality and diversification in line with international market requirements remains an important direction for further development. For instance, in the Tashkent region, more than 1.1 million tons of vegetables are produced annually; however, only slightly over 15.2% of this volume is exported, indicating opportunities for enhancing export potential [9, p. 137].

Analyses show that domestically produced vegetables are well-recognized and widely consumed in markets such as Russia and Central Asian countries. Expanding access to more distant foreign markets requires addressing several important factors, including compliance with international standards (e.g., European quality and safety requirements regarding chemical content) and strengthening competitiveness in markets where major suppliers such as Turkey, China, and other large producers are already active.

The issues outlined above also underscore the importance of selecting effective partnership models with foreign companies that are capable of providing reliable guarantees for exporting vegetable products to international markets.

The Russian market, which is one of the largest consumers for Uzbekistan, demonstrates increasing demand not only for traditional vegetables but also for those that are either not cultivated or are costly to produce within the Russian Federation. Currently, more than 17% of the Russian vegetable market is occupied by Turkey, while the remaining share is distributed among producers from Egypt, China, Uzbekistan, South Africa, Belarus, Moldova, and Israel [10].

An analysis of the geography of agricultural exports formed in recent years shows that Russia ranks first in Uzbekistan's fruit and vegetable exports with a share of 37.6%. It is followed by Pakistan (16.5%), China (12.7%), and Kazakhstan (10.4%). The total export volume amounted to 1.6 million tons (over USD 1.0 billion), which is 1.4% higher in 2024 compared to 2023 [11]. These trends indicate the importance of further expanding trade relations with neighboring and foreign countries and adapting to their market requirements.

The effective resolution of the above-mentioned issues can be achieved through the consistent implementation of targeted measures and the development of intensive vegetable farming in the country. This approach will contribute to increasing export potential, as well as improving the efficiency of using available land, water, and labor resources, scientific and intellectual capacity, long-established agricultural traditions, and the favorable natural and climatic conditions of the republic for vegetable production.

In the scientific literature, various approaches and methods are applied to forecast production volumes, yields, and market conditions. In particular, according to R.F. Djumanova, there are more than 130 forecasting methods used in practice, which can be broadly classified into three main groups in the context of socio-economic forecasting: extrapolation methods, expert evaluation methods, and modeling approaches [12, p. 15].

### RESEARCH METHODOLOGY

This study employs quantitative and econometric methods to analyze the development of the vegetable farming sector in Uzbekistan. A multiple regression model is applied to examine the relationship between gross output and key factors, including cultivated area, fertilizer costs, and yield levels. The least squares method is used to estimate model parameters, while correlation analysis identifies the strength of relationships among variables. Secondary data from official statistics for 2017–2023 are utilized. Additionally, forecasting techniques are applied to predict sectoral growth trends for the period 2024–2030 based on the developed model.

### ANALYSIS AND RESULTS

In the country, including the agricultural sector and, in particular, vegetable production, a multiple regression analysis can be effectively applied to forecast production volumes, yield levels, and market conditions. Using this model, it becomes possible to determine forecasted values for future periods. For this purpose, the following econometric model is constructed:

$$y = \alpha_0 + \sum_{i=1}^n a_i x_i \quad (1)$$

$$y = \alpha_0 + \sum_{i=1}^n \alpha_i x_i + \sum_{i,j=1}^n \alpha_{2n+i} x_i x_j + \sum_{i,j,k=1}^n \alpha_{2n+i} x_i x_j x_k, \quad i \neq j \neq k \quad (2)$$

Here, Y denotes the dependent (resulting) variable;  $X_1, X_2, \dots, X_n$  represent the factors influencing the dependent variable; and  $\alpha_0, \alpha_1, \dots, \alpha_n$  are the unknown parameters of the model.

In this linear model, expressed as  $y = f(x_1, x_2, \dots, x_n)$ , it is necessary to determine the unknown parameters in order to identify the relationship between the variables. The most appropriate and reliable method for estimating these parameters is the method of least squares.

By applying this method, a system of normal equations is constructed, and solving this system makes it possible to estimate the unknown parameters (coefficients) of the model.<sup>1</sup>

<sup>1</sup> U.X.Beglaev. Baliqchilik xo'jaliklarini barqaror rivojlantirishni iqtisodiy dastaklar orqali qo'llab-quvvatlash mexanizmini takomillashtirish. "Yoshlar huquqlari: imkoniyatlar va himoya qilish mexanizmlari" respublika ilmiy-amaliy anjumani 2024-yil 26-mart. <https://doi.org/10.5281/zenodo.10871322>.

$$\begin{cases} na_0 + a_1 \sum x_1 + a_2 \sum x_2 + \dots + a_n \sum x_n = \sum y \\ a_0 \sum x_1 + a_1 \sum x_1^2 + a_2 \sum x_1 x_2 + \dots + a_n \sum x_n x_1 = \sum y x_1 \\ \dots \\ a_0 \sum x_n + a_1 \sum x_1 x_n + a_2 \sum x_2 x_n + \dots + a_n \sum x_n^2 = \sum y x_n \end{cases} \quad (3)$$

When determining the number of unknown parameters, particularly in cases where their number is two or more, the use of specialized software designed for such calculations ensures efficient and reliable results.

The conducted research indicates that, in forecasting the yield of vegetable crops, it is essential to take into account the specific characteristics of the sector as well as the dynamic changes of various related factors. In this regard, the application of multiple regression analysis, which is widely used in scientific literature, is considered appropriate for identifying the interrelationships among variables. This approach enables a more comprehensive analysis and provides optimal solutions for modeling such relationships.

It should be emphasized that, during the research process, a strong interdependence among the factors affecting vegetable yield was observed. In particular, the gross value of vegetable production can be considered as the dependent variable ( $Y$ ), while the factors influencing its growth may include the cultivated area of vegetable crops ( $X_1$ ), the cost of mineral fertilizers applied per hectare ( $X_2$ ), and the average yield per hectare ( $X_3$ ) (Table 1).

**Table 1**

**Factor values used to estimate the gross output of vegetable production and its variation based on regression analysis (case study), in billion UZS<sup>2</sup>**

Years	Y	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>
2017	2844,1	33,5	27575	286.1
2018	4034,8	33,6	25485	224.4
2019	3967,5	38,36	26206	274.3
2020	3913,5	38,1	24802	250
2021	5141,7	38,8	23899	259.8
2022	6079,7	46,0	24489	235
2023	7462,7	58,1	26174	249.9

- Y – gross output value;
- X<sub>1</sub> – cost of mineral fertilizers applied (in UZS);
- X<sub>2</sub> – vegetable cultivation area (in hectares);
- X<sub>3</sub> – average yield (centners per hectare).

Based on the values of the factors presented in the table above, a correlation matrix of pairwise correlation coefficients was constructed to illustrate the relationship between the dependent variable and the explanatory variables for vegetable production. The correlation coefficients between the variables were calculated using the programming capabilities of the MATLAB system.

In this analysis, key factors influencing the gross output value—such as the cost of mineral fertilizers, cultivated area, and average yield—were taken into account (Table 2).

<sup>2</sup> Source: Calculated based on the author's scientific research.

**Matrix of pairwise correlation coefficients reflecting the relationships between factors influencing the gross output value in vegetable production<sup>3</sup>**

	Y	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>
Y	1.0000			
X <sub>1</sub>	0.9406	1.0000		
X <sub>2</sub>	-0.3511	-0.0838	1.0000	
X <sub>3</sub>	-0.4338	-0.2206	0,5706	1.0000

To carry out the forecasting process under consideration, we first examine the following multiple regression model.

$$y_i = \alpha_0 + \alpha_1 x_{1i} + \alpha_2 x_{2i} + \alpha_3 x_{3i} \quad (4)$$

The analysis of the correlation matrix among the selected factors allows for examining the variation in correlation coefficients and their relationships. It should be noted that partial correlation coefficients are used to determine the nature and strength of the relationships between the dependent variable—gross output value of vegetable production ( $Y$ )—and the selected explanatory variables ( $X_1$ ,  $X_2$ ,  $X_3$ ).

The data presented in the table indicate a strong positive relationship between the gross output value ( $Y$ ) and the cost of mineral fertilizers ( $X_1$ ), with a correlation coefficient of 0.9406. A moderate negative relationship is observed between the gross output value ( $Y$ ) and the average yield of vegetables ( $X_3$ ), with a coefficient of -0.4338. Meanwhile, the relationship between the gross output value ( $Y$ ) and the cultivated area ( $X_2$ ) is relatively weak, as indicated by a coefficient of -0.3511.

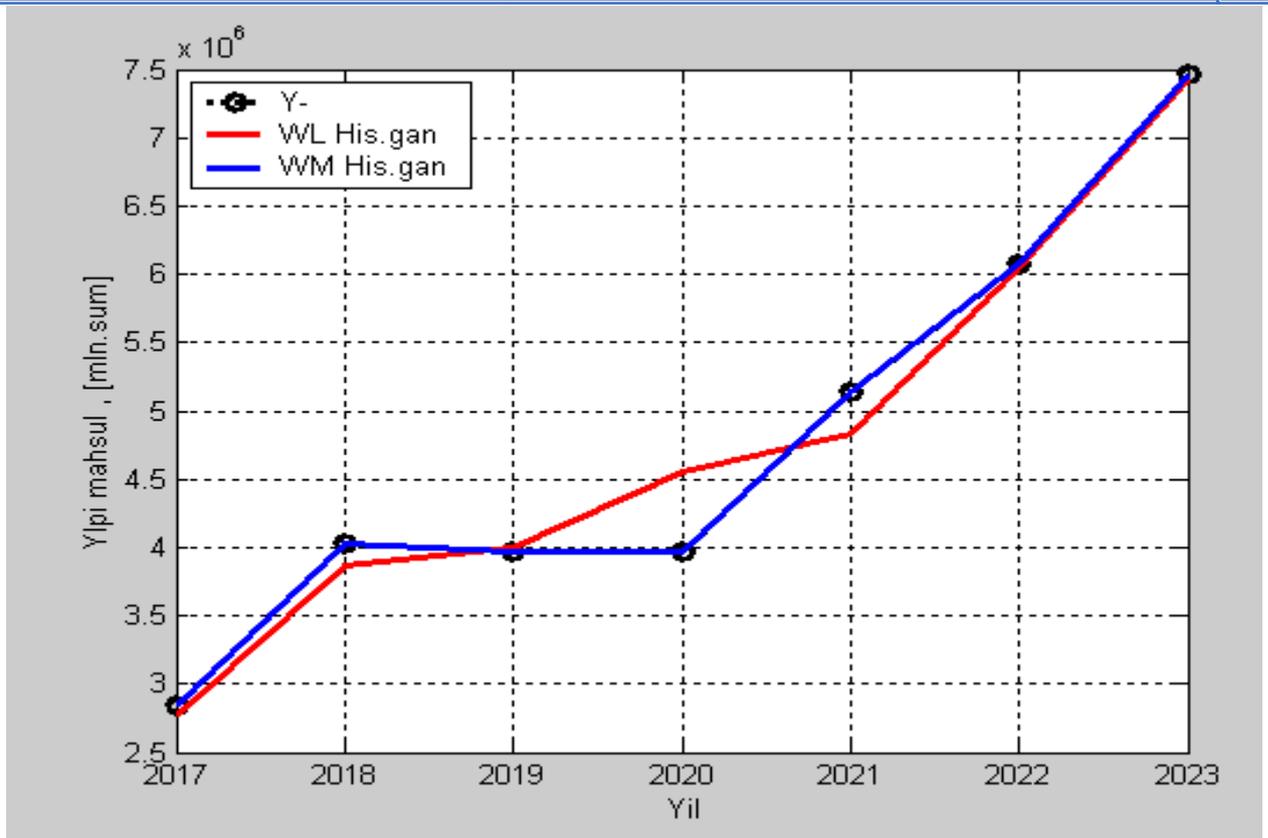
The pairwise correlation coefficients among the explanatory variables (i.e.,  $X_1$  and  $X_2$ ,  $X_1$  and  $X_3$ ,  $X_2$  and  $X_3$ ) are presented in Table 2.

As can be seen from the table, the relationship between the cost of mineral fertilizers ( $X_1$ ) and the average yield ( $X_3$ ) is very weak (-0.0838). Similarly, the relationship between fertilizer costs ( $X_1$ ) and the cultivated area ( $X_2$ ) is also weak (-0.2206). At the same time, a moderate positive relationship is observed between the average yield ( $X_3$ ) and the cultivated area ( $X_2$ ), with a coefficient of 0.5706.

Overall, the selected factors demonstrate varying degrees of interdependence, indicating the presence of both direct and indirect relationships within the vegetable production system. This suggests that a comprehensive econometric approach is appropriate for capturing the complexity of these interactions.

The graphical representation of the actual and model-estimated values of gross vegetable production, calculated based on model (3.5), is presented in Figure 1.

<sup>3</sup> Calculated based on the author's scientific research.



**Figure 1. Graph of actual and model-estimated values of gross vegetable production in the Tashkent region based on model (3.5)<sup>4</sup>**

To determine the overall goodness-of-fit of a multiple linear regression econometric model, the coefficient of determination ( $R^2$ ) can be calculated using the following formula:

$$R^2 = 1 - \frac{\sum_{i=1}^n (y_i - \hat{y}_i)^2}{\sum_{i=1}^n (y_i - \bar{y})^2} \quad (6)$$

- $\hat{y}$  – expected (predicted) value of the dependent variable;
- $\bar{y}$  – arithmetic mean of the dependent variable;
- $\hat{y}_i$  – estimated (predicted, fitted) values of the dependent variable;
- $n$  – number of observations.

In general, the results obtained based on the constructed econometric model indicate that the calculated value of the Fisher F-statistic for analyzing the factors influencing the gross output value in vegetable production is  $F_{(calc)} = 30.415$ . Furthermore, with degrees of freedom of  $\gamma_1 = 3$  (numerator) and  $\gamma_2 = 7 - 3 - 1 = 3$  (denominator), the critical value of the Fisher criterion at a significance level corresponding to  $p = 0.98$  is  $F_{(crit)} = 6.59$ .

Since the calculated value ( $F_{(calc)} = 30.415$ ) significantly exceeds the critical value ( $F_{(crit)} = 6.59$ ), the proposed multiple regression model is statistically significant and adequate. Therefore, it can be effectively used for forecasting the gross output value of vegetable production across different crop types, as well as for predicting future trends in the sector (Table 3)<sup>5</sup>.

<sup>4</sup> Developed by the author.

<sup>5</sup> U.X.Beglaev. Baliqchilik xo'jaliklarini barqaror rivojlantirishni iqtisodiy dastaklar orqali qo'llab-quvvatlash mexanizmini takomillashtirish. "Yoshlar huquqlari: imkoniyatlar va himoya qilish mexanizmlari" respublika ilmiy-amaliy anjumani 2024-yil 26-mart. <https://doi.org/10.5281/zenodo.10871322>.

Table 3

Criteria for assessing the quality and significance of a multiple econometric model<sup>6</sup>

M/t	n	F <sub>p</sub>	F <sub>t</sub>	R <sub>m</sub>	ε <sub>c</sub>	v	r <sub>a</sub>	K <sub>N</sub>	F <sub>p</sub> > F <sub>t</sub> <sup>7</sup>
lines	7	30.145	6.59	0.982	4.143	0.027	0.496	0.416	Completed

Based on the results of calculations obtained by substituting real numerical values—derived from the models and formulas presented above—into the unknown parameters of the developed trend functions, a forecast of the gross output value in vegetable production for the period 2024–2030 was developed, using data for 2017–2023.

In analyzing the dynamics of gross output value in vegetable production through mathematical modeling, it is essential to incorporate all relevant factors influencing this indicator. This approach enables a more accurate assessment of future yield trends and the growth dynamics of gross output value in the sector. Moreover, it facilitates economic analysis of the prospective development processes of the vegetable production sector.

During the research process, forecasts of the gross output value in vegetable production were developed based on regression analysis and multiple regression models. By substituting real numerical values—obtained through the applied models and formulas—into the unknown parameters of the regression equations, projections for 2024–2030 were generated based on the observed dynamics for 2017–2023 (Table 4).

Table 4

Forecast indicators of gross output value in vegetable production and its changes for the period 2024–2030<sup>8</sup>

№	Years	Gross output value (billion UZS)	Cost of mineral fertilizers (billion UZS)	Cultivated area (ha)	Average yield (centners/ha)
		Y	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>
1	2024	8526,1	65,7	27050	250.7
2	2025	9962,4	77,2	28806	255.4
3	2026	11565,7	90,5	31019	262.0
4	2027	13336,1	105,6	33691	270.3
5	2028	15273,6	122,4	36819	280.6
6	2029	17378,2	141,0	40406	292.7
7	2030	19649,9	161,4	44450	306.6

<sup>6</sup> Calculated based on the author's scientific research.

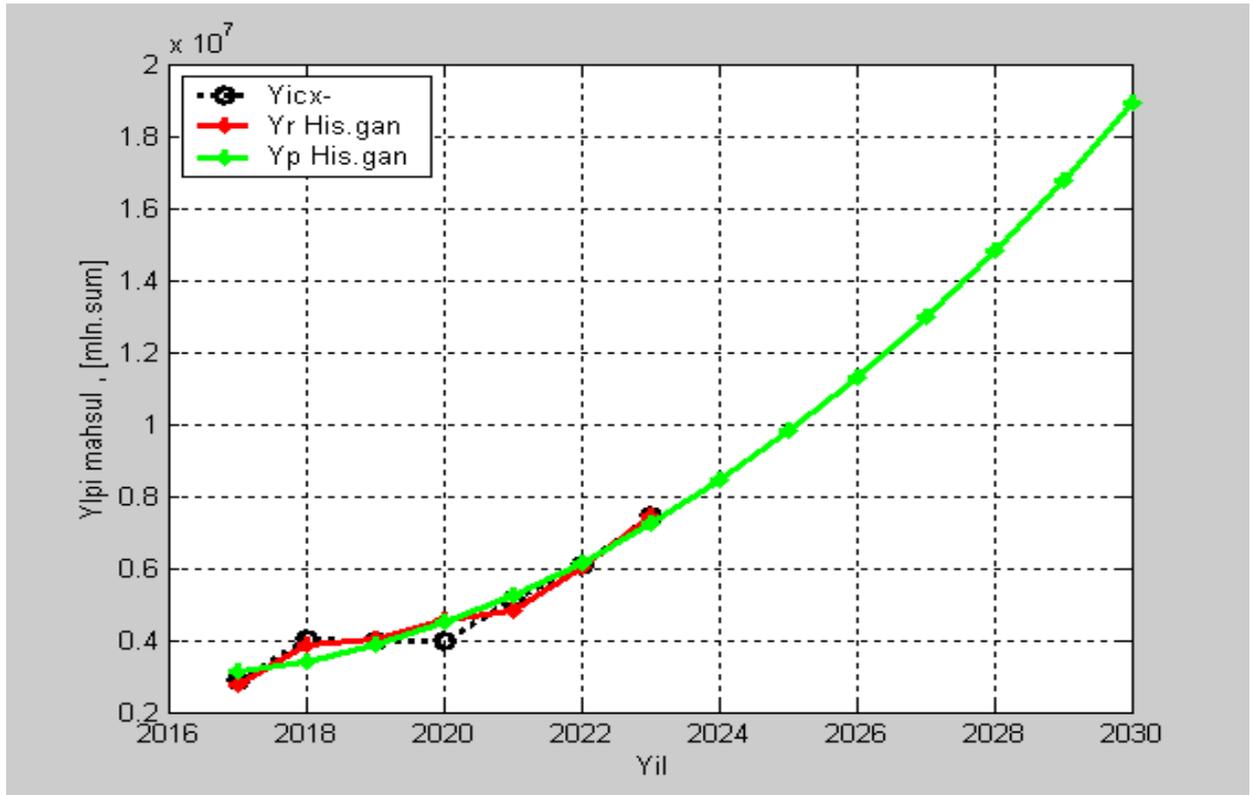
<sup>7</sup> Condition is satisfied.

<sup>8</sup> Developed by the author.

The analysis of the dynamics of vegetable production based on mathematical modeling, along with forecasting through the comprehensive inclusion of influencing factors, enables an accurate assessment of yield growth trends and the identification of key drivers of sectoral development.

According to the calculations carried out, the gross output value of vegetable production in the region is projected to increase from 7,462.7 billion UZS to 19,649.9 billion UZS by 2030. This growth is expected to be supported by improvements in yield levels, resulting in a significant increase in total production.

The forecast graph illustrating the actual and model-estimated values of gross output in vegetable production is presented in Figure 2.



**Figure 2. Forecast of actual and model-estimated values of gross output in vegetable production based on model (3.5) and partial models<sup>9</sup>**

Figure illustrates the dynamics of gross vegetable production over time, comparing actual values, calculated results, and forecast estimates. The black dashed line represents actual data, the red line shows calculated values, and the green line indicates forecasted growth up to 2030. The graph demonstrates a steady upward trend, with significant increases in production expected in future years, reflecting positive development in the vegetable sector and improving productivity levels overall consistently.

## CONCLUSION AND RECOMMENDATIONS

<sup>9</sup> Developed by the author.

In general, the results of the conducted research make it possible to formulate a number of scientific conclusions and practical recommendations. Considering market demand and soil–climatic conditions, it is advisable to intensively develop vegetable production in areas surrounding Tashkent city. This approach provides additional socio-economic benefits for both business entities engaged in vegetable production and society as a whole, particularly through improved economic efficiency of land use, which is reflected in increased average yields compared to traditional methods and higher gross output per unit of cultivated area within a single vegetation period. Furthermore, the reduction of labor and material-technical resource consumption leads to lower production costs, including decreased seed usage per hectare, reduced labor intensity due to fewer agrotechnical operations, and savings of scarce resources such as water through the application of innovative technologies. At the same time, improvements in product quality compared to traditional production methods contribute to higher economic efficiency, and in this context, it is proposed to apply a framework for assessing socio-economic benefits referred to as the “gradation of socio-economic benefits for producers and society through the development of intensive vegetable production.”

In addition, further improvement of state support mechanisms for the development of intensive vegetable production is essential. This includes promoting vegetable exports through the development of cooperatives and producer associations, maintaining export incentives, and supporting the import of modern technological equipment and advanced technologies by introducing customs privileges for a period of at least five years. Similarly, supporting the import of machinery and technologies for vegetable processing, as well as modern digital solutions, will enhance production efficiency and stimulate the production of high-quality, competitive products, thereby increasing export volumes and overall economic returns.

Given that vegetable production is largely carried out by small farmers, dehkan farms, and household plots, it is important to promote their integration into cooperative structures. This will help address challenges such as limited quality control capacity, fragmented production of diverse vegetable types, relatively high transportation costs due to small production volumes, insufficient conditions for modern storage and processing, and limited opportunities to adopt advanced scientific, resource-saving, and digital agrotechnologies. Strengthening cooperative relationships and improving the organizational and legal framework will play a key role in overcoming these constraints.

To ensure sustainable development and mitigate potential risks in the vegetable sector, it is necessary to introduce resource-efficient and high-performance machinery and equipment, particularly small-scale technologies suitable for small farms, alongside modern digital tools. At the same time, developing value-added chains through improved storage, transportation, processing, and marketing infrastructure is crucial. Promoting environmentally sustainable and water-efficient vegetable production systems, taking into account regional specificities, as well as diversifying production in line with global market demand through the introduction of new vegetable varieties, will further strengthen the sector.

In conclusion, the implementation of the scientific findings and practical recommendations developed in this study will contribute significantly to the advancement of the vegetable sector in the Republic of Uzbekistan. It will support the adoption of modern technologies, enhance digitalization processes, and increase the competitiveness of the sector. As a result, agricultural development will accelerate, export potential will expand, foreign investment inflows will grow, new employment opportunities will be created, and overall socio-economic welfare will improve.

## REFERENCES

1. O‘zbekiston Respublikasining “Fermer xo‘jaligi to‘g‘risida”gi Qonuni, 662-II-son. – Toshkent: Adolat, 2004-y. <https://lex.uz/docs/-275195>.

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2. O‘zbekiston Respublikasining “Dehqon xo‘jaligi to‘g‘risida”gi O‘RQ-680-son Qonuni. – Toshkent: Adolat, 2021-y. <https://lex.uz/uz/docs/-5351631>.
3. O‘zbekiston Respublikasi Prezidentining 2017-yil 9-oktabrdagi “Fermer, dehqon xo‘jaliklari va tomorqa yer egalari huquqlari va qonuniy manfaatlarini himoya qilish, qishloq xo‘jaligi ekin maydonlaridan samarali foydalanish tizimini tubdan takomillashtirish chora-tadbirlari to‘g‘risida”gi PF-5199-son Farmoni. <https://www.lex.uz/uz/docs/-3371644>.
4. O‘zbekiston Respublikasi Prezidentining “2022–2026-yillarga mo‘ljallangan Yangi O‘zbekistonning taraqqiyot strategiyasi to‘g‘risida”gi 2022-yil 28-yanvardagi PF-60-son Farmoni. <https://lex.uz/ru/docs/-5841063>.
5. O‘zbekiston Respublikasi Prezidentining “Qishloq xo‘jaligi mahsulotlarining sifat va xavfsizlik ko‘rsatkichlari xalqaro standartlarga muvofiqligini ta‘minlashga doir qo‘shimcha chora-tadbirlari to‘g‘risida”gi 2020-yil 18-maydagi PF-5995-son Farmoni. <https://lex.uz/uz/docs/-4815923>.
6. Mirziyoyev Sh.M. Qishloq xo‘jaligi va oziq-ovqat mahsulotlari ishlab chiqarish – eng dolzarb masala. – 2020-yil 10-aprel. [www.prezident.uz/uz/lists/view/3493](http://www.prezident.uz/uz/lists/view/3493).
7. “Yevropa Ittifoqi mamlakatlari bozorlariga qanday qilib eksport qilish kerak (meva-sabzavot mahsulotlari misolida)”, Botirova D., Kaxxarova G., Akbarov D. – Toshkent, 2015.
8. Xushmatov N. Intensiv sabzavotchilikni rivojlantirishning iqtisodiy samaradorligi. “Globallashuv va iqlim o‘zgarishi sharoitida oziq-ovqat xavfsizligini ta‘minlash: muammo va yechimlar” respublika ilmiy-amaliy anjumani materiallari. – 2024-yil 15-may, 24–30-betlar.
9. Xasanov S.S. Sabzavotchilik tarmog‘ini rivojlantirishning ustuvor yo‘nalishlari. Dissertatsiya. – Toshkent, 2024. – 137-bet.
10. O‘zbekiston Respublikasi Prezidenti huzuridagi Statistika agentligi ma‘lumotlari.
11. O‘zbekiston Respublikasi Qishloq xo‘jaligi vazirligi ma‘lumotlari.
12. Djumanova R.F. “Ijtimoiy-iqtisodiy jarayonlarni modellashtirish va prognozlash”. O‘quv-uslubiy qo‘llanma. – Toshkent, 2012-y., 15-bet.