

Prospects of Innovative Development of The Agricultural Sector

Sayyora Nasimovna Khamraeva¹, Gulnoza Tokhirovna Samiyeva², Nargiza Akramovna Ochilova³

¹Professor of Karshi Engineering Economics Institute of Doctor of Economic Sciences, professor, Uzbekistan

²Associate Professor of the Department Innovative Economy of Karshi Engineering Economics Institute

³PhD, assistant of "Innovative Economy" department, Karshi Engineering Economics Institute, Uzbekistan.

Annotation: In the next period, consistent measures are being implemented in the Republic of Uzbekistan to ensure wider integration of science, education and production, to create and apply innovative knowledge in each field, and to introduce innovative technologies and best practices. However, the results of the scientific and research work on the introduction of innovative technologies and the development of the agricultural sector are at a low level, and the problems that have not been solved for years are preventing the rapid development of the agricultural sector. Therefore, in the future, "... as one of the main directions of agricultural development, the creation of effective mechanisms for the dissemination of knowledge integrated with the production of research, education and consulting services, a system of science, education, information and consulting services" was set as a priority task. The current situation requires increasing the effectiveness of innovative processes in agricultural entities, including the development of scientific and methodological bases for increasing the economic potential of farming, and systematic study of the scientific, theoretical and methodological aspects of these processes.

Keywords: agriculture, crop production, innovation, innovation activity, innovation processes, forecast, innovative development, agricultural sector

1. Introduction

In the conditions of the current global integration process, ensuring the country's food security requires the industry to be flexible to the changing external environment, effective in various innovations and scientific and technical development, based on the sustainable development of agriculture. Therefore, in many developed countries of the world, the modern stage of agricultural development is described as the stage of transition to an innovative model that ensures the systematic integration of the agrarian and scientific-technical sectors in order to increase its efficiency. In particular, in order to "optimize production and distribution systems and implement new business models, which allow us to effectively use land, energy and other natural resources, and at the same time pay more attention to the needs of the world's poor population, we will introduce "smart agriculture" there is a need to create ". According to scientists, an important role in solving the strategically important problems of different countries in the twenty first century is based on knowledge-based economy or innovation economy. In the last 15 years, the number of people working in the field of innovation in the USA and Western Europe has doubled, and in Southeast Asia it has increased 4 times. The share of innovative active industrial enterprises in the European Union was more than 56%. In the developed countries of the world, 75 percent of the gross domestic product is accounted for by innovations.

In the context of global climate change, in the impending decades, the agro-food chain will face a sharp increase in world demand and intensifying competition for limited natural resources, and it will require adaptation to changes and mitigation of such changes. Innovation, as mentioned above, purposes to meet growing demand and to expand the whole network that integrates the sustainable production, processing, distribution and consumption of food, waste reduction, and the so-called food system appear as the main meaning of adaptation. According to scientists' evaluation, by 2050, the population of the planet will reach 9.6 billion, and in order to provide them with food, it will be necessary to increase production by 60% compared to today. If we pay attention to foreign trends, 1 mln. the number of innovations created per population (recognized in foreign patent offices): in the USA - 261.7, in Japan - 213.0; in Germany – 206.3; in France – 171.9; In Russia, it is 1.3.

Today, in the Republic of Uzbekistan, consistent measures are being taken to ensure wider integration of science, education and production, to create and apply new knowledge, to introduce innovative technologies and best practices. . However, the results of the research on the introduction of innovative technologies and the development of the agricultural sector do not reach the lowest levels of the sector, and the problems that have not

been solved for years prevent the agricultural sector from developing more rapidly. Therefore, in the future **it is** set as a priority task "...as one of the main directions of agricultural development, the creation of effective mechanisms for the dissemination of knowledge integrated with the production of research, education and consulting services, the development of the system of science, education, information and consulting services". This situation requires the development of scientific and methodological bases for increasing the efficiency of innovative processes in economic growth potential of agricultural entities, conducting systematic research on the scientific-theoretical and methodological aspects of these processes.

2. Literature review

In the conditions of socio-economic changes taking place in the world and international integration, it is necessary to move the agricultural industry to a new innovative development path in a short period of time. Through this way, there will be an opportunity to raise the status of the village on a modern technical and technological basis. In the twenty first century, the problem of management, organization of innovative activities, selection of methods and mechanisms for innovative development of various sectors of the economy has been in the focus of attention of economists. Innovation, innovative activity, innovative process and similar concepts are firmly established in our daily life, enterprise activity and various aspects of economic sectors. In developed countries, innovation is one of the important factors in increasing the competitiveness of enterprises, strengthening their position in the market and producing consumer goods. In the implementation and implementation of innovative activities, first of all, it is necessary to clarify the main terms and concepts. As a result of studying the researches of the republican and foreign scientists dealing with the problem of innovation, it was found that there are different approaches to the content and essence of innovation, innovative process and innovative activity. In many economic literature, the Australian economist-scientist Joseph Schumpeter is highlighted as one of the first scientists who made an important contribution to the definition and types of innovative processes and the theory of innovative activity in general. At that time, there was no thought about innovation, but concepts such as "effective method", "innovation", "effect", "application" were used in the development of the economy.

From a technical or economic point of view, production is a combination of available resources and forces. Each method of production means a certain combination. Different methods of production can differ only in character and style, either by the object of combinations or by the ratio of their quantities. Each process of production constitutes this combination for us. In his research, Y.Schumpeter considered the issues of new combinations in development, gave a complete definition of the innovation process and singled out five exemplary changes:

- use of new equipment, new technological processes or new market supply in production (sale);
- introduction of new quality products;
- use of new raw materials;
- changes in the organization of production and its material and technical support;
- emergence of new sales markets.

The first most complete description of innovations was introduced into economic science by Y.A.Schumpeter, an Austrian scientist, in his book "Theory of Economic Development". This study initiates the classical theory of innovation. According to Y.Schumpeter, innovation is not only innovation, but also a factor of production. According to Schumpeter, the mass emergence of "new combinations" indicates the the main stage of economic development.

Y.Schumpeter defines innovation as an economic category: it is a productive function that, taking into account the changes in the set of factors affecting it, "predetermines the quantitative changes in the product. If a number of factors o instead of change the form of the function, we achieve innovation. " He emphasized that innovation should be considered only in the context of cyclical and dynamic competition with new ones that replace old goods and technologies, that is, innovation is something that replaces the old is the new production function.

After Y.Schumpeter, G.Mensch, M.Kaleski, B.Twiss and others, "neoclassical" theories of innovation appeared. Prominent representatives of this trend consider innovations as the "main impetus" of development arising from new consumer goods, new methods of production and transportation, new markets, new organizational industrial sectors, and at the same time, they evaluate the cyclical development of the economy.

The innovation process is cyclical in nature. The economic and technological impact of innovative processes is only partially manifested in new products and technologies. The main part is manifested in the increase of

economic and scientific technical capabilities (purchase of new techniques), that is, the technological level of the innovation system increases, which leads to an increase in the demand for innovations.

We can find such terms as "innovation", "innovation", "scientific and technical innovation" in the research works of scientists such as M.Porter, B.Twiss. At the same time, many economists expressed their opinions on the innovation. For example, B. Santo defined innovation as follows: "Innovation is a socio-technical-economic process, which leads to the creation of products and technologies that are better according to their characteristics through the practical use of ideas and discoveries. If it is aimed at obtaining economic benefits, its appearance on the market will create an opportunity for additional income.

In his research, B.Santo based the concept of innovation chain as a linear sequence of certain stages in the process of innovation, various models of innovation processes and innovation modeling. According to L.Vodachek, O.Vodachkova, innovation is a purposeful change in the quality of the system in the work of the enterprise, which can be manifested in quantitative and qualitative changes in one or another field of the enterprise. V.N.Lapin understood innovation as a set of processes for creating new practical tools (innovations) in order to fully satisfy certain needs of people. In our opinion, there is no guarantee that innovation will be beneficial to the community, that it will still be economically efficient and profitable.

In our opinion, innovation is the use of scientific achievements and advanced experience, improvement and development processes of social production, formation of products with new consumer characteristics (goods, products, techniques, technology, other organizational forms and tools), is the materialized final result of investment and creative activity based on implementation, helps to meet the needs of the market and social needs, saves costs and ensures that people have different results in different spheres of life and activity.

According to I.T. Balabanov, innovation is investment in new techniques, technologies, new forms of organization of production, labor, service and management, including control, accounting, planning methods, analysis and The origin of the economic result on the basis of other new forms is important. R.A.Fatkhuddinov defines innovation as follows: "Innovation is the final result of the innovation introduced in order to change the object of management and obtain economic, social, ecological, scientific-technical or other results". Summarizing the opinions of a number of other scientists, they generally expressed the meaning of "innovation" and "innovation", "introducing something new".

Evaluation of the effectiveness of the development and adoption of innovations in agriculture has its own characteristics, and it is necessary to take into account the limited resources of most of the resources used in the sector. This applies primarily to land, material, financial, and recently labor resources (highly qualified managers and specialists are meant). The limited resources and the year-by-year increase of the need make the country's agriculture, especially in the farming sector, the need to move to a new modern stage and an innovative model. Many foreign scientists defended their opinions on the topic of innovation in farms in scientific articles and dissertations.

In particular, V.Moysiadis, Panagiotis Sarigiannidis, Vasileios Vitsas, Adel Khelifi in their scientific article "Smart Farming in Europe" describe a number of advanced developments in European farms. Accordingly, the main technological evolutions related to smart farming (such as unmanned aerial vehicles, unmanned ground vehicles and wireless sensor networks) are introduced, analyzed and discussed, with along with providing the main potential advantages of their use in the agricultural department and the latest research trends in their field. However, it should be noted that one of the biggest disadvantages of the ideas put forward by these scientists is that the prices of the technological equipment they introduce are very expensive, and the introduction of these technologies causes the cost of the product to increase several times 10 times.

3. Results and Discussion

The volume of the gross regional product of Kashkadarya region plays a significant role in the formation of the country's gross domestic product. By the end of 2021, the region took 6th place after Tashkent city, Tashkent region, Navoi region, Samarkand region, Fergana region in terms of gross domestic product. It can be observed that the Gross Territorial Product of Kashkadarya was 43833.3 billion soums. This, in turn, indicates that the volume of the regional product increased by 202.9% compared to 2017, and the volume of the gross agricultural product increased by 197.3%. The growth rate of agricultural production in Kashkadarya region has decreased from 103.3 percent to 101.9 percent over the past 5 years, in particular, the volume of agricultural products, the volume of agricultural products of farms and farmers (personal assistants) the number of households increased by

1.01 and 1.02 times, respectively, while the organizations performing agricultural activities decreased by 1.65 times. Based on the data of the Statistics Department of Kashkadarya region, the agricultural products produced in all categories of the region were assessed as unstable growth in 2017-2021. In particular, in 2021, compared to 2017, the production of cereals and legumes was 82.6%, potatoes - 99.1%, vegetables - 96.2%, and the production of melons, fruit and berry crops and grape production increased accordingly by 15.2%, 5.5% and 3% (Fig. 1).

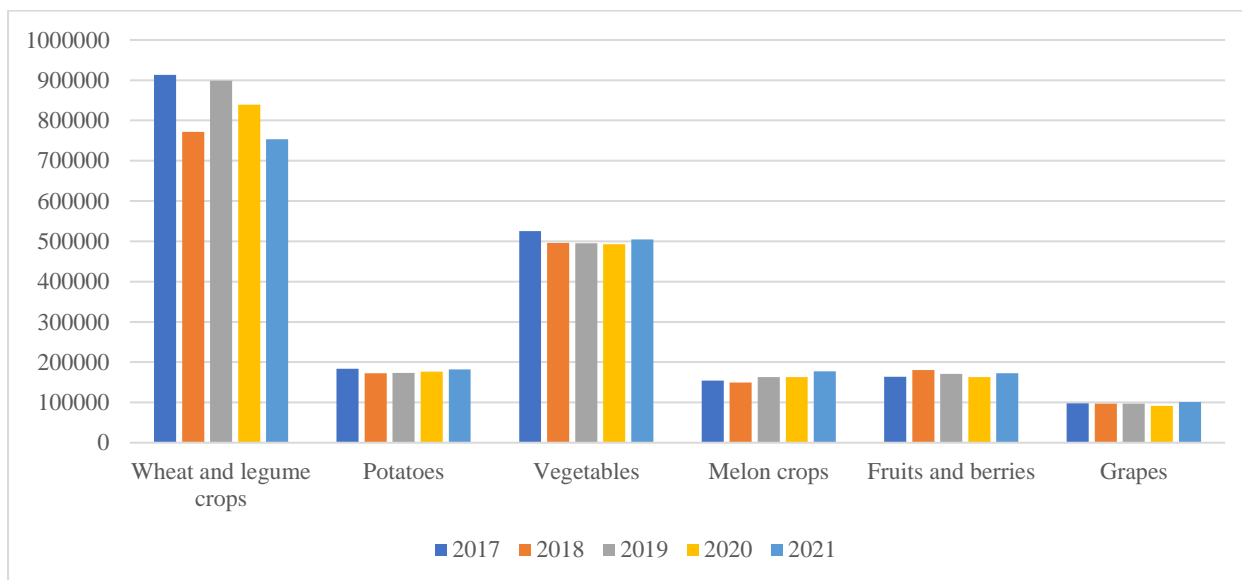


Figure 1. Agricultural products produced in all categories of Kashkadarya region

Taking into account that the permanent population of Kashkadarya region is equal to 3,408,345 people as of January 1, 2022, we will consider the level of standard provision of agricultural products to medical standards (Table 1).

Table 1: The level of provision of agricultural products per capita in 2021

Type of product	Gross product volume, tons		Volume of Gross Product per capita, gr/day		Medical norm, g/day	It is provided in relation to the norm, %	
	2020y	2021y	2020y	2021y		2020y	2021y
Potatoes	176752	181776	142	146	220	64,5	66,4
Vegetables	493098	504988	396	406	330	120	123
Melon crops	163301	177112	131	142	80	163,7	178
Fruits and berries	163178	172334	131	139	285	46	48,6
Grapes	91248	100579	73	81	30	243,3	269,5

As can be seen from the table, potatoes, fruits and berry plants are not enough to fully provide the population. It is known that 2020-2021 was an unfavorable year for agriculture in terms of natural climate conditions. As a result, the production volume of fruit products in the republic decreased sharply compared to previous years. For this reason, we believe that it is appropriate to introduce innovative technologies in the production of agricultural products, taking into account adverse weather conditions to ensure the food safety of the population.

A lot of practical work was done on the development of agricultural science in our region, were improved fundamental, practical and innovative projects. In particular, we will get acquainted with one of the projects implemented in the innovative development of the agricultural network in Kamashi district. 11 projects were implemented in the district in 2019-2021 (Table 2), the value of this project is 140330 million soums.

Table 2: Projects implemented in the innovative development of the agricultural network of Kamashi district

	Unit of measure	2019	2020	2021	Total
Projects implemented in the field of agriculture	piece	3	3	4	11

Total land area	hectares	520	910	1170	2600
Project cost	million soums	28066	49115,5	63148,5	140330
Job created	piece	93	365	415	873
Product production capacity	million soums	11 650	39 050	43485	94185

These projects implemented in the district will not only increase the internal potential of the district and increase the gross regional product, but also create a basis for the creation of new jobs. It is no exaggeration to say that this, in turn, is one of the important factors in reducing the poor strata of the population and ensuring food insecurity.

In addition, in Kamashi district "Asadqara balandchayla" Limited Liability Company, "Kamashi Estate Service" Limited Liability Company, Kashkadarya Region State Forestry, "Comfortable Business Service" Limited Liability Company, "Kamashi estate service food" Limited Liability Company implemented projects worth 127,280 million soums, of which 68,800 million soums were financed by own funds, 20,300 million soums by bank loans, 38,180 million soums (4,440 thousand dollars) corresponded to the account of foreign investment (table 3).

Table 3 Projects implemented by enterprises in the innovative development of the agricultural sector of Kamashi district

№	Project initiator	Brief description of the project	Project capacity		Project value, million soums	Including (million soums)		Number of jobs created		Product production capacity			
			tonna	tons		own funds	credit of bank	foreign investments thousand dollars.	2019 y	2020 y	2019 y	2020 y	
1	«Asadqarabalandchayla» LLC	15 hectares of vineyards and 85 hectares of intensive orchards were created	tonna	1100	3 000	3000				15			
2	«Kamashitomorqaxizmati» LLC	A modern greenhouse was established	tons	150	1 100	800	300		15		500	1 000	
3	State forestry of Kashkadarya region	2500 hectares of pistachio orchards were established	hectares	2 500	50 000	50 000			30	300			
4	«Komfortablbusinesservis» LLC	A greenhouse was established	tons	1 500	35 000	15 000	20 000			50			8000
5	«Kamashipocheon green food» LLC	A greenhouse was established	tons	1 400	38 180			4 440	15				10000

Total by district	127280	68800	20300	4 440	60	365	500	18000
--------------------------	---------------	--------------	--------------	--------------	-----------	------------	------------	--------------

As a result of the projects implemented by these enterprises, 425 new jobs were created in 2019-2020, it can be seen that the volume of product production has increased several times in the gross regional product.

In the course of the research, trend models were developed to determine the indicators of the next three-year perspective based on the volume of products representing the weight of the agricultural sector. Among these trend models, the most optimal options were selected (Fig. 2).

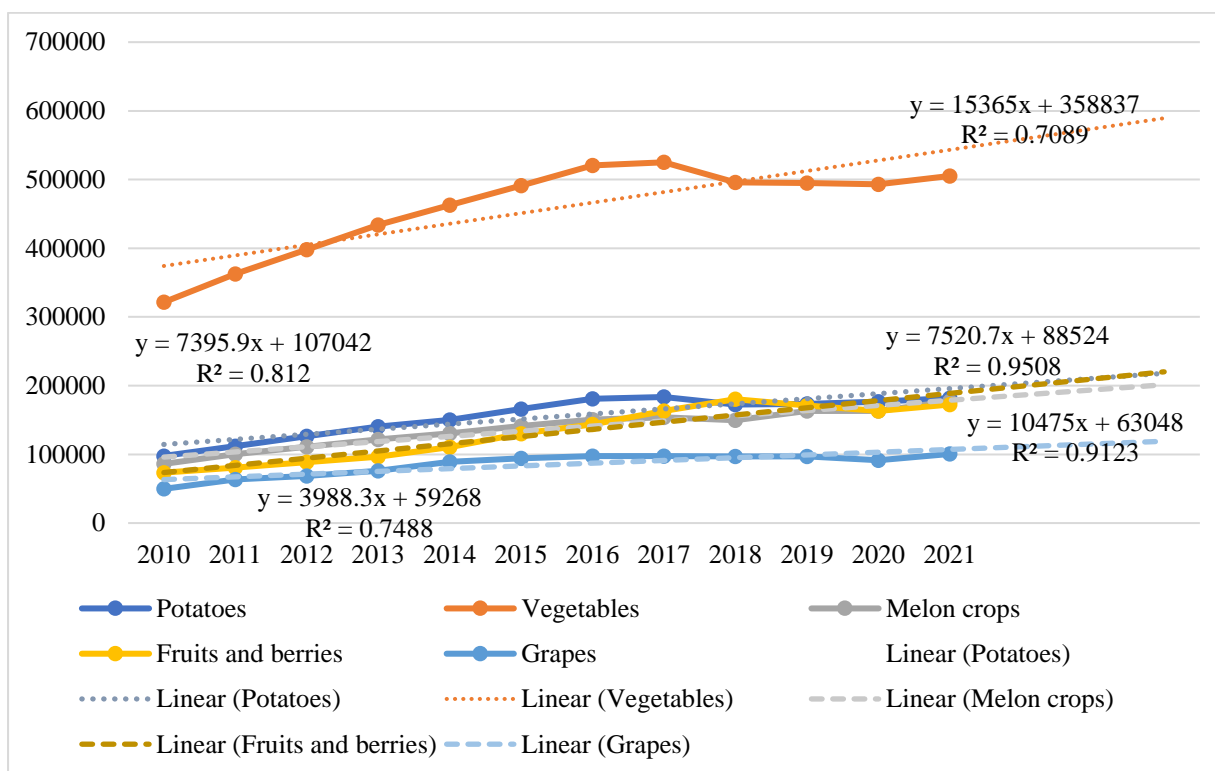


Figure 2. The graph of the trend model of products grown in the agricultural sector in Kashkadarya region

Equations of the trend model were created based on the data of the trend model graph (Table 4).

Table 4 An alternative equation for the trend model

Product type	Trend model	R ²
Potatoes	$y=7395,9x+107042$	0,812
Vegetables	$y=15365x+358837$	0,7089
Polycrop	$y=7520,7x+88524$	0,9508
Fruitsandberries	$y=10475x+63048$	0,9123
Grapes	$y=3988,3x+59268$	0,7488

Using the obtained trend models, the forecast indicators of the dynamics of the volume of products grown in the agricultural sector for 2022-2024 were determined (Table 5).

It can be seen from the table that in 2024, the volume of potato production will increase by 120% compared to 2021, the volume of vegetable production will increase by 116.7%, the volume of sugarcane crops by 113.7%, the volume of fruit and berries by 127.8%, and the volume of grape production by 118.4%. reach was assessed prospectively using trend models. However, it should be noted the dynamics of population growth and the level of food supply are much higher than the growth of food production, and such a conclusion can be drawn if the level of food production increases , the level of daily provision of the population may be at a much lower level. In order to prevent this situation, we believe that it is appropriate to allocate funds to this sector, provide subsidies, and provide preferential loans.

Table 5: Production dynamics and forecast indicators of agricultural products in Kashkadarya region (tons)

№	Type of product					The volume of production growth compared to 2021		
		2021	2022*	2023*	2024*	(in percent)		
						2022	2023	2024
1	Potatoes	181776,1	203189	210585	217981	112	115,8	120
2	Vegetables	504988	558582	573947	589312	110,6	113,7	116,7
3	Melon crops	177112	186293	193814	201335	105,2	109,4	113,7
4	Fruits and berries	172334	199223	209698	220173	115,6	121,7	127,8
5	Grapes	100579	111116	115104	119093	110,5	114,4	118,4

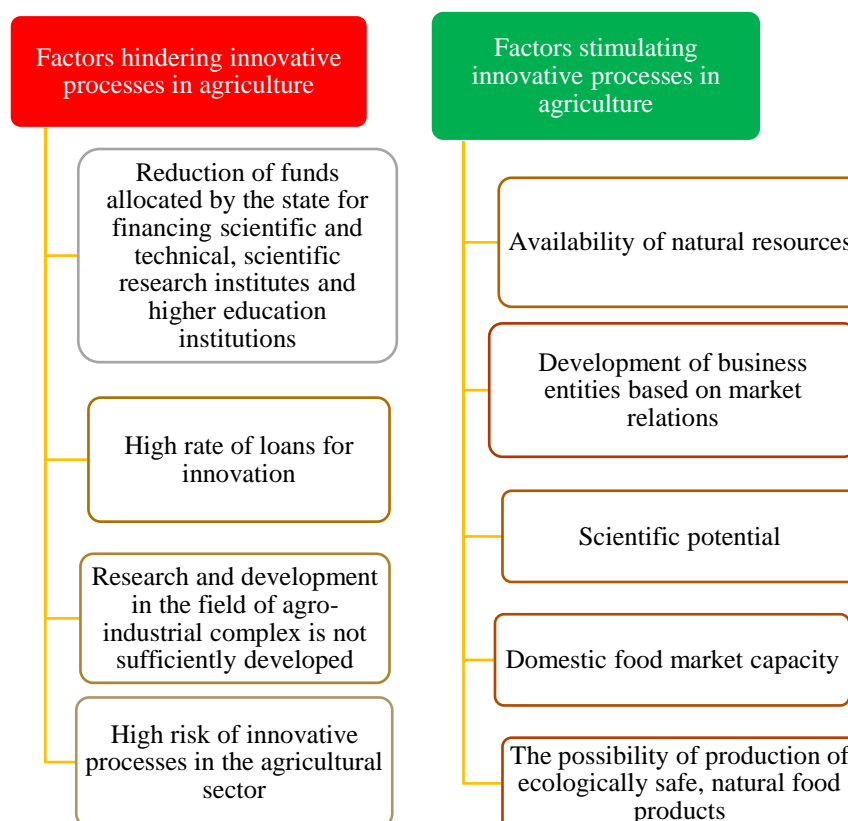


Figure 3. Positive and negative factors affecting innovation processes in agriculture

4. Conclusion

During the analysis of the factors affecting the innovative development of the agricultural sector, they were divided into positive (supporting the development of innovative processes) and negative (impeding innovative processes) factors, (Fig. 3).

Currently, Uzbekistan has all the necessary socio-economic bases for deepening innovation processes and strengthening the innovation base. However, there are problems in the transition of the agricultural sector to the path of innovative development, or in other words, the implementation of innovative projects at the scale of one or even several farms, because farms and subjects processing agricultural products are currently slowness of participation in the ordering of scientific research works and funding of research, the inability of the economic entity to carry out research in the development of advanced innovative technologies and the financing of scientific research, development of agricultural products for the use of new technology, new varieties producers and specialists do not have enough experience, it is necessary to use the services of scientists and specialists, and farmers face certain difficulties in processing and selling products.

MAIN DIRECTIONS OF INNOVATIVE DEVELOPMENT OF THE CROP FIELD					
TECHNOLOGICAL	TECHNICAL	SELECTION-GENETIC	ORGANIZATIONAL-ECONOMIC AND SOCIAL		
Adoption of resource-saving technologies	Improving the technical support system	Increasing the genetic potential of plants	Improvement of management system	Improvement of processes of specialization, integration and cooperation of production of plant products	Improvement of social infrastructure and working conditions of workers
Improving the system of quality tillage and crop care	Application of multifunctional (universal) combined machines and equipment	Establishing a system of updating seed varieties and replacing them with effective seeds	Organization and development of innovative infrastructure	Integration and cooperation of production of plant products	Improvement of the system of labor organization, labor payment and labor incentives
Improvement of the system of protection of agricultural crops from weeds, pests and diseases	Creating compact energy-saving mobile machines with high productivity	Development of new varieties suitable for each region with high yield, disease, pest and weed resistance	Development and adoption of the innovation transfer mechanism to development	Formation of production and realization associations	Improving working conditions
Application of highly reproductive, localized seeds that are responsive to	Organization of optimal technical and mechanization service	Use of developments in biochemistry, physiology	Provision of innovative projects with investments	Improvement of product sales channels	Improvement of social infrastructure services in rural areas

new technologies	centers in regions based on specialization	y and genetics in breeding		
Introduction of advanced methods of irrigation	Automation and computerization of management of agricultural technical systems		Formation of an innovative personnel training system	Diversification of production activities
				Organization of vertically integrated production

Figure 4. The main directions of innovative development of the field of plant breeding

Problems such as insufficient demand of producers for innovative developments prepared by scientists of higher educational institutions and scientific research institutions, lack of organic connection between them, irresponsibility of some producers of agricultural products hinder innovation in agriculture can be included among the factors that hinder the processes.

The problems of innovative development are of particular importance for Uzbekistan, because only innovative development with wide and effective use of new resource-efficient, advanced technologies ensures rapid economic growth, taking into account the preservation of the environment.

In addition to other considerations in the innovative development of the agricultural industry in the current conditions, we consider technical and technological innovations to be the most important direction in the conditions of agricultural modernization (Fig. 4). The development and implementation of technical and technological innovations will be aimed at reducing the current and investment (capital) costs of production, maximum adaptation of the used techniques and technologies to the natural climate, soil and specific characteristics of each region.

The experience of developed countries shows that one of the main conditions for increasing the efficiency of agricultural production is a high level of technical equipment, the use of advanced technologies, that is, innovative activity is the basis of the economic strategy of developed countries. Supposedly, 30% of economic growth is provided by increasing labor costs, 40% by increasing labor productivity, and 30% by applying innovative technologies.

5. References:

1. Decree of the President of the Republic of Uzbekistan dated October 23, 2019 No. PD-5853 "On approval of the strategy of agricultural development of the Republic of Uzbekistan for 2020-2030".
2. Balabanov I.T. Innovation management //Textbook. M.: Russian Academy of Entrepreneurship. – 2001.
3. Calculated by the author based on the data of the Statistics Committee.
4. Gulyamov S.S. The importance of innovative economy in overcoming the consequences of the pandemic. Finance and Banking (electronic scientific journal). The pandemic and the economy. (special issue) №2. 2020. www.journal.bfa.uz.
5. Information from the Kamashi District Department of the Economic Development and Poverty Alleviation Department of the Kashkadarya Region.
6. J. Schumpeter's theory of innovation and subsequent theories.
7. Khamraeva S.N. Analysis of the trend of innovative development of agriculture and its current state // Scientific electronic magazine "Economics and innovative technologies". No. 2, March-April, 2016.
8. S. Khamraeva and N. Ochilova. Analysis of factors to increase the efficiency of the use of peasant farms and the land of the field. E3S Web Conf., 392 (2023)
9. S. Khamraeva and N. Ochilova. Assessment of innovative potential of farmers and homestead land owners. E3S Web Conf., 480 (2024) 03003

10. Khamraeva S.N. Innovative development of rural infrastructure: Monograph; - T.: "Economy-Finance", 2017. - 256 p.
11. Lapin V.N. 3D modeling of fracture initiation from perforated noncemented wellbore //Spe Journal. – 2013. – Т. 18. – №. 03. – С. 589-600.
12. Moysiadis V. Smart farming in Europe //Computer science review. – 2021. – Т. 39. – С. 100345.
13. Santo B. Innovation as a tool for economic development. Moscow: Progress, 2005.
14. Vodachek L., Vodachkova O. Strategy of innovation management at the enterprise. Moscow: Economics, 1989. 167 p.
15. Портер М. Инновационная глобализация и российская конкурентоспособность через призму «Алмаза. Текст научной статьи по специальности «Экономика и бизнес».
16. Твисс Б. Прогнозирование для технологов и инженеров. М.: 2000. – стр. 255.
17. It was developed by the author based on the data of the Statistics Department of Kashkadarya region.
18. http://www.innovation.uz/docs/FORMING_NIS.pdf
19. <https://finance.uz/index.php/ru/fuz-menu-economy-ru/2851-sergej-voronin-stimulirovanie-innovatsionnogo-razvitiya-v-respublike-uzbekistan>
20. <https://habr.com/ru/post/57528/> J. Schumpeter's theory of innovation and subsequent theories.
21. <https://lex.uz/docs/5182749>. Order of the Ministry of Health of the Republic of Uzbekistan, No. 0007-20 dated 24.12.2020.
22. https://www.wipo.int/pressroom/ru/articles/2017/article_0006.html // Global Innovation Index 2017: Switzerland, Sweden, the Netherlands, the United States and the United Kingdom lead the rankings.
23. https://www.wipo.int/pressroom/ru/articles/2017/article_0006.html<http://www.fao.org/3/c-i6273r.pdf>