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INTERNATIONAL PRACTICES OF IMPLEMENTATION OF INNOVATIONS IN AGRICULTURE

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Abstract:

The most serious problem today is the rapid population growth rate on our planet, which makes it more difficult for farmers and other agricultural producers to provide food for the population. Innovation plays a key role in stimulating this process in the agricultural sector. The authors in their article consider innovation processes in agriculture and world experience of their implementation.

Keywords: Agriculture, innovative development, strategy, products, world experience

With the development of the society, all spheres that are related to human activities have begun to develop. Society, scientific and technological progress are moving forward day by day. Today, we can say that people almost every day invent something new, trying to make life easier: smart homes, smart cars, multifunctional gadgets and much more are being created.

One of the most important fields of human activity is agriculture. Without food, people will not survive, which means that agriculture and the products derived from this sector occupy a first place in people's primary needs. As the world's population grew, people realized that our planet was unable to feed so many of its inhabitants, at which point many experts in the field were thinking of how best to use agricultural resources, and to introduce ever-new systems of intelligent agriculture that will help to provide food for the entire population of the earth.

In particular, smart agriculture helps not only to ease human labor but also increases crop yields and helps to reduce food costs.

The agrarian transformations in the world make it necessary to develop new priorities in the development of agriculture in the Republic of Uzbekistan. The priority objectives of agrarian policy are to increase the efficiency and competitiveness of the agricultural sector in domestic and world markets, active integration into the world system and transition of the agro-industrial complex to an innovative way of development. The transition to an innovative economy should ensure the modernization of agricultural production.

In order to ensure the competitiveness of products, the modern economies of the world are making a decisive contribution to the transformation of scientific knowledge into a new consumer value with qualitatively higher properties than its counterparts on the world market. This is why innovation is an important factor in the development of the national economy [1].

Innovation processes are crucial for the agricultural sector of the economy as they bring about real modernization. The main document defining the state policy in the sphere of innovation in Uzbekistan is the Strategy of innovative development for 2022-2026, the program implementation is aimed at qualitative change of the structure of the economy. Within the framework of the strategy, a holistic system of measures aimed at developing the innovative potential of science, technology and innovation, increasing the innovative activity of business and innovative companies, the introduction of innovative technologies in the activities of government, etc. [2].

In recent years, the world has faced various challenges, such as climate change, the effects of the pandemic, economic downturns and conflicts, in such a period it is important to maintain the balance and provide the ordinary population with food, to address these challenges and UNFAO presented the Strategic Framework 2022-2031 at its 170th session in 2022.

Nowhere is the need for science and innovation more acute than in climate change adaptation and mitigation. The Science and Innovation Strategy will strengthen the new FAO Climate Change Strategy. It will help to improve the productivity, quality, diversity, efficiency and environmental sustainability of agro-food systems. In order to effectively implement the Strategy, FAO together with its members and partners, will make every effort to

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mobilize the necessary knowledge, partnerships and financial resources [3].

According to FAO, the leading countries in the agricultural sector are China, India, USA, Indonesia, Brazil, Russia and Iran which together produce about 50% of agricultural production. But not all of these countries use smart agriculture.

Agriculture is the most extensive field of human activity, most of the technological processes of which are carried out on large open land areas, where nature systematically makes its adjustments. The constant presence of elements of risk, the instability of production processes due to local time and weather constraints require managers and specialists of farms, farmers have available alternative management solutions for implementation in extreme conditions, and in their absence - quick search and application of science recommendations and best practices for technological conversion of production, Manoeuvring machinery and other resources to mitigate or eliminate environmental hazards. In this process, rural producers should be assisted by various innovative formations: agro-industrial parks, scientific and production systems, associations, small enterprises, cooperatives, information and consultation centres and points, Other new institutions and organizations.

The innovation process in the agro-industrial complex has its own specificity, due to the characteristics of agro-industrial production, and, above all, its main component - agriculture.

The main features of the formation and development of the innovation process in agriculture include the following:

- The multiplicity of agricultural products and their processed products, the significant difference in the technology of their cultivation and production;
- High dependence of agricultural production technologies on natural and weather conditions;
- A large difference in the period of production for individual types of agricultural products and their processed products;
- A high degree of territorial fragmentation of agricultural production;
- The separation of agricultural producers (at all levels) from organizations producing scientific and technical products;
- Different social levels of agricultural workers;
- Multiplicity of different forms and connections of agricultural commodity producers with innovative formations;
- The absence of a clear and scientifically based organizational and economic mechanism for transferring the achievements of science to agricultural producers and, as a result, the industry lags significantly behind in mastering innovation in production.

An analysis of the experience of countries with developed agriculture shows that government policy in the field of agricultural complex is a key factor for the development of industry. The complex of methods and tools for regulating innovation processes is quite wide, although its options and solutions differ from country to country.

The innovation process in the agro-industrial complex poses many problems that require prompt resolution. It is obvious that the introduction of achievements of science and technology is only one of the components of the innovation process, which covers the creation, development, implementation and dissemination of new technologies both for traditional products and for the production of such types of products that have scientific and technical novelty and satisfy new social needs.

In developed countries, the primary increase in agricultural production is achieved through the implementation of scientific and technological achievements. As a result, state support, especially in the field of strategic areas of scientific and technical progress and fundamental research, as well as in the dissemination of scientific and technical ideas, has become a critical component of the financial basis of innovative development. Basic principles of state support: price regulation, taxation, lending, stabilization of the agricultural market. An analysis of government measures taken in developed countries has shown that for the development of agriculture it is necessary to use the following factors:

- Targeted budget financing of the agro-industrial complex;
- Formation of the organizational and economic mechanism of functioning of the agro-industrial complex on an innovative basis;
- Strengthening the role of public organizations in fostering innovation;
- Development of regional innovative programs of development of agro-industrial complex;
- Improving the personnel training system in the field of innovation activity, providing increase of innovation activity of organizations and commercialization of the results of research.

The strategy for innovative development of the agro-industrial complex, its main goals, objectives and mechanisms for supporting innovative programs and projects should be determined on the basis of the

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state's innovation policy, the main task of which remains to mobilize the capabilities of the scientific and technical potential of the industry for the technical and technological renewal of domestic agriculture. It is necessary to do everything possible to ensure that the further development of agriculture is based on an innovative model that ensures its faster growth compared to other sectors of the economy.

The basic principles of state support remain unchanged: the traditional state regulation of prices and farm incomes, taxation, credit, stabilization of the market of agricultural products, conducting research in the field of agriculture.

An analysis of the experience of countries with developed agriculture shows that public policy in the field of agriculture is a key factor to agricultural development. The range of methods and tools for government regulation of the innovation process is quite wide, although its options and solutions in different counties have their own characteristics.

As one of the most successful countries in agriculture, the Netherlands, despite its territory, is one of the leaders in agricultural exports. The Netherlands is a world leader in innovative technologies in agriculture. «In 2022 the Netherlands exported agricultural products for 122.3 billion euro. This is more than 17 percent more than in 2021» [4].

The Netherlands has achieved all this with new, modernized and innovative technologies. Wageningen University (Wageningen Universiteit) is one of the main generators of breakthrough technologies and belongs to one of the best agro-industrial research institutes in the world. The outstanding achievements of the country in agriculture are due to this university.

The use of «digital technologies» in agriculture is very common in the Netherlands, which certainly helps ease the work of farmers and increase their productivity.

One of the innovative farms in the Netherlands is considered Duijvestijn Tomaten which grows tomatoes developed a system of self-sufficiency of the farm at the expense of geothermal waters. The inverters are kept at optimum temperature for the growth of tomatoes; heating is due to the energy of geothermal waters, the hot strata of which lie undergrowth in the Netherlands.

RijkZwaan is a family-owned company that leads breeders around the world. The peculiarity is that the company does not use methods of genetic engineering, which in our time is rare.

Agricultural innovation is known for its milking robotic milking system which does the work for a person: cleans milks and performs the necessary procedures after milking.

New technologies help increase yields using a minimum of water resources. For example, production of reusable plastic trays for extracting water from the air. Recycled plastic containers reduce plant water demand by 50%.

The most well-known development in agriculture is that which helps farmers get rid of pests without the use of chemicals. Work is being done to breed various species of spiders, bees and flies that can destroy harmful insects. Technology helps farmers to export because international regulations restrict trade in processed cereals. This phenomenon is being exploited by many developed countries in the world.

A novelty in agriculture was that the world's first structured salmon fillet was created on a food-grade 3D printer. Scientists copied fish molecules using legume proteins and algae extracts. This technology has already been patented, with the salmon rich in protein and vitamins B, Omega-3 and Omega-6. They also note that the printed salmon tastes better than the real salmon because it contains no antibiotics, hormones, micro plastics, mercury, and toxins. The plant counterparts of seafood have two goals: saving fish from extinction, and more sustainable nutritional alternatives.

Many know that one of the main enemies of crops is insects which destroy some part of the crop leaving farmers with fewer yields. In Brazil, the technology Motofog for such cases was invented. Since the terrain of the country is rather difficult, entrepreneurs have faced a problem: some areas are difficult to reach by car. After thinking about it, they came up with an effective and genius simple technology - Motofog.

That is, now instead of cars will be used motorcycles, to which a special container with insecticides will be attached at the back, which automatically sprays the substance.

Also, Brazilians have come up with a means to protect plants from pests, it would seem that many people are engaged in a similar business, but here the difference of the Brazilian tool is that the drugs Provivi do not kill the insects themselves, but act on their pheromones. It is with the help of pheromones that insects look for partners for reproduction. It turns out that Provivi drugs violate this process, pests cannot mate, and their number is gradually decreasing.

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Another development for which Brazilian scientists have become famous is a portable 3D camera for livestock analysis, which was created by the Olho do Dono Company. When an animal passes by it, the camera reads information about its weight, build and other parameters. The device also gives advice to the owner about the readiness of livestock for sale. This development greatly simplifies the activities of farmers.

The analysis of the experience of the mechanism of stimulation of increasing the receptivity of agricultural production to innovation showed that the management of scientific and technical progress in the agro-industrial complex of developed foreign countries is complex. At present, world agriculture is moving towards a more knowledge-intensive production.

This is particularly evident in the countries reviewed. All these factors allow developed countries to balance the domestic food market in terms of demand and supply, easily penetrate leading world markets and crowd out domestic producers. The experience of the reviewed countries with a developed market economy shows that science, science-intensive technologies, active innovation activity are the initial driving force of all economic life, and the agricultural production growth is ensured by the implementation of scientific and technical achievements. Suffice it to say that in recent decades about two thirds of the increase in agricultural production has been achieved through the implementation of scientific and technological progress.

Having studied the various developments of the above-mentioned countries, it is possible to conclude that each country, while struggling with similar problems, is seeking ways to overcome them, taking into account its possibilities and the peculiarities of its climate and geographical location, because these are key factors when it comes to agriculture.

The experience of these countries has shown that the innovative development of agriculture helps to lighten the workload and improve the quality and quantity of products produced, which is no less important because by 2050, scientists predict that farmers will have to produce 1.5 times more products [5].

Thus, the widespread use of innovative technologies in Uzbek agriculture opens up wide prospects for increasing its efficiency. It creates new opportunities for significant productivity growth, increased productivity, higher returns and shorter payback times. In addition, the results of the activities of agricultural enterprises increase the investment attractiveness of regions and provide opportunities to attract additional investments.

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