The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.8366312

MAIN ASPECTS OF INNOVATIVE PROCESSES IN AGRICULTURE OF AZERBAIJAN

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Abstract

Improving the sustainability and efficiency of production in the agriculture requires a transition to a qualitatively new innovative and investment socio-economic stage. Only in this way it will be possible to solve macroeconomic issues and achieve rapid economic development, production of high-quality and competitive local products, and food security of the country. Supporting sustainable agriculture requires particular attention to innovation and investment in research, technology and potential development. Innovation and investment are important tools for improving the standard of living and well-being of people, while ensuring social justice and equal access to opportunities in rural areas. In this regard, the paper discusses the issues of ensuring the innovative development of agriculture in Azerbaijan and the factors influencing it. Agricultural research and development by the public and private sectors has been cited as a key factor that can increase agricultural productivity. The paper is to evaluate the effectiveness of innovation processes, analyze the level of research and development expenditures in the agriculture of Azerbaijan and, on this basis, determine the possibilities for further activites. Innovative activity ensures the development and implementation of scientific and technological achievements, the release of competitive new products using modern equipment and technologies, and the achievement of maximum profit. They lead to creation of new requirements, cheaper products, attraction of investments, creation and conquest of new markets. Failure to use the existing agricultural potential at the proper level creates problems in providing the country's population with food. In this regard, the issues of applying innovations in agriculture are becoming more relevant every day.

Keywords: Productivity, İnnovation, İnvestment, Agricultural Research and Development.

INTRODUCTION

Improving the sustainability and efficiency of production in the agricultural sector is one of the main conditions for ensuring food security. As we know, agriculture is the main source of livelihood for the poor people living in the world. In this regard, the promotion of agricultural growth and development is a critical aspect of economic policy in many countries. The leading goal in the development of this area is to increase the material and social well-being of people. Ensuring efficiency and sustainability in every sector of the economy is an indispensable condition for development, but the problem of ensuring them is especially acute in agriculture, since the stability of the socio-economic and political situation in the country depends on the state and level of development of this industry. Sustainability and efficiency are important parameters in the development of any sector of the economy. In addition, recent events, such as the COVID-19 pandemic, as well as the war between Russia and Ukraine, have made the issue of food security even more relevant in the global space.

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In 2015, member countries of the United Nations adopted the Sustainable Development Goals (SDGs), known as the Global Goals, to end poverty, protect the planet and ensure that by 2030 all people live in peace and prosperity. The Sustainable Development Goals are the foundation for a better and more sustainable future for all people. The main goals of the SDGs are to address the global challenges we face, including poverty, inequality, climate change, environmental degradation, prosperity, peace and justice.

Innovation and investment are the main conditions for achieving the Sustainable Development Goals. Because ensuring development depends on the presence and interaction of these two main factors. In this regard, in order to achieve the goals by 2030, new development methods are required, including innovation in development projects. Innovation as a key tool for achieving SDGs 2 (end hunger, food security, improve nutrition and promote sustainable agriculture) and 9 (build resilient infrastructure, promote inclusive and sustainable industrialization and innovation) has and plays an important role (UNCTAD, 2017). However, the low investment attractiveness of the agriculture does not allow farmers to search for innovations and their implementation, which in turn leads to the use of extensive technologies, the use of energy-intensive equipment and old farming methods.

The processes taking place on a global scale, the current state of the country's agriculture, the incomplete use of the existing agricultural potential create certain difficulties in providing the country's population with a range of food products. In general, the increase in the world's population at the expense of developing countries exacerbates the problem of food security for the population, which is already acute in these countries. In this regard, the issues of applying innovations in agriculture are becoming more relevant every day.

In this context the purpose of the paper is to evaluate the effectiveness of innovation processes, analyze the level of research and development expenditures in the agriculture of Azerbaijan and, on this basis, determine the possibilities for further activites.

MATERIALS AND METHODS

In this paper used a systematic approach to determine the factors contributing to the development of innovative agricultural production and statistical comparative analysis methods to assess the research and development expenditures in agriculture of Azerbaijan. The paper uses data from the Ministry of Agriculture and the Azerbaijan State Statistics Committee. In the process of working on the paper were used the relevant laws and national programs of the state, such as Law of the Republic of Azerbaijan “On Science”, “Strategic roadmap for the production and processing of agricultural products in the Republic of Azerbaijan”, the Orders “Azerbaijan 2030: National Priorities for Socio-Economic Development” and “On Ensuring Coordination in the Field of Innovative Development in the Republic of Azerbaijan”.

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RESULTS AND DISCUSSIONS

In modern times, innovation activity involves the development of various areas, as well as the development of the agriculture. Agricultural innovation can be described as the process by which people or organizations use new or existing products, processes, or organizational tools to improve efficiency, competitiveness, resilience, and environmental sustainability, thereby contributing to food security and nutrition, economic development, and the sustainable management of natural resources. J.G. Silva notes that innovation is fundamental to supporting family farming, reviving rural areas, creating attractive jobs for young people, making communities thrive and achieving Zero Hunger (FAO, 2018). The current state of agriculture in our country, the level of food production, in terms of providing the population with food products, highlights the modernization of agriculture. Innovative development of the economy as a whole and agriculture requires the adoption of an appropriate legal framework. The provisions relating to innovation in our country are reflected in a number of legal acts and government programs.

The Law of the Republic of Azerbaijan "On Science" dated June 14, 2016, defines the state policy in the field of scientific innovations. There is includes the formation of the state innovation system and the definition of strategic directions for its development; creating favorable conditions for financing innovative projects, attracting and promoting investments and carrying out appropriate organizational work; creation and development of scientific and innovative entities - integration centers (zones) of science, education and entrepreneurship, technopolises, science and technology parks, technology incubators, innovation funds, a bank of innovative information; by participating in the creation of competitive, high-tech industries, ensuring guaranteed sales markets, encouraging and protecting access to foreign markets; study of science-intensive, innovative development experience and problems of developed countries, their use in the preparation and implementation of the country's development strategy (ARLS, 2016).

The creation of an innovative economy in the country, including the stimulation of the production of competitive products, the creation of the necessary mechanisms for the implementation of innovative activities, the implementation of state support measures and the creation of an appropriate legislative framework in order to ensure the effective use and development of innovative potential were included in the development concept "Azerbaijan 2020: a Look into Future" and "Strategic roadmap for the production and processing of agricultural products in the Republic of Azerbaijan". The concepts continues state support measures to stimulate the intensive and effective development of the agricultural sector in accordance with international practice (ALF, 2016; SRRA, 2016).

On January 10, 2019, the President of the Republic of Azerbaijan signed an Order on ensuring coordination in the field of innovative development in the Republic of Azerbaijan. The purpose of the order is to support the country's innovative development and draw up the innovation strategy project of the Republic of Azerbaijan by involving reputable international consulting companies in the relevant field (IDRA, 2019). Other legislative act in this area was the Order "Azerbaijan 2030: National Priorities for Socio-Economic Development", approved by the

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ISSN 1533-9211
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President of the Republic of Azerbaijan on February 2, 2021, which provides for the issues of ensuring the economic development of the country on an innovative basis, improving the welfare of the population, as well as modernizing human capital and expansion of digitalization (NPRA, 2021).

Undoubtedly, at the final stage of the implementation of the innovation and investment process, the common task for agricultural enterprises is to achieve a positive financial result. F. Hayek considers the main goal of market management to be profit maximization, which is a priority for every innovative entrepreneur, and argues that "the desire for profit allows you to use resources efficiently" (Hayek, 1992).

The current concept applied to agriculture defines agricultural innovation as a new or improved product (product or service), process, system or model created for consumers, enterprises, value chains, markets or organizations to achieve the goals of the agricultural sector. This concept implies that innovations are environmentally friendly, economically and socially beneficial. According to B. White and T. Shi, agricultural innovations are created to increase productivity, quality and quantity of products, diversify them and reduce prices for consumers (Wright and Shih, 2010).

The development and dissemination of innovations covering various areas of agriculture is facilitated by the current state of the markets and favorable policies, as well as developments in the field of science and communications. Agricultural innovations are not only new or improved products, but also models and systems that have a positive social impact. Innovation areas in developing countries are more focused on production and distribution, while developed countries are focused on the supply of resources. Along with public sector investment in agricultural innovation, private sector investment is increasing day by day. The impact of innovation spans the institutional, political, scientific and industrial domains. The issues of evaluating the effectiveness of investments in innovations are reflected in many studies (Barrientos-Fuentes and Berg, 2013).

Analysis of efficiency being the most widely used method for assessing the impact of agricultural innovations. However, the role in other aims, such as food security, environmental protection and poverty reduction, is increasing in modern conditions, such integrated and multidimensional approaches go beyond the economic approach. Moreover, specific models with predictive advantages and high accuracy replace or complement the classical socio-economic approach.

Public investment in agricultural research has become the main vehicle for increasing the productivity of this sector. Higher agricultural productivity - getting more agricultural output for the total amount of inputs used - is increasingly replacing greater use of resources (such as land and labor) as the main source of growth in crop and livestock production. This approach is valid for both developed and developing countries of the world.

The private sector is increasing investment in agricultural innovation, and the national innovation system is receiving economic and political support from governments. For example, in India in 2002, 85% of investment in research came from the state and only 15% from the

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private sector. However, from the 1990s to 2010, the production of seeds and plant biotechnology grew more than tenfold, as did the production of agricultural machinery, veterinary medicine, sugar production and biofuels (Srinivasan and Jha, 2002).

Investment is an important factor in increasing productivity. Productivity is a key determinant of farm income, which improves people's wellbeing and reduces pressure on limited natural resources. Increasing productivity is essential for long-term improvement in living standards. Achieving efficiency both within the sector and within companies is necessary and difficult for all countries, developed and developing alike. Investments in agriculture can significantly increase the productivity of agricultural labor and land. Given the limited scope for land expansion, agricultural growth will depend heavily on productivity gains supported by private investment in physical, human and intellectual capital. Private individuals, mostly farmers, are the largest source of investment in rural areas. However, as mentioned above, investments in public goods such as institution building, productivity research, rural transport, health care, education and social protection, which are necessary for food security and sustainable development, are mainly carried out by the state (Mustafayeva, 2021).

The other sources that can increase agricultural productivity include agricultural research conducted by the private sector and research conducted in different countries. However, these sources do not replace public sector research in agriculture. Private agricultural research and development is not interested in significant investment in many vital areas such as environmental protection, food security and nutrition. However, several studies show that public and private agricultural research complement each other.

Besides, agricultural practices depend on environmental and local spatial conditions. This means that research done in one country cannot be applied to another country without significant changes. Technological progress in high-income countries located almost entirely in temperate zones cannot significantly reduce the cost of production in developing countries with different climates.

Public agricultural research institutions in high-income countries are leading the way in fundamental advances in agricultural science that enable major technological innovations, which in turn increase agricultural productivity. Neither the private sector nor developing countries can completely replace this role. Research shows that in high-income countries (USA, Israel, Japan, South Korea, Canada, Australia, and New Zealand), public expenditures on agricultural research has grown rapidly since the 1960s. However, in recent decades, the growth rate has slowed down significantly and is now declining. Public expenditures on agricultural research and development in these countries rose from $3.9 billion in 1960 to a peak of $18.6 billion in 2009, but then dropped to $17.5 billion by 2013. Among high-income countries, the US continues to lead in terms of public expenditures on agricultural research and development. However, the share of US agricultural expenditures fell from 35% in 1960 to less than 25% in 2013 (Heisey, 2021).

It should be noted that almost all countries of the world have identified the transition to a digital and “green” economy as a priority goal. This issue is also reflected in the UNESCO Science

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ISSN 1533-9211
DOI: 10.5281/zenodo.8366312

Report 2021. Thus, it was concluded that countries need more investment in research and innovation in order to succeed in the digital and green transition. Since 2014, more than 30 countries have increased research spending in line with their commitment to the Sustainable Development Goals. Despite this progress, eight out of ten countries are still dependent on foreign technology, investing less than 1% of their GDP in scientific research. Since the private sector will need to drive much of their dual digital and green transition, countries are striving to make it easier for the private sector to innovate. Some governments are also trying to attract or retain researchers through pay rises, greater international exposure and other measures (UNESCO, 2021). A new report from the USDA Economic Research Service looks at long-term trends in public investment in agricultural research and development in high-income countries and how it is driving economic growth. The report notes that investment in public agricultural research and development in low- and middle-income countries is significantly lower. Evidence of insufficient investment in agricultural foreign direct investment (FDI) in developing countries is also measured by the Intensity Ratio (IR). This indicator is used as a measure of a country's research activity and is defined as the ratio of investment in agricultural research and development (excluding the commercial private sector) to the share of agricultural gross domestic product (Nin-Pratt, 2021). In our country, public spending on science in recent years has been stable at the level of 0.5-0.6% of state budget expenditures, which is 0.2% of GDP. Of course, this is a very low percentage compared to developed countries. In modern conditions, various countries allocate a large amount of investment to innovation activity and scientific research, for example, about 3.1% of Germany's GDP, 3.4% of the USA's GDP, and 3.3% of Japan's GDP are spent on scientific research and development. This indicator is significantly lower in transition economy countries (OECD, 2020). In developed countries, the state controls the development of scientific and technical progress and determines the directions of development. It is the control of the state that prevents the excessive monopolization of fields, which in turn creates the basis for the rapid development of innovations.

Table 1: Key science and research indicators

Indicators	Years							
	2005	2010	2015	2016	2017	2018	2019	2020
Number of research organizations	146	145	141	135	137	133	132	127
Expenditures for science from the state budget:								
mln AZN	28.8	92.8	113.2	110.2	109.8	117.8	122.3	143.6
relative to state budget expenditures, in percents	1.3	0.8	0.6	0.6	0.6	0.52	0.50	0.54
Internal R&D expenditures:								
mln AZN	27.5	92.8	120.9	124.7	129.9	147.5	163.9	162.5
% in GDP	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Fixed assets used in research and work, mln AZN	79.9	97.6	114.2	129.5	157.4	149.1	162.8	159.5

Source: The State Statistical Committee of the Republic of Azerbaijan

ISSN 1533-9211

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According to the indicators (Table 1), the number of research and development organizations decreased by 10%, so the number of organizations in 2015 was 141, and in 2020 - 127. The number of people employed in scientific research and work also decreased by 12%. This can also be explained by objective reasons. Since the reason for these reductions was a number of reforms carried out in the field of science, a stagnation in scientific activity in the country due to the COVID-19 pandemic. In addition to them, as we see from the table, with an increase in state budget expenditures on science, this indicator continues to be 0.2% in relation to GDP. In developed countries, this figure is 2-3% of GDP.

Table 2: Expenditures on R&D

Indicators	2005	2010	2015	2016	2017	2018	2019	2020
Domestic current expenditures on R&D- total, thous. AZN	26468.1	87816.1	118643.3	120782.3	127997.0	144997.9	161299.9	160 981.7
including in the fields of								
Natural Sciences	6 901.3	23406.2	26917.3	30696.6	30533.2	33465.9	40468.2	40990.6
Technical Science	11402.4	38030.7	56706.7	52476.7	56281.1	61934.0	59759.6	55473.9
Health Sciences	1 561.5	3 635.9	10020.8	8949.3	8859.1	13635.5	18028.6	13871.5
Agriculture	1 738.6	7 601.2	6808.4	7611.6	9472.5	10581.8	15117.8	19217.3
Sosial Sciences	2 126.5	8 020.8	6783	9097.2	10102.9	9012.7	7706.9	10217.2
Humanitarian Sciences	2 737.8	7 121.3	11 407.1	11 950.9	12 748.2	16 368.0	20 218.8	21 211.2

Source: The State Statistical Committee of the Republic of Azerbaijan

According to the data (Table 2), domestic expenditures on research and development in our republic increased by 74% compared to 2010, the main part of these expenditures was 34% for technical sciences, 25% for natural sciences, 13% for humanitarian, 6% social sciences and 12% agricultural sciences. In 2020, compared to 2015, the expenditures of agricultural research and work increased by 2.8 times from 6 808.4 thousand AZN to 19 217.3 thousand AZN.

According to the statistics, domestic expenditures on scientific research and development amounted to 160 981.7 thous. AZN, 94% of these expenditures fell on the state and only 6% fell on the private sector and higher education institutions.

ISSN 1533-9211

DOI: 10.5281/zenodo.8366312

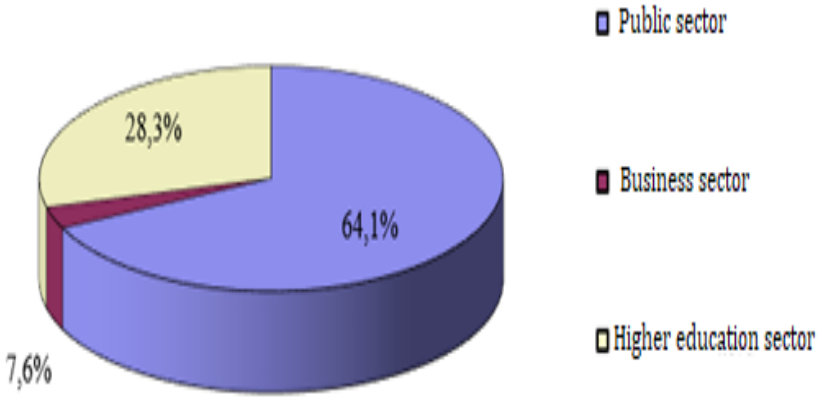

Figure 1: Distribution of R&D organization's by sectors on the end of 2020.

An analysis of R&D spending across countries by funding source shows that in recent years, more than half (59%) of total EU spending has been funded by business, a third (29.3%) by the state, and the rest by foreign funds 9.4%. Overall, about 70% of R&D spending in OECD countries is funded by business. As we can see, these indicators in our country are completely different (OECD, 2019).

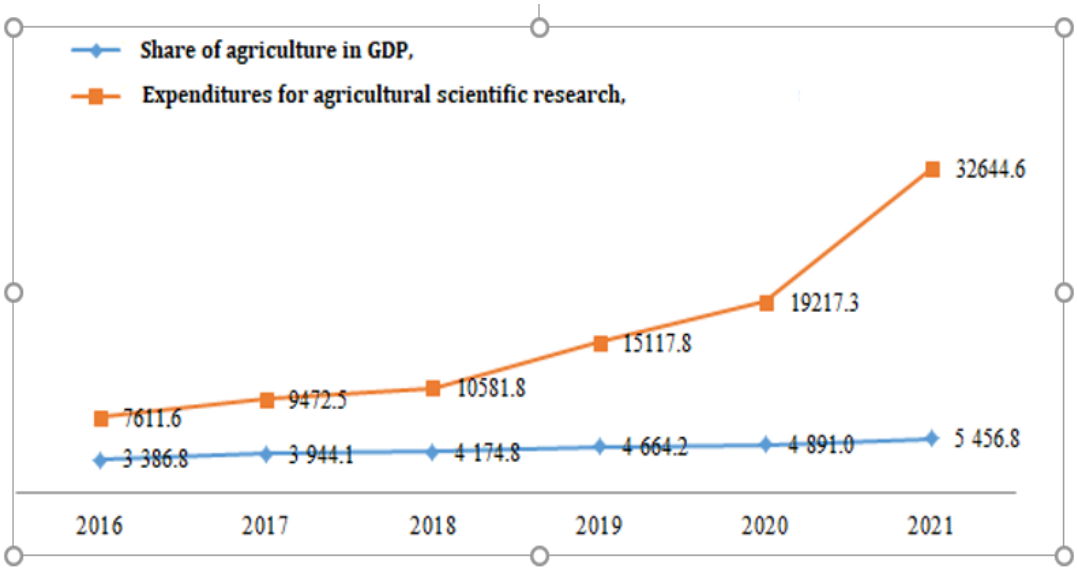

Figure 2: The share of agriculture in the GDP (mln. AZN) and expenditures for agricultural scientific research (thous. AZN)

Source: Complited based on the State Statistical Committee of the Republic of Azerbaijan

Based on the data (Figure 2), we can say that despite the low level of research and development expenditures in agriculture, we are seeing an increase in the level of agricultural share in GDP, which can be explained by the improvement of state support measures for agricultural producers.

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ISSN 1533-9211
DOI: 10.5281/zenodo.8366312

One of the directions of stimulating the cooperation of scientific research and technological activity in the field of innovation is the development of the public-private partnership tool. These constitute the foundation of innovation activity, stimulate investments in R&D as a tool for increasing the efficiency of the national innovation system, and enable efficient use of material, technical, personnel and financial resources. The implementation of important projects and programs requires the establishment of an institutional and organizational alliance between the state and business, where the resources, advantages and opportunities available to the participants complement each other. They are achieved through a rational division of risks and productivity, as well as financial security between them. Such a tool allows to accelerate the cycle of innovation, starting from the conduct of scientific research to the production of full-fledged high-tech products.

Development of public-private partnership models and mechanisms in the modernization of agriculture, selection of methods and tools that increase the sensitivity of agribusiness to innovative development, allow it to take maximum advantage of the positive influence of external and internal factors, as well as the state, entrepreneurs and investors, taking into account the characteristics of production in each field improvement of the mechanism of coordination of interests - requires appropriate theoretical and methodical support.

The pioneer country in the use of the public-private partnership mechanism was the United States. For the first time, such a new organizational form of interaction was introduced during the implementation of the federal program in the field of defense. Most of the federal contracts implemented under the program are not with defense enterprises, but with individual commercial companies. The technologies of such commercial companies are quick to implement, cheaper in price and quick to respond to changes in market demand. Later, this organizational form was used by other state institutions. In the 1990s, the Clinton Administration required all federal agencies and institutions to consider the possibility of attracting non-budgetary funding sources when planning scientific, technical and innovation programs. In this step, business structures were involved in scientific and technical work and created conditions for ensuring bilateral interests (Popper and Wagner, 2002).

The most widespread form of partnership between the state and business is the joint development, implementation and financing of targeted programs. In the process of achieving strategic goals, there was a need to develop partnership forms such as the formation of investment funds, the creation of special economic zones, clusters, and technoparks. At the same time, the state cooperates and integrates with businesses in the implementation of socio-economic, including agrarian policy, in transferring part of the functions of efficient management of industries, in providing conditions for the promotion of local agricultural products and food products to local and foreign markets.

If we look at foreign experience, we see that there are different forms of public-private partnership. In many countries, the ministry of agriculture and its affiliated agricultural research institutes play an important role in funding and conducting agricultural research. Thus, in 1973, the Brazilian Agricultural Research Corporation (Embrapa) was created by the Brazilian federal government to develop the technological basis of the tropical model of agriculture and

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ISSN 1533-9211
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animal husbandry. The initiative was tasked with ensuring Brazil's food security and leadership in the international food, fiber and energy markets. Today, Embrapa is one of the world's largest agricultural research corporations, with half a century of contributions focused on innovation, efficiency, sustainability and social integration. One of the activities of the institution is the evaluation of the profitability of investments in agriculture (EMBRAPA, 2022).

In Argentina, the National Agricultural Technological Institute (INTA) focuses on value chain research and technological innovation to increase the country's competitiveness and develop rural areas. NATI focuses on innovation and combines opportunities to promote interagency cooperation, knowledge and technology exchange through communication systems. Institute has 15 regional centers, six research centers (Agriculture, Natural Resources, Family Farming, Agricultural Research, Political, Economic and Social Sciences, Veterinary and Agronomic Sciences) and 53 experimental stations (FAO, INTA, 2022).

In addition to state research centers, the universities of these countries are also actively involved in conducting research and research (R&D) in the field of agriculture. Agricultural research and studies in the countries of the European Union are mainly conducted in universities specializing in agriculture or natural sciences (University of Natural Sciences in Estonia, University of Life Sciences and Technology in Latvia, Wageningen University in the Netherlands and University of Agricultural Sciences in Sweden).

There are 43 universities and 2 TUBITAK's (the Scientific and Technological Research Council of Turkey) institutes conducting agricultural research and work in Turkey. In order to support food and agriculture work, food and agriculture research centers have been established in a number of universities. The main purpose of such centers is to conduct scientific research on food and agriculture, to cooperate with universities and industry on educational topics, to conduct and manage scientific applied research to solve problems in food industry and agriculture. The priority directions are planning of scientific and technological research that can help Turkey in the field of agricultural development, preparation of necessary funds and implementation of applications, organization and conduct of theoretical and practical work, training programs, as well as improvement of publishing and information activities, promotion of scientific research and university research. In addition, it is to carry out research and investigation on topics needed by the industry and other institutions and organizations, to conduct research on socio-economic and political changes in the region, and to prepare food and agriculture projects.

Industries play a major role in research and development for agriculture, especially in the improvement of various factors of production such as seeds, fertilizers, pesticides, veterinary as well as agricultural machinery and equipment. In a number of countries, special attention is paid to research in such fields. Some food industry companies are also active, but many have low research capacity. In addition, the number of new companies providing specialized advice and services to farmers on new technologies is increasing. In particular, these are companies that provide services related to the application of digital technologies in this sector (OECD, 2019).

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ISSN 1533-9211
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It should be noted that 5-7-year strategic plans in the field of agriculture are developed within the national innovation strategies of the above-mentioned countries, which reflect sustainability, climate change, food availability and other vital issues. Increasing productivity remains an important goal of agricultural innovation systems in many countries, but the range of goals has generally expanded to include sustainability and climate change, food and health, and other social issues. And here, of course, the partnership of the state and private institutions plays a special role. The work carried out in this field is of special importance from the social and ecological point of view. Evaluation of the research and innovation policy helps to increase the efficiency of public funds and, in a broader sense, to improve the activity of the scientific research and innovation system, its contribution to the solution of broad socio-economic and environmental problems, as well as to respond to global challenges.

A number of works have been done in terms of the development of public-private partnerships in our republic. Thus, the State Entrepreneur Partnership Development Center was established within the structure of the Small and Medium Business Development Agency of the Republic of Azerbaijan in 2019. The center's activities include the following:

- İmprovement of the legislative framework and institutional infrastructure related to state-entrepreneurial partnership;
- Preparation, coordination and implementation of projects and programs on public-private partnership;
- Analyzing projects on state-entrepreneurial partnership and supporting the appropriate ones.

The existing mechanism of public-private partnership in the implementation of targeted field programs does not ensure the systematic implementation of innovative processes in all fields and is characterized by local changes in individual sectors only in a small part of the territories. As a result, the budget funds allocated for the renewal of animal breeds and plant varieties, technical and technological modernization, and personnel training do not produce the expected results. Therefore, the biopotential of land, animal breeds and plant varieties is used only up to half, and the level of profitability of the produced products does not provide expanded reproduction on an innovative basis, which ultimately reduces its competitiveness.

The main goal of innovative development in modern conditions is to take new progressive ideas from other countries, including in the field of biotechnologies, genetics and breeding, along with their own scientific and technical work. It is also directly related to the establishment of the national innovation system. Ensuring the joint cooperation of relevant institutes and institutions related to increasing the scientific-technological level of local production.

The development of public-private partnership for the purpose of ensuring the country's food security is of particular importance. In order to achieve long-term development, the relationship between science and industry should be developed, and science should be directly transformed into a productive force. Only in this way is it possible to achieve innovative and sustainable development in agricultural production.

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In terms of ensuring the innovative development of the agricultural sector in our country, as well as the development of public-private partnerships and agricultural innovation systems, the importance of institutions operating under the Ministry of Agriculture is extremely important. These institutions include Agricultural Research Center, Agricultural Innovation Center, Cropping Scientific Research Institute (SRI), Animal Husbandry SRI, Vegetable SRI, Fruit and Tea SRI, Viticulture and Winemaking SRI, Plant Protection and Technical Crops SRI. There is a great need to establish and develop relations between scientific research institutes and private companies. The main goal here is to ensure the mutual interests of private companies and research institutes.

The Agricultural Innovation Center of the Ministry of Agriculture of the Republic of Azerbaijan plays an important role in the application and dissemination of innovations in agriculture. The aim of the center is to develop agriculture in the Republic of Azerbaijan on an innovative basis, to provide access to innovation, to promote technological innovations and methods based on innovative solutions, and to provide methodological and practical support and services for the application of innovative technologies in the field of agriculture.

The main activities of the center are as follows:

- Collection and coordination of innovative ideas, proposals and projects in different directions of agriculture in one center, analysis of the obtained results, organization and promotion of their application in private and state farms;
- İmplementation of measures related to the application of innovations in the agricultural field, the use of modern technologies and equipment, as well as information on the most advanced practices and innovations used in the international and agricultural field;
- Participation in monitoring, expertise and evaluation of local and international projects implemented in the agricultural field;
- Participation in the implementation of innovation-related components of international projects;
- İmproving the innovative technological material and technical base in the agricultural field and coordinating the activities of electronic information provision systems (aım, 2023).

Among the events carried out by the center, innovation festivals, innovation and startup competitions are also important.

In terms of supporting innovative development, it is necessary to highlight the Entrepreneurship Development Fund of the Republic of Azerbaijan. The main goal of the Fund is to provide financial support to entrepreneurial subjects in Azerbaijan, to improve state support mechanisms for the development of entrepreneurship, and to develop cooperation between the state and entrepreneurs. Thus, one of the priority activities of the Fund is the support of production and innovation-oriented projects in the field of agriculture. The fund offers small, medium and large concessional loans.

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From the point of view of the development of public-private partnership in our republic, it is possible to emphasize the creation of agricultural parks. In modern conditions, it is impossible to apply innovations to the entire agricultural field, and in such conditions, point innovation activity is the way out, that is, the region's innovation potential is concentrated in specific areas and the creation of new technology approval bases. The experience of agroparks shows that their direction depends on the specificity of the agricultural area. Each such formation organized in market conditions unites scientific institutions and higher education institutions, personnel training centers, all stages from applied work to production, application and assimilation, and is delivered to the consumer in the form of intellectual and material products. Production, research, processing and mixed agroparks are selected depending on the priority of the type of activity. Research agroparks are directed to scientific and technical research, development of technologies and their application to production. Research agroparks aim to create and spread agro-innovations, creating a foundation for the creation and development of a new generation technological structure.

The Charter on Agroparks was approved according to the Decree of the President of the Republic of Azerbaijan on December 21, 2021. The main goal here is to ensure the development of the non-oil sector, production, processing, packaging of competitive agricultural products based on innovative technologies and methods, and support of agrarian entrepreneurs, as well as creating an attractive environment for local and foreign investments in the agricultural sector. In order to increase the investment attractiveness of agricultural parks, residents are exempted from seven years of income, property and land taxes. Agroparks have been established in many regions of the republic and this process is ongoing.

According to the Ministry of Economy, information for 2022, 51 agricultural parks and large farms with a total project cost of 2.3 billion AZN are being created in 240 thousand hectares of land in 32 regions. 34 of them specialize in plant breeding, 14 in plant breeding and animal husbandry, 1 in animal husbandry, and 2 in the processing industry. 44 agroparks have already started to operate, and design work is underway in others.

Until now, 184 mln. AZN was allocated by the Entrepreneurship Development Fund of the Ministry of Economy for the creation of 25 agricultural parks. The fund provided a preferential loan in the amount of 1 billion AZN for 27 agricultural parks. 26 agroparks that have received an investment promotion document have been given many confirmation documents for the import of machinery, technological equipment and facilities, and according to these confirmation documents. In recent years, 1.3 billion AZN private investments have been made in agricultural parks. Agroparks also play an important role in increasing the level of employment. In 2021, 138 000 tons of wheat, 68 000 tons of barley, 94 000 tons of grain corn, 117 000 tons of sugar beet, 71 000 tons of corn for silage, 19 000 tons of cotton and 27 000 tons of alfalfa will be grown in agricultural parks in 2021. 33 thousand tons of milk and 2.3 thousand tons of meat were produced. During 2018-2021, intensive orchards with a total area of more than 7 600 hectares were planted in the agricultural parks. 17 000 tons of apples, 921 tons of olives, 960 tons of almonds, 934.7 tons of pomegranates, 1.356 tons of grapes, 715 tons of peaches were produced from these orchards in 2021 (SSCRA).

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.8366312

The creation of agroparks in different regions of the country, among other things, is important in terms of spreading advanced practices among farmers. One of these parks is Yalama agropark in Yalama village of Khachmaz region. The production and processing facilities of the agropark, which is a private pilot livestock farm on a land area of 523 hectares, use machinery and equipment manufactured in the USA, Sweden, Italy, Germany and Turkey. The creation of agroparks will promote the development of entrepreneurship in the agricultural field in the country, accelerating socio-economic development, production of competitive agricultural products, increasing the export potential and expanding its geography, creating national brands, increasing the innovative capacity of small and medium-sized farmers, a coordinated unified system in the field of agriculture, as well as it plays an important role in the formation of integrated relations between producers, processors and consumers, in the training of qualified personnel in the agricultural field and the opening of new jobs.

Thus, despite some works carried out in the direction of the development of public-private partnership in our country, there is still a lot of work to be done in this field. Thus, special attention should be paid to the issues of expanding the scientific content in the activity of agroparks, that is, deepening their cooperation with agricultural scientific research institutes and other relevant institutions, applying scientifically based approaches, and establishing the interaction of science and practice. In this cooperation, the interests of each party must be satisfied so that the necessary result can be obtained in the future. By ensuring the development of fundamental and applied science, and technology transfer, the order of innovative products should be formed according to the development strategy of each field based on the contract.

Taking into account the above, there is a great need to prepare the strategy of the state innovation policy in the agricultural field. The main role in the preparation of this document falls to the Ministry of Agriculture and its institutions. Here, first of all, taking into account the achievements of science, including the improvement of innovation activities, the process of creating innovations and contributing to their implementation, priority directions in the development of the agro-industrial complex should be determined, and the following issues should be reflected:

- Formation of an innovative system of the sector based on the creation and establishment of relations between the state, scientific-research institutes and producers;
- Assistance in renewal and expansion of production, as well as in the application to it of advanced achievements of science, technology and management decisions;
- Ensuring the functioning of the higher and secondary education system that prepares personnel, as well as mechanisms for increasing the qualifications of existing personnel;
- Support for scientific-research works by agricultural research institutes;
- Funding of scientific organizations and producers who need it;
- Creation of legal conditions for the development of innovative processes, especially copyright protection and intellectual property protection;

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.8366312

- Application of tax and customs benefits to support scientific activity;
- Regulation of innovation processes at the regional level;
- Ensuring social and ecological orientation of innovations;
- Formation of a favorable innovation environment, including the creation of agrotech parks, including the popularization of the creation and application of innovations.

CONCLUSIONS

The innovative potential of agricultural producers is an important object for assessing the effectiveness of innovative activity and is a complex of internal resources and production components. At the same time, the internal component determines the ability of the subject of innovation to attract resources and integrate both the scientific sphere that produces innovative ideas and the market that consumes the finished innovative product, and the resource component characterizes it. To introduce innovations, it is necessary to assess the availability and level of organization of the effective use of various types of resources.

Many developing countries imitate developed countries because they are weak in innovation, especially due to lack of funding. That is, instead of inventing new technologies, these countries acquire existing technologies and adapt them. According to the level of development and research potential, the innovation promotion policy implemented in many countries can be divided into 4 groups:

Technology transfer;

İncreasing domestic technological potential;

Strengthening the innovative focus of small and medium-sized enterprises;

Development of new companies (“start-ups”) based on high and medium technologies.

The development of agriculture in our country will be possible through the use of innovations. In order to ensure the innovative development of the agriculture, a comprehensive program should be developed with the definition of regulatory measures by the relevant state institutions. It should be noted that, in comparison with other countries, our country has advantages for the rapid development of agriculture, and the modernization of this sector is possible in the following areas: production-technological, breeding-genetic, organizational and managerial innovations.

As we can see, the expenditures of research and development in our country are at a very low level, which indicates that, despite the work done in this area, the policy of promoting innovation in our country is insufficient. Of particular importance is the development of public-private partnership in order to ensure the food security of the country. To achieve long-term development, it is necessary to develop the relationship between science and industry. Science should be directly converted into a productive force. This is the only way to achieve innovative and sustainable development of agricultural production.

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ISSN 1533-9211
DOI: 10.5281/zenodo.8366312

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