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SMART FARMİNG AND MAİN DİRECTİONS OF THE İNNOVATİON POLİCY

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Abstract

This article considers current status and development trends for the smart farming technologies in the context of urgency increasing of the efficiency of the agriculture under the scarcity of land and water resources and on-going climate change in Azerbaijan Republic. The current development of smart farming in the country have been analyzed by the reviewing of agriculture practices, including state measures, subsidy policies, investment promotions and institutional structures. Based on these analyses, recommendations for the enlargement of smart farming technologies applications in national agriculture have been elaborated. It is recommended that this policy is supported in four directions, including widespread use of innovative smart farming technologies, improvement of irrigation and land reclamation infrastructure; development and application of alternative energy sources in agriculture; application of precise farming solutions for high crop productivity in combination with land, water and energy-saving technologies and development of post-harvesting and food processing infrastructure.

Keywords: *smart farming, climate change, new technologies, irrigation, state program, subsidy policy, agro-park, institutional structure, innovation, industrial park.*

Introduction

In Azerbaijan currently the population leaving in the rural areas is 47,2% (4707600 persons by 01 January 2019) from the total population and their main income source remains farming [1]. The oil boom in 2005-2015 has led to the regional development, significant elimination of poverty, in particular strengthening of support for totally one million refugees and internally displaced persons due to occupation of the mountain Karabakh and surrounded territories. To keep welfare from the steep decline in oil prices on the world market, starting from late 2014 the government has announced acceleration of agriculture development as a major strategic policy. Targets are defined to increase agricultural production contributing to the country's export by rational use of the land and water resources and application of the advanced farming technologies.

Starting from 2015 under the government support new big size farms-agroparks has been establishing [2]. They are agro-industrial type farms with the aim of to organize efficient agriculture

business by application of the smart farming technologies, including modern irrigation systems. Decision on establishment of 51 numbers of agro-parks has been made, from which 34 agro-parks are already operational [3]. The government policy to promote small scale farms is also have been developing to keep welfare in the rural places.

In spite of the support measures, the efficiency of the small farms is still low due to the inefficient irrigation infrastructure and water losses, poor agricultural land management, low productivity of the soils, salinity problems and weak financial and institutional capacities of farmers and service organizations.

The challenges originated from the climate changes, including water shortage and temperature raise also require to be seriously taken into consideration. The adaptation and mitigation of the agriculture to the recent climate changes, application of the green economy tools in agriculture is possible by enlargement of the smart farming technologies in agriculture sector in upcoming years. This article addresses the status of the smart farming and outlines future actions for strength agriculture business opportunities in Azerbaijan Republic.

Materials and methods

The object of research is to analyses of the existing situation and drive possibilities for the enlargement of the smart farming applications along the country. As a sources of information official data of state organizations, statistical bodies, as well as external reliable sources were used.

In order to conduct investigations, the main study areas of the smart technologies- irrigation sector, intensive livestock and poultry, greenhouses and smart fishery farms has been considered. Subsidy policy and institutional structure also have been reviewed.

Considering current demand and climate change trends in the country the measures for the enlargement of the smart farming application have been substantiated.

The generalizations are made for the whole territory of the country. From methodological point of view application of the smart technologies is considered as an important measure for efficient usage of the land and water resources, integral part of the mitigation and adaptation policies against the climate changes, high efficiency of the agriculture production, easy operation of the farming technologies starting from farm and up to the higher levels of management.

Discussions and analysis

1. Smart farming overview

During the Soviet period, especially after early 1980s, modern agricultural technologies, such as irrigation, drip, injection, irrigation systems, were applied in vineyards and in the cultivation of cereals and fodder crops. Some experimental work has been carried out for underground irrigation systems. The automatic control systems have been applied in main channels. According to statistics, before the collapse of the Soviet Union, about 40,000 hectares of land were irrigated with sprinkler systems and 930 hectares with drip irrigation.

Traditionally, greenhouses were established in Azerbaijan to grow greens, vegetables and flowers for domestic consumption and export to Russia, Ukraine and other republics.

But in the early years of independence, the existing irrigation infrastructure received less attention, and operating costs were significantly being reduced, existing schemes and equipment for sprinkler irrigation and drip irrigation system destroyed. Some of the equipment for regulating the canal's flow also failed. After land reforms, part of the big irrigation systems partially lost their technological integrity and the operation and technical control of the systems were carried out according to newly applied market principles.

The irrigation sector has received relatively more support after the oil boom period had started from 2004. Establishment of the new big size agro-parks - agro-industrial type of farms has accelerated this proses.

According to Agro-research Center Ministry of Agriculture the area under the pivot systems are reached to 38425 ha in the end of 2018 ***(Table 1.)***.

Table 1. Irrigated areas under the sprinkler irrigation

District name	Pivot irrigation points	Area, ha
Agjabadi	58	4382.30
Ağsu	24	1446.05
Beylagan	72	3297.50
Bilasuvar	96	3955.39
Jalilabad	2	104.48
Fuzuli	10	501.62
Hajigabul	86	5519.32
Imishli	57	2578.96
Ismayilli	1	94.49
Kurdamir	15	632.44
Qax	9	323.24
Saatlı	19	949.79
Salyan	15	695.30
Shamakhi	7	430.88
Samux	74	4434.20
Tovuz	129	7656.44
Khachmaz	8	383.91
Yevlax	17	1039.31
Total	**699**	**38425.63**

Source: *Agricultural Economics Research Center, Ministry of Agriculture, 2019.*

Since 2010, establishment of “Azerkosmos” JSC- national satellite operator in Azerbaijan, smart farming projects have been implementing with the various partners such as Ministry of Agriculture, Ministry of Ecology and Natural Resources and others [4].

Especially in agriculture sector the following projects have been implementing:

1. Monitoring of the sown area (agricultural lands under the plants) by satellite images;
2. Assessment of the crop development, including by phase of development, irrigated areas, yield forecasting;
3. Determination of the soil quality and salinity assessment by the application of the remote sensing technologies;
4. Evaluation of the water volumes collected in the water reservoirs;
5. Monitoring of actual on-going tillage/ irrigation of the field;
6. Monitoring of the agricultural lands for farms subsidy planning.

The development of the greenhouses also accelerated due to the increase of demand for the fresh vegetables during winter period both in the local and international markets.

Thus, we can see that some smart elements of agriculture were applied earlier in Azerbaijan and now the potential for their development is quite favorable, therefore, the acceleration and enlargements in their implementation is advisable.

The smart application in agriculture has not yet widely spread in Azerbaijan due to the following reasons:

1) Land fragmentation and weak capacity of farmers for application of the smart technologies;

2) Insufficient knowledge of farmers on benefits and possibilities of the smart solutions in running of their business;

3) Weak development of the local production for smart solutions and lack of qualified persons, especially in the regions;

4) Weak infrastructure development, including logistic, storage/refrigerator, supply centers in the regions;

5) Limited access to the bank loans and difficulties in mortgage procedures especially for the assets/lands in the villages.

Due to the necessity to increase agricultural production efficiently and environmentally friendly in upcoming years, the following sectors are important to be taken into consideration for smart farm applications in the country:

1. Irrigation sector;
2. Intensive livestock and poultry;
3. Greenhouses;
4. Smart fishery farms.

Next sections analyses above sectors from point of the smart farming technologies applications.

Irrigation: Most of the irrigation network consists of the earthen canals' systems, which efficiency is technologically low. The traditional irrigation methods, widely applying currently in the regions such as furrow, border strip irrigation also lead to excessive water losses at field level. The government provides currently subsidies for the irrigation water consumption. Therefore, enlargement of advance technology applications is critical issue in Azerbaijan to be taken into consideration for the irrigated agriculture in upcoming period.

Livestock and poultry: During 2015-2019 the number of the animals is not changed too much, except poultry head increase by 5,7% and bee units by almost two times ***(Table 2.)***.

The dependence the livestock products from import are shown in Table 2.

Table 2. Level of self-sufficiency in livestock products, percent

Years	2015	2016	2017	2018	2019
All kinds of beef and poultry	94.7	87.9	84.7	82.7	82,5
Beef and meat products	91.8	93.5	86.3	85.1	86,1
Mutton (goat)/ meat products	99.3	98.7	98.0	98.1	97,6
Pork and meat products	17.8	7.0	5.6	5.5	5,3
Poultry and meat products	98.6	79.1	79.7	75.9	74,6
Milk and dairy products	84.3	87.7	86.1	86.7	86,3
Eggs	99.7	98.8	100.5	101.5	101,8

Source: *Level of self-sufficiency and import dependency indicators. Statistic Committee of Azerbaijan Republic: https://www.stat.gov.az/source/food_balances/?lang=en*

As we can observe, during the last four years dependence from the import slightly increased, except pork and milk/dairy products. The government intends to increase local production by adopting of the state program on husbandry development. The draft state program is currently under consideration, which intends construction of the cattle breeding farms with the capacity of 51,000 head livestock, farms for small cattle for 100 thousand head of livestock, 20 leather collecting points, 20 wool mills and 3 wool processing plants, as well as a number of other supportive measures during the 5 years[1]. Thus, intensive farming technology development is necessary to increase livestock production and protection of biodiversity in pastures to prevent overgrazing and greenhouse gas emissions into the atmosphere. The farms with the intensive livestock have been established inside of the some agro-parks establishing after 2015.

Smart fishery farms*:* According to statistic data Azerbaijan has dependence on fishery products about 15%.

Table 3. Level of self-sufficiency in fishery products, percent

Years	2015	2016	2017	2018
Fish and fish products	77.6	82.3	81.2	83.1

Source*: Level of self-sufficiency and import dependency indicators. Statistic Committee of Azerbaijan Republic. https://www.stat.gov.az/source/food_balances/?lang=en*

[1] Source: Agro Science and Innovation Center Ministry of Agriculture. http://aeim.gov.az/en/pages/10/75

Potential to produce more fish meat in the country is quite high. The Azerbaijan Fish Producers and Processors Association has been established in the country on the initiative of individuals and legal entities engaged in fishing, with the support of the Ministries of Ecology and Natural Resources and the Ministry of Agriculture. The main goal of the "Azerbaijan Fish Producers and Processors Association" is to achieve the development of fisheries, the use of new technologies in fisheries and the preservation of ecological balance through the efficient use of natural resources in the country[2].

***Agro-parks and visions for their development*:** The establishment of agro-parks in Azerbaijan began in 2014. In accordance with the Presidential Decree "On measures to improve governance and accelerate institutional reforms in the agricultural sector", the first agro-park was opened in Shamkir in November 2014. Agro-parks are farms where agricultural production and primary processing enterprises are located together. Therefore, such farms are often called agro-industrial farms. Such farms facilitate the application of new innovations and modern technology in agriculture. From an economic point of view, it is difficult to apply new technologies and modern experience in small farms. Therefore, the large farms are suitable for application of the new technologies. As we know there are two forms of creating large farms; the first of which are cooperatives, and the other of which are large farms. Cooperatives are the most common form in the world. Agro- parks can also be attributed to large farms, but they are not just agricultural enterprises. Along with the agricultural sector, industrial enterprises and services are concentrated here.

Agro-parks play an important role in the intensive production, transportation, storage and sale of agricultural products. As agricultural products are perishable, the sales process must be fast. However, in most cases, it is not possible for farmers to sell their products on time, and as a result, the product spoils. Agro-parks create favorable opportunities for the purchase, sale and profitability of high-quality products by creating production, processing and logistics services in a centralized single area with the application of modern technologies. The conditions created in agricultural parks reduce farmers' infrastructure costs.

By 2020, the number of operated agro-parks in our country has increased to 33. So far, 33 agro-parks and large farms with a total state support of 1.1 billion AZN on 153,000 hectares have started operating in the first phase. The activities to create another 18 agro-parks are going on. The new agro-parks will be 109,000 hectares with state support 1.3 billion AZN. In general, it is planned to create 52 agro-parks in our country. These farms will cover an area of 262,000 hectares in 33 rayons of the country [16].

Currently all agro-parks management is organized to the Sumqayıt Chemical-İndustrial Park, Ministry of Economy and supportive measures is elaborating to turn them into sustainable farms and strength their business activity.

Government support -subsidy policy in agriculture: Starting the 2019 the subsidies is providing through the Subsidiary Information System (SIS), which is a subsystem of EAIS (Electronic Agriculture İnformation System). Farmers who are not registered in this system are not be able to receive subsidies. Farmers have access to a personal account created in EAIS via mobile phones, tablets and computers, will enter information about their farms, forecasts and apply for subsidies without contacting the administration. Information about farmer's land plots registered with

[2] Source: Ministry of Agriculture. https://www.agro.gov.az/az/news/azerbaycan-baliq-istehsalcilari-ve-emalcilari-assosiasiyasi-ictimai-birliyi-tesis-olunub

EAIS, on planted or planned crops, as well as information of animals to be subsided is reflected in the cabinet. The mechanism of calculation of subsidies considers applying the coefficients to the base amount as defined in 200 AZN. In order to make flexible decisions on the field, the Agricultural Subsidy Council has been established and the Council implements determination of the coefficients [17].

Subsidies for the sown structure: The Government of Azerbaijan has newly adopted new subsidy policy for the sown structure. According to the new rules the subsidies applied for the crop growing per ha depend on the type of the crop planted. It covers all crops and connected to the basis amount 200 AZN. Therefore for the various crops the subsidy amount differ from each other.[3] According to the decision of the Agrarian Subsidy Council, intensive orchards include the following orchards with drip irrigation system:

- Orchards planted with apple, pear, cherry (cherry), plum, peach (nectarine), apricot, cherry and almond plants with a minimum of 650 vegetative seedlings per 1 hectare;

- Orchards with a minimum of 450 seedlings per hectare of persimmon and pomegranate plants;

- Orchards with a minimum of 650 seedlings per hectare of lemon, orange, tangerine and feykhoa plants;

- Orchards with a minimum of 330 bushes per hectare of hazelnut plant;

- Orchards with a minimum of 330 seedlings per hectare for medlar, cornelian cherries, oleaster, fig, walnut, olive and other crops.

Subsidies for vineyards and intensive orchards have been applying planted from 2019. For other orchards, planting subsidies is provided at a factor of 1.2. In other orchards to be subsidized, the minimum number of seedlings planted per hectare is 90.

Subsidies for breeding animals: The amount of the state subsidy for the breeding animals is 60% of the price. The remaining amount of the price is paid by the bank as a loan.

Subsidies for the imported farming equipment: According to the rules the subsidies currently the amount of the subsidy is 40% of the customs value of the imported equipment. First payment is at list 20% from the price and the remaining amount of the price is paid by the bank as an interest-free loan.

2. Local market: main suppliers of the smart farm equipment

In Azerbaijan there are local and several foreign companies supplying the smart agriculture technologies. Most of them operate in the market by establishment of the local office or through local partners ***(Table 4.)***.

Azerbaijan intends to modernize the agricultural sector by application of advanced technologies to increase the export potential of the country. In order to have successful solutions at different sector levels, various associations have been establishing in the country. Special Department for working with these associations has been established in the Ministry of Agriculture. The main goal is to support the local business community in access to the loans, technologies as well as to find reliable partners from the world. The associations also have been established to listen to the problems of the

[3] Source: AKIA. http://akia.gov.az/az/single/36

local companies and prepare favorable changes into the local legislation for easy business development in the country. Associations can also help foreign companies, willing to enter the Azerbaijan market to find local partners for future cooperation and implementation of the joint projects.

Table 4. Information on some local companies for smart applications

Company	Products
Polyagro LLC	Irrigation equipment.
SMINAGRO	Smart solutions.
Agromarket Service LLC	Smart solutions Valley Irrigation Systems/Control Panels; Agricultural machinery; Sprayers; Seed sowing machines; Cultivator, Plowing machines, Feed mixers etc.
Growgroup	Mini plants for agrarian complex; Procuring (greenhouses, hothouses); the specialized stock and accessories; Micro cells and mineral additives; Plant growing; Equipment for plant growing; Smart and control systems for plant growing; Agricultural production.
METAK	Mini plants for agrarian complex; Procuring (greenhouses, hothouses); Growing fruits and vegetables; Compact equipment for garden work; Inventory, garden equipment.
NPC Agro Cons. and Eng.	Plant growing; Progressive technologies; Smart and control systems for plant growing; Inventory, tools and equipment for garden.
NETAFIM	Irrigation equipment; Drip irrigation systems.
ONURPLAST LLC	Irrigation equipment; Machines and the equipment for irrigation; Drip irrigation systems; Water treatment systems.
PRIOR LEASING	Animal industries/Poultry/Fish industries; Agricultural production; Agricultural technique and equipment; Irrigation equipment; Leasing.
SHABRAN-D	Irrigation projects preparation, installation works and material selling.
SUMGAIT TECHNOLOGY PARK	Plant growing; Machines and the equipment for plant growing; Agricultural technique and equipment; Cultivating techniques; Irrigation equipment; Machines and the equipment for irrigation; Drip irrigation systems; Spare parts for tractors.
Green Farms Azerbaijan	Establishment of green farms.
ARIS LLC	Selling all types of irrigation systems and installing the latest technologies for gardens, villas and sown areas.
Azertexnolayn LLC	Irrigation systems; valves; automatic flow valves; control valves; ball valves; pipes; polyethylene pipes; polypropylene pipes; metal pipes; steel tubes; fittings; water pipe fittings; gas pipe fittings.

The Associations are the right places to organize business discussions with both of the local and foreign partners for smart technologies. They also are able to connect the business community, including the private and public sectors, interested banks as well as foreign companies.

3. Plans for smart agriculture development in Azerbaijan

The GOA has adopted "State Program of socio-economic development of the regions of the Republic of Azerbaijan in 2019-2023" approved by Decree of the President of the Republic of Azerbaijan № 500 from 29 January 2019. According to the action plan of this document some examples from the activities for the smart farming is shown in ***Table 5*** [17].

The smart village projects are intended to be implemented in Barda and İsmayilli rayons (task numbers 7.3.10.2 and 7.3.23.2) to support technology applications in rural places and welfare in the village.

Table 5. Some examples for Smart farming activities intended in the State Program of socio-economic development of Republic of Azerbaijan

No	The name of activity	Time	Executors
7.1.69.	Construction of new agro-gardens (157 ha) and installation of drip irrigation system on the Salyan-Bilasuvar section of the New Alat-Astara highway outside the road protection zone; Construction of new agro-gardens (45 ha) and drip irrigation system in the administrative territory of Salyan region (Shirvan National Park) of Alat-Astara highway; Construction of new agro-gardens (35 ha) and installation of drip irrigation system outside the protection zone of the Baku-Guba highway 34-42 km (Absheron region).	2019-2023	Ministry of Ecology and Natural Resources, Local Rayon Executive Authorities
7.1.75.	Continuation of measures to clean up contaminated lands including: Rehabilitation of contaminated area in the territory of Surakhani region, around the former iodine-bromine plant (100 ha), planting of greenery and construction of drip irrigation system	2019-2023	Ministry of Ecology and Natural Resources, State Oil Company

7.1.86	Development and implementation of pilot projects related to the use of renewable energy sources in irrigation	2019-2021	Ministry of Energy, Ministry of Agriculture, "Amelioration and Water Management" OJSC, local executive authorities
7.3.10.2	Development of agricultural production and processing in Barda rayon, including: Establishment of an agro-complex for cotton growing; Establishment of an agro-park for cotton growing on an area of 2,000 hectares; Planting of sugar beet, corn, soybean, barley and construction of relevant infrastructure on the area of 1500 hectares; Implementation of the "Smart Village" project; Establishment of small and medium-sized grain processing enterprises; Establishment of a grain supply point; Construction of a granary; Establishment of a modern model farm for the production of grain products (soft wheat) on an area of 50 hectares; Development and implementation of a development plan for grain growing; Construction of collection points for drying wet cocoons.	2019-2023	Entrepreneurs, Ministry of Agriculture, Ministry of Economy, "Azerbaijan Industrial Corporation" OJSC, Local Executive Body
7.3.14.2.	Ismayıllı rayon: Establishment of an agro-park for cotton, horticulture and vegetable growing on an area of 5826 hectares; Establishment of 50 ha potato farm; Creation of a modern livestock complex of 1200 heads; Establishment of small and medium-sized grain processing enterprises; Establishment of a grain supply point; Construction of a granary;	2019-2023	Entrepreneurs, Ministry of Agriculture, Ministry of Economy, local executive power

	Establishment of a modern model farm for the production of grain products (soft wheat) on an area of 50 hectares; Development and implementation of a development plan for grain growing; Continuation of measures to establish a farm with the use of pivot irrigation systems.		
7.3.22.2.	Ağsu rayon: Establishment of modern livestock farms; Establishment of feed and seed production complex; Expansion of pomegranate processing area; Establishment of agriculture on 1500 hectares (with pivot irrigation system on 500 hectares); Construction of collection points for drying wet cocoons; Establishment of intensive horticultural farms, continuation of measures for the development of beekeeping.	2019-2023	Entrepreneurs, Ministry of Agriculture, Ministry of Economy, Local executive power
7.3.23.2	Development of agricultural production and processing in Ismayilli rayon, including: Expansion of the existing agro-park on crop production created in the area of 602 hectares; Implementation of the "Smart Village" project; Establishment of a modern model farm for the production of grain products (durum wheat) on an area of 50 hectares; Construction of a seed processing plant; Continuation of measures for the production of vegetable oils, the establishment of a dairy and meat processing plant, the development of fruit growing and beekeeping.	2019-2023	Entrepreneurs, Ministry of Agriculture, Ministry of Economy, Local executive power

Recommendations and conclusions

Currently, Azerbaijan has a strong ambition to transfer new technologies to the non-oil sector due to the instability of oil prices in the world markets. As agriculture is an important sector for the rural population, and main sources of their incomes, in upcoming years the government is expected to put huge investments into this sector modernization.

The application of smart technologies in agriculture is dictated due to the limited water and land resources, worsening of environment, heavy dependence on imports, and the necessity for food security to satisfy the growing population, as well as requirements for sustainable rural development.

New agricultural technologies are applied by the both government and the private sector. Trends and needs in the development of agriculture, require an increase in investments in intensive and resource-saving technologies in the regions of Azerbaijan. It is recommended that this policy *will be supported in four directions:*

1. Widespread use of innovative smart farming technologies, improvement of irrigation and land reclamation infrastructure;

2. Development and application of alternative energy sources in agriculture;

3. Application of precise farming solutions for high crop productivity in combination with land, water and energy-saving technologies;

4. Development of post-harvest/food processing infrastructure in the regions.

There is possibility to organize production of equipment in Azerbaijan and enjoy with the tax free privileges through Sumgait Chemical Industrial Park. Advantages are new infrastructure, tax and customs incentives, logistics, free trade opportunities, one-stop shop, research and development. Industrial parks offer sewer lines, chemical waste, rain, potable, process, fire water supply networks, natural gas supply lines, power lines, substations, transmitters, distribution points, roads and railways, fiber- optic cable lines for the use of residents. The residents of Sumgait Chemical Industrial Park, Mingachevir Industrial Park, Garadagh Industrial Park and Pirallahi Industrial Park are exempted for 10 years from corporate income tax; property tax; land tax; VAT for imported machinery, technological equipment and plant. In addition, residents of industrial parks for a period of 7 years are exempted from customs duties on imported machinery, technological equipment and plant. In accordance with clause No. 6.0.10 of the "Model Regulations on Industrial Parks" approved by the Decree of the President of the Republic of Azerbaijan, dated April 24, 2013, No. 865, managing organization implements representative function ("One window") on behalf of resident of industrial park on getting permission for construction and operation of construction project.[4]

Efficiency of the small landowner agriculture is critical, especially the issue of rational usage of the agricultural land resources. In this regard, the state policy encourages the implementation of land consolidation projects to ensure the easy transfer of technological innovations to the existing agricultural system. In parallel smart application for the small farms also should be considered important element of the rural development.

It is necessary to accelerate activities on elaboration and proposals of new projects with the relevant state bodies and private partners involved in the various aspects of the smart technologies applications into Azerbaijan agriculture sector jointly with the public- private partnership instruments.

[4] https://scip.az/en/page/haqqimizda/umumi-melumat

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Ağıllı kənd təsərrüfatı və innovasiya siyasətinin əsas istiqamətləri

Xülasə

Bu məqalədə Azərbaycan Respublikasında torpaq və su ehtiyatlarının məhdud olması və davam edən iqlim dəyişikliyi şəraitində kənd təsərrüfatının səmərəliliyinin artırılması zərurəti kontekstində ağıllı əkinçilik texnologiyalarının mövcud vəziyyəti və inkişaf tendensiyaları nəzərdən keçirilir. Ölkədə ağıllı əkinçiliyin mövcud inkişaf vəziyyəti dövlət tədbirləri, subsidiya siyasətləri, investisiya təşviqləri və institusional struktur da daxil olmaqla indiki kənd təsərrüfatı təcrübəsi təhlil edilir. Bu təhlillərə əsasən, milli kənd təsərrüfatında ağıllı əkinçilik texnologiyaları tətbiqetmələrinin genişləndirilməsinə dair təkliflər verilmişdir. İnnovativ ağıllı əkinçilik texnologiyalarının geniş tətbiqi, suvarma və meliorasiya infrastrukturunun yaxşılaşdırılması, kənd təsərrüfatında alternativ enerji mənbələrinin inkişafı və tətbiqi, yüksək bitki məhsuldarlığı üçün torpaq, su və enerjiyə qənaət edən texnologiyaların kombinasiyası ilə dəqiq əkinçilik həlləri və bölgələrdə məhsul yığımı sonrası və qida emalı infrastrukturunun inkişafı daxil olmaqla bu siyasətin dörd istiqamətdə dəstəklənməsi tövsiyə edilir.

Açar sözlər: *ağıllı əkinçilik, iqlim dəyişikliyi, yeni texnologiyalar, suvarma, dövlət proqramı, subsidiya siyasəti, aqropark, institusional quruluş, innovasiya, sənaye parkı.*

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Смарт сельское хозяйство и основные направления инновационной политики

Резьюме

В данной статье рассматривается текущее состояние и тенденции развития смарт технологий земледелия в контексте необходимости повышения эффективности сельского хозяйства в условиях нехватки земельных и водных ресурсов и продолжающегося изменения климата в Азербайджанской Республике. Текущее развитие смарт земледелия в стране было проанализировано путем обзора методов ведения сельского хозяйства, включая государственные меры, политику субсидий, поощрение инвестиций и институциональные структуры. На основе этого анализа были разработаны рекомендации по расширению смарт технологий в национальном сельском хозяйстве. Рекомендуется поддерживать эту политику по четырем направлениям, включая широкое использование инновационных технологий интеллектуального земледелия, улучшение инфраструктуры орошения и мелиорации земель, разработка и применение альтернативных источников энергии в сельском хозяйстве, применение точных сельскохозяйственных решений для высокой урожайности в сочетании с земельными, водными и энергосберегающими технологиями, а также развитие инфраструктуры послеуборочной и перерабатающей промышленности.

Ключевые слова: *смарт сельское хозяйство, изменение климата, ирригация, политика субсидирования, агропарк, институциональная структура, инновации, индустриальный парк.*