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The role of irrigation in the formation of the innovation and investment environment of the region

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Abstract. The article substantiates the expediency of irrigation development in the South of Ukraine as an important condition for the formation of a favorable innovation and investment environment in the region. It is proved that the development of irrigation in Mykolaiv region requires a systematic approach with mandatory scientific support on the terms of public-private partnership. The economic and budgetary efficiency of the project for the creation of an innovative landfill for sprinkler farming using Smart-technologies has been determined. It is proved that the implementation of the project for 2021-2023 will increase revenues to the state budget and get budget efficiency at 22%

Keywords: irrigation, investments, innovations, South of Ukraine, agriculture, sprinkler, economic efficiency, budget efficiency

INTRODUCTION

Since the twentieth century, there has been a global increase in the world's population, causing a food crisis. According to [1-3], the state of food security and starvation in the world is extremely serious, and by 2030 may worsen further if the effects of the COVID-19 pandemic caused by the coronavirus SARS-CoV-2 persist.

Almost one tenth of the world's population – up to 811 million people – went hungry in 2020. After nearly five years of tackling the world's hunger and food problems, world hunger has risen sharply in the past year. In addition, it is estimated that about 660 million people may still face famine in 2030, which is

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30 million more than analysts estimate that there was no pandemic due to the long-term impact of COVID-19 on global food security. [1-3].

One of the main reasons for this is climatic change, imperfection of technologies for growing agricultural products, the constant increase in the cost of energy, increasing production of energy crops, which are raw materials for alternative fuels [4].

According to UN forecasts, by 2050 the world's population will increase by 30% and will be about 9 billion people, but a proportional increase in agricultural area will not happen [5,6].

As a result, it is difficult to meet the overall goal of sustainable development, which aims to eradicate hunger and reduce all forms of starvation.

One of the most effective and widespread measures to intensify crop production at the present stage of its development is artificial humidification, in particular in regions with insufficient natural moisture.

Today, 80% of the world's fresh water is consumed by agriculture. Up to 40% of the world's grain stocks are grown on irrigated land. In the United States, only 18% of agricultural land is irrigated, providing 50% of the crop [7, 8].

The world's freshwater reserves are 35 million m^3, of which about 8.5% are fresh water resources, which are concentrated in rivers, lakes and reservoirs, which are the world's traditional source of water supply. Uneven distribution of world water resources necessitates the introduction of economical ways of water use in all sectors of the economy and especially in agriculture.

For countries with limited water resources, which include Ukraine, this issue is particularly relevant. Ukraine has one of the lowest indicators of water supply from the world's water resources in terms of territory – 0.3%, while in the post-Soviet countries this figure is 32 times higher [7, 8].

Formulation of the problem. The steppe zone of the South of Ukraine is characterized by a harsh arid climate, where irrigation is one of the determining factors of the general state of agricultural production, its export and food security of the state. However, the once powerful water management complex of Mykolaiv, Odesa and Kherson oblasts is not fully used today. Of the available area of irrigated land (about 2.17 million hectares), only a quarter is irrigated. Due to this situation, according to EBRD analysts, Ukraine annually loses about $ 1.5 billion in profits. In addition, climate change combined with the reduction of irrigated land in Ukraine threatens the desertification of the southern region. In the Mykolaiv area almost 6 times in comparison with 90s years of the 20th century the areas on irrigation are reduced, as of 31.12.2020 they make 27 thousand hectares [9]. In addition, further climate change will only worsen the natural conditions of soil moisture. Given this fact, the role of irrigation in the full development of agricultural production in the region will only grow. After all, irrigation, as the most effective means of reducing the negative impact of climate change and increasing the efficiency of domestic agricultural production, requires a systematic approach with mandatory scientific justification and support.

ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

The main direction of development of the modern agro-industrial complex is the formation of efficient and competitive agricultural production, which will meet the needs of the population in food and will receive budget revenues through the sale of crop products on world markets [10, 11]. Growing agricultural products on bogar has reached maximum values, further increase in yields is possible only with the use of artificial irrigation in regions with insufficient levels of natural moisture, which include the south of Ukraine [9, 12-15]. A significant contribution to the development of irrigated agriculture was made by R. Vozhegova, V. Gamayunova, L. Granovska, L. Didkovska, S. Doroguntsova, V. Izyumov, V. Koryunenko, V. Limar, P. Morozov, S. Malyarchuk, M. Romashchenko, M. Khvesyk, A. Shatkovsky, V. Shebanin and other. In their work, leading scientists have considered the spread of resourcesaving methods of irrigation of crops and the effectiveness of irrigation.

In their works [9, 16], scientists proposed a model of the process of increasing the efficiency of irrigation, the basis of which is the creation of innovative solutions with practical use and the possibility of commercialization. Today, the main irrigation systems are drip irrigation and sprinkler. Each of the systems, as noted by the authors [9], has its financial and technical and economic advantages and disadvantages. Practical research M. Fomichova [17] indicate the effectiveness of drip irrigation in the cultivation of melons. On drip irrigation, the increase in yield is 11.4 t/ha (89.8%), but the use of this method of irrigation in the cultivation of cereals does not give the desired result [9, 18]. When growing maize hybrids, depending on irrigation methods and different schemes of plant protection against diseases, scientists [9] found that the method of watering has a great influence on plant productivity, which amounted to 16.3% of the total share of grain yield.

US farmers have a very strong practice of growing agricultural products under irrigation. Analyzing

long-term research, it was found that with an annual rainfall of 350-400 mm is insufficient for growing agricultural products. With a rainfall of 350-500 mm, the cultivation of field crops is risky. To obtain a high yield, the total rainfall of 625 mm is too small.

At the beginning of the twentieth century, the area of irrigated land in the United States was only 5.7 million hectares, and in the second half of the twentieth century increased more than 3.6 times. In the 21st century, in areas with insufficient rainfall and semi-arid states, the use of irrigation systems has increased yields by 2-2.5 times. Given the growing shortage of water resources in the United States, the optimization of irrigation regimes becomes especially important. For this purpose, there is an irrigation management service, which carries out centralized planning of irrigation regimes from the computer center. The information collection cycle (on meteorological conditions, soil properties, available moisture reserves, etc.) covers irrigated areas of hundreds of thousands of hectares with analysis of current information and issuance of scientific recommendations within 24 hours. [19, 20].

High technical level of irrigation systems in combination with advanced methods of water distribution management and innovative technologies of artificial humidification provide sustainable productivity of irrigated agriculture. Since the 90s of the XX century, under the influence of the failed reform of the agricultural sector of Ukraine, the infrastructure of irrigated lands only deteriorated, there was a process of sharp reduction of areas with artificial moisture: from 2291 thousand hectares – in 1990 to 472.2 thousand hectares – in 2015. In 2016, the area of actual irrigation began to increase gradually from 477.2 thousand hectares to 532 thousand hectares – in 2019. [25] However, today almost 19 million hectares of arable land are in constant need of irrigation, and 4.8 million hectares are in need of water regulation, and these figures will only increase every year. Drought, according to Mami Mizutori, the UN Secretary-General's Special Representative for Disaster Risk Reduction, is a major factor in land degradation and declining crop yields. [26] Such a difficult situation can be prevented by modernizing the agricultural sector of the economy, developing and implementing the latest technologies for growing crops using modern technologies of irrigation and spreading them among agricultural producers to create a favorable innovation and investment environment in the country and the region in particular.

In view of the above, the issues of determining the role of irrigation in the formation and further development of the innovation and investment environment of the Southern region of Ukraine remain insufficiently studied today.

The aim of the work is to assess the effectiveness of irrigation systems in a region with difficult climatic conditions on the example of the steppe zone of southern Ukraine.

PRESENTING MAIN MATERIAL

Today, one of the priority areas of economic development of the southern region of Ukraine is to increase yields through the introduction of modern irrigation systems [21].

The development of irrigation, as the most effective means of reducing the negative impact of climate change and increasing the efficiency of domestic agricultural production, requires a systematic approach with mandatory scientific justification and support.

The issue of energy conservation, conservation of water resources is relevant today. Rational use of water resources can be solved only with the use of the latest technologies and integrated energy saving during the operation of sprinklers.

The use of automated and computerized irrigation of crops with a clearly defined water consumption, accurate navigation can increase crop yields by 2-3 times compared to the conditions on the bog [9].

Existing irrigation systems use mostly obsolete types of multi-part sprinklers, which have twice exceeded their planned service life (Fig. 1).

Figure 1. *Sprinkler unit two-console (DDA-100V)*

Source: *[22]*

At present, about 5.5 thousand sprinklers are in working order, which can provide irrigation on an area of about 600-700 thousand hectares. Today, foreign companies began to operate actively in the domestic market: Sigma (The Czech Republic), R. Bauer (Austria), Valley, Zimmatis (USA). Among their models are stationary sprinkler systems with circular and frontal trajectories, a wide range of drum sprinklers. Such systems are characterized by wide functionality, provide sprinkling at low water pressure, supply through the pipeline with water intake from the open or closed network, as well as the use of a diesel generator or electric drive makes the system independent in use and reduces energy use.

In Mykolaiv National Agrarian University with the participation of research institutions of NAAS and industrial enterprises of Ukraine-members of the Educational Research and Production Consortium "Southern" in 2019 created an innovative landfill for the transfer of modern technologies in the agroindustrial complex (Fig. 2).

The operation of the landfill creates conditions for the development and implementation of new technologies for growing crops using Smarttechnologies on modern irrigation, optimization of artificial moisture, variety testing and study of adaptive characteristics of new varieties and hybrids of grain and technical crops of domestic and industrial crops. them among agrarians of the Southern region, and also implementation of training of members of associations of water users by modern methods of implementation of hydraulic reclamation and ecologically safe use of reclaimed lands.

a) b) c)

Figure 2. *Fragments of the system of sprinkler agriculture of the Mykolaiv National Agrarian University: a) general view of the sprinkler "Zimmatis"; b) growing corn on irrigated; c) an element of the automation system of the sprinkler.*

This will provide an opportunity to address such important issues that hinder the effective development of agricultural production in the region. Including:

- insufficient level of investment attraction and introduction of innovative technologies in agroindustrial production, in particular in farms;
- low level of use of irrigated lands and deterioration of material and technical base of water management organizations;
- high cost of the latest sprinkler systems and complexes;
- lack of regional centers for monitoring and integrated management of irrigated land fertility;
- lack of sufficient reclamation specialists in the region;
- lack of own production of competitive energy-efficient sprinklers;
- Insufficient introduction of highly efficient, modern, latest technologies for growing agricultural products, etc. [21, 23].

These shortcomings also exacerbate the environmental problem of irrigation, unregulated use of natural resources, energy consumption, increase the cost of agricultural products and reduce guaranteed yields.

The development of family farms and agricultural cooperatives on the basis of irrigated agriculture will enable the Mykolayiv region to develop and specialize in the sectoral areas of commodity producers, which will promote the formation of stable market channels, prevent speculative intermediation, provide transparent traffic patterns participants and will contribute to the transformation of small producers into equal market participants [21, 23].

Modern sprinkler systems are a significant reserve for reducing water consumption, energy conservation and fertilizer application. Therefore, increasing the energy efficiency of sprinklers by even 10% is economically justified. One of the ways to solve the problem of reducing the cost of production is the in-

troduction of energy-saving systems and complexes in the irrigation system [21-24].

A promising direction is the creation of new irrigation systems and sprinklers of a new generation based on autonomous renewable power sources, automated irrigation systems. Such systems and machines must be low-pressure, provide quality irrigation by optimizing the algorithm of work with the simultaneous supply of fertilizers and chemical ameliorants with irrigation water.

In order to fulfill the tasks of agricultural development, nature conservation, as the main direction of agricultural research, it is necessary to create an innovative landfill, which will install a sprinkler "Zimmatis" Pivot 662 meters with fertilizer for modern irrigation system on 71 hectares of university land.

The project will be the basis for the creation of an innovative landfill for irrigated agriculture using Smarttechnologies and a Training Center for members of the organization of water users (DEC), which will be created on the basis of the existing innovative landfill for transfer of modern agricultural technologies to the Research and Training Consortium "Southern". The organization of modern irrigation on 71 hectares in the cultivation of cereals will provide economic and budgetary efficiency (Table 1).

Table 1. *Economic efficiency of the project to create an innovative landfill for sprinkler farming using Smart-technologies*

Indexes	2021	2022	2023	Together
Discount rate (discount rate 11%)	1.0000	0.9009	0.8116	x
Operational activity				
Sowing area, ha	71.1	71.0	71.0	x
Yield, c per 1 ha		60.0	60.0	x
Gross collection, t		426.0	426.0	852.0
Revenue from sales of grain, thousand UAH		3621.00	3834.0	7455.0
Production costs – total, thousand UAH	715.8	744.9	769.7	2230.4
Operating profit, thousand UAH	715.8	2876.10	3064.3	5224.6
Discounted cash flow from operating activities, UAH thousand	715.8	2591.08	2487.05	4362.34
Investment activity				
Capital investments – total, thousand UAH	4290.0	-	-	4290.0
including: - sprinkler	4110.0	-	-	4110.0
- node of fertilizer application	180.0	-	-	180.0
Total costs, thousand UAH	5005.8	744.9	769.7	6520.4
Discounted cash flow from investing activities, UAH thousand	-4290.0	0.00	0.00	-4290.0
Discounted free cash flow, UAH thousand	-5005.8	2591.08	2487.05	72.34
Cumulative discounted free cash flow, thousand UAH	-5005.8	-2414,72	72.34	-
Net present value (NPV), thousand UAH				72.34
Internal rate of return (IRR), %				12.1
Return on investment (PI), %				101.7
Discounted payback period of DPP, years				2 years 11 month

According to the data corresponding to the forecast of table. 1, the economic efficiency of the project of the innovative landfill of sprinkler agriculture with the use of Smart-technologies discounted free cash flow will be 72.34 thousand UAH. The discounted payback period of DPP is 2 years 11 months, which is sufficient in an unstable economic situation.

Tax revenues to the budget for the years of project implementation are estimated at UAH 1620,4 thousand (Table 2).

Table 2. *Revenues to the state budget from the implementation of the project to create an innovative landfill for sprinkler farming using Smart-technologies*

Indexes	2021	2022	2023	Together
1	2	3	4	5
Cash proceeds, thousand UAH	-	3621.0	3834.0	7455.0
Tax liability, thousand UAH	-	603.5	639.0	1242.5
Investment costs (sprinkler, fertilizer application unit), UAH thousand	4290.0	-	-	4290.0
Project implementation costs, thousand UAH	715.8	744.9	769.7	2230.4
incl. - salary	275.3	295	315.3	885.6
- material costs	160	170	170	500
- services	200	195	195	590.0
Tax credit, thousand UAH	60.0	60.8	60.8	181.6
Receipt of VAT in the budget, thousand UAH	-60.0	542.7	578.2	1060.9
Personal income tax (18%), thousand UAH	49.5	53.1	56.8	159.4
Single social contribution (22%), thousand UAH	60.6	64.9	69.4	194.9
Military fee (1.5%), thousand UAH	4.1	4.4	4.7	13.2
Rent for special use of water (UAH 63.97 per 100 m^3), UAH thousand	-	96.0	96.0	192.0
Total payments, thousand UAH	54.2	761.1	805.1	1620.4
Budget efficiency, %				22.1

For three years of realization of the project to the state budget the Mykolaiv National Agrarian University will increase incomes by 1620 thousand UAH and received budget efficiency at the level of 22.1%. Such indicators are essential for the development of irrigated agriculture in the steppe zone of southern Ukraine and the formation of innovation and investment environment in the region.

CONCLUSIONS

The development of irrigation in the South of Ukraine is an important condition for the formation of a favorable innovation and investment environment in the region, the realization of the country's agricultural potential, increase agricultural production, exports and food security.

The high technical level of irrigation systems in combination with the optimization of artificial humidification regimes is the foundation of sustainable productivity of irrigated agriculture. The introduction of modern irrigation systems can reduce the negative impact of climate change, promotes the rational use of water resources, energy conservation and material savings for fertilizers, increase crop yields and more.

The project to create an innovative landfill for irrigated agriculture using Smart-technologies aims to create a favorable innovation and investment environment, conditions for intensification of innovation processes, integration, science, education and production in the region, modernization of the agricultural sector of the region by introducing new scientific technologies for growing crops. on irrigation. The implementation of the project on the area of 71 hectares for 2021-2023 will increase the state budget revenues by UAH 1.6 million and get budget efficiency at the level of 22.1%.

Stimulating the development of irrigation in Mykolaiv region requires a systematic approach with mandatory scientific support on the terms of publicprivate partnership, is a guarantee of high yields of crops, stability of revenues to state and local budgets and strengthening leadership in agricultural markets.

REFERENCES:

[1] The State of Food Security and Nutrition in the World 2021: Transforming food systems for food security, improved nutrition and affordable healthy diet for all World. Retrieved from https://reliefweb.int/report/world/state-foodsecurity-and-nutrition-world-2021-transforming-food-systems-food-security. [in English].

[2] Ukraine will help halve the number of hungry people in the world. Retrieved from https://a7d.com.ua/agropoltika/aktualna_tema/firsthands/1716-ukrayina-dopomozhe-udvichi-skorotiti-kilkist.html [in Ukrainian].
[3] The State of Food Insecurity in the World 2015. Retrieved from https://www.fao.org/publications/sofi/2015/en/.. [in English]
[4] Climate change and agriculture in Ukraine. German-Ukrainian agro-political dialogue 2020. Retrieved from: https://mepr.gov.ua/files/docs/Zmina_klimaty/2020. [in Ukrainian].
[5] How many humans tomorrow? The United Nations revises its projections. Retrieved from https://theconversation.com/how-many-humans-tomorrow-the-united-nations-revises-its-projections-118938 [in English].
[6] Pison, G. (2017). The Population of the World. Population and Societies, (547). [in English]
[7] Xvesyk, M. A., & Mandzyk, V. M. (2009). Water resources are an investment of the present and a prospect for the future. Investytsiyi: praktyka ta dosvid, (1), 2–8 [in Ukrainian].
[8] Didkovs'ka, L. I. (2013). Ecological and economic aspects of microirrigation implementation. Ekonomika APK, (10), 98 [in Ukrainian].
[9] Shebanin, V. S., Novikov, O. Y., & Karpenko, M. D. (2020). Substantiation of expediency of introduction of sprinkler irrigation in modern conditions. Ukrainian Black Sea region agrarian science, (1), 4-10. doi: 10.31521/2313092X/2020-1(105)-1 [in Ukrainian].
[10] Romashchenko M. I. (2012) Naukovi zasady rozvytku zroshennya zemel' v Ukrayini. Kyiv: Ahrarna nauka [in Ukrainian].
[11] Romashchenko, M., Shatkovs'kyy, A., & Ryabkov, S. (n.d.). Drip irrigation in Ukraine: problems and prospects. Retrieved from https://a7d.com.ua/agropoltika/agri-work/5097-kraplinne-zroshennya-v-ukrayin-problemi-perspektivi.html [in Ukrainian].
[12] Alymov, O. M., Danylenko, A. I., & Trehobchuk, V. M. (2005). Ekonomichnyy rozvytok Ukrayiny: instytutsional'ne ta resursne zabezpechennya. Kyiv : Ob'yednanyy instytut ekonomiky NAN Ukrayiny. [in Ukrainian].
[13] Biliaieva, I. M. (2015). Scientific and methodological substantiation of irrigation productivity models for the conditions of the south of Ukraine. Zroshuvane zemlerobstvo, (64), 75-78. [in Ukrainian].
[14] Motuzova, G. V., & Bezuglova, O. S. (2007). Ekologicheskij monitoring pochv. Moscow: Akademicheskij Prospekt, Gaudeamus. 237. [in Russian].
[15] Filipenko, L. A., Zhovtonoh, O. I., & Demenkova, T. F. (2010). Adaptation of water use plans to changes in climatic conditions in the irrigation zone of Ukraine. Vodne hospodarstvo Ukrainy, (4), 23-29. [in Ukrainian].
[16] Nechyporenko, O. M. (2015). Directions of innovative development of irrigation farming in Ukraine. Bulletin of Agricultural Science, (8), 61-65. [in Ukrainian].
[17] Fomichov, M.V. (2019). Irrigation systems as an economic category and their effectiveness. Efektyvna ekonomika, (3). https://doi.org/10.32702/2307-2105-2019.3.153 [in Ukrainian].
[18] Kokovikhin, S.V., & Bilyaeva, I.M. (2017). Productivity And Economic Efficiency Of Growing Of Hybrids Of The Corn Depending On The Methods Of Watering And Protection Of Plants In The South Of Ukraine. Naukovì dopovìdì Nacìonal'nogo unıv ersitetu bı`oresursiv ı` prirodokoristuvannâ Ukraïni, (4(68)). https://doi.org/10.31548/dopovidi2017.04.013 [in Ukrainian].
[19] Randall, D.A., Wood, R.A., Bony, S., Colman, R., Fichefet, T., Fyfe, J. ... Taylor, K.E. (2007). Climate models and their evaluation. Climate Change 2007: the physical science basis. contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridg: Cambridge University Press, 589-662. [in English].
[20] Bykov, A.Y. (2020). Investment Climate of Economic Stability. Jurist, 1, 59–66. https://doi.org/10.18572/1812-39292020-1-59-66 [in Ukrainian].
[21] The program of development of an agro-industrial complex of the Nikolaev area for 2021-2025, the Order № 1 (2021) (the Mykolaev area) (Ukraine). Retrieved from https://www.mkoblrada.gov.ua/UserFiles/decree/1633430495615c2bdf8ac1e.pdf [in Ukrainian].
[22] Дощувальні машини ДДА – 100В. URL: https://itexn.com/573_dozhdevalnaja-mashina-dda-100ma.html (дата звернення: 02.08.2021).
[23] Novikov, O., Potryvaieva, N., & Sadovyi, O. (2021). Introduction of sprinkler irrigation is a guarantee of stability of development of the southern region of Ukraine. Sustainable Development: Modern Theories and Best Practices: Materials of the Monthly International Scientific and Practical Conference (February 24-26, 2021, Tallinn). Tallinn: Teadmus OÜ, 2021, 30-32 [in English].

[24] Deineha, I., Maslov, A., Potryvaieva, N., Berezhnytska, U., Verbivska, L., & Koliadych, O. (2021). Institutional environment tools for small and medium-sized enterprises development. Studies of Applied Economics, 39 (3). https://doi.org/10.25115/eea.v39i3.4798 [in English].
[25] The need for irrigation in Ukraine: investment, countering the effects of drought, financial component. Retrieved from https://agropolit.com/spetsproekty/849-potreba-zroshennya-v-ukrayini-investitsiyi-protidiya-naslidkam-posuhifinansova-skladova [in Ukrainian].
[26] Drought could become the "next pandemic" – the UN. Retrieved from https://www.epravda.com.ua/news/2021/06/18/675134/ [in Ukrainian].

Роль зрошення у формуванні інноваційно-інвестиційного середовища регіону

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Анотація. У статті обґрунтовано доцільність розвитку зрошення в умовах Півдня України, як важливої умови для формування сприятливого інноваційно-інвестиційного середовища регіону. Доведено, що розвиток зрошення у Миколаївській області потребує системного підходу з обов'язковим науковим супроводом на умовах державно-приватного партнерства. Визначено економічну та бюджетну ефективність від впровадження проєкту зі створення інноваційного полігону дощувального землеробства з використанням Smart-технологій. Доведено, що реалізація проєкту за 2021-2023 роки дозволить збільшити доходи до державного бюджету та отримати бюджетну ефективність на рівні 22 %

Ключові слова: зрошення, інвестиції, інновації, Південь України, землеробство, дощувальна машина, економічна ефективність, бюджетна ефективність