

THE RURAL DEVELOPMENT PROGRAM AS AN INSTRUMENT TO SUPPORT THE TECHNOLOGICAL MODERNIZATION OF AGRICULTURE. LUBUSKIE CASE STUDY

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Abstract:

The article deals with the issue of supporting the technological modernization of agriculture by investing in infrastructure surrounding the farms with the use of a financial instrument in the form of the Rural Development Program (RDP) based on the Lubuskie Voivodeship. The article describes, among other things, the importance of infrastructure and support for its development in rural areas in the process of functioning and modernization of the agricultural sector. For the purposes of the article, the data obtained from the Department of Rural Development Programs of the Lubuskie Marshal's Office on expenditure and effects of RDP use in 2007-2020, in infrastructure investments in rural areas of the Lubuskie Voivodeship was analysed. In the article, the authors attempted to present the instrument in the form of the Rural Development Program as a tool for indirect impact on the process of modernization and transformation of agriculture in the Lubuskie Voivodeship, primarily by changing the infrastructural conditions for the functioning and development of agricultural production in rural areas.

Key words: *economic instruments to support agricultural development, rural development, agricultural economy, modernization of agricultural technologies, agricultural production, rural development program, agriculture in the EU, sustainable agriculture*

INTRODUCTION

Due to its specific nature, the modernization of the agricultural production sector plays a key role in the sustainable development of the entire national economy. It is one of the conditions of, among the others, progress and improvement of the efficiency of agricultural production and limitation of unfavourable climate changes generated by agriculture. The fundamental issue in stimulating the modernization processes in this area is played by the surrounding infrastructure, located mainly in rural areas where production takes place. The modernization processes in the agricultural production sector depend on the level of its development, availability and characteristics. Infrastructure, however, sets the framework for the functioning of this branch of the economy. Hence, while striving to launch its modernization processes, investments in

infrastructure in areas where farms operate are of key importance. Therefore, this article deals with the issue of supporting the modernization of the agricultural sector in the form of infrastructure investments, with the use of an instrument in the form of the Rural Development Program. For the purposes of the article, a practical example of the functioning of this tool in the Lubuskie Voivodeship in 2007-2020 was used. The analysis used data obtained from the Department of Rural Development Programs of the Lubuskie Marshal's Office.

MATERIAL AND METHODS

The interest in infrastructure, as a science of importance in the process of economic development, appeared in the 1930s. The infrastructural approach has been presented

in many theories of modern economics, such as the Harrod-Domar model, which takes into account the increase in the level of economic development from the increase in capital productivity [1] but also in other theories of Solow, Romer Barro [2], Lucas or the Rosenstein-Rodan push theory. The very importance of infrastructure in regional development was, among the others, marked in the Treaty of Rome (1957), and the decrees included at the beginning of the formation of the present European Union, were strongly oriented in the structural funds and described as a solid foundation of the entire system [3]. Infrastructure is one of the most important factors determining the trend in rural development. Its importance is not only visible in the regional context (communes, districts), but also sustainable rural development through the technological modernization of infrastructure can be seen in the strategic development plans of the country. The development of infrastructure is mainly to help local people in access to sanitary and energy facilities on a continuous basis, as well as contribute to the development of transport, information networks and opportunities to use modern technology. The result of these measures is the improvement of the quality of life in rural society with an equal use of natural resources in the agricultural production process [4]. There are many definitions of infrastructure in the literature. One of them is the thesis that infrastructure includes all technical and objective factors that are to ensure continuity in the production of the country's economy. Another, in turn, defines infrastructure as *a system of tools and groups that are to maintain and operate essential production in specific territorial units* [5]. The types of infrastructure that contribute to the development of the quality of life of the inhabitants of the Polish countryside have been presented below.

Their shortage significantly limits the proper functioning of rural areas:

- Construction and production infrastructure – this is a type of infrastructure based on farm buildings and their modern equipment. They are the basis of the fundamental agricultural production of farms. These are facilities intended for production and at the same time play a supporting role. Without the construction and production infrastructure, there is no possibility for the proper production operation of agricultural and meat products. Proper equipment of facilities and an appropriate number of buildings facilitate and accelerate the production process, and the use of modern technology allows for the sustainable development of agriculture and environmental protection. Objects included in the construction and production infrastructure refer to such as piggeries, henhouses, cowsheds, barns, and warehouses [6].
- Water infrastructure – this is a type of infrastructure that is designed to provide fresh drinking and production water to farms and residents. According to the literature, it is possible to find information that access to fresh drinking water is the basis for the proper functioning of rural areas and contributes to the rapid development of the countryside [7]. The facilities include water supply networks, connections, water treatment places.
- Sewage infrastructure – infrastructure based on sewage connections, sewage networks and various types of sewage treatment plants. The development of this type of infrastructure contributes to increasing the protection of the local countryside environment, which is one of the most important components of the proper functioning of these areas. There are still differences between urban and rural areas in terms of water supply networks, therefore, mainly in rural areas, continuous modernization of water supply networks is carried out [6].
- Gas pipeline infrastructure – a type of infrastructure based on the supply of natural gas for heating and production purposes. This infrastructure includes gas networks and connections, as well as gas transported in cylinders. Most villages in Poland [6] use bottled gas, as the main water supply networks are located mainly in areas of larger agglomerations, in southern and north-western Poland. The settlement breakdown of the Polish countryside does not allow for economic reasons to allocate the production gas to smaller towns, therefore bottled gas is the most popular in rural areas.
- Road infrastructure – one of the most important types of technical infrastructure. It is an element of regional development and, to a large extent, proper road development allows for better functioning of agricultural areas. Often, the development index of a particular village depends to a large extent on its location next to a particular road infrastructure. Rural areas with difficult transport access have a reduced civilization development index [8].
- Energy infrastructure – the access to electricity is now the basis for the proper functioning of every citizen. Wide access to electricity and heat allows for correct operation in agricultural plants and proper accessibility for the recipients of residential houses. Unfortunately, electric networks routed as overhead networks still dominate in rural areas, which makes them more exposed to changes in weather conditions and dangerous phenomena that occur with them. It causes increased failure rate and power shortages [6]. Based on the data of the Central Statistical Office of Poland (GUS), the use of electricity by rural residents increases every year. Electricity consumption is, on average, higher in rural areas than in cities [6], and transmission costs, due to the wide dispersion of rural areas, are much higher than in cities [9].
- ICT infrastructure – is a type of infrastructure in which both systems and tools enabling the transmission of telecommunications and internet data should be adopted. They are properly secured and powered, including the places of their use [10]. Every year, access to the Internet among the rural population increases. According to data from the Central Statistical Office of Poland, 84.6% of communities had Internet access in

rural areas in 2019 [11]. Having access to extensive Internet information allows for faster transmission of information necessary for the proper functioning of the inhabitants of rural areas.

The level of activation of the technical infrastructure in rural areas is an important factor in the regional development of particular environments. In the last decade, a lot of modernizations have been implemented in Poland in rural areas, especially in the field of water and sewage infrastructure, which increased the attractiveness of rural regions [12] as well as the process of improving the technological level of agriculture in particular territories. This article deals with the issue of supporting the modernization of the agricultural sector in the form of infrastructure investments, with the use of an instrument in the form of the Rural Development Program. For the purposes of the article, a practical example of the functioning of this tool in the Lubuskie Voivodeship in 2007-2020 was used. The analysis used data obtained from the Department of Rural Development Programs of the Lubuskie Marshal's Office.

THE ROLE OF INFRASTRUCTURE IN THE TECHNOLOGICAL DEVELOPMENT OF AGRICULTURE

Infrastructure is an indispensable element in agricultural production in Poland. The answer to this thesis is, for example, the definition of infrastructure in agriculture proposed by Jeznach et al. According to them, infrastructure in agriculture is a structural and spatial co-operator in agriculture, it does not directly participate in agricultural production, but is an indispensable factor for the production system and the Polish market [13]. As a result of the deepening disproportions in the 1990s, the European Union Regional Policy adopted as one of the most important factors the improvement of technical infrastructure in rural areas, which was also pointed out by the World Bank, which stated that the increase in the potential of technical infrastructure in the regions of impoverishment and dispersion may bring a strong increase in capital in these areas and improve the financial condition of agriculture [14]. In Poland, since the accession period, connections between infrastructure and agricultural production have been searched for. It was noted that there were problems that needed attention so as not to disrupt the development of the technical infrastructure at a later stage. These problems included economic, social and scientific categories [15]. The elimination or mitigation of these infrastructural problems brings beneficial effects in agriculture to this day.

In recent years, the condition of infrastructure in Poland has improved. This is especially visible in the aspect of water and sewage infrastructure, which from 2007-2013 recorded an increase of almost 9% (Fig. 1, Fig. 2) [16].

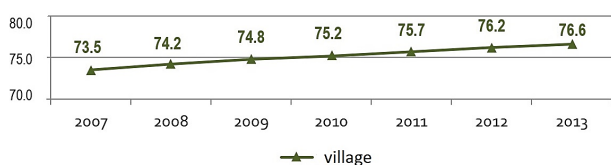


Fig. 1 Rural population using the water supply network
Source: [16].

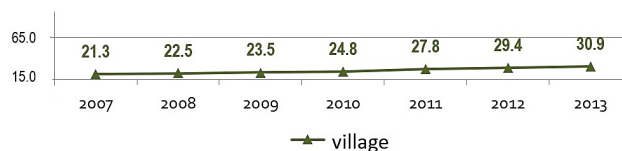


Fig. 2 Rural population using sewage connections
Source: [16].

In the use of the water network and sewage network, and access to ICT infrastructure increased by almost 50% during this period (Fig. 3).

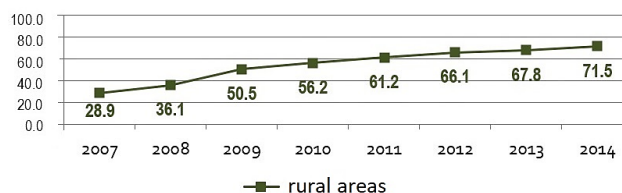


Fig. 3 Rural population using the home Internet
Source: [16].

However, what is the relation between the infrastructural development in the Polish countryside and the technological development of agriculture?

In the case of water infrastructure, an important aspect is the cooperation of drainage systems and drainage of watercourses to comply with the principle of environmental protection. The essence is, among the others, water retention so that in periods of high variability of water resources it is possible to use the accumulated water outlays. Even small but common retention reservoirs prevent flood risks [17].

Unfortunately, the level of agricultural land irrigation decreases from year to year, and this is due to rare maintenance procedures, due to which technical and drainage facilities are subject to degradation. In the last decade, on average, about 1/3 of agricultural land was drained, which should give a large percentage of agricultural production due to the mere maintenance of appropriate water management. On the other hand, in proper technical condition, the water infrastructure was maintained only on every second drained hectare or it is maintained at least every second year [18].

Road infrastructure, as an important factor in the development of rural areas and agriculture, on the one hand should deserve a higher aspect of modernization for agriculture, on the other hand, unfortunately, Polish rural roads do not enjoy a high technological level. In rural areas, where access to agricultural roads and farmlands is difficult, there is a reduced value of technological development in agriculture. In the period 2003-2008, there was practically no development of rural roads. The data shows that since 2003, where there were about 200 thousand km of rural roads in the villages, this number increased by only 9 thousand until 2008 [6]. It is also worth mentioning that until 2020 various types of funds were used for road development, including the Rural Development Program. For the years 2016-2019, almost 3,8 billion zlotys was allocated to investments related to the modernization of rural roads, of which 1,5 billion zlotys was allocated to local

roads, and only 625 million zlotys to agricultural roads with a length of 2,5 thousand kilometres. According to the evaluation carried out after 2020, it was found that 162 million zlotys was used for 1,6 thousand kilometres of agricultural roads [19].

Significant amounts of energy are used in agricultural production. Earlier, at the beginning of the 21st century, agriculture was identified as the main factor in the production of environmental pollution. It was caused by the use of large amounts of chemicals, monoculture production and intensive agriculture [20]. Currently, the use of agriculture offers opportunities for both consuming less energy and producing bio-energy. It should only be remembered that, in accordance with the principle of sustainable development, energy production should use areas other than those valuable for nature and with a diverse ecosystem. Since 2013, the consumption of solid fuels has decreased, which are mainly replaced with liquid fuels and biofuels [20]. The energy infrastructure in Polish agriculture is a significant factor in agricultural production, but much more energy is consumed than the average consumption in the European Union. On average, agriculture in Poland produces about 2.5% with the consumption of about 6% of energy, while in the EU it is on average 3%. Also, the cost of energy input on agriculture is higher than in the EU. Another problem is the large power supply discrepancy or the often unstable connections. A chance for the technological development of agriculture are therefore small reactors based on bio-fuels from animal and plant production; the use of renewable energy sources in the form of wind power plants based on the movement of air waves and using the vibration-membrane method. They take up much less space, and also do not require very large gusts of air to set the wind pole in motion. The price of this type of alternative for solid and liquid energy sources is competitive insofar as with the use of low financial outlays, it is possible to gain an efficient system of obtaining energy [21] and thus reducing costs for future agricultural inputs.

PROBLEMS OF TECHNOLOGICAL DEVELOPMENT OF AGRICULTURE

The spectrum of issues related to the problems of the reconstruction of Polish agriculture, in its technical and social dimensions, is very broad. It includes the entirety of the topics related to the transformation of the already well-established pattern of agricultural functioning, i.e. working and living conditions of rural residents (in particular those employed in agriculture). It also covers matters that are closely related to modern agricultural production, the production base of agriculture, its development trends, and the issues of technical and organizational progress. It should be emphasized here that such reconstruction of agriculture cannot omit the issues related to the evolution of the ownership structure, as well as the forms of management, financing and crediting of this branch of the national economy that depend on it [22].

The challenge is to try to define a specific framework for agricultural infrastructure. This is mainly due to the fact

that the higher the level of development of this branch of the economy, the more the scope and services provided by this infrastructure expand. For instance, at a low level of development of the agricultural economy, it can be observed that the scope of agricultural infrastructure will be practically the same as the scope of rural infrastructure, so in such a case it is necessary to have, for example, an efficient power network that would meet the lighting needs of residents, or a hard surface road network that would provide constant contact of each town with the commune. Going further with a higher level of agricultural production and its connection with mechanization, the scope of agricultural infrastructure will become wider and it will go beyond the infrastructure of "villages". As a result, the mere supply of electricity at its basic level will no longer be sufficient. Development will then be needed to reach the threshold necessary for production processes. As for the paved road network, it will have to be expanded in such a way that tractors and all agricultural equipment can reach each field. Then there must be repair bases for agricultural equipment, garages, petrol stations, fertilizer warehouses, silos, granaries, elevators, sewage treatment plants, etc. It is crucial, because nowadays all these devices determine the modern production process in agriculture. The lack or underdevelopment of the agricultural infrastructure may become a factor that will not allow any introduction of technical progress in agriculture [22].

It is widely known that the more primitive agriculture is, the more it does not require many of the above-mentioned devices or infrastructure facilities to be able to function on a basic level. Taking into account agriculture that is developing and already developed at an almost advanced level, it must be remembered that it has to be constantly provided with services for many such institutions, facilities or devices. Therefore, it should be recognized that the scope of this infrastructure should be increased, at least in proportion to the development of agriculture, but by default it should precede this development. The proper functioning of the technical infrastructure depends on the correct course of the production process of agriculture and its efficiency, and hence the infrastructure performs important economic tasks in relation to agriculture [23].

The examples relating to the importance of infrastructure in the technological development of agriculture can be seen in the following situations, which include, for example [23]:

- The lack of roads and transport can mean that deliveries of agricultural products may be delayed or not reach consumption or processing at all. In addition, the poor condition of roads contributes to the much earlier wear and tear of mechanical means of transport, which is directly connected to a greater financial outlay related to the need to pay for repairs or more frequent refuelling associated with higher fuel consumption.
- Interruptions in the supply of electricity may lead to a situation in which the biological and technological cycle in the agricultural infrastructure will be disrupted,

which will have a direct impact on work in both livestock and agricultural production.

- The problem with water aspects may have an impact on the agricultural and life infrastructure of the inhabitants, due to the lack of drinking water, which translates directly into proper functioning [7].
- The failure of construction and production infrastructure (which includes, among the others, piggeries, henhouses, cowsheds, barns, warehouses, and which constitute the basis of the fundamental agricultural production of farms), may be a problem in the proper production functioning of agricultural and meat products. Proper equipment of facilities, as well as an appropriate number of buildings facilitate and accelerate the production process. On the other hand, the use of modern technology allows for the sustainable development of agriculture and environmental protection [6].

It should be remembered that despite the involvement of significant funds in the development of rural technical infrastructure and the achievement of some modernization progress, many elements subordinate to the technical infrastructure in rural areas may leave a lot to be desired. For example, the poorly developed technical infrastructure in the countryside will constitute one of the most serious, if not the most serious, barriers to the multifunctional development of rural areas. This may translate directly into unfavourable living or working conditions in the countryside, and also lead to a reduction in the attractiveness of these areas for potential investors. Additionally, the insufficient level of infrastructure equipment may pose a threat to the degradation of the natural environment. Therefore, it is necessary to take care of the technological development of agricultural infrastructure so that various types of failures or other problems, having a direct or indirect impact on the role of this infrastructure, cannot occur or occur very rarely [6].

THE SOURCES OF FINANCING INFRASTRUCTURE IN RURAL AREAS

The main source of financing infrastructure in rural areas is the Rural Development Program. In recent years, we have witnessed the expansion of water and sewage, road and other infrastructure – such as village clubs, marketplaces, melioration and land consolidation. The European Union's rural development policy was introduced as the second pillar of the CAP during the "Agenda 2000" reform. It is financed by the European Agricultural Fund for Rural Development (EAFRD). This fund is intended to contribute to the implementation of the Europe 2020 strategy (the Union's strategy for growth and jobs) by promoting sustainable development in rural areas. The EAFRD contributes to the development of an agricultural sector that is territorially and environmentally sustainable, climate-friendly and resilient to climate change, as well as competitive and innovative [24].

In the case of the Lubuskie Voivodeship – under the Rural Development Program, the Territorial Self-Government

Units (82 communes and 14 districts) had 124 million euros in the years 2007-2013 [25] and 101,5 million euros for the years 2014-2020 [26] which gives an average of over 2 million euros per commune or district in the last 10 years.

As indicated by the source data, available at the Department of Rural Development Programs of the Lubuskie Marshal's Office – communes and districts can be divided into "more" and "less" active in obtaining funds available under the RDP. This was influenced not only by the activity of individual authorities or poor preparation of technical documentation, but also by the criteria on the basis of which points were awarded in the announced competitions, such as, for example, the basic tax income of the commune or the average unemployment rate in the district [27]. When analysing individual regulations of the Minister of Agriculture and Rural Development, it can be concluded that the Ministry gives more incentives to municipalities with a worse economic situation, which means that they have a greater chance of obtaining funding for water and sewage operations or the construction or modernization of local roads.

RESULTS AND DISCUSSION

In the years 2007-2020, as part of the Rural Development Program, over 225 million euros was allocated to the municipalities of the Lubuskie Voivodeship.

Table 1
List of investments implemented under the Rural Development Program in 2007–2020

TYPE OF INVESTMENT	INDICATOR
water supply and sewage networks	600 km
home sewage treatment plants	1500
construction/reconstruction of local roads	110 km
construction/reconstruction of village clubs	300
renovation of churches	50
sports facilities	200

Source: own study based on the data of the Department of Rural Development Programs of the Marshal's Office of the Lubuskie Voivodeship – as of 31.12.2021.

Taking into account the fact that the number of inhabitants of the Lubuskie Voivodeship is almost 1 million [28] it is 225 euros per capita. The amounts referred to above do not include funds intended for direct payments to farmers, which are also an element of the Rural Development Program.

The enormity of infrastructure investments implemented under the Rural Development Program is visible in every commune of Lubuskie province. This is evidenced by information boards on individual investments, because it is the beneficiary's duty to inform about the aid received from the European Union, including EAFRD and the Rural Development Program [29]. Within these millions of euros, not only new elements of infrastructure were created, but the contractors of these operations were entities from the Lubuskie economy, providing construction, water and sewage and road services, which had a positive

impact on the development of these entities. The development of this infrastructure also influenced the agriculture of Lubuskie province. Melioration operations have permanently improved the agricultural production capacity of the soil. On the other hand, land consolidation allowed eliminating the breakdown of individual farms into small plots of various shapes and sizes, often located at a considerable distance (checkerboard of fields), and creating farms with a compact area without changing the ownership structure (but usually taking into account soil valuation, which modifies this structure), which enables rational farming [30]. Construction and modernization of local roads increases road safety, and water and sewerage operations increase the quality of life of the inhabitants. Despite many investments and millions of euros spent on them, village heads and mayors still report a great need for financial resources for water, sewage and road operations. The percentage of people using the water supply system in the Lubuskie region is 94.6%, and that of the sewage system – 74.1% of the total population of the voivodeship. And despite the millions of investments, there are still significant needs in this area. An example is the Zwierzyn Commune, where only the first kilometre of the water supply network is being built, and the degree of the water supply system until recently was 0% [31].

CONCLUSION

Infrastructure development is the basis for modernization processes in the agricultural sector. Without appropriate infrastructure conditions, it becomes impossible to implement process, product or organizational innovations in agricultural production. The available infrastructure determines the possibilities of agriculture development, its progress and directions of technological modernization. Summarizing the role of the RDP instrument in the technological modernization of agriculture described in this article based on the Lubuskie Voivodeship in 2007-2020, it should be emphasized that this program was an indirect tool conditioning the processes of progressive changes. By characterizing its impact in this period, its impact can be described as complementary and stimulating for modernization and transformation processes. Based on the analysis of the data of the Department of Rural Development Programs of the Lubuskie Marshal's Office, it is easy to notice that in the analysed period its impact on the modernization processes of Lubuskie agriculture concerned mainly the development of technical infrastructure systems, which are a necessary condition to start the modernization process and technological progress. In the years 2007-2020, this instrument undoubtedly contributed to the improvement of the infrastructural conditions surrounding the field in the form of, among other things, construction of 600 km of water supply and sewage systems, construction and reconstruction of 110 km of roads. Thus, improving the acceleration functions of the infrastructure in the development of the agricultural sector. These investments undoubtedly contributed to the improvement of conditions for the growth and functioning of agriculture, and their pro-modernization impact, as a

result of the introduced qualitative and quantitative changes, created the possibility of applying new or significantly improved solutions in agricultural production in a particular area.

REFERENCES

- [1] A. H. Gardner, *Economic Growth: The Problem of Capital Accumulation, Macroeconomic Theory, The Macmillan Company, New York 1961, pp. 505-535.*
- [2] R. J. Barro, Sala-i-Martin X., *Economic Growth, The MIT Press, Cambridge (Massachusetts) 2003; Rosenstein-Rodan P.N., Uwagi o teorii „wielkiego pchnięcia”, Ekonomista, Państwowe Wydawnictwo Naukowe, nr 2, Warszawa 1959, pp. 360-369; Romer P.M., Endogenous Technological Change, Journal of Political Economy, University of Chicago Press, Vol. 98, No. 5, Chicago 1990, pp. 71-102.*
- [3] M. Dolata, *Znaczenie infrastruktury w koncepcji trwałego i zrównoważonego rozwoju obszarów wiejskich, Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania, Uniwersytet Szczeciński, nr 40, t. 2, Szczecin 2015, p. 47.*
- [4] K. Krukowski, *Rozwój zrównoważony w strategiach gmin wiejskich, Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, t. 2, Zamość 2000, p. 82*
- [5] W. Chudy, *Infrastruktura techniczna a rozwój turystyki w gminach wiejskich województwa małopolskiego, Infrastruktura i Ekologia Terenów Wiejskich, Polska Akademia Nauk Oddział w Krakowie, Komisja Technicznej Infrastruktury Wsi, Kraków 2008, pp. 53-61.*
- [6] E. Berkowska, H. Rasz, D. Stankiewicz, *Infrastruktura techniczna wsi, Studia BAS, nr 4 (24), Wydawnictwo Sejmowe, Warszawa 2010, pp. 181-188 and 212.*
- [7] W. Chudy, *Rozwój infrastruktury obszarów wiejskich, Infrastruktura i Ekologia Terenów Wiejskich, Polska Akademia Nauk Oddział w Krakowie, Komisja Technicznej Infrastruktury Wsi, nr 10, Kraków 2011, p. 100.*
- [8] M. Tomaszewski, *Infrastruktura techniczna jako czynnik poprawiający warunki życia w wiejskich gospodarstwach domowych, Prace Naukowe Szkoła Główna Gospodarstwa Wiejskiego. Wydział Ekonomiczno-Rolniczy. Katedra Polityki Agrarnej i Marketingu, nr 33, Szczecin 2004, pp. 266-275.*
- [9] MRiRW, *Informacja o stanie infrastruktury technicznej wsi – raport roczny 2009, Warszawa 2010.*
- [10] M. Kowalewski i inni, *Infrastruktura Teleinformatyczna Państwa, Instytut Łączności Państwowy Instytut Badawczy, Zakład Zastosowań Techniki Łączności Elektronicznej, Warszawa 2008, pp. 12-13.*
- [11] M. Orczykowska *Spółeczeństwo informacyjne w Polsce w 2019 r., Główny Urząd Statystyczny, [https://stat.gov.pl/obszary-tematyczne/nauka-i-technika-spolczenstwo-informacyjne/spoleczenstwo-informacyjne-w-polsce-w-2019-roku,2,9.html](https://stat.gov.pl/obszary-tematyczne/nauka-i-technika-spolczenstwo-informacyjne/spoleczenstwo-informacyjne/spoleczenstwo-informacyjne-w-polsce-w-2019-roku,2,9.html), pp. 1-2 [accessed: 19.03.2022].*
- [12] L. Kłós, *Wpływ infrastruktury technicznej na atrakcyjność obszarów wiejskich, Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania, Uniwersytet Szczeciński, Nr 25, Szczecin 2012, pp. 183-189.*
- [13] M. Jeznach i inni, *Potrzeby kształtowania infrastruktury wsi na terenach chronionych, a rozwój gospodarczy gmin kampinoskich, Zeszyty Naukowe AR Krak, nr 377, Kraków 2001, p. 451.*

- [14] J. Wilkin, *Obszary wiejskie w polityce rozwoju gospodarczego Polski*, Polskie Towarzystwo Ekonomiczne, FAPA, Komitet Ekonomiki Rolnictwa Państwowej Akademii Nauk, Warszawa 1996, p. 32.
- [15] K. Wierzbicki, K. Krajewski *Kierunki rozwoju infrastruktury technicznej obszarów wiejskich w Polsce*, Woda-Środowisko-Obszary Wiejskie, Wydawnictwo IMUZ, t. 4, z. 2b(12), Raszyn 2004, pp. 9-20.
- [16] *Ministerstwo Rozwoju i Rolnictwa, Rolnictwo i obszary wiejskie w latach 2007-2015, Warszawa 2015*, <https://www.dodr.pl/dodr/ogloszenia/102015>, pp. 30-32 [accessed: 20.03.2022].
- [17] E. Pierzgalski, *Zasoby wodne a rozwój rolnictwa*, Studia i raporty IUNG-PIB, 2010, z. 19
- [18] E. Kaca, *Diagnoza z elementami prognozy stanu odwodnień i nawodnień użytków rolnych*, Średnio i długookresowe programy rozwoju melioracji w skali kraju i województw, z uwzględnieniem potrzeb rolnictwa, możliwości realizacyjnych i skutków środowiskowych, Falenty 2014, <https://www.itp.edu.pl/old/nauka/produktyw/Programy%20rozwoju%20melioracji.pdf>, pp. 19-23 [accessed: 24.03.2022].
- [19] J. Komża, *Obszary wiejskie: infrastruktura drogowa*, Dziennik warto wiedzieć, 2017, <https://wartowiedziec.pl/rozwoj-i-fundusze/41743-obszary-wiejskie-infrastruktura-drogowa> [accessed: 27.03.2022].
- [20] M. Woźniak, *Zrównoważona gospodarka energetyczna na obszarach wiejskich w Polsce*, Polityka Energetyczna, z. 1, t. 21, Warszawa 2018, pp. 69-84.
- [21] Vortex Bladeless, *First wind turbine without blades nor gears*, <https://vortexbladeless.com/technology-design/>, [accessed: 27.02.2022].
- [22] K. Wilczyńska, *Infrastruktura wsi i rolnictwa. Próba definicji* Poznań 1983, *Ruch prawniczy, ekonomiczny i socjologiczny*, Rok XLV, zeszyt 2, 1983, pp. 157 and 161.
- [23] S. Ogrodnik, *Infrastruktura techniczna a produkcja rolna: w zarysie*, ss. 259-260 i 263 [w:] *Annales Universitatis Marie Curie-Skłodowska Lublin. Polonia* vol. XXIX/XXX, 16 SECTION H 1995/1996, Zakład Gospodarki Żywnościowej Wydziału Ekonomicznego UMCS.
- [24] European Union, *The second pillar of the CAP: Rural Development Policy – Information documents on the*, 2017.
- [25] Regulation of the Minister of Agriculture and Rural Development of 25 January 2013 (*Journal of Laws* of 2013, item 119).
- [26] Regulation of the Minister of Agriculture and Rural Development of April 21, 2022 (item 922).
- [27] Regulation of the Minister of Agriculture and Rural Development of March 2, 2022 (item 564).
- [28] https://pl.wikipedia.org/wiki/Wojew%C3%B3dztwo_lubuskie as of 15.05.2022.
- [29] Annex III of the Commission Implementing Regulation (EU) No 808/2014 of 17 July 2014.
- [30] <https://encyklopedia.pwn.pl/haslo/3972846> as of 15.05.2022.
- [31] Data of the Statistical Office in Zielona Góra, as of December 31, 2021.

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