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Key challenges related to smart villages

Introduction

Modern law seeks new solutions for shaping agriculture in Europe, which is also the result of the growing competitiveness among EU countries. As a rule, modern law is seen as a tool for implementing the goals of the Common Agricultural Policy and fostering not only the profitability, but, above all, developing innovation. Therefore, agricultural policy program plans and following them legislative acts contain not only a general definition of the goals of innovation, but also specific legal mechanisms that help to realize them. Most of the mechanisms implemented in recent years seem to be of an experimental nature, such as the greening policy,¹ the implementation of certain mechanisms related to climate protection,² or the environmental issues.³ As with any peculiar experiment, some are successful, and some are not, remaining ultimately subject to modification.

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¹ European Court of Auditors, *Greening – a more complex income support system that is not yet environmentally effective*, Special Report 2017, No. 21.

² W. Ziętara, Z. Mirkowska, *Zielony ład – w kierunku rolnictwa ekologicznego czy ekologizacji rolnictwa?*, “Zagadnienia Ekonomiki Rolnej” 2021, vol. 368, no. 3, pp. 29–54.

³ L. J. Cole, D. Kleijn, L. V. Dicks, J. C. Stout, S. G. Potts, M. Albrecht, J. Scheper, *A critical analysis of the potential for EU Common Agricultural Policy measures to support wild pollinators on farmland*, “Journal of Applied Ecology” 2020, vol. 57, no. 4, pp. 681–694.

The developing solutions to the idea of smart villages should also be seen in this category. They are a heterogeneous legal instrument that is largely shaped as a collection of different solutions enabling the implementation of innovation in rural areas. At the same time, these solutions should be sufficiently compatible among themselves in order to form complementary instruments to serve society and the local community.⁴

The purpose of the discussion is to identify the challenges faced not only by legislators in defining the regulations that would make up smart villages, but also the challenges faced by farmers who will apply these mechanisms. These challenges define the development perspective of agriculture and mainly focus on innovative solutions, but not only from the sphere of technology, but also from the social and economic aspect as well as the provision of public goods. The identification of the challenges of the future must be supported by examples from the past. Most of the solutions for smart villages in Poland come from other European countries. However, there are also a few Polish examples that fall within the concept of smart villages, and the challenges of the future may be identified on their experience.

The following research hypotheses will be emphasized in the paper. The first is the lack of unified European solutions for the development of smart villages. None of the EU countries has developed a comprehensive solution as yet. The model for the development of smart villages, which is the sum of various legal instruments that depend on the choice of local society is, on the one hand an opportunity, on the other hand a threat to the realization of smart villages.⁵

The second hypothesis is the need to combine the global⁶ and European challenges with the needs of local societies. Smart villages are intended to be a response to rural depopulation⁷ and the farmers' departure from the

⁴ L. Naldi, P. Nilsson, H. Westlund, S. Wixe, *What is smart rural development?*, "Journal of Rural Studies" 2015, no. 40, pp. 90–101.

⁵ P. W. Maja, J. Meyer, S. von Solms, *Smart Rural Village's Healthcare and Energy Indicators-Twin Enablers to Smart Rural Life*, "Sustainability" 2022, vol. 14, no. 19.

⁶ V. I. Lakshmanan, A. Chockalingam, V. K. Murty, S. Kalyanasundaram, *Smart Villages: Bridging the Global Urban-Rural Divide*, Toronto, 2022.

⁷ A. Rosner, M. Stanny, *Przemiany struktury społeczno-zawodowej ludności wiejskiej*, in: M. Halamska, M. Stanny, J. Wilkin (eds.), *Ciągłość i zmiana: Sto lat rozwoju polskiej wsi*, Warszawa 2019, pp. 119–146. The phenomenon of rural depopulation is noted in Regulation 2021/211, cited further. Recital 32 indicates that "as many rural areas in the Union suffer from structural problems, such as a lack of attractive employment opportunities, a shortage of skilled labor, underinvestment in broadband, digital and other infrastructure and basic services, and an exodus of youth, it is essential to strengthen the socio-economic structure in these areas,

profession.⁸ This global and particularly European problem is to be solved through grassroots initiatives of local communities. The legal challenge is to identify the needs of rural residents in such a way as to offer them a choice of legal instruments that will meet their expectations, while at the same time the combination of these mechanisms will realize the need to stem the rural exodus. Undoubtedly, the implementation of this concept should also be combined with the mechanisms that have already proven successful in identifying smart cities.⁹

Another hypothesis concerns the complexity of the legal instruments that make up smart villages. Their rather rapid variability and the possibility of choosing specific mechanisms depending on the needs of the population is a challenge for agriculture. Identifying the needs of a modern village and combining the individual instruments should in total yield not only the economic progress, but above all innovative progress. This complexity of legal instruments is also a challenge because of the legislature's permanent readiness to identify possible aid measures. It will be a challenge to keep the legislation up to speed with the milling technicization of agriculture and the implementation of new solutions in this area.¹⁰ Undoubtedly, meeting these challenges will also have an impact on the competitiveness of European agriculture, if only in comparison with third countries, including China,¹¹ or the US.

in line with the Cork Declaration 2.0. 'Better Life in Rural Areas,' particularly by creating jobs and generational exchange, introducing the Commission's jobs and growth agenda in rural areas, promoting social inclusion, helping young people, generational exchange and the development of 'smart villages' in rural areas across the European Union, and by contributing to mitigating depopulation."

⁸ A. L. Rossouw, M. Garbutt, *Six Roles of ICT in Alleviating Depopulation of Rural Villages Through Improved Quality of Life*, "Lecture Notes in Networks and Systems" 2023, vol. 624, pp. 341–351.

⁹ M. Czupich, M. Kola-Bezka, A. Ignasiak-Szulc, *Czynniki i bariery wdrażania koncepcji smart city w Polsce*, "Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach" 2016, no. 276, pp. 223–235.

¹⁰ S. P. Priyadarshini, P. Balamurugan, *Unmanned Aerial Vehicle in the Smart Farming Systems: Types, Applications and Cyber-Security Threats*, Proceedings of the 2022 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems, ICSES 2022; R. Lankauskienė, Ž. Gedminaitė-Raudonė, *Toward Holistic Perceptions of "Smart" Growth in Development Paradigms and Policy Agendas*, "Land" 2023, vol. 12, no. 2.

¹¹ R.S. Sattar, M.S. Mehmood, M.H. Raza, V.P.I.S. Wijeratne, B. Shahbaz, *Evaluating adoption of climate smart agricultural practices among farmers in the Fujian Province, China*, "Environmental Science and Pollution Research" 2023, no. 30, pp. 45331–45341, <https://doi.org/10.1007/s11356-023-25480-0>.

The comprehensiveness of the matter under study allows us to point out only to the most important challenges facing the development of smart villages in Poland. It will depend on the regulations adopted and the financial assistance directed whether these challenges will be met by farmers. In addition to legal consensus, social agreements will also have to be found, as smart villages will serve not only farmers, but also other rural residents.¹² Therefore, the solutions adopted must be as universal as possible.

The presented issues are only a sample selection of the most important challenges facing smart villages. They are a contribution to a further discussion and answers to the question of how to effectively implement the interesting idea of smart villages so that it brings the best possible results for the Polish and European countryside.

1. The evolution of smart villages

The idea of smart villages is part of the broad idea of sustainable development.¹³ At the same time, it is a concept meant to promote progress in agriculture, especially the implementation of innovative solutions. The question arises as to what lies behind the concept of smart villages?¹⁴ In science, the question has been asked what really makes a smart village, smart?¹⁵ The answer to these questions is not easy, because the very term smart villages has evolved¹⁶ over years. In this development of the concept of smart villages, the first challenge can already be seen. This means that the legal institution in question is in the process of forming its final shape. However, even the postulated shape is not entirely clear. This allows, on the one hand, to adapt

¹² A. Visvizi, M. D. Lytras, “*Rescaling and refocusing smart cities research: From mega cities to smart villages*,” *Journal of Science and Technology Policy Management* 2018, no. 9, pp. 134–145.

¹³ B. Jeżyńska, *Proekologiczne instrumenty wsparcia zrównoważonego rozwoju obszarów wiejskich*, “*Studia Iuridica Agraria*” 2012, vol. X; M.A. Król, *Obszary o wysokich wartościach przyrodniczych i ich znaczenie w ochronie różnorodności biologicznej na obszarach wiejskich*, in: M. Górski, J. Niedziółka, R. Stec, D. Strus (eds.), *Public Administration and Nature Protection. Zagadnienia ekonomiczne, społeczne oraz prawne*, Warszawa 2012, pp. 47–66.

¹⁴ L. Naldi, P. Nilsson, H. Westlund, S. Wixe, *What is smart rural development?*, “*Journal of Rural Studies*” 2015, vol. 40, pp. 90–101.

¹⁵ P. Gerli, J. Navio Marco, J. Whalley, *What makes a smart village smart? A review of the literature*, “*Transforming Government: People, Process and Policy*” 2022, vol. 16, no. 3, pp. 292–304.

¹⁶ S. Renukappa, S. Suresh, W. Abdalla, N. Shetty, N., Yababati, R. Hiremath, *Evaluation of smart village strategies and challenges*, “*Smart and Sustainable Built Environment*” 2022, <https://doi.org/10.1108/SASBE-03-2022-0060>.

the law to the changing reality, but on the other hand, prevents the rational planning of the entire aid system in advance.

One of the beginnings of the legal concept of smart villages is the announcement in April 2017 by the European Commission of the “EU Smart Villages Action.”¹⁷ At the moment of its presentation the plan included an initial definition of smart villages, which later evolved. The main idea was to gather practical solutions from villagers, that can be implemented to make their lives easier. On top of this, technological progress and climate protection were to be ensured. Implementing technological advances is also an important task. It is pointed out that “the term smart villages can be defined as those villages (local communities) that use digital technologies and innovations in their daily life, thus improving its quality, improving the standard of public services and making better use of local resources.”¹⁸

It is also stressed that “in the case of Smart Villages, the assumptions are identical. Namely, the whole idea is to provide residents with the best possible living space and, in addition, in the case of smart villages, to level the standard of living with that in cities. All the technological advances here are likely to create new opportunities for local entrepreneurs, improve the services provided and access to them, and strengthen civil society. Undoubtedly, easier contact with government offices via the Internet or the option to propose one’s own civic initiative could do a lot of good.”¹⁹

Such assumptions of integrating various innovation-oriented grassroots activities are the basis of Smart Villages and have been implemented in several European countries. The experience of the functioning of Smart Villages so far such as in Germany,²⁰ Italy,²¹ the Czech Republic,²²

¹⁷ https://enrd.ec.europa.eu/news-events/news/eu-action-smart-villages_en [accessed on 3.03.2023].

¹⁸ Quoted by http://ksow.pl/files/Bazy/Biblioteka/files/Inteligentna_wies_-_publikacja_2019.pdf, p. 8 [accessed on 3.03.2023].

¹⁹ <https://almine.pl/inteligentna-wioska-smart-village-co-to-omowienie/> [accessed on 3.03.2023].

²⁰ L. Hanning, J. Laxa, D. Ahrens, *A roadmap to becoming a smart village-experiences from living labs in rural Bavaria*, “eJournal of eDemocracy and Open Government” 2022, vol. 13, no. 2, pp. 89–109.

²¹ S. Battino, S. Lampreu, *The role of the sharing economy for a sustainable and innovative development of rural areas: A case study in Sardinia (Italy)*, “Sustainability” 2019, vol. 11, no. 11

²² M. Pěluča, *Smart Villages and Investments to Public Services and ICT Infrastructure: Case of the Czech Rural Development Program 2007–2013*, “European Countryside” 2019, vol. 11, no. 4, pp. 584–598.

Hungary,²³ Slovakia²⁴ or finally in Poland²⁵ shows that there is no single scheme that can be recommended and applied in the legal process.²⁶ However, the inconsistency of regulations and the lack of a single model shaping smart villages that is a determinant of the formation of smart villages clearly has one unifying element, which is the implementation of innovative solutions. It should also be noted that the Smart Village concept is developing not only in Europe, but also on other continents.²⁷ This leads to an assessment of the level of competitiveness of the legal solutions adopted there with European norms. This is a challenge that may determine the success of the Smart Village concept in the global sphere.

The challenge is to find in the various legal mechanisms the possibility of combining them, so that together they form such an organized legal model that will contribute to the success of smart villages. Much importance in this regard is attached to the leader of the team, to the person or entity that will be able to carry out the assumed changes in the village. Sometimes these are merely symbolic like integrating the village into the Internet, sometimes they are complex measures including education, health care, agricultural trade, environmental and climate action.

The evolution of the Smart Village concept has led to it becoming one of the main issues in the latest financial perspective of the CAP to be a transmitter of modern solutions to agriculture. In recital 23 of Regulation (EU) 2021/2115 of the European Parliament and of the Council of December 2, 2021, laying down rules on support for strategic plans drawn up by Member States under the common agricultural policy (CAP strategic plans) and financed by the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD) and repealing

²³ T. T. Sikos, D. Szendi, *Evolution of smart village models in Hungarian Abaúj micro-region*, "Regional Statistics" 2022, vol. 12, no. 4, pp. 152–175.

²⁴ D. Košecká, P. Balco, P. Bajzik, *Readiness of Towns and Villages in Slovakia for the Implementation of Smart Solutions*, *Studies in Systems*, "Decision and Control" 2022, vol. 420, pp. 505–532.

²⁵ S. Żukowska, B. Chmiel, M. Połom, *The Smart Village Concept and Transport Exclusion of Rural Areas-A Case Study of a Village in Northern Poland*, "Land" 2023, vol. 12, no. 1.

²⁶ V. Zavratnik, A. Kos, E. S. Duh, *Smart villages: Comprehensive review of initiatives and practices*, "Sustainability" 2018, vol. 10, no. 7.

²⁷ M. Acosta, S. Riley, O. Bonilla-Findji, D. Martínez-Barón, F. Howland, S. Huyer, A. Castellanos, J. D. Martínez, N. Chanana, *Exploring women's differentiated access to climate-smart agricultural interventions in selected climate-smart villages of Latin America*, "Sustainability" 2022, vol. 13, no. 19.

Regulations (EU) No. 1305/2013 and (EU) No. 1307/2013²⁸ it is pointed out that “a smarter, modern and sustainable CAP must make use of research and innovation so that it can support the multifunctionality of the EU’s agricultural, forestry and food production systems by investing in technological development and digitization, as well as improving the uptake and effective application of technologies, particularly digital technologies, and improving access to and increased dissemination of impartial, reliable, relevant and new knowledge.” It is technological development and digitization that are to be among the markers of the Smart Village.

Article 77(1)(e) clearly indicates that Member States may grant support for cooperation purposes under the conditions set forth in the provision and further specified in their CAP Strategic Plans to prepare and implement smart villages strategies defined by Member States. Such an approach is also signaled in the Polish National Strategic Plan for the CAP, where it is emphasized that “the concept of smart villages, including the development of bio-economy, will be implemented. Investments in smaller scale technical infrastructure will be implemented.”²⁹ This can be equated with the implementation of innovations that enable technical progress combined with sustainable development, including climate protection. Innovation and climate are the main determinants not only of the smart village concept but also of the entire new CAP. Therefore, the challenge for smart villages may prove to be an increased importance in the investment process. As emphasized in the introduction, they have so far been treated as a kind of experiment. In the current approach, they are coming to the fore as one of the most desirable legal mechanisms for solving the current problems of agriculture in Europe.

The Polish Plan notes that a new instrument to be implemented as part of the intervention will be smart villages development projects aimed at using knowledge or innovation to find solutions in the areas of improving the quality of life, reducing depopulation, unfavorable demographic trends, increasing the quality of local services or security, respecting the local environment, insufficient number of jobs or digital exclusion, among others. The main challenge is to combat depopulation (rural depopulation) and raise

²⁸ Regulation (EU) 2021/2115 of the European Parliament and of the Council of December 2, 2021, laying down provisions on support for strategic plans drawn up by Member States under the common agricultural policy (CAP strategic plans) and financed by the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No. 1305/2013 and (EU) No. 1307/2013 (Official Journal of the EU of 2021 L 435/1).

²⁹ National Strategic Plan for the CAP, p. 33.

awareness of digital tools in agricultural activities. These two challenges, in order to be realized, require a huge amount of money. This is why innovation, along with climate protection, is one of the main priorities, of the new Common Agricultural Policy.

Smart villages are also created through the cooperation of various partners, including the involvement of the local community, as well as the scope of possible support under the LSR. This should contribute to strengthening multi-stakeholder cooperation at the local level.³⁰ The involvement of the local community and their ideas for the development of their own village, both individual and collective, is key to the success of the idea of smart villages. All of the cited examples of how such solutions worked assumed bottom-up initiative from the residents. The state only helped by creating a legal and financial framework for the implementation of specific projects.

As assessed in the Polish Plan, “an effective tool used in rural development can be the concept of Smart Villages. Within the framework of this concept, it will be important, among other things, to take advantage of the e-skills of society, access to e-health and other basic services, innovative solutions for environmental protection, conducting a closed-loop economy for agricultural waste, promoting local products supported by technology and ICT, implementing and reaping the full benefits of smart specialization of agri-food projects, tourism, cultural activities, etc. It is worth noting that the digital component in the Smart Villages concept is not mandatory. However, in addition to digitalization, the Smart Villages concept also seems to be a suitable method to be applied to the issues of: use of renewable energy, conservation of natural resources, social innovation, social capital, revitalization, mobility, etc.”³¹ This analysis alone presents a multiplicity of possible solutions related to environmental protection, innovation, tourism, or culture. This poses the challenge of linking the many spheres of the countryside in Poland in terms of legislation. All these mechanisms must work together in order to clearly define the development model of smart villages.

2. The future and further challenges of smart villages

In light of the European and national regulations presented, the future of agriculture is smart villages, as solutions that support progress and innovation. Solutions that are not imposed by legislation, but arise from the

³⁰ National Strategic Plan for the CAP, p. 1025.

³¹ *Ibidem*, Appendix 2 SWOT Analysis Objective 8, p. 30.

grassroots initiative of the local community. The first challenge is to identify these needs. A precise indication of what service or solution, or a combination of them, is needed in a given village. Such an indication must be preceded by economic, social and legal analyses. Only good preparation of such an investment that meets local needs can prove effective and determine the success of smart villages.

The challenge is also to find leaders among the rural population who not only have ideas, but also know how to implement them. In this regard, the state's challenge is to conduct training and information meetings for farmers, because only gaining knowledge about the pros and cons of particular solutions will allow rational decisions to be made. Without a leader who will convince the local community to implement innovative solutions, the measures taken may prove ineffective.

Building innovative villages also requires local coordination. For local governments, it is a challenge to coordinate individual projects so that they not only meet local needs, but serve all villagers. In this regard, local government officials should learn about the various options for building smart villages so that they can advise farmers and then control them.

Smart villages will not be built without public assistance. The noticeable increase in interest in this concept in the new Common Agricultural Policy is an opportunity for the development of smart villages. At the same time, the rather general declarations exemplified above must be followed by adequate financial resources to meet the requirements of innovation implementation. The rather low level of funding for greening policy has been met with inefficiency. For much more costly innovations, and thus with a higher degree of risk, much greater financial incentives are needed than before.

Developing forms of cooperation between science, business and agriculture will also be a challenge. The transfer of knowledge to the economy must have a defined legal framework. The cost-effectiveness of relevant innovations, patents, or implementations should be indisputable for explorers, but at the same time quite affordable for farmers and possible implementations. This challenge is one of the more significant due to the limited number of agricultural schools and uneven research opportunities in more European countries. The development of smart villages depends largely on the level of funding for science and research. Without adequate research facilities, no innovation in agriculture will work and will require the development of further intermediate solutions, and these no longer have the desired effect.

The legal challenge will be to develop solutions for the operation of precision agriculture. For example, at least the use of drones in agriculture

is not completely regulated. It is not clear how they are supposed to collect data on agricultural crops, soil quality, etc. There are no regulations allowing them to monitor other people's property, i.e. land, there is no clear status related to the protection of personal data, or, finally, liability for any damage caused by these machines. Drones are just one example here. What is lacking in agricultural law today are modern solutions for advancing agriculture. Legal instruments that would keep up with innovations. Therefore, *de lege ferenda* it would be appropriate to postulate the development of a law on precision agriculture that would respond to the most important needs of modern agriculture.

Conclusions

The analysis of smart villages presented in the paper and the identification of the challenges facing Polish agriculture leads to several final conclusions. First, there are no unified European solutions for the development of smart villages. As indicated in the introduction, none of the EU Member States have such comprehensive solutions either. There is also no unified model for the development of smart villages. The individual elements that make up a smart village relate primarily to the grassroots ideas of local communities. They can use the already existing legal mechanisms, or they can act on the basis of regulations scattered over many branches of law. The *de lege ferenda* postulate is to clarify the main components of smart villages and identify the most commonly chosen mechanisms to help their development.

In the concept of smart villages there is a merging of global and European challenges together with the needs of local societies. The challenge is to find solutions that will convince villagers not only to stay in the village, but also to carry out agricultural activities. As emphasized, the legal challenge is to identify the needs of rural residents in such a way as to offer them a choice of legal instruments that will meet their expectations, and at the same time the combination of these mechanisms will realize the need to stem the rural exodus. The problem of rural depopulation is a global problem. The observed depopulation should be stopped before implementing various innovative solutions that will not only help farmers, but will serve all rural residents.

After all, smart villages are not one specific legal mechanism. The complexity of the legal instruments that make up smart villages is a major challenge for lawmakers. What is it that he can offer farmers in the organizational sphere, as well as through financial assistance, that will make them stay in the countryside? The answer to this question is a global challenge, because,

contrary to appearances, technological advances making the world a “global village” are not conducive to the uniform development of urban and rural innovations. Identifying the needs of business farmers and people living in the countryside will determine the success of the experiment that is smart villages. The challenges outlined require not only a legal framework, but, above all, substantial economic assistance. Without targeted subsidies, no progress in agriculture may take place in European countries, simply because farmers will not be able to afford such investments.

BIBLIOGRAPHY

- Acosta M., Riley S., Bonilla-Findji O., Martínez-Barón D., Howland F., Huyer S., Castellanos A., Martínez J.D., Chanana N. (2022), *Exploring women's differentiated access to climate-smart agricultural interventions in selected climate-smart villages of Latin America*, “Sustainability” vol. 13, no. 19.
- Battino S., Lampreu S. (2019), *The role of the sharing economy for a sustainable and innovative development of rural areas: A case study in Sardinia (Italy)*, “Sustainability” vol. 11, no. 11.
- Cole L.J., Kleijn D., Dicks L.V., Stout J.C., Potts S.G., Albrecht M., Scheper J. (2020), *A critical analysis of the potential for EU Common Agricultural Policy measures to support wild pollinators on farmland*, “Journal of Applied Ecology” vol. 57, no. 4.
- Czupich M., Kola-Bezka M., Ignasiak-Szulc A. (2016), *Czynniki i bariery wdrażania koncepcji smart city w Polsce*, “Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach” no. 276.
- Gerli P., Navio Marco J., Whalley J. (2022), *What makes a smart village smart? A review of the literature*, “Transforming Government: People, Process and Policy” vol. 16, no. 3.
- Hanninger L., Laxa J., Ahrens D. (2022), *A roadmap to becoming a smart village-experiences from living labs in rural Bavaria*, “eJournal of eDemocracy and Open Government” vol. 13, no. 2.
- Jeżyńska B. (2012), *Proekologiczne instrumenty wsparcia zrównoważonego rozwoju obszarów Wiejskich*, “Studia Iuridica Agraria” vol. X.
- Košecá D., Balco P., Bajzik P. (2022), *Readiness of Towns and Villages in Slovakia for the Implementation of Smart Solutions*, *Studies in Systems*, “Decision and Control” vol. 420.
- Król M.A. (2012), *Obszary o wysokich wartościach przyrodniczych i ich znaczenie w ochronie różnorodności biologicznej na obszarach wiejskich*, in: M. Górski, D. Niedziółka, R. Stec, D. Strus (eds.), *Administracja publiczna a ochrona przyrody. Zagadnienia ekonomiczne, społeczne oraz prawne*, Warszawa.
- Lakshmanan V.I., Chockalingam A., Murty V.K., Kalyanasundaram S. (2022), *Smart Villages: Bridging the Global Urban-Rural Divide*, Toronto.
- Lankauskienė R., Gedminaitė-Raudonė Ž. (2023), *Toward Holistic Perceptions of “Smart” Growth in Development Paradigms and Policy Agendas*, “Land” vol. 12, no. 2.
- Maja P.W., Meyer J., Solms S. von (2022), *Smart Rural Village's Healthcare and Energy Indicators-Twin Enablers to Smart Rural Life*, “Sustainability” vol. 14, no. 19.

- Naldi L., Nilsson P., Westlund H., Wixe S. (2015), *What is smart rural development?*, "Journal of Rural Studies" no. 40.
- Pělucha M. (2019), *Smart Villages and Investments to Public Services and ICT Infrastructure: Case of the Czech Rural Development Program 2007–2013*, "European Countryside" vol. 11, no. 4.
- Priyadharshini S. P., Balamurugan P. (2022), *Unmanned Aerial Vehicle in the Smart Farming Systems: Types, Applications and Cyber-Security Threats*, Proceedings of the 2022 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems, ICSES.
- Renukappa S., Suresh S., Abdalla W., Shetty N., Yabbati N., Hiremath R. (2022), *Evaluation of smart village strategies and challenges*, "Smart and Sustainable Built Environment," <https://doi.org/10.1108/SASBE-03-2022-0060>.
- Rosner A., Stanny M. (2019), *Transformations of the socio-professional structure of the rural population*, in: M. Halamska, M. Stanny, J. Wilkin (eds.), *Continuity and Change: One Hundred Years of Development of the Polish Countryside*, Warszawa.
- Rossouw A. L., Garbutt M. (2023), *Six Roles of ICT in Alleviating Depopulation of Rural Villages Through Improved Quality of Life*, "Lecture Notes in Networks and Systems" vol. 624.
- Sattar R. S., Mehmood M. S., Raza M. H., Wijeratne V. P. I. S., Shahbaz B. (2023), *Evaluating adoption of climate smart agricultural practices among farmers in the Fujian Province, China*, "Environmental Science and Pollution Research" no. 30, <https://doi.org/10.1007/s11356-023-25480-0>.
- Sikos T. T., Szendi D. (2022), *Evolution of smart village models in Hungarian Abauj micro-region*, "Regional Statistics" vol. 12, no. 4.
- Visvizi A., Lytras M. D. (2018), *Rescaling and refocusing smart cities research: From mega cities to smart villages*, "Journal of Science and Technology Policy Management" no. 9.
- Zavratnik V., Kos A., Duh E. S. (2018), *Smart villages: Comprehensive review of initiatives and practices*, "Sustainability" vol. 10, no. 7.
- Ziętara W., Mirkowska Z. (2021), *Zielony ład – w kierunku rolnictwa ekologicznego czy ekologizacji rolnictwa?*, "Zagadnienia Ekonomiki Rolnej" vol. 368, no. 3.
- Żukowska S., Chmiel B., Połom M. (2023), *The Smart Village Concept and Transport Exclusion of Rural Areas-A Case Study of a Village in Northern Poland*, "Land" vol. 12, no. 1.

KEY CHALLENGES RELATED TO SMART VILLAGES

Summary

The aim of the considerations was to identify the challenges related to smart villages arising in the Polish and European legal systems. The expansion of the smart villages concept has become more apparent the new Common Agricultural Policy which provides for the development of different legal mechanisms which, put together, will help to create a smart village. The legal, but also social and economic challenges related to this proposal have been indicated and supported by examples of the implementation of innovative villages in selected European countries, taking into account the influence of globalisation and Europeanisation on the very concept of intelligent villages. Further to that, potential threats

from the adopted solutions, as well as their impact on the competitiveness of agriculture have been highlighted. It has also been shown that intelligent villages constitute one of the transmitters of innovation in agriculture and digital rural development.

Keywords: Common Agricultural Policy, National Strategic Plan, agriculture, innovative village, intelligent village

SFIDE FONDAMENTALI RELATIVE AI VILLAGGI INTELLIGENTI

Riassunto

L'articolo si propone di identificare sfide fondamentali relative ai villaggi intelligenti negli ordinamenti giuridici polacco ed europeo. Nella nuova politica agricola comune dopo il 2023 lo sviluppo della concezione di smart village è più accentuato. Essa prevede di sviluppare vari meccanismi giuridici che nell'insieme porteranno a creare questo tipo di villaggio. Nell'articolo sono state messe in risalto soprattutto sfide giuridiche, accanto a quelle sociali ed economiche, supportate da concreti esempi provenienti da Paesi europei scelti. Nel contesto delle sfide discusse si è tenuto conto anche delle questioni riguardanti la globalizzazione e l'europeizzazione. Si è fatto altresì riferimento a possibili minacce risultanti dalle soluzioni adottate, nonché ad un loro impatto sulla competitività dell'agricoltura. È stato anche appurato che i villaggi intelligenti agiscono da cassa di risonanza per promuovere l'innovazione nel settore agricolo come anche l'innovazione digitale delle zone rurali.

Parole chiave: politica agricola comune, Piano strategico nazionale, agricoltura, villaggio innovativo, villaggio intelligente