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FROM AGRICULTURAL DEVELOPMENT TO SMART DEVELOPMENT: A THEORETICAL APPROACH TO THE EVOLUTION OF PUBLIC INTERVENTION IN RURAL AREAS

ABSTRACT

The aim of this study is to analyze public intervention in rural areas, with the focus on the definitions and characteristics of rural development paradigms. The study also explores the evolution of public intervention and the significance of agriculture for rural development, functions of rural areas and the assumptions of the nascent paradigm of smart rural development.

A literature review was conducted to identify the main concepts of rural development, i.e. agricultural development, multifunctional development of agriculture, multifunctional rural development, sustainable rural development, integrated rural development and smart rural development. The article identified the main assumptions of these concepts and demonstrated how their key elements have been preserved since the 1960s as the new concept of smart rural development is based in part on older concepts. With regard to any new features of smart rural development, the article referred to the findings of leading researchers in the field as well as of EU institutions which recognized

that implementation of new technologies and ICT in the economic, social and environmental spheres is necessary for rural areas to have a chance to develop.

Key words

rural development policy, sustainable development, smart rural development, rural development paradigms

Introduction

As indicators of socio-economic development in rural areas are lower than in cities or areas under urbanization processes, states and international organizations pursue policies aimed at strengthening the potential of rural areas, which since the end of World War II have experienced significant changes due to an increased public intervention in this field, particularly among member states of the European Economic Community (EEC), and then the European Union (EU), as well as in the United States. The objective of this study is to analyze the composition of the main directions of public intervention in relation to rural areas. The author aims to address the following research questions: How is rural development defined? What are the most significant paradigms of rural development and their characteristics? How have the directions of public intervention changed in relation to rural areas? What is the significance of agriculture for rural development? What are the functions of rural areas? What are the assumptions of the nascent paradigm of smart rural development?

A review of literature on the subject was conducted to characterize the main paradigms, which are also ideal types (utopias). Based on a self-designed questionnaire, crucial assumptions were then synthesized, making it easier to compare them and highlight the most important similarities and continuities of specific assumptions as well as innovative elements.

Rural development

Rural development is defined in the literature as "development that benefits rural populations; where development is understood as the sustained improvement of the population's standards of living or welfare" (Anriquez & Stamoulis, 2007, p. 2). Bruce F. Johnson argues that rural development should result in structural changes in rural areas, including increased agricultural productivity and

a decrease in employment in the sector and the proportion of rural residents in the total population (Johnson, 2007, pp. 2–3). Jan Douwe van der Ploeg et al. (2000) highlight the importance of producing high-quality food, promoting short supply chains, diversifying economic activities and finding alternative sources of income for rural residents (pp. 392–392). Ian Hodge and Peter Midmore (2008) also emphasize the impact of diversifying economic activities in rural areas (p. 25). Maria Halamska and Ruta Śpiewak (2008) stress the significance of planning and coordinating changes by various entities (citizens, central and local authorities) in order to improve the living conditions of rural residents and integrate these communities with the whole society. Christopher L. Atkinson (2017) highlights social and economic activities that contribute to improving the quality of life.

Rural development – main approaches

The approach to rural development has undergone a significant evolution. Early concepts stressed the need to implement solutions that were better suited to cities. However, the urbanization of rural areas did not yield effective results, often intensifying the disparities in development between urban and rural regions and contributing to the degradation of the natural environment (Michalewska-Pawlak, 2013, p. 30). This was followed by the emergence of the new concepts of rural development: agricultural development, multifunctional agricultural development, multifunctional rural development, sustainable rural development and integrated rural development.

The concept of agricultural development links rural development to the agriculture sector. This approach, implemented after World War II, aimed to address food security concerns in a war-ravaged Europe and regarded agriculture as the core of rural economies, requiring public intervention to achieve objectives such as food security, stable incomes for farmers, and environmental protection. Agriculture was considered the driving force behind rural development and its productive, social and environmental functions (Hodge & Midmore, 2008, pp. 25–26). However, this proved to be inefficient due to high costs, growing inefficiency, and environmental degradation caused by increased production that involved mechanization, extensive use of fertilizers and new technologies (p. 26).

Multifunctional agriculture is based on the idea that rural areas should perform functions beyond traditional food production. These functions include providing public goods such as rural landscapes, biodiversity and cultural heritage (Kołodziejczak, 2015, p. 132), which can satisfy a number of environmental,

economic, social or cultural needs of the entire society (Wilklin, 2010, p. 19). Guido van Huylenbroeck et al. (2007) categorize the non-commercial functions of agriculture into four types: green, blue, white and yellow (p. 7). The green functions include management of natural resources (flora and fauna) and landscapes, contributing to the improvement of animal welfare, reducing greenhouse gas emissions and building a circular economy. The blue functions concern water management (taking care of its quality, regulating the flow and responding to floods), as well as wind energy generation. The white functions of agriculture include ensuring food security and safety. The yellow functions are related to the cultural heritage of rural areas, the development of agritourism and care for the vitality of these areas.

Multifunctional rural development is a broader concept and indicates that agricultural activity is just one of the possible forms of economic activity in rural areas. The concept promotes the diversification of economic activity and the development of highly competitive agricultural activities (Michalewska-Pawlak, 2015, p. 32). Rural residents can find employment and additional income in the service sector, industry, and tourism and recreation (Hodge & Midmore, 2008, p. 26). New activities can include the production of high-quality local products, management of natural resources and rural landscape (Knickel & Renting, 2000, p. 513). Attractive goods and services can increase the income of rural residents and farmers (van der Ploeg & Roep, 2003, p. 43). Apart from stimulating local entrepreneurship, multifunctional development of rural areas means investing in infrastructure or increasing levels of education (Sikora, 2012, p. 217).

According to the concept of multifunctional development, rural areas have a number of different functions. Jerzy Wilklin (2010, p. 29) divides these functions into four categories. The first of these is production, which encompasses the commercial production of food and raw materials for industry and energy, as well as tourism and non-commercial services such as the production of food and domestic inputs. The second category encompasses the social aspect and includes ensuring social cohesion in rural areas and providing social security for agricultural and non-agricultural families. The next function is cultural and concerns the protection of traditions, the strengthening of cultural identity and local and regional distinctiveness. The final function is environmental. Its negative aspects include the contribution to soil erosion, watercourse pollution, greenhouse gas emissions, and/or a reduction in biodiversity. On the other hand, its positive effects include protecting soil, watercourses, and biodiversity. According to Michalewska-Pawlak, rural areas fulfill several functions: residential

(serving as a place of residence for people involved in agriculture and other sectors); production (focused on food production); services (offering services that improve the quality of life in rural areas); recreation (taking advantage of natural resources such as forests, meadows, diverse flora and fauna, and clean air for rest and relaxation; tourism (through the development of agritourism); culture (related to local culture, cultural heritage, rural art and customs); environmental (protecting the natural environment and genetic resources); and aesthetic (preserving the beauty and traditional rural landscape) (2015, pp. 32–33).

Sustainable agricultural and rural development is a key component of the multifunctional development of agriculture and rural regions – a response to the widespread environmental degradation after World War II caused by mechanization, use of chemicals, and the rapid growth of agricultural production (Adamowicz & Zwolińska-Ligaj, 2020, p. 20). Sustainable development is based on responsible use of natural resources so that future generations can benefit from them as we do today. It emphasizes the need for balanced development not only in the economic dimension but also in the social and environmental spheres.

The concept of sustainable development in rural areas focuses on creating a favorable business environment. Here economic activities are diversified, with agriculture not being the dominant sector. The indicators for employment and education are high, and the inhabitants of rural areas have stable incomes and unemployment is at a natural level. The quality of life in rural areas improves through various initiatives such as the provision of infrastructure and public services aimed at reducing poverty and social exclusion. Cultural values, such as heritage, rituals, traditions and folk art, are emphasized. Natural resources, including soil, water and air, are used responsibly. Sustainable development in rural areas also involves protecting biodiversity, preserving ecosystems, limiting the use of chemicals, and exercising prudence in the use of biotechnology and genetic engineering in agriculture and food production. Thus the concept supports stable economic and social development while maintaining ecological balance (Adamowicz & Zwolińska-Ligaj, 2018; Czudec et al., 2018; FAO, 2017; Roszkowska-Mądra, 2009; Stanny & Czarnecki, 2011; Wilklin, 2011; Wlazły, 2018; Woś & Zegar, 2002).

Sustainable rural development is not possible without sustainable agricultural development based on responsible use of soil and water resources and their proper maintenance for future production. The products and raw materials derived from such agriculture should be safe, meet the needs of consumers and the food industry, and guarantee food self-sufficiency in rural areas. Farmers

should aim to reduce or eliminate environmental risks, and all land users should work to protect and preserve biodiversity. Employment agriculture should offer incomes comparable to those in other sectors and facilitate the modernization and growth of farms (Krasowicz, 2005, p. 25). According to Philip G. Robertson and Richard R. Harwood, sustainable farming practices must be economically viable, environmentally safe, and socially acceptable. John Reganold stresses the importance of economic benefits and environmental safety (1990), while Rod MacRay emphasizes the minimization of waste, promotion of self-regulation and increasing ecosystem resilience (Velten et al., 2015).

The concept of integrated development, as another approach, is based on multifunctionality and the territorial approach (Michalewska-Pawlak, 2015, p. 35). The territorial approach assumes that the spatial disparities in socio-economic development can be addressed by means of external stimuli (such as aid programs financed by central authorities) and the involvement of local actors (Nemes, 2005, p. 24). It is important to take into account the unique characteristics of each region and tailor intervention tools accordingly. A wide range of stakeholders (local authorities, residents, economic and social organizations, community leaders, and others) should be involved in setting the objectives of local development strategies (Dudek, 2017, pp. 20–22; Kostov & Lingard, 2004, pp. 10–11). Baldock et al. identify three principles of integrated rural development: integration, individuality and involvement. Integration involves balancing different interests to achieve economic, social and environmental objectives. Individuality recognizes the distinctiveness of each region. Involvement refers to building local partnerships, promoting social participation, and engaging the local community in the development process (2001, pp. 14–15).

Smart development

Smart development is founded upon an economy centered on knowledge and innovation. As such, in the strategic documents of the European Union, future development depends on investing in the education sector and supporting the transfer of knowledge and innovation. A key role in this process is played by information and communication technologies, as well as by its enhanced commercialization so that innovative ideas are transformed into marketable goods and services. This, in turn, is intended to contribute to economic growth, job creation and solving social problems (European Commission, 2010, p. 13). Smart development is not possible without investment in the research and development

(R&D) sector, the promotion of lifelong learning, and building a digital society (pp. 13–14).

The elements that make up the concepts of smart development and their impact on development at the regional level have been studied and described in the literature. A study into the impact of R&D investments was undertaken by Rodriguez-Pose (2001) and Bilbao-Osorio and Rodriguez-Pose (2004). The importance of the presence of the high-tech sector was underlined by Feldman and Florida (1994), Florida and Kenney (1986), and Hansen and Winther (2011).

The concept of smart development emphasizes the importance of location and regional specificity (Wójcik, 2018, p. 8). Spatial diversity in socio-economic development, determined by the resources available (natural, human, financial, technical infrastructure, functioning institutions), determines the type of economic activity undertaken and the inflow of investments (Romer, 1990; Wójcik, 2018). It is therefore necessary to identify the strengths of a region so that inhabitants can take advantage of specializing in a given field (as in the Innis' staple theory (Gałązka, 2017) or Porter business clusters (Pylak et al. 2014, p. 10). Within smart specialization, investments are made in the R&D sector, and innovations are created that relate to the economic structure and activities in a given area (Foray et al. 2011, p. 5; Naldi et al., 2015, p. 92).

Smart rural development

Smart rural development is a term that often appears in the literature (Adamowicz, 2020; Komorowski & Stanny, 2020; Naldi et al., 2015; Prause & Boevsky, 2017; Wójcik, 2018; Wójcik, 2018a). This is a relatively new concept, which has not yet been defined in a well-established way, as individual authors pay attention to different aspects of development.

Wójcik (2018a) outlines the various aspects of smart rural development. These include public services (education, health care and security), management and co-management (participation of citizens in this process and their influence on decisions concerning the financing of undertaken activities), social creativity (seeking innovative ways of solving local social and economic problems), technological innovations (possibly used in social activities and developing entrepreneurship), development of communication (means of communication, IT networks), environmental protection and new ways of using natural resources, including an increase in the importance of alternative energy sources.

Philip McCann and Raquel Ortega Argilés noticed that implementation of the concept of smart rural development requires a different approach than those

used in the cities. Smart specialization can be implemented only in intermediate regions (EU specifies three types of regions in regional policy: less developed regions with GDP lower than 75% of average GDP per capita in the EU, intermediate regions with GDP between 75% and 90%, and most developed regions with GDP above 90%) and only in areas that have sufficiently large population base, otherwise smart specialization may actually limit possibilities and inhibits development (Naldi et al., 2015, p. 93).

The concept of smart rural development builds upon prior development concepts, which primarily focused on regions rather than rural areas. Smart rural development, however, introduces some new elements. A questionnaire was designed and administered to identify the key elements of the most important rural development concepts, allowing for a comparison of their main assumptions (Table 1). The elements compared included: main approach, supported economic sectors, driving force of economic development, functions of agriculture, directions of public intervention, and functions of rural areas. The identified approaches were sectoral (focused solely on a limited sector of economy, in this case agriculture), multisectoral (considering multiple sectors of the economy such as agriculture, forestry, services, industry), territorial (empowering local authorities to play a role in decision making and to collaborate with other communities, local and regional authorities to determine supported sectors), and participatory (requiring involvement from a wide range of local actors and stakeholders, such as businesses, non-profit organizations, volunteers, activists, etc.). In terms of supported economic sectors, the analysis considered which sectors were provided with special aid.

The driving force of economic development is an important part of comparison and in this regard, we observe the major changes. Initially, the authorities, particularly the EEC institutions and national governments, focused solely on agriculture and food production in the rural areas. Later, they realized that in order for agriculture to drive economic growth in these regions, it needed to be competitive on a global scale. Sustainable rural development requires decoupling economic development from the depletion of natural resources. The approach to integrated rural development is based on the recognition that local conditions, such as climate, natural landscape, traditional ways of food production, buildings, lifestyle, and natural resources are important determinants of rural development. Local actors should follow global trends and leverage their strengths in the development process. The new concept of smart rural development stresses the importance of local specificity while also acknowledging that modern development is impossible without the implementation of new

technologies, including ICT, big data and the Internet. The development of knowledge also plays a critical role, as people in rural areas need to be educated and trained to implement new solutions in sectors such as agriculture, forestry, services, public services (health care, education, culture, transportation) and production systems. Public intervention has also shifted towards investments in modern technologies in various sectors, such as public services, environmental protection and food production.

Since the implementation of the concept of multifunctional rural development, there has been a growing belief that rural areas serve multiple purposes beyond production, including social, environmental, cultural, service, residual, aesthetic, and recreational functions.

Conclusion

The main goal of this research was achieved through the analysis of key concepts in rural development, which are agricultural development, multifunctional development of agriculture, multifunctional rural development, sustainable rural development, integrated rural development, and smart rural development.

The analysis showed that there has been a continuous evolution in the approach to rural development. After World War II, a sectoral approach dominated, with public intervention focused primarily on agriculture as the main driver of economic development. However, over time it became clear that the role of agriculture in economy and employment was diminishing, and that rural areas needed support in social and economic spheres, such as infrastructure, public services, transportation and environmental protection.

Although the concept of rural development has changed, some of the older aspects of public intervention in this area remain relevant. For example, since the Treaty of Rome in 1958, the EEC has supported farmers' income and food supply, indicating that the scope of public intervention is expanding. New challenges and goals are being addressed with new instruments.

The new concept of smart rural development builds upon many of the previous concepts, but with an emphasis on the integration of new technologies and ICT in the economic, social and environmental spheres. The literature review demonstrated that the instruments and solutions used in smart city development cannot be directly applied to smart rural development. Similarly, the institutions of the European Union and researchers in this field recognize that new technologies and ICT are necessary for rural areas to develop.

Table 1. The concepts of rural development – comparison

Specification	Agriculture development	Multifunctional development of agriculture	Multifunctional rural development	Sustainable rural development	Integrated rural development	Smart rural development
Approach	Sectoral	Sectoral	Multisectoral	Multisectoral	Multisectoral, territorial, participatory	Multisectoral, territorial participatory
Supported economic sectors	Agriculture	Agriculture	Agriculture, another sectors	Diversification of economic activity	Diversification of economic activity	Diversification of economic activity
The driving force of economic development	Agriculture	Agriculture	Competitive agriculture, diversified competitive economic activity	Decoupling development from the use of natural resources	Local specificity, strength	Development of knowledge and innovation, modern technologies, ICT, local specificity, strength
Functions of agriculture	Production, social, environmental	Production, social, environmental, cultural	Production, social, environmental, cultural	Production, social, environmental, cultural	Production, social, environmental, cultural	Production, social, environmental, cultural

Directions of public intervention	Ensuring food supply, ensuring agricultural income, environmental protection	Ensuring food supply, ensuring agricultural income, environmental protection	Ensuring food supply, ensuring agricultural income, environmental protection, investments in infrastructure and education	Ensuring the supply of high-quality food, environmental protection, pro-environmental activities, improvement of the quality of life in rural areas through investments in infrastructure and human capital, activities aimed at reducing the consumption of natural resources	Ensuring the supply of high-quality food, environmental protection, pro-environmental activities, improvement of the quality of life in rural areas through investments in infrastructure and human capital, activities aimed at reducing the consumption of natural resources	Ensuring the supply of high-quality food, investments in modern technologies in the economy and public services, agriculture and environmental protection, reducing the use of natural resources, climate protection
Functions of rural areas	Food production	Food production	Food production, social, environmental, cultural, service, residual, aesthetic, recreational	Food production, social, environmental, cultural, service, residual, aesthetic, recreational	Food production, social, environmental, cultural, service, residual, aesthetic, recreational	Food production, social, environmental, cultural, service, residual, aesthetic, recreational

Source: own work

REFERENCES

Adamowicz, M., & Zwolińska-Ligaj, M. (2020). The "Smart Village" as a Way to Achieve Sustainable Development in Rural Areas of Poland. *Sustainability*, *12*(16), 1–28.

Anríquez,G., & Stamoulis, K. (2007). Rural Development and Poverty Reduction: Is Agriculture Still the Key? ESA Working Paper No. 07-02. Retrieved from https://www.fao.org/3/ah885e/ah885e.pdf/

Atkinson, Ch. L. (2017). Rural Development. In A. Farazmand (Ed.). *Global Encyclopedia of Public Administration, Public Policy, and Governance*. DOI 10.1007/978-3-319-31816-5_1014-1

Baldock, D., Dwyer, J., Lowe, P., Petersen, J.-E., & Wardet N. (2001). *The Nature of Rural Development: Towards A Sustainable Integrated Rural Policy in Europe*. Retrieved from http://d2ouvy59p0dg6k.cloudfront.net/downloads/comp_report.pdf

Czudec, A., Miś, T., & Zając, D. (2018). *Zrównoważony rozwój obszarów wiejskich w wymiarze regionalnym*. Poznań: Bogucki Wydawnictwo Naukowe.

Dudek, M. (2017). Ocena możliwości wykorzystania zintegrowanego podejścia terytorialnego w realizacji polityki wobec wsi i rolnictwa. In P. Chmieliński, M. Dudek & B. Karwat-Woźniak (Eds.), *Zintegrowany rozwój lokalny w kontekście zmian w relacjach wiejsko-miejskich* (pp. 11–34). Warszawa: Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej Państwowego Instytutu Badawczego.

European Commission. (2010). *Communication from the Commission: Europe 2020: A strategy for smart, sustainable and inclusive growth*. Brussels, 3.3.2010, COM (2010) 2020 final.

FAO. (2017). *Innovation for Sustainable Rural Development*. Retrieved from https://www.fao.org/3/i7769e/i7769e.pdf/

Feldman, M. P., & Florida, R. (1994). The Geographic Sources of Innovation: Technological Infrastructure and Product Innovation in the United States. *Annals of the Association of American Geographers*, *84*(2), 210–229.

Florida, R. L., & Kenney, M. (1986). Venture Capital, High Technology and Regional Development. *Regional Studies*, *22*, 33–48.

Foray, D., David, P. A., & Hall, B. H. (2011). Smart specialization. Management of Technology & Entrepreneurship Institute (MTEI) Working Paper. Retrieved from https://infoscience.epfl.ch/record/170252?ln=en

Gałązka, A. (2017). Teoretyczne podstawy rozwoju regionalnego – wybrane teorie, czynniki i bariery rozwoju regionalnego. *Studia BAS*, *1*(49), 9–61.

Halamska, M., &Śpiewak, R. (2008). Rozwój wiejski – nowa utopia czy konieczność? In M. Drgas & A. Rosner (Eds.), *Polska wieś i rolnictwo w Unii Europejskiej. Dylematy i kierunki przemian* (pp. 393–416). Warszawa: IRWiR PAN.

Hansen, T., & Winther, L. (2011). Innovation, Regional Development and Relations Between High- and Low-Tech Industries. *European Urban and Regional Studies*, *18*(3), 321–339.

Hodge, I., & Midmore, P. (2008). Models of Rural Development and Approaches to Analysis Evaluation and Decision-Making. *Économie rurale*, *307*, 23–38.

van Huylenbroeck, G., Vandermeulen, V., Mettepenningen, E., & Verspecht, A. (2007). Multifunctionality of Agriculture: A Review of Definitions, Evidence and Instruments. *Living Reviews in Landscape Research*, *1*, 3. Retrieved from http://www.livingreviews.org/lrlr-2007-3/

Knickel, K., & Renting, H. (2000). Methodological and Conceptual Issues in the Study of Multifunctionality and Rural Development. *Sociologia Ruralis*, *40*(4), 512–528.

Kołodziejczak, A. (2015). Wielofunkcyjność rolnictwa jako czynnik zrównoważonego rozwoju obszarów wiejskich w Polsce. *Studia Obszarów Wiejskich*, *37*, 131–142.

Komorowski, Ł., & Stanny, M. (2020). Smart Villages: Where Can They Happen? *Land*, *9*(5), 151. DOI: https://doi.org/10.3390/land9050151

Kostov, P., & Lingard, J. (2004). *Integrated rural development – do we need a new approach?* Retrieved from https://www.researchgate.net/publication/23748838_Integrated_rural_development_-_do_we_need_a_new_approach

Krasowicz, S. (2005). Cechy rolnictwa zrównoważonego. In: J. S. Zegar (Ed.), *Koncepcja badań nad rolnictwem społecznie zrównoważonym* (pp. 23–39). Warszawa: Wydawnictwo Instytutu Ekonomiki Rolnictwa i Gospodarki Żywnościowej.

Michalewska-Pawlak, M. (2015). *Zarządzanie rozwojem obszarów wiejskich w Polsce w warunkach integracji europejskiej*. Warszawa–Wrocław: Oficyna Wydawnicza ASPRA.

Naldi L., Nilsson, P., Westlund, H., & Wixe, S. (2015). What is smart rural development? *Journal of Rural Studies*, *40*, 90–101.

National Academy of Engineering. (1969). *Impact of Science and Technology on Regional Economic Development: An Assessment of National Policies Regarding Research and Development in the Context of Regional Economic Development*. Washington, DC: The National Academies Press.

Nemes, G. (2005). Integrated rural development. The concept and its operation. Institute of Economics Hungarian Academy of Science Discussion Paper 2005/6. Retrieved from http://www.policy.hu/nemes/publikaciok/muhelytaulmany2005_6.pdf

van der Ploeg, J., Renting, H., Brunori, G., Knickel, K., Mannion, J., Marsden, T., & Ventura, F. (2000). Rural Development: From Practices and Policies towards Theory. *Sociologia Ruralis*, *40*, 391–408.

van der Ploeg, J. D., & Roep, D. (2003). Multifunctionality and rural development: the actual situation in Europe. In G. van Huylenbroeck & G. Durand (Eds.), *Multifunctional Agriculture; A New Paradigm for European Agriculture and Rural Development* (pp. 37–53). Farnham: Ashgate.

Prause, G., & Boevsky, I. (2015). Smart rural development. Retrieved from: https://www.researchgate.net/publication/315655058_Smart_rural_development

Reganold, J. P., Papendick, R. I., & Parr, J. F. (1990). Sustainable Agriculture. *Scientific American*, *262*, 112–120.

Robertson, G. P., & Harwood, R. R. (2013). Sustainable Agriculture. In S. A. Levin (Ed.), *Encyclopedia of Biodiversity* (pp. 111–118). Waltham: Academic Press.

Romer, P. M. (1990). Endogenous Technological Change. *The Journal of Political Economy*, *98*(5), 71–102.

Roszkowska-Mądra, B. (2009). The Concepts of Agricultural and Rural Development in the European Union. *Gospodarka Narodowa*, *10*, 83–102.

Sikora, J. (2012). Multifunctional Character of Rural Areas in Poland. *Journal of Agribusiness and Rural Development*, *24*(2), 215–226.

Stanny, M., & Czarnecki, A. (2011). *Zrównoważony rozwój obszarów wiejskich Zielonych Płuc Polski. Próba analizy empirycznej.* Warszawa: IRWiR PAN.

Wilklin, J. (Ed.) (2010). *Wielofunkcyjność rolnictwa. Kierunki badań, podstawy metodologiczne i implikacje praktyczne.* Warszawa: IRWiR PAN.

Wilklin, J. (2011). Wielofunkcyjność wsi i rolnictwa a zrównoważony rozwój. *Wieś i Rolnictwo*, *4*(153), 27–39.

Wlazły, A. (2018). Zrównoważony rozwój obszarów wiejskich w aspekcie teorii wielofunkcyjności. *Progress in Economic Sciences*, *5*, 66–93.

Woo, Y., Kim, E., & Lim, J. (2017). The Impact of Education and R&D Investment on Regional Economic Growth. *Sustainability*, *9*, 676. DOI:10.3390/su9050676

Woś, A., & Zegar, J. S. (2002). *Rolnictwo społeczne zrównoważone.* Warszawa: IRWiR PAN.

Wójcik, M. (2018a). *Inteligentny rozwój obszarów wiejskich (smart rural development): koncepcja, wymiary, metody.* Warszawa: Instytut Geografii i Przestrzennego Zagospodarowania Polska Akademia Nauk.

Wójcik, M. (2018b). Koncepcja inteligentnego rozwoju (smart development) – wyzwanie dla planowania obszarów wiejskich. *Acta Universitatis Lodziensis Folia Geographica Socia-Oeconomica*, *31*, 5–15.

Velten, S., Leventon, J., Jager, N., & Newig J. (2015). What is Sustainable Agriculture? A Systematic Review. *Sustainability*, *7*, 7833–7865.