



AgEcon SEARCH

RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Oskar Wolski

Digitalisation of Rural Areas and Agriculture in the EU Debate: How Far from What Research Says?

Abstract: Digitalisation of rural areas and agriculture is a vital thread in the EU debate now, at the time of developing the 2021–2027 programming perspective and defining the CAP goals. However, in this debate selected geographic and social factors influencing the process of digitalisation—according to the literature—do not seem to be taken into account. This leads to simplifications and generalisations of the rural reality. Given that satisfying different groups of stakeholders in different areas of Europe poses a big challenge to any of the EU policy, efforts to make them more effective should be stepped up. This paper is to serve that role. Its main aim was to discuss the gaps in the EU debate on digitalisation of rural areas and agriculture. The simplifications and generalisations present in the debate come down to the marginalisation of the role of place and people in the process. These in turn stem from perceiving the rural reality through the prism of binary division of rural society and economy. The former is seen to be constituted by farmers and non-farmers, while the latter by agricultural and non-agricultural functions of rural areas.

Keywords: digitalisation, rural areas, agriculture, rural development policy, EU policy, information and communication technology (ICT).

1. Introduction

In 2010, the European Commission (EC) published “A Digital Agenda for Europe”, a document which paved the way to common access to the internet and other technologies for the European Union (EU) citizens (EC 2010a). In the context of rural areas of Europe, this message was largely strengthened by the “Cork 2.0 Declaration”, in which the role of digital technologies in developing the potential

Oskar Wolski, PhD Candidate, University of Łódź, Department of Regional and Social Geography, Faculty of Geographical Sciences, Kopcińskiego St. 31, 90-142 Łódź, oskwolski@gmail.com, ORCID: 0000-0001-8790-1677.

of rural areas was highlighted (EC 2016). In 2013, the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), which supports the digitalisation of rural areas and agriculture, was involved in the work. At least several actions have been taken to facilitate digitalisation, for instance the identification of beneficiaries' needs, the collection of data, the publication of information material and booklets, as well as the organisation of workshops and seminars. The events organised are professional in character, or they are open. In the latter case, they are dedicated to the representatives of various sectors (agriculture, administration, academia, research or policy-making) and serve as a platform for a knowledge transfer, good-practice exchange, discussing actions taken across regions and sharing ideas how to improve EU policy in this field (Elouna Eyenga 2019).

The issue of digitalising rural areas is not merely practical, however, because there is a long tradition of research on it. In academia, it is discussed mostly with regard to digital divide that affects the life of certain groups of rural people or is present in given rural areas in general, in territorial systems from regional to global (e.g. Philip et al. 2015; Vicente, López 2011; van Dijk 2008; EC 2010a; NTIA 1995). In the context of rural areas, particular attention is also paid to peripheral areas (Grimes 2003). Nevertheless, it must be noted that the notion of peripherality has been changing over time, or at least it has acquired a new significance along with the development of information and communication technologies (ICTs). P. McCann and R. Ortega-Argil (2015) prove that today not only is the mobility across geographic space considered, but also the mobility across virtual space, as well as the ability to operate in a parallel reality. Given the diversity of rural areas in Europe, including their different degree of peripherality as understood above, and the fact that digital divide is shrinking globally (Doong, Ho 2012), it can be stated that the issue of digitalisation of rural areas may be interpreted as a classic one of geography. It relates to the differences in access to specific goods as a result of geographical location (location rent).

Geographical location, also in terms of the access to ICTs, impacts the social and economic vitality of rural areas. For example, S. Grimes (2003) argues that it is the peripheral rural areas, that is, the areas which largely do not participate in development process, which can benefit most from digitalisation. Digitalisation – S. Grimes (2003) continues – helps overcome a physical distance between the peripheral areas and the core ones, i.e. the distance that could only be reduced to a limited extent physically (e.g. by improving transport accessibility to such areas). Rural communities also benefit more from access to ICTs than urban people, because “the distance” to some goods and services – which in case of the lack of the access, especially to the internet, may be more easily accessed in cities than

in the countryside – is also overcome. Finally, access to ICTs favours participation in all manner of interactions between people, which again could be less frequent in the countryside just because of a lower population density (Warren 2007; Philip et al. 2015).

This paper confronts the debate on digitalisation of rural areas in the EU with the selected contemporary problems of rural “digital” development as identified in academic literature. However, it does not focus on the digital divide in a wider sense but on the role of ICTs in fostering rural development, actions taken for digitalising rural areas and agriculture, and discussion about the needs of people in terms of the use of such technologies. In other words, the paper confronts the policy-makers’ and experts’ points of view with the academics’ view on the above problems of digitalisation. I discuss a practical side of the debate based on the outcomes of the seminar on “Multi-level strategies for digitising agriculture and rural areas” organised by EIP-AGRI, which was devoted to the issue.¹ The seminar represents the state of the EU debate at the moment. It was also a step towards shaping the post-2020 digital future of rural areas in Europe. At the seminar, the initiatives taken by the EU organs for digitalising rural areas and the grassroots actions taken at local level implemented by rural actors were discussed. Following these, the problem of how to effectively introduce ICTs via digital strategies was debated. In total, more than 150 experts from almost all of the EU countries took part in the event.

Representatives of various sectors participate in such events and a number of problems are raised. This suggests that the EC is creating a proper environment for discussion and knowledge exchange. However, digging into the course and outcomes of the debate, it can be found that the rural reality in the debate is simplified and generalised (I develop this argument later in this paper). The one-fits-(not)-all problem in shaping policies is well-recognised (e.g. Ward, Brown 2009) but is still evident in programming development. In the context of digitalising rural areas, the problem can be come down to critical comments that respective policy programmes and initiatives to promote the use of ICTs neglect rural socio-economic and geographical contexts (Salemnik, Strijker, Bosworth 2017). Although it is

¹ The seminar was held on 12–13 December 2018 in Antwerp, Belgium. In the part of the paper titled “Outline of the EU Debate on Digitalisation of Rural Areas and Agriculture”, the information obtained during the author’s participation in the seminar was used. Hence, this part of the paper may express the opinions of the experts of the seminar as well. The author took part in this seminar as a representative of academia, and his participation was financed by the European Commission. The paper reflects the author’s view, which does not purport to reflect the opinions of the EC. More information about the seminar is available at: <https://ec.europa.eu/eip/agriculture/en/event/eip-agri-seminar-multi-level-strategies-digitising> (accessed March 2019).

difficult to develop policies that satisfy different groups of stakeholders in different (rural) regions of the continent equally (OECD 2006; Wolski 2018), it does not relieve the participants in the dialogue of the duty to take steps to make the policy more effective, and this is where I see a particular role to be played by academics. Exactly such a belief inspired this paper. Its main aim was to **discuss simplifications and generalisations in the EU debate on digitalising rural areas and agriculture**, which I call gaps. The specific objectives were as follows: 1) to discuss and sort the outcomes of the debate and to make recommendations on how to improve the process of strategic planning of digitalisation; 2) to disseminate the outcomes of the debate and to communicate these to academics, which I believe is important as such; 3) to identify the research areas in which research can deliver outputs important for policy-makers and thus to improve the rural development policy in the aspect discussed.

After the Introduction and Methods sections, in the third part of the paper, I briefly discuss selected issues of rural development in relation to the role of digitalisation and technologies in this process. In this part, I also outline the complex nature of contemporary rural areas, and so the complex nature of their development. This leads me to the identification of the success factors in the process of digitalisation of such areas, and thus I build a background against which to discuss the EU debate on digitalisation of rural areas and agriculture, which is a fourth part of the paper. There I present aims and components of digital strategies as defined by the experts, discuss selected problems raised during the seminar and identify previous initiatives which the seminar followed. In the fifth part of the paper, I juxtapose the most important threads from the third and fourth parts. In doing so, I identify gaps in the EU debate that can decrease the effectiveness of the digital strategies. To counteract these gaps, a role of place and people should be revisited in the digital strategies and seen in context, which I explain. Since the fifth part constitutes the main part of the discussion I held, the paper ends with a brief conclusion.

2. Methods

In the paper, which follows an interpretative paradigm, I deployed an expert/narrative literature review method (cf. McKibbin 2006). The review was carried out in the fields discussed: selected issues of contemporary rural development, the role of digitalisation and technologies in rural development, and selected issues of rural geography.

Using the knowledge acquired during the participation in the EIP-AGRI seminar was an important precondition, and it greatly influenced the character of the paper.

In this way, it was also possible to connect the academic considerations about digitalisation of rural areas and a practitioners' perspective. In order to identify other initiatives taken to foster digitalisation of rural areas and agriculture, I conducted a query on the websites of the European Commission and the EIP-AGRI.²

3. The Role of Digitalisation and Information and Communication Technologies in Rural Development – The Most Important Issues

The rural world is not easy to generalise and generalisations are not useful in most cases in the formulation of solutions for specific geographic areas (Wolski, Wójcik 2019). There is no exception in the case of rural development, a process that is now significantly different than it was in the past. It is more complex and may follow various paths (Terluin 2003). Not only have the functions of rural areas changed (e.g. Baldock et al. 2001; Marsden 1999; Lowe, Murdoch, Ward 1995), but also the primary function of these areas—agriculture—has evolved (e.g. van Huylbroek, Durand 2003). There are various rural actors (e.g. Baldock et al. 2001; OECD 2006; van der Ploeg et al. 2000) and institutions that play a vital role in the process. These institutions function at different levels in relation to each other (e.g. Ward, Brown 2009; van der Ploeg et al. 2000; Terluin 2003; Ray 2001). Moreover, actors and institutions both work in different contexts – the “differentiated countryside” (Murdoch et al. 2005) – which result from the space being understood in a specific way depending on where and by whom it is interpreted.

Digitalisation and information and communication technologies can be applied both in agriculture, a function typically associated with rural areas, and in new functions more recently identified in these areas. They can also be applied to help improve the vitality of rural areas in general. Hence digitalisation and ICTs are used to foster rural functions or to increase the quality of life in rural areas. Given that rural areas are characterised by significant diversity, starting at the local level leading up to the continental level or higher, they show a great diversity in terms of accessibility to ICTs, adoption of ICTs and also the way these technologies are used (Salemnik, Strijker, Bosworth 2017; Philip et al. 2015).

Academics have discussed two main strands that involve the above issues. K. Salemnik, D. Strijker, and G. Bosworth (2017) distinguish connectivity research and inclusion research. The former involves the issues of the provision of digital infrastructure and its quality. The special focus is on the urban-rural divide, i.e. the differences in the accessibility of ICTs between urban and rural areas (cf. Vicente, López 2011) and the evaluation of policies aimed at increasing accessibility. The

² <https://ec.europa.eu> and <https://ec.europa.eu/eip/agriculture> respectively (accessed June 2019).

latter is the research on how different groups of people are engaged in the use of technologies and how they use them in everyday life, which relates to digital competence (cf. Ilomäki, Kantosalo, Lakkala 2011). This is the research on the diffusion of ICTs among people and to regions.

In broader context, the problem of the (non-)accessibility of ICTs and its social and economic consequences can be considered via the concepts of equality and justice, with particular attention to “the rural penalty” (van Dijk 2006; Malecki 2003; cf. Hite 1997). Due to the fact that rural areas can benefit more significantly from the proper use of ICTs than urban areas, it is inferred that the latter have a built-in advantage in interacting with ICTs, and the presence of ICTs is rather an urban phenomenon (Poncet, Ripert 2007; Skerratt 2010; Grimes 2003; Vicente, López 2011). This explains why, in general, the role in equalising opportunities and capabilities is credited to digital infrastructure (Janc, Czapiewski 2013), in terms of both individuals and regions. However, there is not only the question of whether a given rural area or individual has the access to ICTs or not, but what comes from it. Providing access to ICTs only opens the door, and there is a need to take it one step further. This means that if we consider ICTs to be factors of rural development, the way they are adopted and used is decisive (Hage et al. 2013).

Based on the literature review, I distinguish three main factors that impact the adoption and the use of ICTs, which are intertwined. First are environmental conditions, both social and natural, which result from a location in a particular geographic space (a geographic factor). Second are users' abilities, which I understand not only as digital skills, but also in a broader sense as education or willingness to explore (a social factor). Third are facilities (an infrastructural factor). Both the adoption and the use of ICTs are affected by many variables within all of these three factors. In terms of the geographic factor, it is first and foremost the distance from the urban centres of the diffusion of new technologies (Forman, Goldfarb, Greenstein 2005; Goldfarb, Prince 2008; Goggins, Mascaro 2013), which seems particularly interesting given the above-mentioned role of ICTs in overcoming the physical distance, and “the distance” from the people who are themselves facilitators of new technologies, i.e. the people identified as well-educated and well-situated (Whitacre 2008). In the analyses of rural businesses, the context of a place, consisting of not only physical distance, but also cultural and informational distances, has also been highlighted (Goggins, Mascaro 2013). The social factors are on the one hand the knowledge of what ICTs can be used for and the skills in how to use them, and on the other hand the aim in using ICTs, are all rooted in the social context in which an individual lives (Helsper 2012; Selwyn 2006; Mitzner et al. 2010). In addition, the age of users and the circumstances that have prompted them to take up activities in a virtual reality at a given time have been proved to

have an influence on social inclusion (Rogers 2003; van Dijk, Hacker 2003; van Dijk 2006; Mitzner et al. 2010). In terms of the infrastructural factor, the last-mile problem and the reliability of the services (Warren 2007; Philip et al. 2017; Rowe 2003) and the investment in technologies via various different policies (Salemnik, Strijker, Bosworth 2017; EC 2013; Grimes 2003) have been the most frequently discussed issues.³

To put it rather colloquially, the internet—the most important ICT nowadays—can be used, for example by businesses, to send invoices to customers online rather than by post. However, if it is used mostly for this reason, it can be assumed that the features of new technologies have not been properly adopted, and thus there is no need to make further investment in the provision of newer, next-generation or more reliable technologies, because sending e-mails does not require it. We do know, however, that such a need exists, that is investment in technologies in rural areas fosters their competitiveness (Naldi et al. 2015; EC 2010b). But such investment must be accompanied by education and training to make any ICT policy work (Gillet 2000). This also clarifies why in terms of the role of ICTs in rural development the focus is on tangible benefits. For example, H. Akca, M. Sayili, and K. Esengun (2007) identify the following in the transition countries specifically: e-trade opportunities (inputs and outputs), extension/training activities for rural residents, advertising rural tourism products, knowledge transfer from urban to rural areas and vice versa, handling official procedures (tax, banking) and using GIS for natural-resource management. From the perspective of rural businesspeople, E. Malecki and B. Moriset (2008) argue that ICTs help win new markets, including niche and global ones, facilitate access to production factors and avoid unwanted business trips. From the perspective of employees, the benefits from remote working or teleworking are well recognised. The most frequently listed include flexible working hours, the possibility to shape one's own working environment and the increase in job availability for those who are outside typical modes of work, for example disabled people (Janc, Czapiewski 2013; Tsiligrirides 1993). What comes from the above is that the specific use of ICTs in each of the fields of economic activity mentioned greatly depends on where, by whom and for what ICTs are used, and the spectrum of ICT applications is wide, which necessitates making rural communities aware of all these benefits.

The benefits from ICTs are also evident in social activity. In contrast to the economic benefits, their tangibility is not so obvious (cf. Malecki 2003) as users value these social benefits individually and subjectively. Here academics have

³ More generally, this debate can be positioned in the research on the diffusion of technologies and innovation (e.g. Baptista 2001; Vicente, López 2011).

focused on different aspects of inclusion versus alienation as perceived by an individual. Digitalisation helps increase qualifications, which leads to increased self-esteem (Roberts et al. 2017), fosters participation in social life (Park 2004; Dabinett 2000), enriches leisure-time activities and provides access to information, including its hobby-oriented use (Malecki 2010). All of these benefits can be considered to be those of an individual who lives both globally via virtual reality and locally via a particular rural setting. In the paper, I obviously do not refer to the every-day benefits which we all get—as users especially of the internet, including the readers of this paper—both because of the fact that they are plentiful and that these benefits are common and well-known.

4. Outline of the EU Debate on Digitalisation of Rural Areas and Agriculture

The European Commission associates the works on digitalisation of rural areas and agriculture with inclusive growth and rural development, including smart rural development and the Smart Villages approach (EC 2010a; EC 2010b; EC 2017; ENRD 2018). The seminar “Multi-level strategies for digitising agriculture and rural areas” was an example of a result-oriented discussion. This is reflected not only in the title of the seminar, but also in the topics discussed. The experts did not concentrate on the issues of digital divide in rural areas or the importance of ICTs in rural development, which were taken for granted. Instead, they focused on framing the process and making recommendations for developing the strategies, i.e. the recommendations manageable at different levels of planning, which makes this seminar stand out from other previous initiatives. The discussion was conducted as part of the work towards the post-2020 Common Agriculture Policy (CAP), whose reform was sparked in June 2018 when the EC formulated legislative proposals. The existing proposals highlight that planning the CAP should include “a description of the **strategy for the development of digital technologies in agriculture and rural areas** and for the use of these technologies to improve the effectiveness and efficiency of the CAP Strategic Plan interventions” (EC 2018, p. 101; my emphasis). The very multi-level nature of strategies stems from the approach adopted to shaping EU policy in general, which assumes greater complementarity between institutions working at EU, national and regional levels, and resources available at these levels. At the same time, the participation of the representatives of farm business, academia, administration and policymakers was seen to bring additional benefits linked to cross-sector cooperation.

The seminar aimed at promoting multi-level digital strategies for agriculture and rural areas taking into account the specific regional context. It had the following specific objectives:

- to raise awareness about the role importance of strategic planning to foster and steer the digitalisation of agriculture and rural areas, also with a view to the future Strategic CAP Plans;
- to inspire through existing examples of strategic planning and relevant digitalisation initiatives across Europe;
- to discuss and kick-start the process for developing digital strategies adapted to the local context and to local needs by fostering mutual learning among actors, sectors and governance levels;
- to showcase tools and initiatives developed at EU level to accompany the digital transformation in the farming and rural economy sectors.⁴

The discussion was held in various formats, including breakout sessions, open space, gallery walk, and presentations. In this part of the paper, I discuss the outputs of this dialogue without linking these outputs to specific sessions, problem groups working as part of the sessions and particular problems discussed. Likewise, I do not link the stances presented in this part with specific contributors. All this is due to the concise nature of the paper on the one hand, and ethical issues, for example maintaining experts' anonymity, on the other. I start with the key aspects of digital strategies, i.e. the aims and components of these strategies. Later I discuss selected problems of shaping the digital environment in rural areas. The order in which I do so does not reflect the importance of these issues as expressed by the experts.

4.1. Strategies for Digitalisation of Rural Areas and Agriculture – Aims and Components

Digitalisation should not be an end in itself. On the contrary, according to the EIP-AGRI experts the list of goals that can be achieved with the proper use of ICTs is long. Nonetheless, from the perspective of the EC, the most crucial are those which make it possible to achieve CAP goals more effectively. This particularly applies to the goals in the next programming period, which are the ones I focus on in the paper.

To make a digital future happen, it is relevant to increase the accessibility of ICTs via a high-quality digital infrastructure. In terms of reliability of the services, the experts first and foremost point to broadband and 5G, which are the latest-generation technologies. Alternatives to these are ready-to-use technologies, that is technologies that do not demand the building of any special new infrastructure.

⁴ Based on the seminar materials distributed among the participants. Some of these are also available at: <https://ec.europa.eu/eip/agriculture/en/event/eip-agri-seminar-multi-level-strategies-digitising> (accessed March 2019).

However, this is preferable if the ready-to-use technologies are sufficient to satisfy users' needs or the latest-generation technologies cannot be provided. In all cases, access to all the technologies mentioned should be common. Different models of managing such infrastructures were also discussed. These included regional/local government funding in alliance with government departments or private capital, as well as joint partnerships. Although pricing policies can vary substantially in these models, investment aimed at increasing the accessibility to ICTs should contribute to mitigating the urban-rural digital divide.

As the provision of a proper infrastructure is only a precondition for the use of digitalisation in boosting rural development and agriculture, the improvement of digital competences along with better access to knowledge and information about ICTs are additional goals. The spectrum of potential actions to be taken is broad, although local initiatives should be preferred due to the fact that at this level it is easier to tailor the scope of activities to the people's needs, to customise training and identify target groups.⁵

What may be connected with the supply of proper infrastructures and technologies, and the improvement of digital competences is the better adoption of ICTs. It is highlighted that in the age of the rapid technological advance of technologies, it is necessary to constantly enhance competences, which further increases the receptivity and openness to technology-induced opportunities. In context, it also leads to increasing the creativity of rural communities and decreasing the cost of introducing technology in the future. There is also adaptability as understood from the perspective of the technology itself, which means that it may be easily maintained or improved in the future, i.e. that there is no need to build new infrastructure, but the existing one can be modified and customised.

Another goal of strategies that can be categorised technical is building a proper data ecosystem, which includes data management, semantics standards, data interoperability and data (open) sharing with respect to ownership rights. In other words, it is building a common standard for accumulating, storing, managing and using data, to which the access should be provided for an average user. The data discussed was: geodetic, cadastral, GIS (and, more generally, any spatial data available, such as maps), as well as numerical, which can be used for better managing local resources, shaping spatial policies, customising solutions in accordance with changes in the natural environment, monitoring resources, comparing different kinds of processes across member countries, and for the needs of the research

⁵ This is in accordance with the research: the transfer of knowledge occurs primarily at the local level – as local as the neighbourhood level – and not at more aggregated, regional levels (Andersson, Klaesson, Larsson 2016; Koster, van Ommeren, Rietveld 2014).

community. If such data is open, communities will be invited to all the actions mentioned. It also ensures the transparency of government-led actions at various levels. Finally, social responsibility for the actions taken⁶ and the protection of common goods (e.g. natural resources and cultural landscape) increases.⁷

Data, or in particular spatial data that follows a defined standard makes it possible, among others things, to monitor and map natural resources and thus to increase the efficiency of their use, which in the opinions given is seen as a goal in itself. Reduction of the impact on the natural environment and maintaining biodiversity (e.g. by means of better land and forest management and water regulation) are other environment-related applications of the common data ecosystem. Sustainability and the knowledge about climate changes are thus reflected in this school of thought. In this regard, the countryside represents not only a resource but also a good.

Data accessibility along with the adoption of technologies establish a good setting for inclusive growth, since they may lead to greater involvement of rural people in development. What follows from this are the next goals of digitalisation, which can be summarised as broad support for the communication process between stakeholders, including institution-to-institution communication and institution-to-person communication, and support for the identification of communities' needs. For the latter, online surveys or e-mail feedback, which are easily technically manageable, have already been used. For the rest, the ease with which people communicate nowadays is a sign of the times. Communication is becoming predominantly non-face-to-face. However, when used to consult pro-development actions or foster participation, the internet should not be the sole tool but an additional one, which means that the existing face-to-face communication channels should remain important.

Digitalisation strategies should also act for the benefit of rural economic growth. At this point, the discussion focused on agriculture on the one hand and the remaining functions of rural areas on the other. The most important agriculture-related problem areas that can be addressed with the use of ICT are education of the farming community, building confidence in agricultural producers, better management of agricultural enterprises' resources, optimisation of food-supply chains and, generally, improvement of the quality of agricultural production. From a consumer perspective, opportunities to encourage awareness of what we eat and how we purchase it were noted.

⁶ This also fits into democratisation, understood as the reduction of the distance in the relationship between local governments and other representatives of the local community who are treated as stakeholders (cf. Wolski, Wójcik 2019).

⁷ Managing changes in rural life with respect to the protection of the countryside is also a vital issue of smart rural development (Wolski 2018).

Of the other aspects of the rural economy, the rural business sector was highlighted. The increase in competitiveness of this sector was a key issue, as it was also in terms of the rural economy as a whole. A number of the applications of ICTs were pointed out, which stems from the variety of professional activities in the countryside and the occupational statuses of rural residents. However, particular attention was paid to the reduction in the physical distance between rural and urban areas – or even its elimination in the case of some professional activities. The lack of physical distance also favours job opportunities.

Technological advance is significantly shaping the rural service market, and this includes both the services produced and available in the countryside and services that are “outside” the countryside but used by rural people. Supply and demand for services can be moulded by producers and buyers to much greater extent than previously. This is of great importance in terms of increasing the quality of services and for the recentralisation of the whole sector.

Finally, digitalisation can be linked to goals of a holistic nature. These, for example, include the improvement of the quality of rural life, although one may note that this goal is common to all strategies and policies. This, however, does not alter the fact that access to ICTs is seen as an argument for staying in the countryside.

The experts also assigned the components of strategies to the goals of the digital strategies defined, so that their achievement could be possible at different levels of the management of development. I categorise these components according to the basic principles of developing any strategy. First and foremost, the experts highlighted the need to understand the context for the strategy to be implemented. This relates to the recognition of socio-economic characteristics of a given rural area and further diagnosis of the needs. If the strategy concerns a regional level or even higher, the issue of equal treatment of regions across Europe was raised. In terms of access to ICT this means that, regardless of their specifics, regions should have the opportunity to implement digital strategies by the same rules.

Having taken into account local conditions, it is possible to define the vision of technological development of a given rural area (or a individual village if necessary). However, I suggest that the scope of the conditions to be considered should be extended. The financial-institutional environment and network of horizontal and vertical relations in which villages/rural areas exist should be included in what is typically considered as social, economic and environmental conditions. It is also important to recognise rural area residents’ digital competences and the reasons why they use ICTs, because these do not necessarily correlate with the measures of development.⁸

⁸ This is also proved, for example, by Goldfarb, Prince 2008; Zhang 2013; Selwyn 2006.

According to the experts, strategies should be embedded in legal regulations, including EU and national (regional) lawmaking. Hence, what is important are links and synergies between digital strategies and other strategies, representing the strategies for rural development and agriculture development. Depending on implementation and funding mechanisms, different institutions may be managing the process. However, it is desirable that the process should be coordinated between different levels of management and planning, which reflects the direction in which EU policy is evolving.

Defining a funding mechanism and sources of capital itself was also considered important. A number of reasons for this were discussed, which I group as follows: First, the cost of investment varies significantly depending on the geographical location. Second, high prices may be charged if the supply of services is low in relation to demand, which concerns peripheral rural areas in particular. Third, it is difficult to achieve profitability in these areas, which reduces the availability of commercial suppliers' provision. Finally, having built an infrastructure, it is essential to provide technical and advisory support, understood as the improvement of digital competence as well whether the strategy is comprehensive. In short, the role of the components of digital strategies discussed so far is to create a business model for digitalisation, economically speaking.

An action plan at the local level should not only take account of the schedule of actions, but also of "mini-strategies" in the following areas identified by the experts: defining the users and hence the actors (given an inclusive approach); a plan for users' involvement; building relations with participating entities; making a community aware of the implementation of a strategy; building communication channels that keep a community updated with actions taken, including any consequence of these actions; and monitoring of the implementation as well as monitoring of expected results in the future, which can also apply to more aggregated levels of planning, that is regional or national.

Development of strategies as explained above again brings the comparison to an ecosystem to mind, a set of interrelated elements in a particular organisational context.

4.2. Selected Problems of Shaping the Rural Digital Environment

Discussions during problem-group sessions made it possible to formulate the following problem areas in shaping digital environment in rural areas: transfer of knowledge about technologies and acquisition of this knowledge; a place of digitalisation in the CAP; development of strategies and the planning process of digitalisation in context; management of the process, including the multi-level

nature of management in the implementation of digitalisation; involvement of rural communities; possible linkages between digitalisation and the principles of rural smart development and smart villages; data-related problems; benchmarking; monitoring of results. In this part of the paper, I have collated these issues and discuss them only briefly so that the outputs of the discussion assume the nature of recommendations.

Knowledge and learning about ICTs is a problem that can be considered in two ways. On the one hand, it is a certain form of organisation of how rural communities acquire digital competence. On the other hand, it is changing the mindset in these communities and the way they think about technologies, as well as making them aware of a (potential) role these technologies play in the life of an individual or groups of people. Both facets should be addressed while building openness for digitalisation among rural people.

If digitalisation is to help achieve the CAP goals, designing the infrastructure for the implementation of ICTs in rural areas and in agriculture should result from placing this process in the CAP in a way that these relations are understandable to all rural actors. This makes it possible to define expectations in terms of the outcomes of digitalisation in a given time and place, and will lead to answers to the following questions: What key problems of the countryside in Europe are solved via digitalisation (in the new programming period)? What approach to solving these problems should be adopted at different levels of management? What are the first steps to putting the plans that have been discussed into effect?

The next three problems discussed, governance, rural community involvement and smart rural development/smart villages can also be connected. In the smart villages approach it is the communities – constituted by local governments defined as the municipality governing at this level and other stakeholders working together – who play a central role in local development. Despite the fact that it has been practised and discussed for a long time, the concept of governance still calls for the capacity of public administration, as well as substantial social capital, explained as the readiness of various rural actors to take part in the management of local development. However, the coordination of the process should not only embrace all levels of digitalisation (as a part of rural development and agriculture development). It should also take place in the following domains: geographical, political, cultural, economic and technological. What is more, all these domains vary at different levels; for example, there are political structures specific to the local level but not to the national one, or there are geographical conditions that must be considered at the local level but are not so relevant on a wider scale, or there are cultural factors rooted at a purely local level that influence a process. This double coordination (levels and domains) is a challenge to shaping digitalisation policy, because it

crosses all levels of the management of development, as does the policy for rural development in general (cf. OECD 2006).

Smart villages believe that technology is a tool for achieving development goals (EC 2017), and the same was highlighted by the experts. These villages are also communities that use the best available knowledge and learn from it, so this kind of approach can be put to use in designing digital strategies, particularly in terms of the involvement of rural actors and their acquisition of digital competence. In digitalising a rural area, as well as introducing the smart villages approach at the local level, there is a “build it, and they will come” conviction, according to which the first necessity is to take the initiative. Only after this, can one expect further steps to be taken, including people’s involvement. However, it has been noted that smart villages are more rooted in the local environment (in spite of the fact that they develop vertical relations), so that they are more likely to work only at this level, while digital strategies are created at different levels.

The last group of problem areas includes the issue of data used in the digitalisation process and in the very process of implementing strategies, the monitoring of the implementation of digitalisation of rural areas and agriculture in a broader sense, and benchmarking in a narrow sense. These can be connected, since the data is essential to both monitoring and benchmarking. I position benchmarking after monitoring, because the former is related to good practices in a given field of activity, which in the case of the digitalisation of rural areas first need to be developed and disseminated (although the experts indicated some experiences that deserve such a label). In order to do this, knowledge about the process of digitalisation is necessary, which comes from the monitoring. Of course, some questions were raised; for example, if digitalisation is a tool for achieving CAP goals, what exactly should be monitored and how often. In other words, should the monitoring cover the expected outputs of building a digital infrastructure, or should it cover the CAP goals, and on this basis assess the progress in digitalisation? In the first case however, the focus might, even unintentionally, be shifted towards digitalisation itself, instead of remaining on the rural development that digitalisation is intended to foster. In the second case, assessment would be only indirect.

4.3. Selected Previous Initiatives on the Digitalisation of Rural Areas and Agriculture in the EU

Despite the fact that the seminar, based on which I have developed the main argument in this paper, summarised the previous efforts taken in order to foster the process of strategic planning of the digitalisation across rural Europe, it is worth listing previous selected initiatives. This not only shows the path to the current

state of the debate, but it also may suggest which of the issues were most frequently addressed, and hence broaden the outline of the EU debate presented earlier.

Two types of initiative can be distinguished. The first is directly related to the issue of digitalisation, while the second covers a number of innovation-related topics, of which digitalisation is “just” one. The latter includes, but is not limited to, “big events”, many of which are cyclical, organised as part of the EU or cooperating organisations’ action for innovation in rural areas and agriculture (Agri-Innovation Summits, Agri-Research Conferences, Global Forums for Innovation in Agriculture or Forums for the Future of Agriculture) and the work by the Subgroup on Innovation for Agricultural Productivity and Sustainability. Digitalisation is also a vital thread in the work of the Thematic Group on Smart Villages, which was conducted under the European Network for Rural Development (ENRD) “Smart and Competitive Rural Areas” theme. Using digital technology to move towards identified goals is one of the tools used in the Smart Villages approach (ENRD 2018). It was also heavily debated during the meetings of this thematic group.⁹ Following the Smart Villages initiative, digitalisation of rural areas also found its audience during the 2018 European Week of Cities and Regions under the workshop “Revitalising rural areas through digitalisation and connectivity”. In particular, it raised the questions of what are enabling conditions and bottlenecks on the way to introducing smart solutions in the rural environment and how to build innovative local policies. The initiatives devoted to the specific issue of digitalisation were also numerous, and they went into the two main topics: ICTs in business and the rural economy, with particular attention to agriculture, and the provision of the digital infrastructure.

Supporting the use of the ICTs in business and rural economies was mostly intended to equip stakeholders with knowledge on the use of technologies in their businesses and match representatives of different sectors so that cooperation between technology and agriculture sectors could be established. This includes, for instance, the “ICT in Agribusiness Conference” (Skopje, Macedonia, November 2016), “EIP-AGRI Seminar *Digital Innovation Hubs: Mainstreaming Digital Agriculture*” (Brussels, Belgium, November 2017), “EIP-AGRI Workshop *Enabling Farmers for the Digital Age: the Role of AKIS*” (Jūrmala, Latvia, April 2018), “EIT Digital Conference 2018” (Brussels, Belgium, September 2018), and the cyclical meeting of the Working Group on Digital Innovation Hubs (Brussels, Belgium).

Provision of the infrastructure capable of meeting the specific requirements of various kinds of users followed the discussion on the broadband infrastructure

⁹ https://enrd.ec.europa.eu/enrd-thematic-work/smart-and-competitive-rural-areas/smart-villages_en (accessed March 2019).

and the funding opportunities (“Seminar on the *EU Financing for Broadband Infrastructure Projects 2014–2020*”, Berlin, Germany, September 2016; “Broadband Days 2017”, Brussels, Belgium, November 2017; the meetings of the Working Group on Digital Innovation Hubs).

In spite of the large number of initiatives, these addressed problems discussed in the literature selectively, which begs the question of what is missing in the EU debate on digitalisation of rural areas and agriculture. The next part of the paper answers this question

5. Place and People in the Debate on Digitalisation – A Geographic Perspective

The debate on digitalisation of rural areas in the EU corresponds with two main strands of research on this subject, that is the provision of digital infrastructure and its quality, and the inclusion of different groups of people and the application they find for technologies. This debate, however, does not exhaust the specific issues addressed in these two strands of research.

Perceiving access to ICTs via the notion of equality and justice, as well as considering this access to be a precondition of development that equalises opportunities and prevents a digital gap between urban and rural areas, which are all covered in the literature, are also issues in the debate. However, it is assumed in this debate that digitalisation can play its role in development across rural Europe equally, meaning that it is needed everywhere. To put it another way, not only should access to ICTs be better where it is now weak, but also it should be even better where it is already very good. Although rural communities’ differing needs in terms of access to ICTs and the different roles of digitalisation were highlighted, ICT resources and ICT infrastructure, as well as digital competence already possessed were not discussed in strictly regional terms, and that, after all, is what the EU policy is.

With respect to the needs of rural communities and the way they use technologies, the literature broadly addresses the diversity of ICT users in terms of age, the factors that prompt them to the activity in a virtual world, and the specific social context in which they live. The EU debate, however, focuses around the dualistic division of the rural community into farmers and non-farmers, which reflects the division of the economy of rural areas into agricultural and non-agricultural functions. Even if we stick to this means of identification of rural actors, i.e. by their economic activity, rural communities actually constitute a continuum. This includes farmers on intensive farms, small farmers additionally running agritourism farms, residents receiving income outside agriculture, for example,

from wage labour in the rural area where they live or the city they commute to, and service entrepreneurs, to mention just a few. What is more, people who live in the country but work outside the rural world frequently treat the countryside only as a place of residence, so they do not fit this identification method. Additionally, not all farmers use ICT tools in the same way. Likewise, not all non-farmers see the same benefits from digitalisation. This leads to the unification of users' needs depending on what they do for a living. It is my contention that it is necessary to pose the question of how appropriate it is to define rural actors through the prism of their economic role. After all, with regard to the use of ICTs, people spend a lot of time on entertainment and other leisure-time activities, and this is true of both rural and urban people.

It may be therefore concluded that the geographic factor and the social factor – two out of the three factors, beside the infrastructural factor, discussed in the literature–have not been not fully developed in the EU debate. The geographic factor comes down to the reduction of physical distance, while the social one to the use of ICTs depending on economic activity. The simplifications and generalisations of rural reality mentioned in the introduction to the paper stem from these.

In support of my position, a simple example of such underdevelopment of these aspects can be given. It is argued that building infrastructure that allows transmission of data in the 5G technology is of great importance, by implication everywhere. However, in Poland, according to the National Institute of Telecommunications, the effective norms of electro-magnetic radiation (EMR) mean it is impossible to launch this technology at the moment (as of March 2019), unless some telecommunication services that operate in other bands are switched off. Needless to say, the users of services on these bandwidths, who use them not only because they do not have an alternative, but also because they are satisfied with the service provided, would suffer from deteriorating quality of service. Also, the underdevelopment of the digital infrastructure in Poland, especially in rural areas, means it is far more common to access the mobile internet than it is in the rest of Europe (14% of the traffic in Poland is via this kind of access, while the European average is 6%). At the same time, the capacity of mobile networks is about to diminish in the rural areas of Poland, and this is possible even in 2019 if data transmission follows the current configuration and the long-term evolution (LTE) standard is not introduced.¹⁰ The highly technical details presented here are not so important as the fact that such issues, deeply rooted in a regional context, are not

¹⁰ <https://www.telepolis.pl/artykuly/dyskusje-o-rynku/szybki-internet-w-telefonie-siec-5g-normy-pem> (accessed March 2019).

being considered. The EU debate should therefore be oriented on selected problem areas, which result from regional characteristics of the existing infrastructure (ICT resources) and users' prevailing preferences (part of digital competence). This also relates to the geographical and social factors mentioned.

The fact that there is only a fragmentary "geographic reflection" in the EU debate on the digitalisation of rural areas and agriculture may be ascribed to the lack of "hard" scientific evidence or to its lack of influence on policy-makers. Results in well-defined research areas can improve the decision-making process. Comparative research at different spatial scales, which are dependent on the aims of such research and data availability, seems to be the most important. Both research and policy-making communities should also consider this a shared goal that streamlines EU policy. In parenthesis, research on digitalisation can be an excellent example of cooperation between business and academia.

Having juxtaposed the past research and the outputs of the EU debate on rural digitalisation, **three specific research areas important for the future research, particularly for the research of the comparative nature, can be identified:**

- technical aspects and the quality of ICT infrastructure given a geographical location and time element, that is the technology dynamics and the trends in the use of ICTs in rural areas;
- digital competences of users in rural areas, including the socio-economic, cultural, and technological environments, in which they fulfil their needs in terms of the access to ICT, and in combination with their preferences and expectations;
- determination of relations between a wide array of digitalisation issues and other rural development issues.

6. Conclusion

The research so far carried out on digitalisation of rural areas reveals many issues, including the spatial diversification in access to the digital infrastructure and ICTs and the users' attitudes and behaviour depending on various factors, which can all be related to the diversity of rural areas in terms of social and economic characteristics in general. In the research on the accessibility of ICTs as well as on digital inclusion, the improvement of dedicated policies is often stressed, which results from the fact that the policies and programmes to date have been ineffective and generic actions are not sufficient (Salemnik, Strijker, Bosworth 2017).

The European Commission is striving to adjust EU policy to the changes in rural areas, including technological ones (cf. EC 2010a; EC 2013). However, the debate on the digitalisation of rural areas and agriculture that has been taken

up needs to be improved, among other things because of the gaps identified in this paper. The role of place and people in any socio-economic process, including rural development and other processes involved in it, has been well-argued, and therefore, as mentioned earlier, these gaps are not completely new problems. What poses a challenge, however, is to authentically allow for these while programming development. This in turn demands research on what I tentatively call the geography of new technologies in rural areas.

Consideration of any problem of rural development, including digitalisation or selected problems of digitalisation, needs to be accompanied by the awareness of the complexity of rural reality. Hence the perception of rural communities and rural economies through the prism of the division of these into farmers and agriculture on the one hand and non-farmers and non-agricultural functions on the other hand does not favour the improvement and refocusing of policy. What is more, it produces simplifications and generalisations that reduce its effectiveness. Of course, the CAP is by nature concentrated on agriculture, and, as a result, it is worth to acknowledge that the opening of the CAP for other rural development issues is already a step towards more integrative agricultural policy. However, according to the literature (cf. OECD 2006), taking account of the continuums of rural actors and the functions of rural areas that may vary from place to place, although difficult in practice, is the next step that needs to be taken, and the issue of developing strategies for digitalisation in Europe only proves this. Additionally, the use of ICTs is also a matter of individual preference, while programming development needs to address the needs of masses. With respect to this, the municipal level seems to span EU policy and the level of an individual user. Providing opportunities to shape solutions at this level particularly should thus be prioritised in post-2020 EU policy.

Bibliography

- Akca H., Sayili M., Esengun K. (2007). Challenge of rural people to reduce digital divide in the globalized world: Theory and practice. *Government Information Quarterly*, 24 (2), 404–413.
- Andersson M., Klaesson J., Larsson J.P. (2016). How local are spatial density externalities? Neighbourhood effects in agglomeration economies. *Regional Studies*, 50 (6), 1082–1095.
- Baldock D., Dwyer J., Lowe P., Petersen J.E., Ward, N. (2001). *The nature of rural development: Towards a sustainable integrated rural policy in Europe*. London: Institute for European Environmental Policy.
- Baptista R. (2001). Geographical clusters and innovation diffusion. *Technological Forecasting and Social Change*, 66 (1), 31–46.

- Dabinett G. (2000). Regenerating communities in the UK: getting plugged into the information society? *Community Development Journal*, 35 (2), 157–166.
- van Dijk J. (2006). Digital divide research, achievements and shortcoming. *Poetics*, 34 (4–5), 221–235.
- van Dijk J. (2008). One Europe, digitally divided. In: A. Chadwick, Howard, P.N. (eds.). *The Handbook of Internet Politics* (pp. 288–304). London: Routledge.
- van Dijk J., Hacker K. (2003). The digital Divide as a complex and dynamic phenomenon. *The Information Society*, 19 (4), 315–326.
- Doong S.H., Ho S. (2012). The impact of ICT development on the global digital divide. *Electronic Commerce Research and Applications*, 11 (5), 518–533.
- European Commission (EC) (2010a). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Digital Agenda For Europe*. Brussels: European Commission, <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52010DC0245R%2801%29> [accessed: March 2019].
- European Commission (EC) (2010b). *Communication from the Commission: Europe 2020: A Strategy for Smart, Sustainable and Inclusive Growth*. Brussels: European Commission, <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex:52010DC2020> [accessed: March 2019].
- European Commission (EC) (2013). *Communication from the Commission: EU Guidelines for the Application of State Aid Rules in Relation to the Rapid Deployment of Broadband Networks*. Brussels: European Commission, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.C_.2013.025.01.0001.01.ENG [accessed: March 2019].
- European Commission (EC) (2016). *Cork 2.0 Declaration: A Better Life in Rural Areas*. Luxembourg: Publications Office of the European Union, https://enrd.ec.europa.eu/sites/enrd/files/cork-declaration_en.pdf [accessed: June 2019].
- European Commission (EC) (2017). *EU Action for Smart Villages*, https://ec.europa.eu/agriculture/sites/agriculture/files/rural-development-2014-2020/lookingahead/rur-dev-small-villages_en.pdf [accessed: September 2018].
- European Network for Rural Development (ENRD) (2018). Smart villages: Revitalising rural services. *EU Rural Review*, 26. Luxembourg: Publications Office of the European Union.
- Elouna Eyenga P. (2019). *The EIP-AGRI supports agricultural community in shaping its digital future by working together*. <https://www.iof2020.eu/blog/2019/03/eip-agri-supports-agricultural-community> [accessed: March 2019].
- Forman Ch., Goldfarb A., Greenstein S. (2005). How did location affect adoption of the commercial Internet? Global village vs. urban leadership. *Journal of Urban Economics*, 58, 389–420.
- Gillett S.E. (2000). Universal service: Defining the policy goal in the age of the Internet. *The Information Society*, 16 (2), 147–149.
- Goggins S.P., Mascaro C. (2013). Context matters: The experience of physical, informational, and cultural distance in a rural IT firm. *The Information Society*, 29 (2), 113–127.
- Goldfarb A., Prince J. (2008). Internet adoption and usage patterns are different: Implications for the digital divide. *Information Economics and Policy*, 20 (1), 2–15.

- Grimes S. (2003). The digital economy challenge facing peripheral rural areas. *Progress in Human Geography*, 27 (2), 174–193.
- Hage E., Roo J., van Offenbeek M., Boonstra A. (2013). Implementation factors and their effect on e-Health service adoption in rural communities: A systematic literature review. *BMC Health Services Research*, 13 (19), 1–16.
- Helsper E.J. (2012). A corresponding Fields model for the links between social and digital exclusion. *Communication Theory*, 22 (4), 403–426.
- Hite J. (1997). The Thunen model and the new economic geography as a paradigm for rural development policy. *Review of Agricultural Economic*, 19 (2), 230–240.
- van Huylenbroek G., Durand G. (eds.) (2003). *Multifunctional agriculture: a new paradigm for European agriculture and rural development*. Aldershot: Ashgate.
- Iilomäki L., Kantosalo A., Lakkala M. (2011). *What is digital competence? Linked portal*. Brussels: European Schoolnet.
- Janc K., Czapiewski K. (2013). The internet as a development factor of rural areas and agriculture – theory vs. practice. *Studia Regionalia*, 36, 89–105.
- Koster H.R.A., van Ommeren J., Rietveld P. (2014). Is the sky the limit? High-rise buildings and office rents. *Journal of Economic Geography*, 14 (1), 125–153.
- Lowe P., Murdoch J., Ward N. (1995). Networks in rural development beyond exogenous and endogenous models. In: J.D. van der Ploeg, G. van Dijk (eds.). *Beyond modernisation: The impact of endogenous rural development* (pp. 87–105). Assen: Van Gorcum.
- Malecki E.J. (2003). Digital development in rural areas: Potentials and pitfalls. *Journal of Rural Studies*, 19, 201–214.
- Malecki E.J. (2010). Everywhere? The geography of knowledge. *Journal of Regional Science*, 50 (1), 493–513.
- Malecki E.J., Moriset B. (2008). *The Digital Economy. Business Organization, Production Process and Regional Development*. London: Routledge.
- Marsden T. (1999). Rural futures: The consumption countryside and its regulation. *Sociologia Ruralis*, 39 (4), 501–520.
- McCann P., Ortega-Argilés R. (2015). Smart specialization, regional growth and applications to European Union cohesion policy. *Regional Studies*, 49 (8), 1291–1302.
- McKibbin A.K. (2006). Systematic reviews and librarians. *Library Trends*, 55 (1), 202–215.
- Mitzner T.L., Boron J.B., Fausset C.B., Adams A.E., Charness N., Czaja S.J., Sharit J. (2010). Older adults talk technology: Technology usage and attitudes. *Computers in Human Behavior*, 26 (6), 1710–1721.
- Murdoch J., Lowe P., Ward N., Marsden T. (2005). *The Differentiated Countryside*. Routledge Studies in Human Geography. London: Routledge.
- Naldi L., Nilsson P., Westlund H., Wixe S. (2015). What is smart rural development? *Journal of Rural Studies*, 40, 90–101.
- National Telecommunications and Information Administration (NTIA) (1995). *Falling through the Net: A survey of the “have nots” in rural and urban America*, <http://www.ntia.doc.gov/ntiahome/fallingthru.html> [accessed: March 2019].
- Organisation for Economic Co-operation and Development (OECD) (2006). *The New Rural Paradigm: Policies and Governance*. Paris: OECD.

- Park S.O. (2004). Knowledge, networks and regional development in the periphery in the internet era. *Progress in Human Geography*, 28 (3), 283–286.
- Philip L.J., Cottrill C., Farrington J., Williams F., Ashmore F. (2017). The digital divide: Patterns, policy and scenarios for connecting the ‘final few’ in rural communities across Great Britain. *Journal of Rural Studies*, 54, 386–398.
- Philip L.J., Townsend L., Roberts E., Beel D. (2015). The rural digital economy. *Scottish Geographical Journal*, 131 (3–4), 143–147.
- van der Ploeg J.D., Renting H., Brunori G., Knickel K., Mannion J., Marsden T., de Roest K., Sevilla-Guzmán E., Ventura F. (2000). Rural development: From practices and policies towards theory. *Sociologia Ruralis*, 40 (4), 391–408.
- Poncet P., Rippert B. (2007). Fractured space: A geographical reflection on the digital divide. *GeoJournal*, 68, 19–29.
- Ray Ch. (2001). *Culture economies: A perspective on local rural development in Europe*. Centre for Rural Economy, <https://www.ncl.ac.uk/media/wwwnclacuk/centreforruraleconomy/files/culture-economy.pdf> [accessed: August 2018].
- Roberts E., Anderson B.A., Skerratt S., Farrington J. (2017). A review of the rural-digital policy agenda from a community resilience perspective. *Journal of Rural Studies*, 54, 372–385.
- Rogers E.M. (2003). *Diffusion of Innovations*. New York: Free Press.
- Rowe B. (2003). Rural technology deployment and access: Successes upon which to build. *Government Information Quarterly*, 20 (2), 85–93.
- Salemnik K., Strijker D., Bosworth G. (2017). Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas. *Journal of Rural Studies*, 54, 360–371.
- Selwyn N. (2006). Digital division or digital decision? A study of non-users and low-users of computers. *Poetics*, 34 (4–5), 273–292.
- Skerratt S. (2010). Hot spots and not spots: Addressing infrastructure and service provision through combined approaches in rural Scotland. *Sustainability*, 2 (6), 1719–1741.
- Terluin I.J. (2003). Differences in economic development in rural regions of advanced countries: An overview and critical analysis of theories. *Journal of Rural Studies*, 19, 327–344.
- Tsiligirides T. (1993). Teleworking: An information technology tool for integrated broadband communication development in rural areas of Europe. *Journal of Information Technology*, 8 (4), 241–255.
- Vicente M.R., López A.J. (2011). Assessing the regional digital divide across the European Union-27. *Telecommunications Policy*, 35, 220–237.
- Ward N., Atterton J., Kim T.-Y., Lowe P., Phillipson J., Thompson N. (2005). Universities, the knowledge economy and ‘neo-endogenous rural development’. *Centre for Rural Economy Discussion Paper Series*, 1, 1–15.
- Ward N., Brown D. (2009). Placing the rural in regional development. *Regional Studies*, 43 (10), 1237–1244.
- Warren M. (2007). The digital vicious cycle: links between social disadvantage and digital exclusion in rural areas. *Telecommunications Policy*, 31 (6–7), 374–388.

- Whitacre B.E. (2008). Factors influencing the temporal diffusion of broadband adoption: evidence from Oklahoma. *The Annals of Regional Science*, 42 (3), 661–679.
- Wolski O. (2018). Smart villages in the EU policy: How to match innovativeness and pragmatism? *Więś i Rolnictwo*, 4 (181), 163–179.
- Wolski O., Wójcik M. (2019). Smart villages revisited: Conceptual background and new challenges at the local level. In: A. Visvizi, M. Lytras, G. Mudri (eds.). *Smart Villages in the EU and Beyond: People, Technology, and Wellbeing* (pp. 29–48). Bingley: Emerald Publishing.
- Zhang X. (2013). Income disparity and digital divide: The Internet Consumption Model and cross-country empirical research. *Telecommunications Policy*, 37 (6–7), 515–52.