How to cite: Öztaş Karlı, R.G., B. Özüduru & S. Çelikyay, 2023. ICT-supported applications in rural area planning: Vodafone Smart Village model. Ege Univ. Ziraat Fak. Derg., 60 (4): 541-559, https://doi.org/10.20289/zfdergi.1273336

Research Article
(Araştırma Makalesi)

Ege Üniv. Ziraat Fak. Derg., 2023, 60 (4):541-559
https://doi.org/10.20289/zfdergi.1273336

ICT-supported applications in rural area planning: Vodafone Smart Village model*

Kırsal alan planlamasında BİT destekli uygulamalar: Vodafone Akıllı Köy modeli

* This article is summarized from the corresponding author's master's thesis.

Rukiye Gizem ÖZTAŞ KARLI [1*]

Burcu ÖZÜDURU [2]

Selma ÇELİKYAY [1]

[1] Bartın University, Faculty of Engineering, Architecture and Design, Department of Landscape Architecture, 74100, Merkez, Bartın, Türkiye

[2] Gazi University, Faculty of Architecture, Departmnet of City and Regional Planning, 06570, Çankaya, Ankara, Türkiye

***** Corresponding author (Sorumlu yazar):
roztas@bartin.edu.tr

Received (Alınış): **30.03.2023** **Accepted** (Kabul Tarihi): **28.11.2023**

ABSTRACT

Objective: The objective of this study was to evaluate ICT-supported innovative solutions through a new-generation rural living model, Vodafone Smart Village (VSV) model, which is Türkiye's first smart village equipped with end-to-end digital technologies and offers a new-generation rural life model.

Material and Methods: The study is based on a qualitative research method, a case study analysis. The research design is a holistic single-case design. Within the scope of the study, Vodafone Smart Village (VSV), located in Kasaplar Neighborhood (Aydın), was examined. Data were collected through semi-structured interviews and a questionnaire.

Results: To ensure a balanced and sustainable rural development and to plan rural areas for keeping the pace with the globalizing world in the process of transformation into an information society, it is essential to integrate ICT-supported innovative solutions to rural areas. In this context, the effective use of LEADER and Smart Village models is crucial.

Conclusion: This study emphasizes the importance of ICT-supported innovative solutions in rural development plans, projects and practices in Türkiye, in particular relevant plans, policies and strategies to be created in order to compete in the global world.

Keywords: Digital divide, information society, LEADER, rural development

ÖZ

Amaç: Bu çalışmanın amacı, BİT destekli yenilikçi çözümlerin Türkiye'nin uçtan uca dijital teknolojilerle donatılmış ilk akıllı köyü, yeni nesil kırsal yaşam modeli olan Vodafone Akıllı Köy (VAK) modeli üzerinden değerlendirilmesidir.

Materyal ve Yöntem: Çalışma, nitel araştırma yöntemlerinden biri olan örnek alan çalışmasına dayanmaktadır. Araştırma deseni ise bütüncül tek durum desenidir. Çalışma kapsamında Kasaplar Mahallesi'nde (Aydın) yer alan Vodafone Akıllı Köy (VAK) incelenmiştir. Veriler yarı yapılandırılmış mülakat ve anket ile toplanmıştır.

Araştırma Bulguları: Dengeli ve sürdürülebilir kırsal kalkınmanın sağlanması ve kırsal alanların planlanarak bilgi toplumuna dönüşüm sürecinde küreselleşen dünyaya ayak uydurabilmesi için BİT destekli yenilikçi çözümlerin kırsal alanlara entegrasyonu sağlanmalıdır. Bu kapsamda LEADER ve Akıllı Köy modelleri etkin bir şekilde kullanılmalıdır.

Sonuç: Bu çalışma; Türkiye'de kırsal kalkınma plan, proje ve uygulamalarında özellikle küresel dünyada rekabet edebilmek için oluşturulacak plan, politika ve stratejilerin BİT destekli yenilikçi çözümleri de içermesi gerektiğinin önemini vurgulamaktadır.

Anahtar sözcükler: Dijital bölünme, bilgi toplumu, LEADER, kırsal kalkınma

INTRODUCTION

After the 1980s, rural development and rural area planning became one of the priorities of growth-based policies (Gülçubuk, 2006; Mantino, 2010; Naldi et al., 2015). Problems such as increasing income inequality and poverty, deterioration of the rural-urban balance in favor of the city, increasing development gap between regions, social injustices and economic imbalances, pollution and rapid consumption of natural resources, climate change, global warming, and growing digital divide with developing technology have increased the focus on the development of rural areas (OECD, 2006; Yenigül, 2017). Demographic and socio-economic structures of rural areas are more limited and static than those of urban areas. In addition, many problems, such as infrastructure (roads, water, electricity, telephone, internet systems), development, and advancement of education and health facilities are limited in rural areas. The socio-economic characteristics of the people in rural areas are low. For this reason, the inability to adapt and use technologies restrict rural people's access to technical information, thus negatively affecting the development of rural areas and the transformation process of rural people into an information society (World Bank, 2005; Maumbe & Okello, 2013).

Since the beginning of the 2000s, the information revolution has transformed technology into an essential part of daily life, significantly improving the quality of life. Competitiveness of businesses has increased, new economic growth and job opportunities have been created, better access to services has been provided, and local communities have been strengthened; therefore, the global economy has been reshaped, and the phenomenon of an information society has come to the fore (World Bank 2005; Hoq, 2012). In transforming countries into an information society, strategies for developing solutions for rural people's problems also shape rural development approaches and area planning (Öztaş Karlı, 2021). Developing information technologies requires a social structure that can adapt to the changes in technology; for this reason, the concept of rural development has to dwell on community participation by eliminating imbalances between rural and urban areas, ensuring collaboration between public and private sectors, non-governmental organizations (NGOs), and local people, and adopting constructive approaches, such as encouraging innovation (European Commission, 2006, 2017).

Information and communication technologies (ICT) are fundamental elements of the information society and lead to inequalities that negatively affect the environmental, social, and economic structure due to differences in use (Öztaş et al., 2019). Societies are in a continuous process of transformation and development, which causes a significant impact on individuals. One of these impacts, the inequality between individuals, is called the "digital divide" (Hoffman & Novak, 1999) in the information society. When inequality in the availability of information tools is added to the existing inequality in income and education across rural and urban populations, the transition to an information society becomes more difficult.

In the transition to an information society, the socio-economic status of rural areas and people affect the access and utilization practices of ICTs. In this context, the number of policies, projects, and studies to increase access to ICTs and technology use in rural areas has been rising recently (European Commission, 2018, 2020a, 2020b; ENRD, 2020). In particular, due to rapid technological developments, the European Union (EU) is improving telecommunication services and solving the digital divide problem through capacity-building programs (ENRD, 2019a). One of these efforts is the LEADER (Links Between Actions for the Development of the Rural Economy) approach, an EU rural development initiative (European Commission, 2017).

The LEADER approach is implemented in rural areas of the member states to achieve EU's rural development objectives. The LEADER approach is a method that emerged in the context of achieving and stimulating rural development through local rural communities, rather than through the implementation of prescribed measures (European Commission, 2006; Cañete et al., 2020). The basis of this approach is the participation of local actors in the decision-making processes of rural development strategy-making and projects to be implemented in the EU, the openness and transparency of the

process, the support of relevant private and public organizations, and the transfer of good practices (Altundağ, 2008; Nieto Masot et al., 2019). The LEADER approach distinguishes LEADER from traditional rural development policies by showing "how" development will be achieved rather than "what" should be done. The LEADER approach has 7 main components: bottom-up elaboration and implementation of strategies, area-based local development strategies, local public-private sector partnerships: local action groups (LAGs), innovation, networking, cooperation and integrated and multisectoral actions (Figure 1). The components of the LEADER approach should not be considered separately from each other as they complement each other (European Commission, 2006).

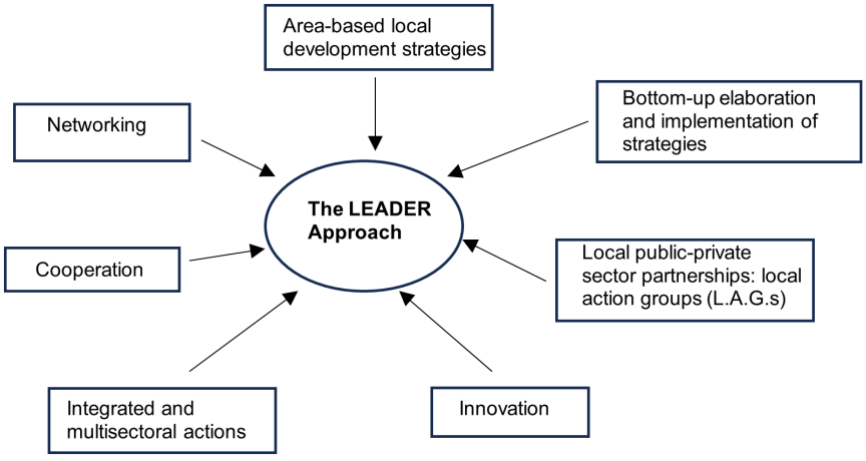

Figure 1. Seven key features of the LEADER approach (EC, 2006).

Şekil 1. *LEADER yaklaşımının yedi temel özelliği (EC, 2006).*

In addition to the LEADER approach, one of the innovations emerging in the rural development process is the smart village model, which is a model of rural development that uses ICTs to promote sustainable development of rural areas based on clarifying characteristics and needs of rural development, in addition to the LEADER approach in the EU (Zhang & Zhang, 2020). The smart village model is based on a participatory approach that uses the solutions offered by digital technologies to improve economic, social, and environmental conditions to develop and implement strategies, particularly by promoting innovation (ENRD, 2019b).

Plans, projects, policies, and implementations for rural development in Türkiye need to be more organized, cohesive, and coordinated. The policies and practices were not formulated within the planning discipline and plan gradation; they were partially supported by economic and social policies (Öztaş & Karaaslan, 2017; Berber, 2019). Policies were conducted to provide services to rural areas, and in particular, the spatial dimension was ignored (Öğdül, 2019). While public and private sectors, as well as NGOs, play active roles in decision-making processes, the participation of local people has not been effective. In other words, an effective monitoring/evaluation mechanism was not established. Area-based local development strategies have been designed, but local initiatives and regional and international collaborations have not been supported adequately (Akci, 2015; Gökçe et al., 2022).

In this context, local labor markets have yet to be established in Türkiye, and the contribution of local organizations remains limited. Subsidies and loans were insufficient, and a top-down planning approach was adopted (Gülçubuk et al., 2016). In addition, social disharmony has increased; local technology and knowledge have remained insignificant; ICT-supported innovative tools have not been used effectively; and the increase in inequalities created by the digital divide has not been managed. Smart and competitive strategies and policies that can integrate rural areas into the globalized world and the transformation process stages of the society into an information society brought about by the

developing technology have not been established. The policies on the topic were not implemented until 2003, and the concept of "rural area" comes to the fore only under two sections in Türkiye's most recently prepared "2015-2018 Information Society Strategy and Action Plan".

The objective of this study was to evaluate ICT-supported innovative solutions that can develop innovative, local development strategies and support bottom-up planning to ensure rural development and keep pace with the globalizing world in the process of transformation of rural areas into an information society through the Vodafone Smart Village (VSV) model, which is Türkiye's first smart village equipped with end-to-end digital technologies and offers a new generation rural living model. Although rural areas are not open to change due to their characteristics, they are more stable and can be easily guided by appropriate transformation and planning policies.

In the rest of the study, the smart village model and ICT-supported innovative solution applications are mentioned. Next, the study's methodology is detailed, and the findings are presented from the in-depth interviews conducted in VSV and the surveys conducted in Kasaplar Neighborhood. Afterward, the VSV Project is discussed within the scope of the LEADER approach. In the conclusion and recommendations section, strategy and policy recommendations for the integration of ICT-supported innovative solutions into rural areas are provided.

Smart village model

Technological developments and changes that alter people's daily routines, environmental perceptions, electricity, food, health, and education are directly linked to the social and economic characteristics of the community (Stojanova et al., 2021). Achieving sustainable development goals requires finding the right solutions to economic inequality and climate change, ensuring access to modern technologies, and utilizing the needed infrastructure (Öztaş Karlı, 2020). Considering the disadvantages/advantages of practical approaches, making rural areas "smart" is one of the most promising paths in rural development, as it improves the quality of life and economic level of rural people by keeping pace with developing technology and has the potential to be more effective than other strategies (Zavratnik, 2018; Gerli et al., 2022).

Smart villages are settlements based on a rural development model that acquires smart solutions for the local problems of rural people (Renukappa et al., 2022). Building on existing local capabilities and the sustainable development of their respective regions (Ella & Andari, 2018), they provide a participatory approach to improving economic, social, and environmental conditions, developing and implementing strategies, especially in promoting innovation and using the solutions offered by digital technologies. Smart village managers collaborate with other communities and actors in rural and urban areas. The creation and implementation of smart village strategies are financed by various public and private sources (World Bank, 2019). To implement the smart village model, the decision-makers must adopt a bottom-up integrated planning approach, establish effective public-private community partnerships, develop supportive policy frameworks, and provide access to financing mechanisms. The most important point of the process is to ensure local communities' participation and make decisions in parallel with the wishes and needs of the community (Gevelt et al., 2018). Therefore, it is necessary to adopt a "problem-solving" perspective that aims to determine the problems in rural areas and generate solutions with ICTs in developing smart villages.

The developments in information technologies have changed the traditional service provision and the demographic structure of rural areas. To keep pace with these developments, it is necessary to increase and develop the use of ICT-supported innovative solutions (National Rural Development Strategy, 2015). Internet technologies can provide access to any information from anywhere at any time, and along with the developments in ICT, the interaction between people and computers is increasing. These developments increase the need for applications related to the smart village. The "Internet of

Things (IoT)" concept stands out as one of these smart systems. With IoT, any data can be received from anywhere at any time, and data can be collected, exchanged, and analyzed. In this context, IoT offers various opportunities to users (Can et al., 2016).

Several applications increase people's quality of life and contribute to societies' social, cultural, and economic development in various fields, along with the increase in the ability of objects to interact while sharing information. IoT is used in education, agriculture, and health services. In education, e-books, teleconferencing, and video conferencing with experts are some examples (Mohanty et al., 2020). In the medical and healthcare fields, telemedicine, remote health monitoring, emergency notification systems, wearable IoT devices, real-time baby monitoring (Chandra et al., 2019; Gahlot et al., 2018), in agriculture, smart agricultural applications (Sensitive Agriculture, Livestock Management / Animal Monitoring, Monitoring of Climate Conditions, Smart Greenhouse / Greenhouse Automation, Crop Management, Pest Control Management, Food Stock Management, Dairy Farm Monitoring, End-to-End Farm Management, Agricultural Drones, Kindle E-Books, Mobile Applications, Site Specific Food Production, Productivity, Protection, Soil Quality Control) can be given as some of the examples (Aleksandrova, 2018; Xing et al., 2021).

Recent technological advancements made smart systems more common across European countries. These smart-systems analyze all factors required for production. Producers can monitor and manage farming duties with a tablet or a phone, which reduces the labor force, creating more efficient production opportunities (ENRD, 2019b; Komorowski & Stanny, 2020). Smart agriculture practices guide actions to transform and reshape agricultural systems to effectively support development and provide food security in a changing climate (FAO, 2019). High-tech smart farming systems are used on farms; the whole farm is monitored, humidity and temperature levels are controlled with smart sensors, misuse of resources is prevented, and pollution is reduced (Avşar, 2016). Smart irrigation is a relatively new concept in the agricultural sector. Sensors and water flow controllers are used in the irrigation cycle. These tools are programmed to run at certain times of the day to enable controlled water use, which reduces the amount of water used on a field by automating the running times of the irrigation system (Soni et al., 2018; FAO, 2019). The smart village model is not the only strategy for developing rural areas (Zavratnik et al., 2018), but it facilitates the rural development process (Adamowicz & Zwolińska-Ligaj, 2020). Therefore, strategies and policies should be developed to create smart and competitive rural areas in the rural development process by utilizing technological opportunities.

MATERIALS and METHODS

Materials

The main material of the study consists of printed and online publications, reports and documents of various institutions and organizations, plans and projects, statistical data, and legal regulations. In addition, the materials of the study include face-to-face in-detailed interviews conducted with 3 members of the project team and fieldwork on 28.05.2019 in the implementation area of the VSV located in Kasaplar Neighborhood of Koçarlı District of Aydın Province, and face-to-face surveys conducted with 64 people on 27.05.2019 in Kasaplar Neighborhood.

Methods

The study is based on a case study, one of the qualitative research methods (Figure 2). The research design is a holistic single-case design. In the holistic single-case design, there is a single unit of analysis (a city, a family, a port, a village, etc.) (Yıldırım & Şimşek, 2008). Within the scope of the study, Vodafone Smart Village (VSV), located in Aydın Province, Koçarlı District, Kasaplar Neighborhood, and Kasaplar Neighborhood was examined. The practices in VSV were evaluated within the scope of the LEADER approach. In this context, five features and 15 criteria were selected within the study's scope to evaluate the VSV Project's impact on rural development. In the period of transformation to an information

society in Türkiye, VSV was selected as the study area due to the use of ICTs in rural areas, especially in the agricultural sector. In this context, it is the only "smart village" in Türkiye. In the study, data were collected in May 2019 through in-detailed interviews and questionnaires. In-depth interviews and semi-structured interviews were used to collect data from the founders of VSV in line with the VSV Project process (project development process, project implementation process, and the project's effects). The questionnaires were used to evaluate the approach of the people of Kasaplar Neighborhood to the problems experienced in rural areas, which constitute an obstacle to rural development in Türkiye in the process of transformation into an information society in the context of technological developments. In this context, the questionnaire included three headings: socio-economic and demographic and environmental and social indicators and evaluated within the scope of this study.

A convenience sampling technique was used in the study. According to the province-based neighborhood population for 2019 obtained from the TURKSTAT Address Based Population Registration System (ABPRS), 470 (N) people live in Kasaplar Neighborhood (TURKSTAT, 2019). In order to ensure statistical significance at a 95% confidence interval (Cochran, 1963), it was calculated that the sample size should be at least 54 (Equation 1). To minimize the error value, the required number of surveys was exceeded by 10%, and 64 face-to-face surveys were conducted.

$$n=\frac{Z^2NPQ}{ND^2+Z^2PQ}=\frac{1{,}96^2.470.50.50}{470.10^2+1{,}96^2.50.50}=54 \quad (1)$$

n: sample size

Z: confidence coefficient

N: population

P: the probability that the characteristic to be measured is present in the population

Q: 1-P

D: accepted sampling error (a sampling error of 10% was assumed for the study).

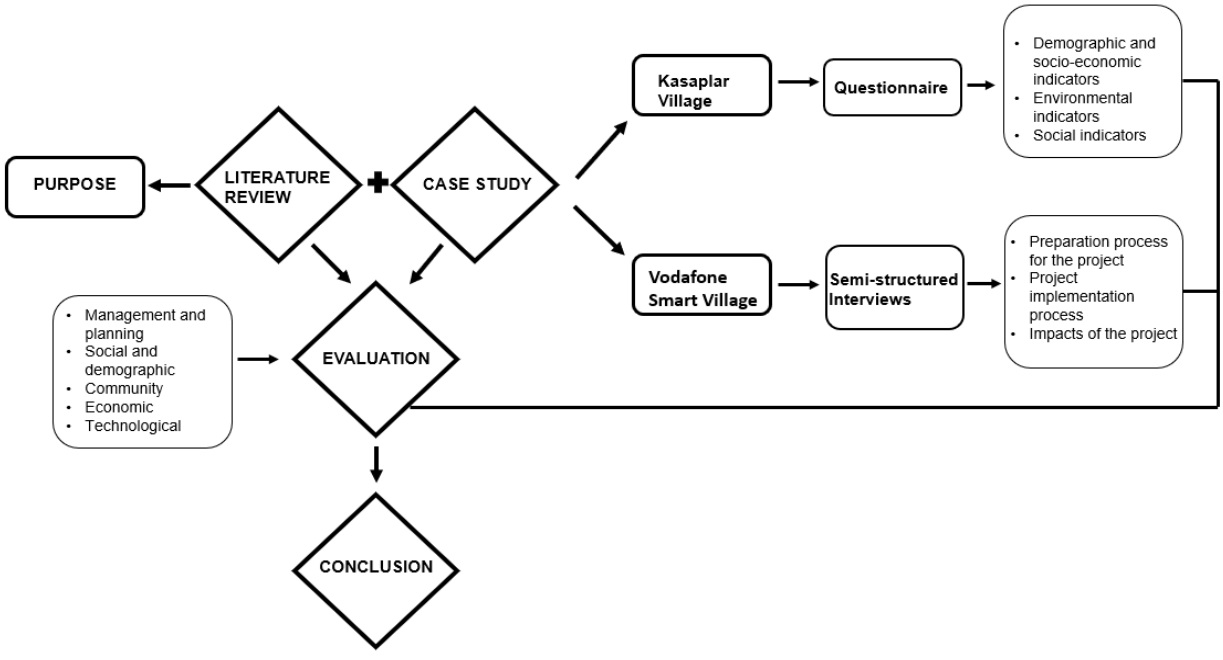

Figure 2. Research framework.

Şekil 2. *Araştırma çerçevesi.*

RESULTS and CONCLUSİON

Vodafone smart village (VSV) project

VSV Project was launched on 26 October 2017 in Aydın Province, Koçarlı District, Kasaplar Neighborhood, in partnership with TABİT (Tarımsal Bilişim ve İletişim Teknolojileri Ltd. Şti.) and Vodafone Türkiye to support development in rural areas. VSV is "the world's and Türkiye's first smart village equipped with end-to-end digital technologies" (Vodafone, 2017). This project created a "new generation rural life model" by integrating advanced technology into traditional agricultural techniques. This model aims to increase productivity in production and use smart agricultural practices in family farming and improve the villagers' quality of life. The project area was 29.8 hectares together with the pasture belonging to the village (Figure 3). The VSV Project includes sections such as "modern fruit growing area, under-canopy vegetable growing area, modern hothouse practices, open field vegetable and fodder plant cultivation, fruit and vegetable processing warehouse, cold air facility, collective milking and milk cooling system, modern pasture (grazing) area, monitoring and tracking center, water and fertilizer management center, animal feeding and management center, farmer decision support center, renewable energy solution center, soil leaf analysis laboratories, experience workshops, training centers, social life, and sports facilities" (Vodafone, 2017).

Figure 3. VSV settlement area (VAKDR, 2019).

Şekil 3. *VAK yerleşim alanı (VAKDR, 2019).*

Preparation process for the project

The emergence of VSV is based on the "agricultural marketing" project of TABİT (Agricultural Information and Communication Technologies). With this project, 17,000 villages in Türkiye were visited, the problems in rural areas were determined and solutions were generated. However, after a while, it was observed that the rural people did not implement these solutions. For this reason, instead of visiting every village, the foundations of the VSV Project were initiated with the idea of creating a center, a model village that everyone can be inspired by and that can adapt to any place. The project was initiated with the idea that it would be an area where farmers who want to be informed about the practices described by visiting the villages or who want to apply them in their fields can come, receive training and practice (T. Akın, personal communication, 28 May 2019).

The main criteria determined for the site selection of VSV are given below;

- It should be established on fertile agricultural land where most crops are grown ,
- It should be away from the leverage pressure brought by the housing and tourism sectors,
- It should be a village with dominant rural characteristics (economic, social, demographic),
- It should be about 1 hour from the international airport,
- It should represent Türkiye in terms of demographic characteristics (low education level, average income level, high elderly population, high migration, etc.),
- It must be an undeveloped village in the western part of Türkiye,
- There should be resistance such as the education level of the village people, the population of the village, and the existence of certain problems in the settlement area.

In the context of these criteria, 5 provinces were determined as İzmir, Aydın, Manisa, Muğla, and Mersin. The main reason for choosing these 5 provinces is that 80% to 96% of the agricultural products grown in Türkiye can be produced in these provinces. These 5 provinces were evaluated within themselves, and it was seen that Koçarlı District of Aydın Province met the above criteria, and it was decided to establish the campus in Kasaplar Neighborhood. The selection of Kasaplar Neighborhood was influenced by the fact that agricultural and animal production areas are very close (C. Yıldırım, personal communication, 28 May 2019).

The imbalances created by the plans and policies in Türkiye between rural and urban areas have increased with various problems arising in the rural development process. The objectives of the VSV Project to solve these problems and especially the use of developing technology in agricultural production are directly related to rural development policies. As a result of the rural development policies examined by Yıldırım and Akın (2019) in the process of smart village development, it was determined that there are deficiencies in rural development since the development plans in Türkiye require a society that consumes rather than produces-the project aimed to eliminate these deficiencies.

The projects and practices implemented within the scope of LEADER in the EU also show that projects where local people are the main actors are successful. In the VSV Project, the "participation" approach, one of Türkiye's biggest and most important deficiencies in rural development policies, has been adopted. Within the scope of the VSV Project, which does not ignore local actors, the support of the public was obtained by conducting interviews with local people before the implementation (T. Akın, personal communication, 28 May 2019). However, in time, the locals did not support the project knowingly and consciously, and the reason for this was that there was a different perception of economic income in the village people due to the name "Vodafone" (C. Yıldırım, personal communication, 28 May 2019).

Project implementation process

VSV is "Türkiye's first technology application village" (Vodafone, 2017); it aims to use fully smart devices in the agricultural production process and animal husbandry in the village. In addition, automation systems and measurements will be managed with mobile devices. Qualified data will be collected in a single center in this way. In this context, IoT applications for "smart irrigation system, early warning system, pest automation, seedling planting techniques, solar drying system, atmosphere-controlled soilless green feed production, new generation olive and almond garden, smart milking system, smart pasture, spraying unit, smart hothouse, N.F.C. technology, free-range chicken unit, beekeeping systems" are included in VSV (O. Kurt, personal communication, 28 May 2019). It is planned to make farmers' lives easier with these applications' effective and efficient use.

2016-2018 Vodafone Smart Village Status Report (VSVSR, 2019) was utilized in the implementation process of the project (Figure 4-5);

- Smart Pasture research for the reduction of feed costs in animal husbandry,
- Establishing a collective milking station to increase milk yield in animal husbandry and using smart information management.
- Efficient lettuce cultivation work with women entrepreneurs using smart technologies,
- Efforts to increase yield in profitable melon cultivation,
- Efforts to increase yields in profitable cotton cultivation and olive cultivation, village poultry and beekeeping,
- In VSV, it is seen that objectives such as organizing various courses and activities for training and socialization for farmers, women, youth, and children were achieved.

The VSV Project is actually a project closely intertwined with the villagers (T. Akın, personal communication, 28 May 2019). It is seen that a community-based approach is adopted that does not ignore the needs of society and tries to produce solutions by taking into account the problems that may arise in the continuation of the process. In VSV, ICTs are currently used in agriculture and education. In Kasaplar Neighborhood, especially the agricultural production process is combined with ICT.

Figure 4. Project implementation examples (1) (VAKDR, 2019).

Şekil 4. *Proje uygulama örnekleri (1) (VAKDR, 2019).*

Figure 5. Project implementation examples (2) (VAKDR, 2019).

Şekil 5. *Proje uygulama örnekleri (2) (VAKDR, 2019).*

Impacts of the project

The VSV Project promotes the region and Kasaplar Neighborhood on a local, national, and international scale. However, the villagers' dependence on the traditional production method, lack of willingness to work, being closed to innovation, and, most importantly, thinking that they have more knowledge than experts and acting accordingly make the use of ICTs difficult and negatively affect the

development process of the smart village (C. Yıldırım, personal communication, 28 May 2019). In addition, while participation in smart village applications was high at the beginning of the project process, the people of Kasaplar Neighborhood showed a negative attitude towards VSV later on. The application in which almost the whole village actively participated is the smart milking center (O. Kurt, personal communication, 28 May 2019). 5 women farmers earned significant income by producing lettuce in the smart greenhouse with the training they received. One farmer also earned income through early melon production (VAKDR, 2019). Although participation is not at the expected level, it is seen that the yield obtained by the participating farmers is at the expected level. The approach of the surrounding neighborhoods to the VSV Project is more moderate than in Kasaplar Neighborhood (C. Yıldırım, personal communication, 28 May 2019).

Kasaplar neighborhood survey assessment

The survey was conducted with 64 people living in Kasaplar Neighborhood; it was aimed to determine the capacity use and skills of I.C.T. applications of the people living in Kasaplar Neighborhood and to establish the relationship between Kasaplar Neighborhood and VSV. The findings obtained from the evaluation of the survey results are given below.

Demographic and socio-economic indicators

The sample consists of 37.5% women and 62.5% men; 12.5% are 20-30 years old, 12.5% are 31-40 years old, 6.3% are 41-50 years old, 31.3% are 51-60 years old, and 37.5% are over 61 years old; 25% are single and 75% are married. When the educational status was examined, it was found that 18.8% were secondary education graduates, 25% were primary education graduates, 31.3% were literate, and 25% were illiterate. The people in the sample have yet to complete secondary, high school, and higher education degrees.

While 6.3% of the respondents always, 50% sometimes, and 43.8% never use VSV's facilities during agricultural production. It is observed that the rate of never utilization is high due to the low number of people engaged in production among the respondents, the presence of elderly individuals, and especially the fact that some individuals are against this project. However, to make a better evaluation, another question was asked to the public about their use of VSV applications. The main purpose of asking this question is to determine whether this is the case only in the agricultural production phase or whether the utilization rates of VSV practices generally are at the same level. While 25% of the neighborhood people do not use any application, 75% of them use applications. Among these applications, it is noteworthy that the usage rates of the smart milking center (38.2%) and farmer SMS package (35.6%) are higher than the other applications. Only 1.2% of the sample stated that they use other applications (smart irrigation and smart pasture).

Notably, the milking process, a very difficult task, especially for women, became easier with the "smart milking center," which benefits women and is the most used application. It was determined that after a certain period, the people come to the smart milking center, which is actively used only for the cow milking action, and they do not have attitudes such as obtaining more efficiently and more liters of milk and generating economic income from it. With the "farmer SMS package," producers received daily data and news on weather conditions, irrigation amounts, etc., which provided great convenience to the users. In addition, although the neighborhood residents did not use all of the VSV applications, they stated that the smart village supported the producers by organizing courses on agricultural productivity and production and by making the agricultural tools in the VSV available for the use of the neighborhood people.

A total of 68.8% of the people surveyed with the VSV Project stated that they use smart technologies in production and animal husbandry, making their lives easier and increasing their income. The contribution of the VSV Project to employment was positively acknowledged by the majority, with 75%

stating that it played a role. However, they expressed a preference not to work themselves. Once more, participants in this sample expressed that the VSV Project contributed to women's participation in working life, with a rate of 43.8%.

According to 75% of the respondents, the VSV Project team supports agricultural production and productivity. With the use of smart agriculture practices, farmers learned industrial and traditional agricultural techniques. However, in terms of the transition to industrial agriculture, respondents expressed varying views: 56.3% stated that agriculture was negatively affected, 12.5% found it beneficial, while 31.2% remained undecided. Farmers generally do not want to change the traditional agricultural techniques they are used to, so they have yet to adopt the industrial agriculture technique fully.

Among those surveyed with the VSV Project, a majority of 68.8% reported using smart technologies in production and animal husbandry, citing that it eases their lives and enhances their income. The positive response to the impact of the VSV Project on employment came from 75% of the respondents. They acknowledged the project's contribution to employment but expressed a preference not to engage in the work themselves. Once more, participants in this sample, at a rate of 43.8%, affirmed the contribution of the VSV Project to women's participation in working life.

According to 75% of the respondents, the VSV Project team provides support in agricultural production and productivity. With the use of smart agriculture practices, farmers have learned industrial agriculture techniques as well as traditional agriculture techniques. However, for the transition to industrial agriculture, 56.3% of the respondents stated that agriculture was negatively affected, 12.5% stated that it was beneficial, and 31.2% were undecided. In general, farmers do not want to change the traditional agricultural techniques they are used to, so they have not fully adopted the industrial agriculture technique.

Among the respondents, those who believed that the VSV staff involved in transferring VSV practices to the neighborhood possessed sufficient knowledge constituted 56.3%, while 25% remained undecided, and 18.7% expressed the need for more knowledge.

It is seen that the fact that Kasaplar Neighborhood has fertile soils and offers the opportunity to grow a wide variety of products due to its climate cannot be turned into an opportunity by the neighborhood people. The VSV Project offers various opportunities to the people of the neighborhood to increase their economic income and improve their quality of life.

Environmental indicators

It has been determined that there are some problems in infrastructure services such as sewerage, water, and roads in Kasaplar Neighborhood. 33.3% of the respondents state that VSV has yet to contribute to Kasaplar Neighborhood regarding infrastructure and superstructure. On the other hand, 40% of the respondents stated that VSV did contribute to the neighborhood; a stream in the neighborhood was cleaned, the existing football pitch was improved, and wifi and internet were provided in the neighborhood square. In addition, the respondents stated that infrastructure services should be provided by central and local governments, that the VSV team does not have such an obligation, and that it is wrong to attribute such problems to them. This statement indicates that there are problems in the planning process, especially in the implementation and monitoring/evaluation stages, that infrastructure services in rural areas need to be improved, and that the control of services cannot be ensured.

In addition, it was stated that the VSV team made arrangements in the idle pasture at the neighborhood's entrance, made the pasture usable, provided road service, and contributed to the painting of the exterior facades of the houses by providing free paint. It was found that the spatial arrangement of the neighborhood was the focus of 78.7% of the examples provided by the respondents.

Social indicators

During their leisure hours, a substantial 68.8% of the surveyed individuals choose to allocate their free time in coffeehouses. Moreover, worship is practiced by women to the extent of 18.8%, while 6.3%

prefer spending time with neighbors, and an additional 6.3% of young individuals engage in sightseeing activities. 85.7% of the people of the neighborhood who participated in the survey stated that VSV provides opportunities for the socialization of the people of Kasaplar Neighborhood. Of these opportunities, 64.3% are family tea gardens, and 21.4% are football pitches. 81.3% of the respondents stated that VSV carries out activities to integrate women into social life. These activities generally include training and courses for women. However, as in other practices, the neighborhood people stopped attending these training after a while.

87.5% of the respondents stated that the VSV team provides various training courses to increase people's ability to use technology. These courses are especially beneficial for the poorly educated and elderly people. However, it was also found that the courses were ended due to insufficient participation in these courses.

50 % of the respondents stated that VSV's technological infrastructure and applications contributed to the neighborhood, 25% were undecided, and 25% stated that they did not contribute. When we look at the ownership of technological tools of the neighborhood people, it is seen that the ownership of smartphones (87.5%) and mobile internet (62.5%) is at the highest rate. Laptop ownership and home internet use were found mostly in families with children. In addition, it was observed that the individuals who use normal mobile phones are younger individuals with higher educational attainment. In general, it is concluded that the neighborhood has an infrastructure in terms of device ownership, but they use them, especially for communication and socializing purposes.

Notably, the social opportunities offered by VSV are especially targeted toward women and children, who are characterized as disadvantaged groups. It is seen that courses are organized to contribute to children's education, and social activities such as theatre and cinema, which are not available in urban areas, are carried out in the VSV settlement. It has been determined that VSV has carried out various activities for the people to follow the current technologies and improve their ability to use technology. Still, all these activities have stopped due to the need for more public participation.

The survey findings show that the VSV team is trying to implement and disseminate the technological infrastructure. Still, the neighborhood residents prefer to use these applications or attend courses. To summarize, it was found that although the respondents knew what would benefit them and were aware of the opportunities offered by VSV, they needed to be more engaged with VSV.

DISCUSSION

The current planning system and the laws and regulations made for this purpose are beginning to differentiate under the influence of changing and developing technological and socio-economic factors. Rural areas are being reshaped, and the problems of rural areas vary in this context. These problems are the ones that arise due to the inability to use technological tools and technology, such as the digital divide that emerges based on globalization and developing technology, the inability to take part in global networks, the inability to use ICT-supported innovative solutions in production, and in this context, the decrease in efficiency and loss of time. Among these problems, the digital divide makes structural adaptation difficult in rural areas. The inability to take place in global networks causes rural people to be inadequate in cooperation. The inability to use ICT-supported innovative solutions in production reduces productivity and accelerates rural-urban migration. In addition, the inadequate educational status of the rural people and the fact that they need to be open to innovations cause the emergence of the need for more ability to use technological tools and technology. In other words, the problem of "imbalance between rural and urban areas" no longer manifests itself in inadequacy/imbalance in-service distribution. As can be seen, globalization and developing technology change society's structure and existing problems. For this reason, the transformation process into an information society should be well designed, and priority should be given, especially to rural areas where disadvantaged people are concentrated.

Adaptation to technology for rural development will strengthen the rural-urban relationship and reduce inter-regional inequality in all dimensions by bringing innovative solutions to social issues.

To assess the impact of the VSV Project on rural development, 5 dimensions and 15 criteria were identified within the context of the LEADER approach. These are in the management and planning dimension; participation understanding, approach, strategic approaches, cooperation, planning understanding, financial instruments, monitoring and evaluation criteria; in the social and demographic dimension; social cohesion, digital divide, education level of rural people, local-specific criteria, in the community dimension; networks, target group, cooperation, in the economic dimension; sectoral diversity, local employment, local economy, women entrepreneurs, local development criteria and in the technological dimension; innovation and smart and competitive rural areas criteria (Table 1).

Table 1. Evaluation of practices in VAK within the scope of LEADER approach

Çizelge 1. LEADER yaklaşımı kapsamında VAK'daki uygulamaların değerlendirilmesi

Dimension	Criteria	Sub-criteria	Implementations in the VSV
MANAGEMENT AND PLANNING	Participation approach		√
	Approach	Bottom-up approach	√
		Top-down approach	O
	Strategic approaches	Region-based approach	√
		Area based approach	√
	Cooperation	Public institutions	O
		Private Sector	√
		NGOs	√
		Local community	√
	Planning approach	Holistic planning	O
		Segmental planning	X
	Financial tools	Subsidy	X
		Incentives	X
		Local incentives	X
	Monitoring and Assessment		√
SOCIAL AND DEMOGRAPHIC	Social cohesion		O
	Digital divide		√
	Education level of the rural population	Low	√
		Medium	X
		High	X
	Local specific		O
COMMUNITY	Networks	International	√
		Local	O
	Target group		X
	Cooperation		√
ECONOMY	Sectoral diversification	Agriculture	√
		Tourism	X
		Industry	X
		Tourism-Services	X
		Agriculture-Tourism	X
		Agriculture-Industry	X
	Local employment		√
	Local economy		√
	Women entrepreneur		√
	Local development		√
TECHNOLOGICAL	Innovation	ICT (Information communication technologies)	√
		IoT (Internet of Things)	√
	Smart and competitive rural areas		O

√- Available O- Not sufficient X- Not available

Management and planning dimension

The VSV Project adopts a participatory approach. However, it is observed that there needs to be sufficient in ensuring the participation of local people in the process and the continuity of the participants. It is difficult to ensure the continuity of projects not orientated toward the demands and needs that the public is not involved in. In this context, at the stage of determining the stakeholders in the SMP process, an effective group should be formed in which the local people will be active, as well as the private and public sectors, including people who are important and trusted by the neighborhood people. This situation, which is also encountered in the EU, has been solved by establishing local action groups (LAGs), one of the main features of the LEADER approach. In fact, with the LAGs, the unequal weight of stakeholders in the participation process, which causes the SMP to be criticized up to date, is also solved. In the LEADER approach, LAGs should have a balanced structure, and stakeholders and partnerships from the private sector should constitute at least 50% of local partnerships in the decision-making process.

Adopting a bottom-up planning approach, the managers of the VSV Project have created region and area-based strategies and carried out studies orientated toward the wishes and needs of the public. The projects and practices implemented in the EU within the scope of LEADER show that projects where local people are the main actors are successful. However, the village is a "spatial" concept, and planning has multifaceted environmental, social, and economic characteristics. A holistic planning approach that includes these three dimensions should be adopted in the plans and projects.

The fact that the globally recognized Vodafone corporate company is one of the partners of the VSV project facilitates VSV's national and international cooperation and integration into global networks. Looking at the collaborations made during the creation process of VSV, it is seen that private sector institutions and organizations, NGOs, and local people are involved in the process, but collaborations with public institutions are insufficient. During the creation process of the projects and applications, Türkiye's incentive options and numbers needed to be improved; VSV did not benefit from public grants and incentives.

The process until the achievement of the objectives within the scope of the VSV Project is monitored and evaluated. Although interventions are made in some cases arising from local actors to ensure the effective functioning of the process, the monitoring and supervision mechanism needs to be improved, which is one of the problems experienced in the SMP process in Türkiye, also emerges in the VSV Project.

Social and demographic dimension

The educational status of rural people plays an effective role in developing rural areas. The low level of education of the people of Kasaplar Neighborhood has a negative impact on VSV and causes an increase in the digital divide. However, VSV is trying to reduce the digital divide with the activities carried out to improve the technology usage skills of the local people and the wireless internet access service established in the village square to increase the access of the village people to the internet; various activities are carried out, especially for women and children. Courses such as literacy and handicrafts were offered for women, while educational courses and activities were organized for children. In addition, initiatives were taken to employ women, and women entrepreneurs were supported by providing training on smart greenhouse production. It is seen that there needs to be more work on local identity or culture in the practices carried out in VSV.

Community dimension

It is observed that VSV has national and international collaborations and is integrated into global networks. However, in the community dimension, problems related to the quality of social capital in VSV are noteworthy. Social capital includes the number and quality of other cooperation networks established within NGOs and society. The need for high-quality social capital hinders the successful implementation of participation processes. During the creation of the VSV Project, this issue should have been

considered when creating the site selection criteria. In addition, VSV has not been able to create international and national networks for the target group of the Kasaplar Neighborhood, and it has yet to be able to benefit from the knowledge sharing and experiences of other individuals at a sufficient level.

Economic dimension

The practices in the VSV are focused on agriculture and animal husbandry, and there are no activities to increase sectoral diversity (tourism, industry). Considering that 70% of the individuals in the neighborhood work as farmers, 20% as laborers, and 10% as daily wage laborers, sectoral diversification activities were ignored at the initial stage of the project. Providing local employment opportunities to rural people, VSV has organized various activities and practical training to support women entrepreneurs, especially efficient lettuce cultivation using smart technologies. On the other hand, efforts were made to increase yields in profitable melon cultivation and milk yield incomes with a smart milking center. In addition, farmers were allowed to use all the tools owned by VSV free of charge and to receive free consultancy from experts. Since agriculture is the main sector in the Kasaplar neighborhood, it is seen that VSV contributes to local employment and development, especially in agriculture and animal husbandry.

Technological dimension

In VSV, efforts aimed at ensuring the integration of technological developments in rural areas to develop local development with a focus on agriculture. However, the use of ICTs and IoT tools should be encouraged and supported in agriculture, education, and health. Although insufficient, digital libraries have been established in VSV to inform people about farming, fertilization, diseases, etc., and especially to increase their technological competencies. With these initiatives, efforts have been made to create smart and competitive rural areas in order for rural areas to play an active role in the global market.

In cases where local people are unwilling to VSV, there are problems in producing solutions. Nevertheless, with VSV, a unique and positive case study smart village model has been created in which ICTs are used in the agricultural sector to create smart and competitive rural areas, where the problems experienced in the rural development process in Türkiye are tried to be solved, and which has been put into practice for the development of rural areas with the globalizing world and developing technology.

CONCLUSION and RECOMMENDATIONS

The VSV Project experience teaches many things about rural development in Türkiye, rural area planning, and adapting different models to rural areas. First of all, although all efforts in the organization are associated with planned and appropriate actions, rural Türkiye's demographic and socio-economic structure stands as an obstacle in front of all VSV and similar projects. Adoption of technology in agricultural production and animal husbandry required by the smart village model, overcoming the problems in the fields of education, health, infrastructure, etc. by increasing the communication of farmers among themselves and with institutions through technology, adoption of ICT-supported applications and prevention of digital divide will be possible by overcoming the problems in the demographic and socio-economic structure of the local people.

First, comprehensive studies should be carried out to keep the young population in rural areas. The proportion of the young population has decreased in the Kasaplar neighborhood; therefore, the target group to adopt technology was limited. Returning this structure with its causes and consequences will be possible when it is handled at different scales with regional, urban, and rural policies. Job opportunities and social interactions for the young population to return to the neighborhood and continue their lives can be made more easily accessible with technology.

Another issue is that the uneducated population is higher in rural areas. Smart village projects should be considered together with both short-term and long-term education processes to ensure the continuity of interest. Continuity of interest is also very important for the participation and support of the

local community. This situation is also problematic due to the issues within the scope of the economic and social structure. Economically unsatisfied rural people or insufficient motivation from the economic contribution of the technology cause the local people not to participate in the training processes to a sufficient extent. In addition, the social segregation between the male and female population causes women, who adopt the changes more easily, to start training but not to continue afterward due to social and economic pressures. The trained population's impact on the neighborhood remains marginal for these reasons.

Within the scope of the study, strategy/policy recommendations for creating smart and competitive rural areas / smart village models that can keep up with the globalized world and the transformation process to the information society brought about by technology are presented below.

In the planning phase

- It should not be neglected that the characteristics and dynamics of each rural area are different, and these issues should be taken into consideration during planning,
- Participation of actors in the planning process should be ensured,
- The ICT access and usage levels and skills of disadvantaged groups should be measured and focused policies should be developed for each group (middle-aged and above, low-income, women, disabled).
- LEADER approach should be adopted in this context;
  - Local action groups (LAGs) should be established in rural areas,
  - A bottom-up planning approach should be adopted,
  - Local development strategies should be developed for each region,
  - International and national networking should be targeted,
  - Cooperation should be built,
  - Integrated and multi-sectoral activities should be organized,
  - Innovation should be encouraged.

In the implementation phase

- Broadband internet access should be provided to rural areas,
- Telecommunication infrastructure should be improved in rural areas,
- The competitiveness of rural areas should be increased,
- Funding and incentive opportunities should be increased,
- Networks and cooperation should be built,
- The demands and needs of rural areas should be taken into consideration together with local characteristics,
- ICT device ownership and access to ICTs should be increased,
- Efforts should be made to improve the digital skills of rural people, courses and training should be organized,
- Visual content in Turkish should be enriched for individuals whose educational status is not very good or who cannot read or write at all,
- The use of ICT in agricultural production in rural areas should be encouraged,
- The creation of a solidaristic social environment should be supported,

- Sectoral diversity in rural areas should be increased.

At the monitoring/assessment phase

- Monitoring and assessment mechanisms should be established,
- A "digital divide index" should be developed to enable the development of policies for rural people by measuring the ICT access, utilization, and skills of rural people.

ICT-supported innovative solutions should be integrated into rural areas to ensure balanced and sustainable rural development and to plan rural areas and keep pace with the globalizing world in the process of transformation into an information society. In this context, the effective use of LEADER and Smart Village models in rural development contributes to increasing the competitiveness of rural areas, improving environmental quality with spatial development projects, developing innovative methods in rural area planning, developing interdisciplinary and public participation studies, and effective use of monitoring and evaluation mechanism. Finally, this study emphasizes the importance of ICT-supported innovative solutions in Türkiye's rural development plans, projects, and practices, especially the plans, policies, and strategies to be created to compete globally.

REFERENCES

Adamowicz, M. & M. Zwolińska-Ligaj, 2020. The “Smart Village” as a way to achieve sustainable development in rural areas of Poland. Sustainability, 12 (16): 6503.

Akci, A., 2015. Kırsal Kalkınma İçin Bir Model Önerisi: Köy Kümeleri. Selçuk University, Institute of Sciences, (Unpublished) Phd Thesis, Konya, Turkey, 224 pp.

Aleksandrova, M., 2018. Tarımda IoT teknolojileri. (Web page: https://dzone.com/articles/iot-inagriculture-five-technology-uses-for-smart) (Date accessed: March 2022).

Altundağ, H., 2008. AB Kırsal Kalkınma Politikasında LEADER Yaklaşımının Yeri ve Türkiye’de Uygulamaya Yönelik Yapılan Çalışmalar. T.C. Tarım ve Köyişleri Bakanlığı, Dış İlişkiler ve Avrupa Birliği Koordinasyon Dairesi Başkanlığı, Uzmanlık Tezi, Ankara, 4-32.

Avşar, D. & G. Avşar, 2016. “Türkiye’de tarımsal üretimde kullanılan makinalarda yeni teknolojik gelişmeler 3-5”. 4th International Symposium on Innovative Technologies in Engineering and Science, Antalya,

Berber, E., 2019. Doğu Karadeniz Bölgesi’nde Kırsal Mahalle (Köy) Yerleşik Alanının Belirlenmesi. Karadeniz Technical University, Institute of Sciences, (Unpublished) Master Thesis, Trabzon, Turkey, 165 pp.

Can, Ö., E. Sezer, O. Bursa & M.O. Ünalır, 2016. “Nesnelerin interneti ve güvenli bir sağlık bilgi modeli önerisi, 1201-1209”. 4th International Symposium on Innovative Technologies in Engineering and Science, Alanya/Antalya,

Cañete, J. A., A. Nieto, E. Cejudo & G. Cárdenas, 2020. “Territorial Distribution of Projects Within the LEADER Approach (2007–2013) in Extremadura and Andalusia, 87-109”. In Neoendogenous Development in European Rural Areas: Results and Lessons. Springer, Cham.

Chandra, S. R. Gupta, S. Ghosh & S. Mondal, 2019. An intelligent and power efficient biomedical sensor node for wireless cardiovascular health monitoring. IETE Journal of Research, 1-11.

Cochran, W.G., 1963. Sampling techniques. New York: Wiley, 118 pp.

Davoudi, S. & I. Strange, 2009). Conceptions of Space and Place in Strategic Spatial Planning (7-42). London: Routledge.

Ella, S. & R.N. Andari, 2018. “Developing a smart village model for village development in Indonesia, 1-6”. 2018 International Conference on ICT for Smart Society (ICISS), IEEE.

ENRD, 2019a. Food and drink supply chains. (Web page: https://enrd.ec.europa.eu/enrd-thematic-work/smart-and-competitive-rural-areas/food-and-drink-supply-chains_en) (Data accessed: April 2022).

ENRD, 2019b. Smart villages. (Web page: https://enrd.ec.europa.eu/enrd-thematic-work/smart-and-competitive-rural-areas/smart-villages_en) (Date accessed: April 2022).

ENRD, 2020. Common agricultural policy post-2020. (Web page: https://enrd.ec.europa.eu/policy-in-action/common-agricultural-policy-post-2020_en) (Date accessed: April 2022).

European Commission, 2006. The LEADER approach, a basic guide, fact sheet. (Web page: https://enrd.ec.europa.eu/sites/default/files/2B953E0A-9045-2198-8B09-ED2F3D2CCED3.pdf) (Data accessed: March 2022).

European Commission, 2017. The european network for rural development (ENRD) LEADER/CLLD. (Web page: https://enrd.ec.europa.eu/leader-clld_en) (Date accessed: September 2019).

European Commission, 2018. Wifi4EU free wifi for europeans. (Web page: https://wifi4eu.ec.europa.eu/#/home) (Date accessed: April 2022).

European Commission, 2020a. Shaping Europe's digital future. (Web page: https://digital-strategy.ec.europa.eu/en) (Date accessed: April 2022).

European Commission, 2020b. Broadband Europe. Support for broadband rollout.(Web page: https://digital-strategy.ec.europa.eu/en/policies/broadband-support) (Data accessed: April 2022).

FAO, 2019. Climate-smart agriculture. (Web page: http://www.fao.org/climate-smart-agriculture/en/) (Date accessed: March 2022).

Gahlot, S., S.R.N. Reddy & D. Kumar, 2018. Review of smart health monitoring approaches with survey analysis and proposed framework. IEEE Internet of Things Journal, 6 (2): 2116-2127.

Gedikli, B., 2007. Stratejik Mekansal Planlama: Planlamada Yeni Anlayışlar Yöntemler ve Teknikler. Ankara: İmge, 237-289.

Gerli, P., J. Navio Marco & J. Whalley, 2022. What makes a smart village smart? A review of the literature. Transforming Government: People, Process and Policy, 16 (3): 292-304.

Gevelt V., T., C. Canales Holzeis, S. Fennell, B. Heap, J. Holmes, M. Hurley Depret, B. Jones & M.T. Safdar, 2018. Achieving universal energy access and rural development through smart villages. Energy for Sustainable Development, 43: 139-142.

Gıda Tarım ve Hayvancılık Bakanlığı, 2015. Ulusal kırsal kalkınma stratejisi 2014-2020. (Web page: https://kkp.tarim.gov.tr/UKKS%20(2014-2020).pdf) (Date accessed: March 2022).

Gökçe, S., T. Titiz, F. Özden, & I. Ferruh, 2022. İzmir Büyükşehir Belediyesi'nin kırsal kalkınmaya yönelik hizmet kalitesinin değerlendirilmesi: Bergama ve Ödemiş ilçeleri örneği. Ege Üniv. Ziraat Fak. Derg., 59 (3): 513-527.

Gülçubuk, B. 2006. Kırsal kalkınma, Türkiye'de tarım kitabı. Ankara: TC Tarım ve Köyişleri Bakanlığı Strateji Geliştirme Başkanlığı, 11-32.

Hoffman, D.L. & T.P. Novak, 1996. The growing digital divide: Implications for an open research agenda, Understanding the digital economy. Data Tools and Research, 245-260.

Hoq, K. M. G., 2012. Role of information for rural development in Bangladesh: a sector-wise review. Information Development, 28 (1): 13-21.

İçyer, A., 2010. Marka Kent Oluşturma Açısından Stratejik Kent Yönetimi. Karamanoğlu Mehmetbey University, Social Sciences Institute, (Unpublished) Master Thesis, Karaman, Turkey, 134 pp.

Komorowski, Ł. & M. Stanny, 2020. Smart villages: Where can they happen?. Land, 9 (5): 151.

Mantino, F., 2010. The reform of EU rural development policy and the challenges ahead. (Web page: https://mpra.ub.uni-muenchen.de/49294/) (Date accessed: March 2022).

Maumbe, B. M. & J. Okello, 2013. "Uses of Information and Communication Technology (ICT) in Agriculture and Rural Development 113-134". In Sub-Saharan Africa: Experiences from South Africa and Kenya. In Technology Sustainability and Rural Development in Africa. IGI Global.

Mohanty, S., B. Mohanta, P. Nanda, S. Sen & S. Patnaik, 2020. "Smart Village Initiatives: An Overview, 3-24". In Smart Village. Springer, Cham.

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

Nieto Masot, A., G. Cárdenas Alonso & L.M. Costa Moreno, 2019. Principal component analysis of the leader approach (2007–2013) in south western europe (extremadura and alentejo). Sustainability, 11 (15): 4034.

Numanoğlu, G., 1999. Bilgi toplumu-eğitim-yeni kimlikler-ı bilgi toplumu ve eğitime yansımalar. Ankara University Journal of Faculty of Educational Sciences, 32 (1): 331-339.

OECD, 2006. OECD rural policy reviews, the new rural paradigm policies. (Web page: https://www.oecd.org/cfe/regionalpolicy/thenewruralparadigmpoliciesandgovernance.htm) (Date accessed: February 2022).

Öğdül, H., 2019. Kırsal alanların değişimi ve kırsal planlama çerçevesinde bir değerlendirme. Mimarist, 66: 41-49.

Öztaş Karlı, R.G., 2020. "Akıllı kentlerden Akıllı Köylere, 29-47". Mimarlık Planlama ve Tasarım Alanında Teori ve Araştırmalar, Gece Kitaplığı.

Öztaş Karlı, R. G., 2021. Bilgi ve İletişim Teknolojilerinin Kırsal Kalkınmadaki Rolünün A'WOT Analizi ile Değerlendirilmesi. Yuzuncu Yıl University Journal of Agricultural Sciences, 31 (2): 494-501.

Öztaş, R.G., B. Özüduru & H.S. Çelikyay, 2019. "Dijital bölünme çerçevesinde bilgi toplumuna dönüşüm sürecinin değerlendirilmesi, 253-270". Çukurova 3. Uluslararası Bilimsel Araştırmalar Kongresi, Adana, TÜRKİYE.

Öztaş, Ç. Ç. & Ş. Karaaslan, Ş. 2017. Türkiye'de kırsal planlama ve farklı ülkelere ait kırsal planlama örnekleri. Journal of Urban Academy, 10 (32): 432-465.

Renukappa, S., S. Suresh, W. Abdalla, N. Shetty, N. Yabbati, & R. Hiremath, 2022. Evaluation of smart village strategies and challenges. Smart and Sustainable Built Environment, https://doi.org/10.1108/SASBE-03-2022-0060

Soni, K., D. Waghela, R. Shah & M. Mohan, 2018. "Smart well monitoring system (1-5)". 2018 International Conference on Smart City and Emerging Technology (ICSCET), IEEE.

Stojanova, S., G. Lentini, G. P. Niederer, T. Egger, N. Cvar, A. Kos & E. Stojmenova Duh, 2021. Smart villages policies: Past, present and future. Sustainability, 13 (4): 1663.

TÜİK, 2019. Adrese dayalı nüfus kayıt sistemi. (Web page: https://biruni.tuik.gov.tr/medas/?kn=95&locale=tr) (Date accessed: September 2019).

Vodafone-Tarımsal Bilişim ve İletişim Teknolojileri Ltd. Şti., 2019. 2016-2018 yılı Vodafone Akıllı Köy Durum Raporu (VAKDR), Vodafone-TABİT, Aydın, 45 s.

Vodafone, 2017. Vodafone akıllı köy projesi. (Web page: http://www.vodafoneakillikoy.com/) (Date accessed: September 2019).

World Bank, 2005. Information and communication technologies for rural development: Issues and options, Volume 1. Main Report and Annexes. Washington, DC. World Bank. (Web page: https://openknowledge.worldbank.org/handle/10986/8316) (Date accessed: February 2022).

World Bank, 2019. Smart village. (Web page: http://www.worldbank.org/en/topic) (Date accessed: March 2022).

Xing, Y., S. Lei, C. Jianing,F.M. Amine, W. Jun, N. Edmond & H. Kai, 2021. A survey on smart agriculture: Development modes, technologies, and security and privacy challenges. IEEE/CAA Journal of Automatica Sinica, 8 (2): 273-302.

Yenigül, S. B., 2017. Kırsal Kalkınma politikalarında yeni yaklaşımlar ve bu yaklaşımların Türkiye'nin kırsal kalkınma politikalarına etkisi. Planning, 27 (1): 16-25.

Yıldırım, A. & H. Şimşek, 2008. Sosyal Bilimlerde Nitel Araştırma Yöntemleri. Ankara: Seçkin Yayınevi.

Zavratnik, V., A. Kos & E. Stojmenova, 2018. Smart villages: Comprehensive review of initiatives and practices. Sustainability. 10 (7): 2559.

Zhang, X. & Z. Zhang, 2020. How do smart villages become a way to achieve sustainable development in rural areas? Smart village planning and practices in China. Sustainability, 12 (24): 10510.