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SMART VILLAGE - SOLUTIONS FOR SUSTAINABLE DEVELOPMENT OF RURAL AREARS IN EUROPEAN UNION AND LESSON LEARNT FOR VIETNAM

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LIST OF ACRONYMS

BSCI	Business Social Compliance Initiative
CAP	Common Agricultural Policy
CSR	Corporate social responsibility
EAFRD	European Agricultural Fund for Rural Development
ERDF	European Regional Development Fund
ESF	European Social Fund
ESIF	European Structural and Investment Funds
EVFTA	EU-Vietnam Trade Agreement
EU	European Union
FTA	Free trade agreement
GDP	Gross Domestic Product
GVA	Gross Value-Added
IES	Institute for European Studies
ILO	International Labour Organization
ISO	International Standard Organization
LAG	Local Action Group (LEADER)
RDP	Rural Development Programme
PMU	Project Management Unit
SA	Social Accountability
SFSCs	Short food supply chains
TOT	Training of trainers
WP	Work packages

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INTRODUCTION

One of the solutions towards achieving the higher commitments of the Sustainable Development Goals is to find appropriate ways to address economic inequalities, climate change, accessibility access to modern technologies and other necessary infrastructure. While the concept of smart city has been studied well such as "Smart City", the concept of "Smart Village" is still a matter of debate among scholars, researchers and policy makers.

In fact, in recent years, the rural areas of the EU are facing increasing difficulties and challenges, which are the increasing decline of the rural population, the ongoing trend of population aging. In addition, income disparities are widening between rural and urban residents (GDP per capita in rural areas is 66% in EU-28 compared with 118% in urban areas). The proportion of people living in rural areas at risk of poverty and lack of social cohesion is higher in cities with 22.4% of the population compared with 21.3% in urban areas. Besides, in many remote rural areas, it is difficult for them to access public services, etc.

With an objective to implement initiatives based on the global trend of building smarter and more sustainable communities, the European Union has launched an action program called “Smart Villages” in 2017. Accordingly, Smart Villages are understood as communities in rural areas that use innovative solutions to demonstrate resilience by exploiting local strengths and opportunities.

Rural communities will rely on a participatory approach to implement development strategies to improve economic, social and environmental conditions on the basis of applying technology platforms and solutions. Models aimed at ensuring rural areas will continue to play an essential role in creating a stronger, resilient community, leading to more prosperous development.

1. Objectives

The objective of the research project is to contribute towards complementing and completing the academic knowledge on smart village initiatives, systematizing and analyzing all EU policies and models in this field and making policy recommendations for Vietnam

This research project will use the methodology: (1) Literature review of current policies in the European Union related to the smart village initiative; (2) Data collection through paper review and Eurostat statistics.

To understand and assess the impact and effectiveness of Smart Village initiatives on how rural communities accept and use digital solutions, it is necessary to recognize and analyze policies and initiatives. Accordingly, the specific objectives of the research project are:

• Identify the factors that support or deter the development of smart villages in the European Union.

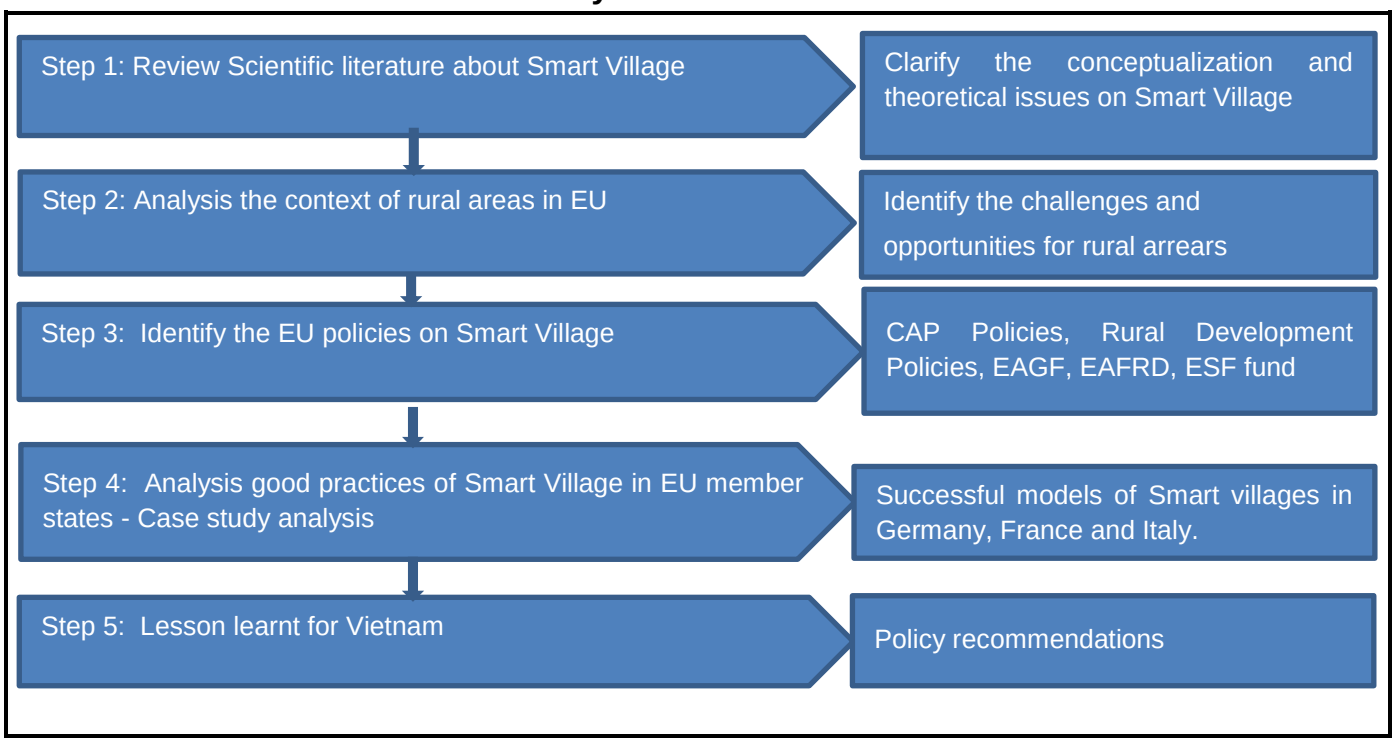
• Analyze EU policies and initiatives with a focus on the European Cork 2.0 Declaration (Cork, Ireland) entitled “A Better Life in Rural Areas”; the Bled Declaration (Bled, Slovenia), rural and digital development policies.

• Analyze Smart Village policies and models in EU member states such as Germany, France, and Italy. Research will clarify the involved factors; solution- application initiatives on transforming digital services for the food supply chain; technology application in connecting rural areas with urban areas; solutions to develop co-working areas in rural areas.
• Propose policy suggestions for applying initiatives, models initiatives in Vietnam. This benefits policymakers, local authorities and rural development policy in Vietnam.

2. Research methodology

The research project applies the following methods:
1. Literature overview of EU policies on Smart Villages.
2. Data collection via paper review and statistics.

Analytical framework



PART I: THEORETICAL BASIS ON SMART VILLAGE DEVELOPMENT

1.1. Concept of rural area

The diversity of socio-economic contexts and natural conditions in each country leads to different understandings and conceptions of rural areas and regions (Blanca Arellano, et al, 2017). Up to now, there has not been a concept of rural area that has been widely accepted and applied (Valerie du Plessis, et. al, 2002). With each different approach, the concept of rural area is viewed in different dimensions, however rural area is generally defined as a relatively low populated area with a similar population density compared to cities. This is also an area with predominant agricultural activities and where communication and infrastructure development issues need to be facilitated to develop, which benefits the cost reduction for economic and commercial activities.

Based on the criteria of population density and population to determine which are rural and urban areas, the Food and Agriculture Organization of the United Nations (FAO) has defined rural areas according to two methods: (1) urban areas are defined by law, where all centers of provinces, districts and the rest are defined as rural; (2) based on the observed level of population density living in clusters to distinguish urban and rural areas rural areas as areas characterized by low population density, poor, backward, underdeveloped in most countries in the world (FAO, 2015a).

In the EU region, the concepts of rural and urban areas are the two main concepts commonly used in the analysis of urbanization in rural areas by policy makers, researchers, national authorities and international organizations such as the Economic Cooperation and Development (OECD), United Nations UN and EU, etc. Accordingly, a rural area is an area with a population density of less than 150 people per square kilometer. Specifically, rural areas are divided into: (1) predominantly rural (PR); (2) intermediate (IN) and (3) predominantly urban (PU) (OECD, 2009) (Dimitris Ballas, et al, 2003).

In Vietnam, rural is a term used to refer to an area in which agricultural production accounts for a large proportion. Rural areas can be viewed from many economic, political, cultural and social perspectives. According to Decision No. 132-HDBT on May 5, 1990 of the Council of Ministers, our country has the following types of urban areas such as urban centers of grade 1: population reaching at least 1 million people, at least 15,000 people/km2 regarding population density,at least 90% of non-agricultural workers etc. Areas that can not meet those criterion specified above are defined as rural ones.

1.2. Concept and theory of smart village

From an academic perspective on rural development theory to explain the concept of Smart Village, the top priorities in socio-economic development policies in most countries around the world are implementation of policies, activities aimed at diversifying rural economy, promoting rural economic restructuring, encouraging the participation of people and businesses in non-agricultural production activities, linking production with food security issues, quality improvement of rural labor resources, etc.

Analysis of the development of rural areas is associated with the development of urban areas by most scholars. Specifically, in the 1980s, the goal of rural development was to improve the lives of the poor in rural areas, encourage the self-development of the poor and disadvantaged groups as well as solve the problem of mobilization and allocate resources equitably through appropriate regional and national policies. On that basis, economists of the neo-liberalism theory of thought have put forward the view of promoting free markets and reducing government intervention. Rural development needs to call for community participation and enhance economic opportunities in rural areas. Leading this theory is the theory of endogenous growth or new growth theory (Saraceno, 2014).

This theory marks a fundamental change in macroeconomic management, policy making of governments in countries in reducing state intervention in the 1980s and 1990s. The International Monetary Fund (IMF) and the World Bank (WB) play a central role in promoting neo-liberal policies in developing countries. Policies need to concentrate on: (1) Spending reduction for the public service sectors; (2) Equitization of state-owned enterprises; (3) Barriers removal for developing of the private sector promotion; and (4) Market liberalization.

For rural areas, according to this theory, the rural development approach needs to be changed from the top-down to the bottom-up approach in order to effectively exploit the local resources. With this approach, rural development is heavily influenced by factors at the local level in mobilizing resources to participate in rural economic activities. This approach also considers rural development to be a participatory process that emphasizes the empowerment of rural residents. Thus, they can control the development process according to priorities of their choice (OECD, 2018).

Based on this theory, a number of countries such as Italy, Spain and Germany have developed a "Local economic development" (LED) approach with the aim of building local economic capacity to create local jobs, promoting sustainable local economic growth and improving quality of life. It is a multi-dimensional, multidisciplinary, inclusive and participatory approach at the local level (Christian M. et. al, 2015). This

method was later spread to developing countries because of its effectiveness in regional development as well as not much required industrialization. At the same time, this method can be extended to other industries such as tourism, crafts and services. In addition, a series of new initiatives have been applied in rural development named the “sustainable livelihoods approach” emphasizing the role of social capital.

Recently, the theory of the “New Rural Model” (OECD, 2006) has been officially applied in most of the developed countries by the OECD since 2006. According to this theory, with changes in natural, socio-economic conditions, agricultural production is no longer the main factor contributing to the income of households or the main source of employment. Economic development in rural areas requires the asscociation with the development of urban areas in the context of increasing integration with the region and the world (OECD, 2006).

Based on the above theories, Van Gevelt and John Holmes believe that the premise for a rural community to develop is to create accessibility to financial resources and appropriate technology, technical and service capacity. On that basis, people can exploit and develop business capacity and transform it into activities providing modern services. These factors are considered to be catalysts for the development of education, health, food security and manufacturing businesses creating a better change for people's lives in rural areas. Such a transformation of problems is the "Smart Village" (Terry Van Gevelt and John Holmes, 2015). Approaching from another angle, in the study of smart cities and villages, (Visvizi and Lytras, 2018) argue that the concept of smart villages needs to be associated with 3 specific issues, namely ecosystem, rising value of information and communication technology (ICT) with the participation of actors such as civil society organizations (CSOs), policymakers, rural residents, and “think tanks” (Visvizi, A. Lytras, M.D, 2018).

In a global context, the smart village concept was first introduced by Viswanadham and Vedula in their book called "Designing a Smart Village", whereby authors believed that a smart village model should be built following the smart city model such as the effect of integrated technology changes in remote and remote areas. The purpose of smart villages is to solve problems through the implementation of ICT Information and Communications Technology and the GIS Geographic Information System. The model will include 04 areas: (1) Institutions, (2) Human resources, (3) Service chain, (4) Service delivery mechanism and technology. In addition, there were 7 key areas that needs smart villages’s focus, which was economy, ICT, people, governance, environment and energy (M. Mishbah, et al ,2020). Mentioned above areas, ICT awareness is used as a tool in local economic development efforts (AD Santoso et al., 2019). Besides, the Banyuwangi - Indonesia smart village model proposed by author AA Aziiza focused on 6 areas including (1)

Administration, (2) Technology, (3) Resources, (4) Services, (5) Living, and (6) Tourism (AA Aziiza et al, 2020).

In the EU, the emergence of the notion of smart villages is closely associated with the 2016 Cork 2.0 Declaration for a Better Life in Rural Areas, which set out a 10-point manifesto to improve quality of life in rural areas (EEuropean Commission, 2017). It highlighted the need to overcome the digital divide between rural and urban areas and to develop the potential offered by connectivity and digitalisation in rural areas. The concept was given further impetus in 2017 by the European Commission's publication EU Action for Smart Villages. Therefore, the smart villages approach must be front and centre of any attempt to solve depopulation, boost the provision of services and realise opportunities for growth in rural areas. Smart villages embrace a functional cross-sectoral approach, interlinking the available and future development tools. It is about the life of rural citizens and it reaches out to a broad range of stakeholders beyond local people, including rural development practitioners, legislators, politicians, entrepreneurs, NGOs and academics. With this program, the European Commission and Thematic Group on 'Smart Villages European Network for Rural Development (ENRD) have clarified a number of important point, such as: Smart Villages are about people.They are about rural citizens taking the initiative to find practical solutions – both to the severe challenges they face and, importantly, to exciting new opportunities which are transforming rural areas

The concept of "Smart " is the use of digital technology when they are appropriated by rural communities as one of the tools applied in the implementation of projects in rural areas. "Smart " also means thinking beyond itself. Development initiatives are not only implemented at the village level but also reached many rural areas, as well as being applied to promote connectivity between rural and urban areas. Besides, "Smart" is also understood as a new form in building cooperation and alliances between farmers and other rural actors; between municipalities; the private sector and civil society in the region from the bottom-up and the top-down. Accordingly, the work of implementing the idea of Smart Development is largely based on the economic and social conditions of a geographical area. Therefore, the unique nature of each rural area will determine the different development goals associated with the changing needs of each locality (Raven, et al, 2016).

In other words, innovation will not succeed if the local community does not have the potential (needs and skills) to adopt. Innovation is useless if they are not new, or the introduction of technology is so “so new” that it cannot be absorbed (Oskar Wolski, 2019). Modern technology and innovation are seen as fundamental and key components to improve the standard of living, service quality, and support the use of resources in rural areas as much as possible (Zavratnik, et al 2018). Developing an innovation-based Smart Village should be closely linked to the economic and social specialization of that area, etc.

Therefore, the concept of "smart" is not a specific model or standard solution that can be imposed on a particular area but the use of local people's knowledge, experience, local assets in the best form to proactively apply the best practices and gain the highest efficiency.

From shaping such action programs, the concept is understood as " Rural areas and communities that are build on their existing strengths and assets as well as new opportunities for added value development and where new traditional networks are improved by digital communication technologies, innovation and better use of knowledge for the benefit of residents" (ENRD, 2018). The shaping of "Smart Village" also shows the difference between smart village and smart city (Smart city). While smart cities tend to focus more on big data and opportunities to transform working method through digital technologies, smart villages are more focused on local communities with the use of digital technology to improve the lives of residents in rural areas.

Thus, according to the author, the concept of "smart villages" is the initiatives and solutions that local communities implement in order to develop their potential, respond to challenges, and bring prosperity to their own community. Rural communities include local governments and other actors representing different interests in rural areas. Activities are designed to fit the needs of the community with a bottom-up and people-centred approach.

PART II : RURAL AREA OF THE EUROPEAN UNION

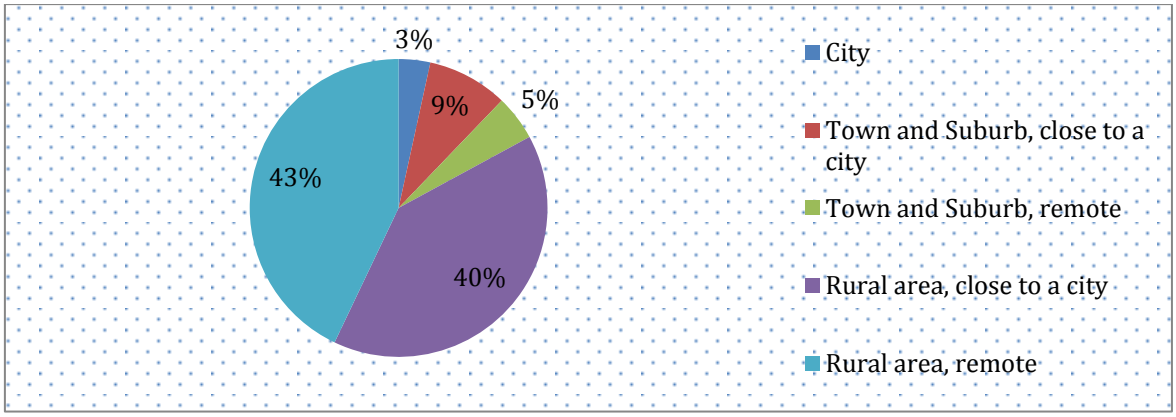
2.1. The context of rural areas in the European Union

Although accounting for only a small proportion with about 28% of the population on 76.1% of the area of the European Union, contributing 15.3% of the region's value added (EC, 2020), improving the lives of people in rural areas has always been seen as one of the priority focuses of EU policies. In its “Vision for Rural Areas to 2040”, the European Commission emphasizes that rural areas are the fabric of society, a core part of our identity and economic potential. Accordingly, agricultural production is not merely a source of food, these activities must be placed within a framework with stricter regulations in order to achieve the growing objectives. Agricultural production must sustainablely grow, which contributes to solving problems of social security, employment; improve the quality of human resources for rural areas; ensure food quality and safety for consumers; contribute to reducing pollution and climate change in the region. Therefore, the European Commission will have investment programs for the future in this region (EC, 2019).

The rural area accounts for a large part of the area: With more than 341 million hectares, the rural area accounts for 83% of the total area of the EU, of which agricultural land, forests and natural areas account for nearly 80% of the total area of the EU.

Figure 2.1: EU land area, 2018

Unit: percentage



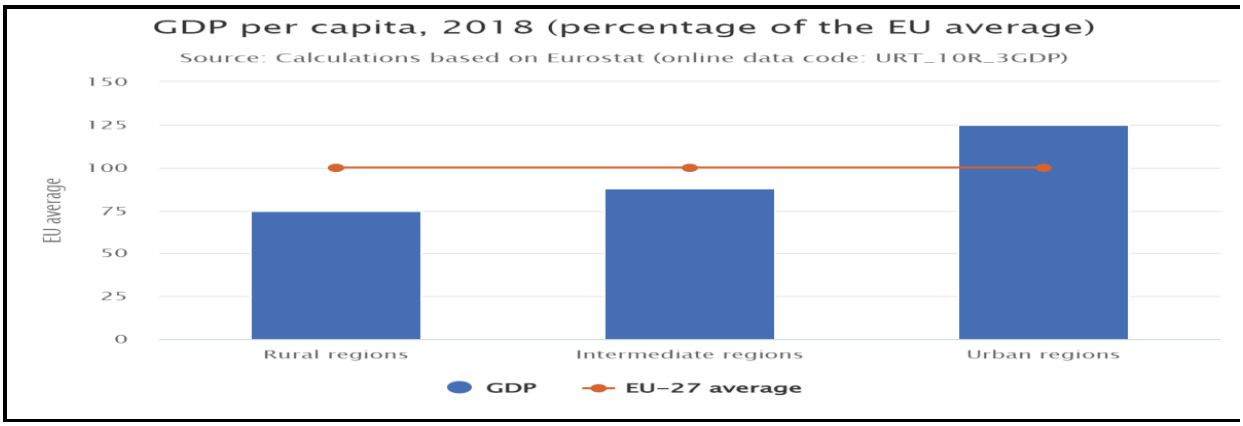
Source:European Commission (2019) “EU rural area in numbers”

Population decline and increasing trend of domestication: 30.6% of the EU population lives in rural areas. In the period of 2013 - 2017, 500,000 people left rural areas, and the trend of population aging and proportion of elderly people is gowing higher than before.

The income disparity between rural and urban people is still quite large: While the economic growth of the EU has increased in recent years leading to the increasing average income of GDP per capita, the average income gap between rural and urban areas is still quite large. Specifically, the figure 2 below shows that GDP per capita in rural areas only reaches 66% of the EU-28 average compared to 118% in urban areas.

Figure 2.2: GDP per capita in 2018 (percentage of the EU average)

Unit: % EU average

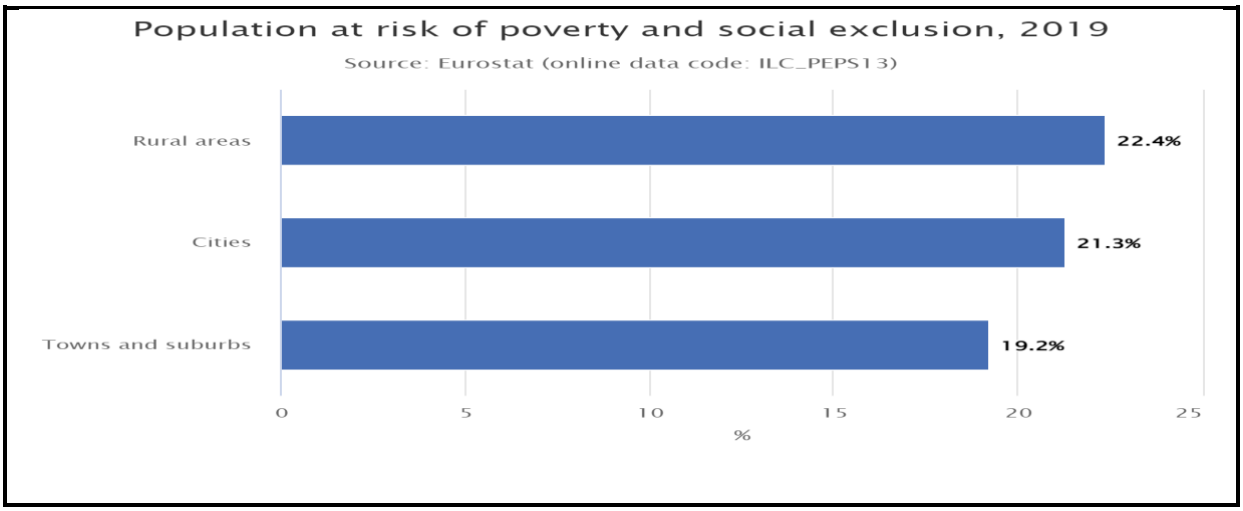


Source:European Commission (2019) "EU rural area in numbers"

High proportion of population at risk of poverty and risks of social cohesion in rural areas: Percentage of population at risk of poverty and social exclusion is higher in rural areas (22.4% of the population) than in towns and cities (21.3% in urban areas), etc.

Figure 2.3: Risk of poverty and social exclusion in the EU in 2019

Unit: %



Source:European Commission (2019) "EU rural area in numbers"

Low accessibility to services: In many remote and isolated rural areas, access to public services such as education and healthcare is still limited due to lack of infrastructure connectivity (hard infrastructure including transportation and irrigation; soft infrastructure including information services, high-speed internet access) (EC, 2019). The average road distance to essential services is much shorter in urban areas than in rural areas. For example, in the city, the average road distance to the nearest doctor is 3.5 km, while the average distance is nearly 21.5 km in remote rural areas. Only 60% of households in rural areas have access to fast broadband (>30Mbps), compared with 86% of the EU population as a whole.

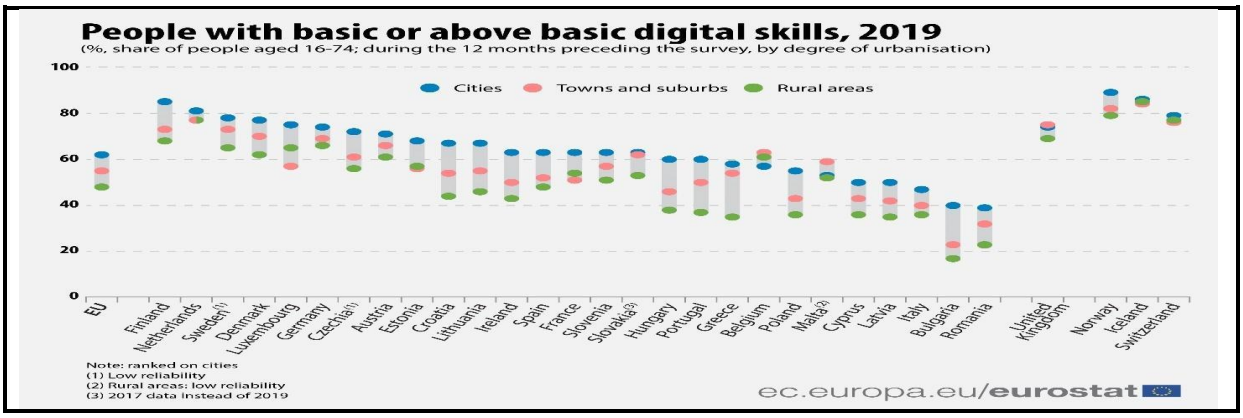
Higher employment rate in rural areas: Although the employment rate in rural areas is higher than in cities, especially for people aged 20 - 64 years, this corresponds to an increase of 68% - 73% (period 2012 - 2020). However, the total number of employed workers did not increase. This shows that the increase in the employment rate is not due to the effect of the policy but in fact the decrease in the rural population. Besides, the issue of gender gap in employment has also increased significantly.

In the field of education - training and skills, the proportion of the population aged 25-64 in rural areas with university degrees has increased (from 18% in 2012 to 22% in 2019), but this rate in the city grew even higher. One issue that the European Commission sees is the need of immediate action to broadband internet services access since the applying digital solutions skills for most people in rural areas is still too limited.

Gender Gap in Employment: The EU rural employment rate was 67% for women and 80% for men in 2019, which is equivalent to a gender employment gap of 13 percentage. Meanwhile, the employment rate for city residents (aged 20-64) is 68% for women and 78% for men.

Digital skills: In 2019, the gap in digital skills between city residents and those living in rural areas averaged 14 percentagein the EU (measured by the difference in the relative of digitally skilled adults with those with basic skills). This gap is larger with 20 percentage in 07 EU member states- Ireland (20 percentage), Lithuania (21 percentage), Hungary (22 percentage) and 23 percentage higher in Bulgaria, Greece, Croatia and Portugal.

Figure 2.4: Dgital skills of EU member states



Source: Urban and rural living in the EU - Products Eurostat News - Eurostat (europa.eu)

2.2. Some challenges for Smart Village development

As we mentioned above, the goal of developing smart villages in the European Union in recent years is the use and promotion of initiatives by local communities. By that to exploit their strengths and inherent assets in order to create added value, solve challenges and aim to create prosperous development. Approaching and implementing Smart Village initiatives is the application of the theory of innovation, growth and rural development (Nieto, et al 2019). The outcome of the program is to assess local needs for services and translate these needs into economically viable solutions (EC, 2020) What are the emerging challenges facing the EU rural sector? Why is it important to implement Smart Village initiatives?

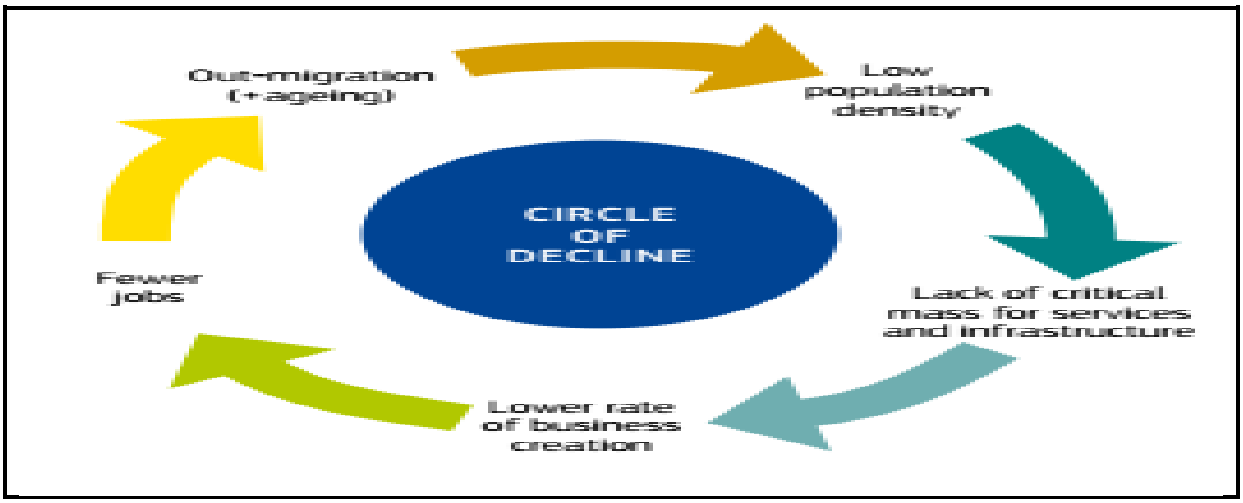
First, depopulation and demographic changes in rural areas:

Although population decline is considered as a general phenomenon rather than a cause, even though depopulation is considered a symptom of rural decline rather than a cause, there is no doubt that it is one of the main factors driving the smart villages agenda. Predominantly rural areas account for around 28% of the EU population, while a further 31.6% live in towns and suburbs (intermediate areas), and 40.4% live in cities (Eurostat, 2020).

The trend of urbanization with a gradual narrowing of rural areas is expected to dominate in the coming years, therefore, the EU population living in cities is expected to increase by 24.1 million people by 2050. Meanwhile the population of the EU living in cities is expected to increase, mainly rural areas will reduce 7.9 million people. However, this trend will also be different considering each specific region, specific characteristics of each EU member state. Overall, almost two-thirds

of the rural population in EU-13 (i.e. those that joined the EU in 2004) is declining, while in EU-15 (those that joined before 2004) two-thirds of rural areas maintain the population and even increase(ERND, 2018).

Figure 2.5: Major challenges in EU rural areas



Source: European Network for Rural Development (2018) Smart village revitalizing rural services- EU rural review No26.

Second, the reduction of public services:

The decline in the population in rural areas makes the operating costs of basic services such as education, healthcare, commerce and public transport increase leading to limited public service provision of many local government agencies. In addition, in response to the recent financial crisis (2011-2017), most of EU member states were forced to reduce spending on social activities, cut public budgets, and save costs by reducing level of public service delivery, encourage privatization instead. As a result, this situation has exacerbated inequality between rural and urban areas. Figures show that just over a quarter of the EU population living in rural areas has a university education; the rate of students dropping out of school early and young people without jobs or without vocational training is increasing; health care needs are unmet; the proportion of people at risk of poverty is much higher in rural areas than in cities.

The OECD have analyzed and shown that *"Rural communities cannot exist without adequate public services meeting the needs of the people. Access to schools, health and social care, and other services is critical to the well-being of rural residents and the social and economic resilience of these communities"*. According to this theory, the OECD also makes some recommendations that the provision of public services in agriculture should be adjusted to the characteristics of each region, locality, or a

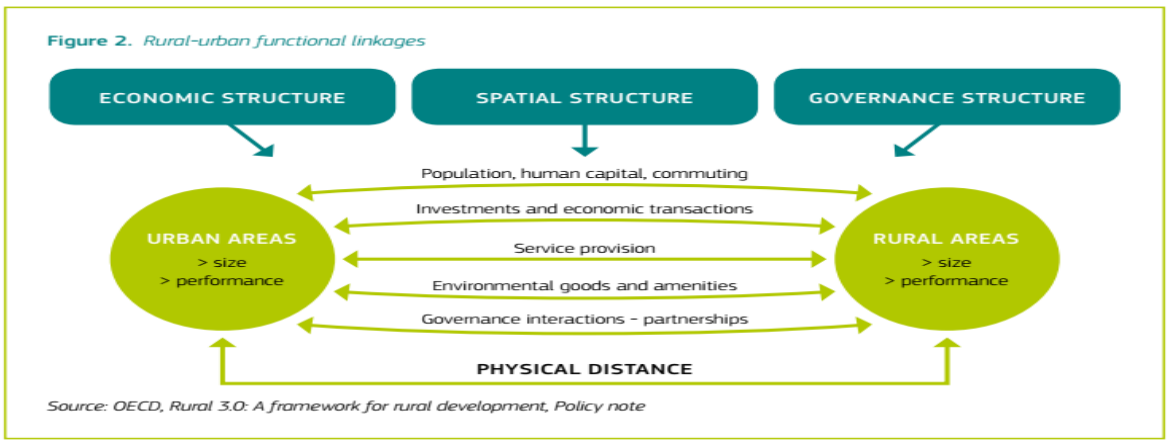
specific plan of development goals. Moreover, it is necessary to change the logical perception from spending to investment, etc (OECD, 2008).

Third, the linkages between rural and urban areas are weak:

According to the Organization for Economic Co-operation and Development (OECD), rural areas are geographically close to or accessible to cities are the fastest growing regions in terms of gross domestic product (GDP) and productivity. Connecting will create faster resilience during crises and typical case is the 2008 economic crisis. Cities will contribute greatly to rural growth, but the benefits will not be achieved without access and cohesion between the two regions (OECD, 2016).

Therefore, in order to achieve successful results, “Smart Village” programs should aim to cooperate both with other similar rural areas and with large and small population centers. Regional solutions are planned for mutual benefits.

Figure 2.6: Rural- urban connectivity model



Fourth, limited promoted role of rural areas in the transition to a circular economy with low carbon emissions.

In the EU, the rural and intermediate areas account for 88.2% of the EU's territory, playing an important role in the achievement of carbon emissions targets. The report of the European Commission in 2012 also shows that greenhouse gas emissions (GHGs) from agricultural production in rural areas account for 471 million tons of CO2, which is equivalent to 10.3% of EC total emissions (Eurostat, 2016). In order to meet the goal of reducing carbon emissions, in the past, the EU has also issued policies to implement programs to waste reuse, clean energy utilization, biodiversity and mainly the importance of rural areas in meeting emission reduction targets. However, the implementation results have not been executed as expected. Specifically, the rate of waste reuse in some member countries during the period 2004-2012 in countries such as Greece, Slovakia,etc is recored to be too low and do not reach 10% of waste reuse (EEA, 2015).

Projects to reduce carbon emissions have not met the set targets due to a number of following reasons. The process of evaluating and monitoring projects of all levels is still restricted, and the project implementation criteria are not precisely equivalent with the requirements of the region. Moreover, the method of traditional agricultural production is still quite popular and the level and capacity of the local community is still limited. It is challenging to access science and technology or simply lacks of a market of agricultural products from emission reduction projects (EC, 2018).

However, in the current context, many villages in different parts of Europe have been implementing projects of energy saving, renewable energy production and sustainable transport development, as well as promoting local clusters in the circular economy. Many “Smart Village” projects have been successful in supporting local businesses, opening up public procurement, and building local food and energy hubs. Developing “smart village” models will be the solution to meet the goals of reducing carbon emissions, reducing costs and increasing income for the local economy.

Finally, the limited digital transformation of rural areas.

Promoting digitalization with the aim of catching up with urban areas, bridging the gap, these areas will increase the attractiveness of rural areas and develop a new role in Europe's transition to a digital economy through the implementation of smart villages. However, the number of households in rural areas with access to broadband services (30 Megabits/sec) is still too low, which is only 25% compared to 68% of urban residents (EC, 2016). The main cause of this problem is that the too low population density in rural areas, the inconvenient topography of many areas, the lack in needs of the people, etc making it difficult to attract private investors.

To address this problem, the rural development program for the period 2014-2020, the EU also approved a budget package worth 21.4 billion euros to be implemented by the Investment Fund and 6.4 billion euros by the Development Fund (EC, 2016). Many solutions at regional and national level have been proposed such as training, capacity building, knowledge for people, promulgating policies to attract businesses to invest in rural areas, however, the effect has not yet met the expectations of policymakers. In addition, it is seen to have many downsized, dissolved, closed projects such as schools, shops or bus services in urban areas because of the reduced public budget, the complicated operation process, and the low efficiency. Thus, the application of digital technology to smart village projects in the field of those above public services will be focused on development through the construction and development of many forms of community-owned social enterprises (ERND, 2017).

PART III: EU POLICY ON SMART VILLAGE DEVELOPMENT

3.1. Policy on innovation and smart village development in the European Union

The shaping and selection of pilot projects, action programs for "Smart Villages" is focused on solving emerging challenges in rural areas by exploiting the potential existing strengths and potential as well as new opportunities to create added value. Morover, improving existing communication networks with digital communication technologies is to create access and better application meeting benefits for people in rural areas (ERND, 2017). Therefore, the idea and action programs "Smart Village" have been integrated by the EU with a medium and long-term development strategy for economic development in rural areas.

The goal of the smart village program is to improve the lives of rural areas through the implementation of programs and activities to diversify the rural economy, promote economic restructuring, and encourage the participation of local communities and businesses in non-agricultural production activities, connect production with food security issues, and improve the quality of rural labor resources.

Promulgating institutions, policies and regulations as the basis for the implementation of the "Smart Village" program in EU member countries officially launched by the European Commission in the Cork 2.0 Declaration (Cork, Ireland) with the name called “A Better Life in Rural Areas” (EC, 2016). In this statement, the EU affirms that programs at the regional and member state levels need to address emerging challenges in rural areas and the policies need to be more specific. Accordingly, with 10 main points raised, the EU affirmed that investment in rural areas is necessary to encourage and recognize the potential of rural areas for economic growth. The Declaration also particularly concentrates in bridging the digital divide between rural and urban spaces with the aim of developing the potential of digitization in rural areas (Veronika Zavratnik et all, 2019).

Concreting the policy in the Cork 2.0 Declaration, in October 2017, the European Commission officially launched an action program called "Europe action for smart villages" to promote and support smart village initiatives in the future. Accordingly, the program set out specific actions such as organizing seminars, conferences, building thematic groups, digitizing platforms, developing broadband systems. Primarily, it aims to focusing on connected and digital solutions building a thematic group on "Smart Village" to share initiatives as well as draw on successful experiences.

Along with institutionalizing policies into specific action programs to be implemented during the 2017-2021 pilot period, the European Commission has also opened consultation forums, which focus on groups of people. The beneficiaries are rural

communities, policy makers, social criticism groups including agricultural experts, innovation, consulting groups, researches, think-tanks at the university institute to clarify the concept of “Smart Village”.

In order to further promote the implementation of the program, the European Commission issued the Bled Declaration (Bled, Slovenia) affirming the importance of implementing smart village initiatives in April 2018. Accordingly, the application of digital solutions in the direction of integration, innovation and creativity will be the tool to make the "Smart Village" a place worth living. The development of business models and digital technology platforms in the circular, sharing economy will be encouraged by the EU for "Smart Village" development solutions (EC, 2018). In this statement, the EU once again emphasized that rural areas will create synergy by applying technological achievements (digital platforms, e-health, e-governance, etc, applications in circular, bio-based economy, rural tourism, social innovation). Typical "Smart Village" models will become samples for future development projects. Promoting the establishment of a "Smart Village" network with the goal of connecting villages and associations across Europe allows the exchange of information and experiences creating the power of "smart village" communities ".

In addition to specific action programs on smart villages, the EU has also made adjustments to the Common Agricultural Policy (CAP) to support the implementation of these initiatives. In particular, it aims to ensure sustainable and environmentally friendly agricultural production processes, rational use of natural resources as well as the driving force for growth in rural areas. At the 2000 agenda, the European Commission officially approved the adjustment of the common agricultural policy into two main pillars: (1) First Pillar - mechanisms to support commodity consumption farmers and (2) Second Pillar - rural development program.

The three objectives and overall purpose of the CAP include: (1) fostering the competitiveness of agriculture; (2) ensuring the sustainable management of natural resources, and climate action; (3) achieving a balanced territorial development of rural economies and communities, including the creation and maintenance of employment. However, in practical terms RDPs are drawn up with reference to six more specific priorities, which are further divided into more detailed focus areas: (1) Knowledge transfer & innovation in agriculture, forestry & rural areas; (2) Farm viability/ competitiveness, sustainable management of forests; (3) Food chain organisation, animal welfare, risk management in agriculture; (4) Ecosystems related to agriculture and forestry; (4) Resource efficiency, low-carbon / climate-resilient economy and (6) Social inclusion, poverty reduction, economic development. Based on that, the measure Investments in physical assets as set out in the Rural Development Regulation allows support for: Investments in farms to improve their performance; Investments in processing and marketing and Investments in farm- or forest-level infrastructure. Next, within the framework of implementing these initiatives, the EU also approved policies such as: (1) Digital

Europe Programme; (2) Policies on strengthening rural innovation; (3) Renewable energy and sustainable rural development; (4) Action plan on digital education; (5) Development of broadband network, etc.

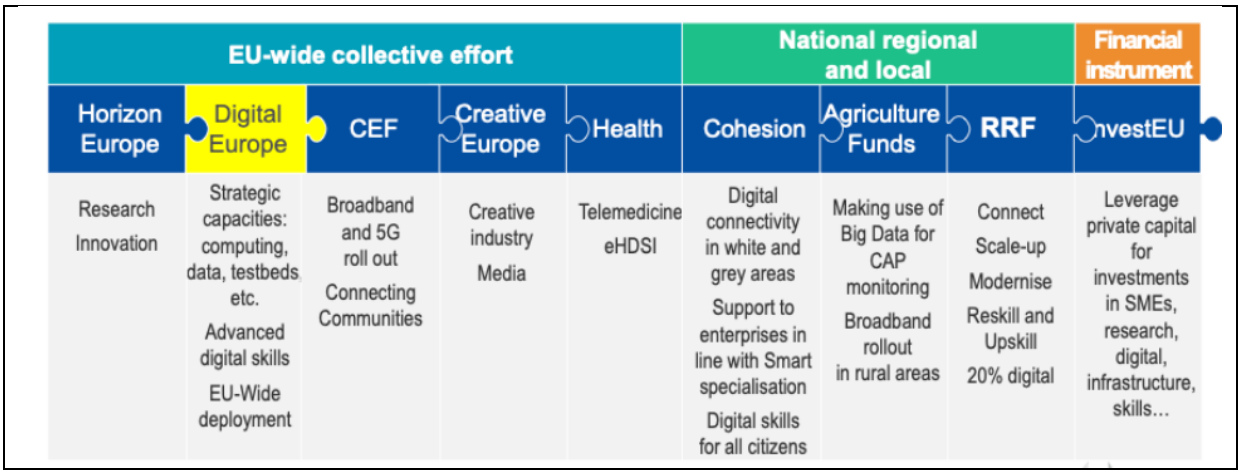
At the national level, the smart village program is also institutionalized by the member countries into national and rural development programs. In addition, depending on specific conditions, member countries have funding programs for initiatives for innovation, digitization, climate protection, etc.

3.2. Tools and budget for implementing initiatives

3.2.1. Budget for Smart Village initiatives

The budget constitution, managing and monitoring tools of smart village initiatives are implemented at two levels regarding regions and member countries.

Figure 3.1: Programs and budgets for the Smart village initiative



Source: Andrea Koch, et al 2021 "Financial Support mechanisms for Smart Villages and Smart Regions.

Immediately after the European Commission launched a program called "Europe in action for smart villages", the European Parliament approved a budget package for pilot implementation of "Smart Village" projects in EU member states with an budget of 3.3 million euros for the period 2018 – 2019 (EC 2019). The goal of the program is to pilot "Smart Villages" promoting, applying the initiatives of the local community to solve existing difficulties and challenges aiming at rural life improvement. On that basis, strategic solutions will be proposed to be applied for the next period 2021 - 2027, as well as for the long-term vision extending to 2040.

Cohesion policy 2021 – 2027: The Commission's proposal for the Cohesion policy in 2021 – 27 foresees several Policy Objectives, which are relevant for the Smart villages approach: Policy Objective 1: A smarter Europe by promoting innovative and smart economic transformation. Specific objectives: (2) Reaping the benefits of digitisation for citizens, companies and governments, (3) enhancing growth and competitiveness of SMEs and (4) developing skills for smart specialisation, industrial transition and entrepreneurship. Policy Objective 3: A more connected Europe by enhancing mobility and regional ICT connectivity. Specific objectives: (1) Enhancing digital connectivity and (3) Developing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility including improved access to TEN-T and cross-border mobility. As well as (4) Promoting sustainable multimodal urban mobility.

Rural Development Agenda (Pillar 2 of CAP): The budget was approved by the European Council on 17 December 2020 with 85.3 billion euros. This budget source is disbursed through European Agricultural Guarantee Fund (EAGF), Rural Development Fund (EAFRD), Regional Development Fund (ERDF), Social Development Fund (ESF), etc. Financial resources are currently focused on training and capacity building for the community, supporting startups in rural areas, and implementing specific action programs associated with "Smart Villages".

2020 Horizon Program: The program focuses on funding research projects with the goal of academically clarifying "concepts", "initiatives". In addition, the program's budget also funds the project to build "living labs" and "innovation actions". The research results will contribute to the development of smart village development strategies.

Digital Program: This program focuses on bringing digital technology to businesses, citizens and public administrations. The program will provide funding that focuses on five areas, including: supercomputing, artificial intelligence, cybersecurity, advanced digital skills, and ensuring a wide use of digital technologies across the economy and society, including through Digital Innovation Hubs, etc. Its goal is to improve Europe's competitiveness in the global digital economy and achieve technological sovereignty. It will do so by deploying and capacity-building new digital technologies, in order to support digital transformation that will guarantee high quality public services benefiting citizens and businesses. The budget is set out in the 2021-2027 Multiannual Financial Framework with 7.5 billion euros. It will shape and support the digital transformation of Europe's society and economy (Andrea Koch, et al, 2021).

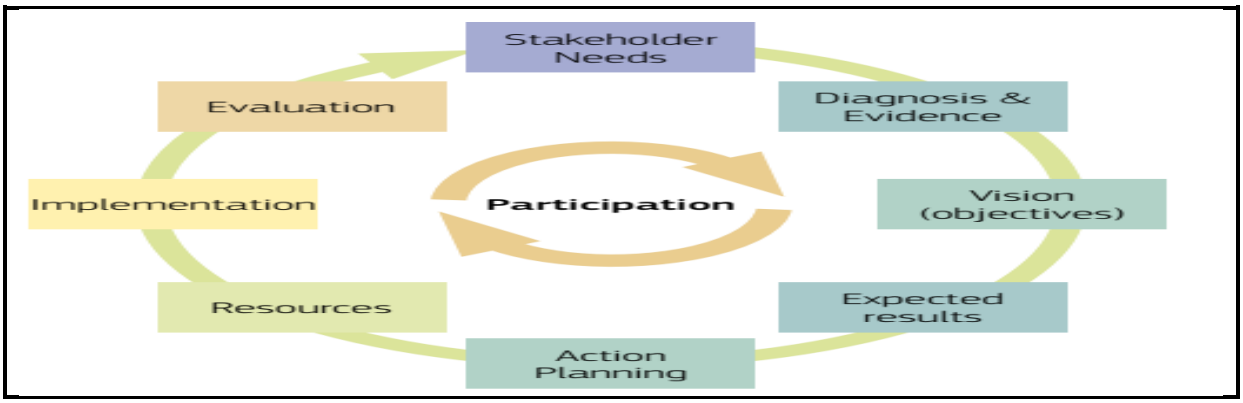
Connecting Europe Facility (CEF): This program aims to create cross-border interaction between state administrative agencies, businesses and people through the implementation of service infrastructure and digital services (DSI) and broadband networks. For the 2021-2027 period the Commission proposed a budget of 3 billion euros, mostly focused on connectivity aspects, still subject to an agreement on the

overall long-term EU budget. Supported projects contribute to: (1) Improvements in the competitiveness of the European economy; (2) Promotion of the interconnection and interoperability of national, regional and local networks; and (3) Access to such networks, thus supporting the development of a Digital Single Market. The budget for the period of 2021-2027 is proposed to be 3 billion euros.

3.2.2 Toolkit for Smart Village design

The smart village models implemented in the European Union during 2017-2020 are widely covered in supporting businesses and innovation in rural areas, social innovation for green agreement, infrastructure, digital and broadband development, etc. Thus, each project has different sets of tools to evaluate effectiveness, however, the process of building smart village projects starts with a participatory planning toolkit.

Figure 3.2: Model and plan of Smart village



Source: European Network for Rural Development (2021) "Co-designing and co-planning village services" https://enrd.ec.europa.eu/sites/default/files/tg_smart-villages_briefing_services.pdf

According to the above model, the process of designing and planning smart village development in the EU is an iterative cycle. The principle of modeling is the process of bringing together all aspects of a plan into a coherent, unified process that ensures the well-focused, resilient, practical, and cost- effective plan. Following the right process will ensure that local people will play a central role in all stages of implementation, as well as the process of learning from mistakes for new development.

This model can be used in combination with top-down (government policies) or bottom-up (initiatives) approaches. However, for effective implementation, the process needs to take the following steps:

(1) *Mapping context & stakeholders:* The building of smart village development strategies requires the parties to understand the regional context, identify potentials, advantages as well as challenges posed to take specific actions to achieve common goals. Theoretically, there are many methods of identifying an area's potential and challenges such as the use of participatory planning in surveying, needs assessment, etc.

(2) *Engaging stakeholders:* Stakeholder engagement plays a vital role in all stages from strategy formulation to implementation and monitoring of results. Incorporating participation will also affirm that the implementation of the smart village strategy will meet the needs of the local community, as well as promote the ability to promote creativity, efficiency of parties and wanted results.

(3) *Designing smart strategy:* Like regional and local development strategies, smart village development strategies need a holistic approach that integrates interventions in a coherent and clear manner. Strategies should be logically structured with clear interventions to ensure the overall goal. The activities in the strategy that need to be developed need to exploit the advantages and potentials of the locality in order to solve the challenges via the use of the SWOT analysis model. Smart village strategies must be SMART (specific, measurable, achievable, realistic and time-bound). Smart village strategies need to identify innovative solutions (digital, technological, social or other) to increase the effectiveness of the proposed activities.

(4) *Planning actions:* While strategies are focused on providing overall vision and direction, action planning is a more detailed process that involves setting costs, planned resources, timing, identification of risks and barriers, as well as planning for community participation.

(5) *Monitoring:* The activities implemented in the smart village development strategy need to be closely monitored to ensure that the expected results are achieved, as well as to detect difficulties and challenges in order to have strategy adjustment. The monitoring process requires a continuous SMART (specific, measurable, achievable, realistic and time-bound) framework approach (ERND, 2021).

Some indicators to evaluate the effectiveness of smart village models are proposed for each field, such as:

Governance in smart village projects: Evaluation indicators in the field concludes: (1) public services (the evaluation indicators of administrative services, the rate of using information technology to serve the community); (2) transparency index (financial and information transparency indicators); (3) policies (an index to assess the level of participation of stakeholders in the development, design and implementation of smart village initiatives).

Information technology: Index to evaluate information infrastructure, accessibility to broadband internet services.

Resources: Indicators for assessing financial resources in agricultural, forestry and fishery production, and human resources are gender, age, education level, occupation of rural residents.

Services: Are classified to essential services (health services, education) and economic services (number of businesses, logistics, number of jobs).

Rural tourism: Includes potential evaluation indicators of local tourism such as an indicator of cultural identity, tourist attractions, rural infrastructure (hotels, homestays).

Overall assessment: The pilot implementation of smart village initiatives in recent years in the European Union focus mainly on remote rural areas in order to improve the lives of people in rural areas.

Smart village initiatives are the result of institutionalizing a concrete action plan from the Cork 2.0 Declaration (Cork, Ireland) entitled “A Better Life in Rural Areas”.

Digital solutions used in smart village models towards integration, innovation and creativity are seen as the foundation to promote the effectiveness of smart village models.

Thus, in order to solve emerging challenges in rural areas in recent years, the EU has been implementing a series of solutions and action programs, one of which is the "Smart Village". On the basis of flexible application, the action plan does not impose a rigid framework. Member states are proactive in exploiting and promoting local initiatives, promoting the number of commerce, e-commerce, technologically connected solutions to solve isolation in rural areas. Furthermore, it is demanding to increase the ability to connect public services, production, business efficiency and balance the disparity between rural and urban areas, etc.

The smart village model is currently being applied flexibly to each region and locality on the basis of determining the local context and needs (SWORT analysis). Therefore, a specific policy framework applied to smart villages has not been developed until now. On the other hand, there are the initiatives and programs, which are approved by the European agenda based on the established policies such as: Rural Development Programs (RDPs), Digitization programs, Enhancing rural innovation policies, Renewable energy and sustainable development in rural areas. Smart village models are built and approached according to a bottom-up approach by promoting stakeholder participation.

PART IV: SMART VILLAGE CASE STUDY

4.1. Smart village model in Germany

4.1.1. Regional context and challenges for rural areas

Urbanization in the Federal Republic of Germany has taken place quite widespread in recent years but rural areas still account for approximately 80% of the territory and more than 40% of the population (Rural population in 2020 is 18,768,241, down 0.16% compared to 2019 is 8,798,952 people) (World bank, 2021). With more than 53% of the area used for agricultural activities (19.1 million hectares), up to 9.4 million hectares are classified as Less Favored Areas. For agricultural production, 33% (11 million hectares) are covered by forests, of which 47% are privately owned.

The German rural areas have significant differences in population density, agricultural production scale, people's income and unemployment rate. Specifically, about 1.3 million people are working in 400,000 farms and farms that are managed by farmers account up to 53%. The average size of farms in Germany is up to 43 hectares, which is concentrated in areas such as the new Bundesländer (East Germany) and the North West. The farms in the South are smaller in size (EC, 2017).

Compared with other member states in the region, the German rural population is generally more educated and more productive. However, the German rural area is also facing the following major challenges.

Rural population decreases and rural labor migration increases: The development of rural spaces in Germany is very different. While some rural areas, especially those bordering towns, are experiencing high economic growth, others are affected by migration and negative growth. This is clearly seen in the population growth in East Germany (the less developed area) and West Germany. While West Germany - an area with favorable economic indicators witnesses the slightly increased proportion of the population, Eastern Germany - especially the eastern part of Berlin has seen population decline over the years.

In 2015, the Federal Statistics Office estimated that 12.5 million people lived in East Germany excluding Berlin. This is 2.3 million fewer people than the time when Germany was reunified in 1989-90. And experts worry that number could drop to just 11 million by 2030.

The migration of rural residents is increasing that hinders public services (education, health care), job opportunities for local workers, and investment enterprises. It is more difficult to invest in rural areas and the quality of life of rural people is declining.

Lack of infrastructure: Many rural infrastructures are not invested in renovation causing the works to be degraded. For example, while interstate roads are always in good condition, local roads are quite rundown. The German Urban Institute estimates that 15% of Germany's urban road bridges need to be completely rebuilt. A study by development bank KfW found that German municipalities need almost $40 billion for road and transport infrastructure (CNBC, 2016).

Not only transport infrastructure, rural residents also find it difficult to access public services such as healthcare, education, broadband, etc. For example, in Dennin (a small town of North Berlin) has no groceries, no clubs, not even a doctor or nurse.

The gap between urban and rural areas in terms of broadband connection quality is still quite high. The reason is that private companies focus on deploying internet connectivity in inner-city and commercial areas, but mostly rural areas are ignored (with few visitors and remote areas). Table 4.1 shows that nearly 50% of residents in rural areas in Germany only have access to a transmission line with maximum speeds - 50 Mbps in 2018. 2.2 million households are facing this issue.

Table 4.1: Broadband usage rate in Germany (According to BMVI 2018)

	≥ 1 Mbps	≥ 2 Mbps	≥ 6 Mbps	≥ 16 Mbps	≥ 30 Mbps	≥ 50 Mbps
City	100%	100%	99,9%	98,3%	95,7%	93,5%
Suburb	99,9%	99,8%	98,3%	89%	83,2%	76%
Countryside	99,2%	98,9%	97,3%	73,1%	64,3%	50,5%
Total	99,9%	99,9%	99,8%	92,4%	88,1%	82,9%

The average 4G availability in rural Germany is 73.5% compared with 82.2% in urban areas. Among Germany's 13 states with large rural populations, none of them have rural areas where 4G availability exceeds 80%. 4G availability in most rural areas across Germany ranges from 70% to 75%, meaning that people living in this area cannot have a 4G connection a quarter of the time (Francesco Rizzato, 2019).

4.1.2. Strategies to support the development of smart villages in Germany

Rural Broadband Connectivity Strategy: The German Federal Government's 2018 coalition agreement identifies a priority target of nationwide gigabit network

expansion by 2025. The federal government has also developed a Strategy 5G strategy for Germany to support network expansion and development of 5G applications at an early stage.

Deploying gigabit networks: The goal of the Federal Government is to provide full coverage of gigabit networks with fiberglass (minimum speed of 1 gigabit/s (GBit/s) in Germany by 2025. To achieve this purpose, the German government relies on an existing network of broadband infrastructure, but this approach is not suitable in sparsely populated areas that have high investment costs and low demand. For this reason, public funding is provided subject to certain conditions such as the Federal Department of Transportation and Digital Infrastructure (BMVI) broadband funding program.

The total funding for fiber optic connectivity made by the federal government corresponds to 12 billion euros up to now. Share of budget funding for national cable programs is from 50 to 70% of gigabit expansion costs. In special cases, government funding is up to 100% including costs of rental consulting and planning services. In addition, state governments will also contribute additional budgets to implement gigabit expansion programs and projects (BMVI, 2021).

Thus, the government's broadband network development projects are considered a supporting foundation for the implementation of "Smart Rural" projects.

Federal Government Mobile Communications Strategy: To address the challenge of high-speed internet access in rural areas, the Federal Cabinet approved the Communications Strategy Federal Government Mobile on 18 November 2019. With the goal of developing digital infrastructure, building 5,000 more mobile phone poles and committing to ensure coverage for 99.95% of households and 97.5% of the country's area, the main The German government has provided a budget of 1.1 billion euros. This strategy aims to focus coverage on remote, isolated and remote rural areas by equipping new satellite technologies instead of having to install them at terrestrial locations.

The German government is curently planning to support the purchase of hardware for satellite internet services such as Elon Musk's Starlink. The government will implement subsidy packages for all wireless internet connection providers in rural areas (via satellite or directional radio link). In addition, with a corresponding funding budget of 500 euros ($611), the program aims to support local households to equip and purchase application equipment such as Starlink satellite dishes, wireless internet- supported devices (Michael Nienaber, 2021).

The program is integrated between the national program (promotion of broadband deployment) and local authorities (approval and implementation of local initiatives for high-quality internet connectivity). A project to install more than 250km of fiber optic

cables has been implemented covering more than 93 villages to increase connectivity of high-speed broadband with > 30 Mbps speed in the Hoxer region. In the state of North Rhine - Westphalia, the local government also co-sponsored this initiative with a budget of 11 million euros, and more than 13,400 businesses have access to > 50 Mbps high-speed broadband connections. In addition, this program also extends to industrial and commercial areas, etc.

Strategies to promote digital change in rural society

Along with broadband deployment strategies implemented by the Federal Department of Transport and Infrastructure, other implemented national strategies are the strategy to promote digital change in rural areas led by the Ministry of Agriculture. The goals of these programs are to:

- Support high-speed bandwidth expansion.
- Build capacity in information technology.
- Promote smart digital services.

In addition, the Federal Program on Rural Development (FPRD) funding aims to accelerate the innovation process, create attractiveness of rural areas. With an annually funded project budget of 55 million euros, the program aims at 3 pillars:

a- Land.digital: Funding program for 68 digital transformation projects in rural areas is with a total budget of 11 million euros. Funding recipients are businesses, clubs, universities, colleges, centrally-run cities and districts. Areas where the results are likely to apply including Economy and labour, volunteering, mobility, education and training, healthcare, local service delivery and information and communication platforms. For example, a project related to "co-working" received funding in the field of "Economics and labor" aims at creating a common space to work (empty premises). The activities of the program are created as capacity building training, clarifying the concept of coworking space and method of operating model. Regarding medical field, the project "Pharmacy 2.0" has also been implemented to develop digital and analog signals to provide better health care services for people in rural areas.

b- Rural in the digital age: With 11 funded projects, the program aims to change the spatial and socio-economic structure through the application of digital solutions. Specific activities of the projects focus on researching and assessing the factors required to create innovation in rural areas, as well as the needs and impacts of digitalisation in rural areas. For example, the "Open Data Land" project focuses on analyzing the potential and challenges of open data sources in rural areas. The "Smart Micro-Logistics" project focuses on researching the contributions of open data sources in rural areas. The contribution of digitization to logistics service delivery is effective for different rural areas.

c- Smart Region (Smarte.Land.Regionen): Development and discovery of regional digital services are based on a common technical platform. This program applies to 07 regions (Bernkastel-Wittlich, Coesfeld, Loerrach, Neustadt an der Waldnaab, Potsdam-Mittelmark, Vorpommern-Greifswald and Uelzen).

On the ground of the framework of the rural development program, the Federal Ministry of Agriculture and Food (FMFA) is responsible for implementing the project "Smarte.Land.Regionen" to promote the use of digitalization in rural areas creating a balance between rural and urban areas. The digital program focuses on services in rural areas, improvement of working ability and living conditions of local people, health care services, agricultural products, public transport optimization, etc.

4.1.3. Some models of smart villages in Germany

a - Model of "Digital Villages"

Objective: The project's goal is to create added value for rural ecosystems with digital solutions and services.

Implementation period: The project has been carried out since 2015 in Eisenberg, Göllheim, and Betzdorf-Gebhardshain, Rhineland-Palatinate, Germany.

Implementation budget: The project is funded by the Rhineland-Palatinate Ministry of Interior and Sports (a total cost of 4.5 million euros) and technically supported by the Fraunhofer Institute for Experimental Software Engineering (IESE). The project is also supported by the Rhineland-Palatinate Development Authority, which focuses on supporting community engagement and civil society.

Project stakeholders: Key project stakeholders include residents, local businesses, the authorities of city associations, researchers from Fraunhofer IESE and other project partners. In which, the German County Association (Deutscher Landkreistag) acts as a consultative body providing advice to project stakeholders. Experts from Fraunhofer Institute will provide implementation methodology with SWOT analysis, assessment of strengths, weaknesses, opportunities and threats of rural services' digitization.

By a bottom-up approach, the project engaged locals, businesses and local authorities to assess aspects of the local digital ecosystem including infrastructure, digital platforms, domain specific applications, social needs and skills of local residents, as well as local governance systems.

With the solution of creating a common digital platform, the Fraunhofer Institute has provided new digital solutions, which are applied to many fields such as supply of local goods in short supply chains, services communications, mobility and e-government. The application of digital platforms helps to improve the efficiency of services, which works based on principle of sharing and applies to payment services, login, data usage control and partner networks.

Local residents are invited to contribute ideas and work with interdisciplinary teams to create user-friendly applications.

The role of project supervision is performed by network coordinators from Betzdorf-Gebhardshain, Eisenberg & Göllheim.

***Implementation mechanism*:** The project is divided into 3 phases, specifically:

- The first phase of the project from 2015 to 2016 is mainly about digital support for the locality.

- In the second phase of the project, the project focuses on the field of communication. In addition to developing and adopting “DorfNews” as a local online portal, “DorfFunk” has been developed as a communication hub for the region. “LösBar” is designed as a linking tool for citizens and public administration agencies to communicate directly.

- The third phase from 2020 to 2021 is the period of consolidating and maintaining the results of the project.

***Assessment of the project’s efficacy*:** The application of digital platforms is to promote local economic development. Digital applications meet the ability to supply local products in a fastest way by direct connection between producer and consumer. Via this application, consumers grasp the method, production, product quality, and vice versa and the producer also captures the needs and tastes of consumers to offer the most suitable products. Participating in the process of distributing products via electronic applications, volunteers are mobilized and perform the role of distributing products, connect parties in the supply chain. In addition, the applications also help people communicate online about the production situation and provide feedback to local authorities.

***Project implementation process*:** Models (living labs) are proposed to be put into practice according to the participatory method. Specifically, activities and solutions have been implemented in the first phase, which is mobilizing the participation of stakeholders (people, businesses, local authorities). This process continues to be maintained regularly throughout the project implementation cycle in order to ensure transparency, efficiency, and people's expectations. Digital services are expanded

and applied to many fields such as local bread shops, organic farming farms, supermarkets, sports stores, pharmacies, laundromats, bookstores and libraries, etc.

In addition, the project's digital applications also serve for communication purposes. Specifically, the DorfNews (local portal) technical platform allows local authorities to notify local news, local events. In addition, this application also shares news about the project implementation, information about local events such as cultural festivals, food, and provides general information about services for tourists. Thereby, it promotes the connection between the local community and other areas.

b, - Model “Smart Countryside” Lippe / Höxter (Smart Countryside Lippe / Höxter) Lippe / Höxter Smart Countryside

(SCS) Model Lippe / Höxter is part of a regional development program aimed at accelerating digital transitions in Ostwestfalen-Lippe.

Like the Digital Villages model, the “Smart countryside” model also provides digital solutions to improve living conditions in rural areas.

The Smart Countryside implementation budget was initiated in 2013 (under a partnership of the Lippe and Höxter regions) and funded by the European Union (EFRE programme). The total budget of the project is 840,000 euros, of which 80% is funded by the European Union, 20% comes from Lippe and Höxter funds.

Project stakeholders: With a "bottom-up" methodology, local residents play a central role in the project and participate in planning and deciding what solutions should be implemented. In addition, they are also project volunteers to participate in training courses in digital skills, and be responsible for imparting knowledge to other members of the community. Accompanying local residents are agencies, schools and businesses that provide smart digital solutions.

How the project works: With a broader scale, the "Smart countryside" project is implemented in 16 villages with deployed, connected digital solutions for a wider range. The method of operation of the project is carried out with an application called "village app" to make connections for a wide geographical area (16 villages) with the aim of discussing and developing digital solutions for local needs. Other complementary activities of the project are training activities, which aims at improving the local residents’ capacity to use digital skills. The selection of digital ideas for Höxter and Lippe is conducted openly and transparently with the participation of all parties in order to find the most effective solutions for residents in the above regions.

Implementation tool: The Digital Village Platform has been applied to the project to improve connectivity and communication among residents, and between residents and local authorities.

The platform (The Caring Village) is applied to increase cohesion and help each other in production and daily life in the community.

The Faith Platform provides online church services, appointments, pilgrimage routes.

The Living Platform owns a major project, which is the establishment of a smart village hall. The residents developed the idea of the infrastructure and the business model.

Digital Education has pproximately 150 Digital Village professionals of all ages, who volunteer to teach digital topics to residents, use purposefully established communication and education corners in the village halls. There are some certain topics including data security, digital farming, education 4.0, eCommerce, volunteer work, media and IT law.

Some comments:

Mobilizing the participation of stakeholders in the community in the implementation of smart village projects will determine the success.

Digital application solutions have been applied to a broader range from the supply of agricultural products between producers and consumers to the connection between residents and local government, applications in medical services, education and tourism, etc.

The application models of digital platforms for each region are different. People's decisions with the adoption of digital ideas will be the highest priorities in the implementation of the model.

Specific policies to the smart village model have not been approved by the German government and projects are implemented based on the framework of regional and broadband development policies.

The implementation of broadband broadcasting projects in rural areas does not only improve people's lives but also meet national strategic goals more broadly.

The implementation of smart village projects with the achieved results will also be the basis for the government to make policy adjustments to attract the participation of the private sector in rural areas.

Despite the increasing participation of private enterprises, public investment in rural areas will be necessary to create platforms that attract private sector investment.

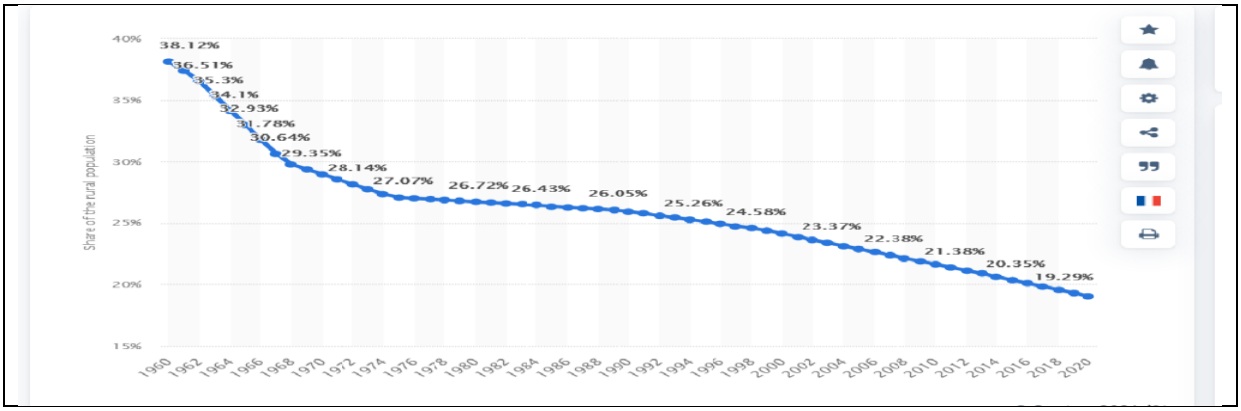
4.2. Smart village model in the French Republic

4.2.1. Rural context

The rural area occupies 53.6% of the total area of 632,833 km2, and is home to 29.9% of the population (EC, 2020). Compared to other countries in the region, France has a larger area than Germany, however, the population is less than 20%, which creates great pressure on maintaining the operation of public services. According to the EU classification of rural areas, France has twice as many people living in rural areas as Germany and 10 times that of the UK (Alexandria Sage (2013).

As in many other European countries, France is also facing migration, changing demographics with the migration of rural workers to urban areas. Evidence is that the French countryside accounted for 70% of the population in the 1970s, this area curently accounts for less than 30%. The consequences of this issue lead to changes in local government management of issues such as education, science and technology development, etc. Therefore, top priorities of the government in recent years are the implementation of regional development policies, which aims to create more dynamic development for rural areas, solve migration problems, attract businesses to invest in rural areas (Jeanne, et al, 2016).

Figure 4.1: Percentage of rural population in France from 1960 to 2020



Source: Statista 2021 Rural population share in France 1960-2020.https://www.statista.com/statistics/466457/france-share-of-rural-population/

Figure 4.1 shows that in 2020, rural areas in France account for only 19.02% of the total population. In the general trend of urbanization, the percentage of the French

population living in rural areas is considered quite high compared to other countries. From 2006 to 2020, the share of French residents living in rural areas continues to decline, from about 22.6% in 2006 to slightly more than 19% in 2020 (Statista, 2021). Like many other EU member states, rural France is facing the following challenges.

Firstly, public transport development: The lack of public transport system in rural areas causes people in rural areas to still use personal vehicles to travel (padam , 2021).

Second, lack of internet network: According to a survey, 6.8 million rural residents do not have internet access ("minimal quality Internet access") (Local (2019). Compared with some other countries in the region, it shows that France's internet service access rate for French residents is too low because 95% of Dutch residents have access to speeds of 4Mbps or more, Switzerland, Denmark and Sweden also achieved similar levels (Local (2019).

Third, lack of medical care: The shortage of doctors also affects rural areas around the Paris metropolitan area but it is most severe in central France (Clare Byrne (2017). The shift of professions of medical staff from rural areas to cities makes it increasingly difficult for the rural health system to meet the medical examination and treatment needs of people in rural areas (Local (2019).

In order to assess the level of sustainability and prosperity in rural areas, in 2019, the Ifop organization surveyed and released some results showing that 60% of French people think that the French countryside is weakening ("poverty" and "increasing unemployment"). 5% of those who migrated to the city said that they left because life in the rural areas was "boring", "isolated" and "difficult to travel", 60% of the interviewees said that they did not access to public services.

4.2.2 Financial mechanism to finance the "Smart Village" initiative

With the goal of improving people's lives in rural areas, the French Government has also implemented smart village programs and initiatives with financial resources of the rural development program. Sponsored smart village initiatives focus on innovation, digitization, climate protection, etc (Andrea Koch and Thomas Egger (2021). In addition, the budget for implementing the initiatives is also funded by the regional budget under the regional development program via the European Fund for Rural Development (EAFRD).

At the regional level, according to transition rule of the Common Agricultural Policy (CAP) (adopted on 23 December 2020), the regional development program will receive €26.9 billion from the EAFRD budget for the period 2021-2027 and additional

8.1 billion euros from other funds. As a result, smart village initiatives will be expanded to many regions by 2025.

At the national level, the National Fund for Land Use Development and Planning (FNADT) collaborates with the regional fund (the DRAC fund) on cultural issues. There are tools of funding national projects (Supportive development of digital workshops, The French National Plan for Digital Inclusion, and private foundations (foundation from AFNIC, organization handle domain.fr)), which has an annual call for projects on digital platforms.

4.2.3. Case study on Smart Village model in France

Digital transformation initiative in Lormes - The future village of Lormes (Village du futur).

Lormes, is a small town of 1,300 inhabitants, located in the Nièvre province of the Bourgogne region in central France. In order to promote socio-economic development via enhancing digital applicability, in 2015, the project “Future Village” was officially implemented. The basis of the project implementation is based on the regional development policy adopted by the French government with the aim of promoting the economic and social potential of ICT and the Internet for remote rural areas (ernd, 2021). The message that the "Petite ville du futur" project gives is "Let's invent the rural territory of the future together" (“Let's Invent together the rural territory of the Future”).

A number of action programs have been implemented:

- Building a strategic vision, from which specific action programs have been set out (Educational support services and digital inclusion provision and the program “Digital Passports for All”).

- Establishing a rural center “Portes du Morvan” with provision of 8 offices connected to high speed broadband network (100 Mb FTTH Fiber).

Implementation budget: Project implementation budget of 600,000 euros is funded by DIACT (French National Agency for Regional/Local Development and supported by the European Fund for Rural Development (EAFRD).

The main areas that the project will focus on engaging community participation in promoting initiatives at all stages of the project, which focuses on 06 priority service areas: (1) digital applications; (2) electronic medical center application; (3) construction of a public media center and multi-function video/cinema; (4) learning spaces and public libraries construction; (5) a center for distribution/collection and

processing of agricultural products; and (6) digital application-based tourism referral center.

Participating parties:

- *Local government:* Be responsible for supporting and connecting parties during project implementation and ensure project activities to comply with legal regulations.

- *People:* Participate in the project implementation stages from developing ideas to participating in specific activities.

- *Technical expert team:* Provides digital strategy support and free training to all levels of government and local residents.

Some results achieved: Improved infrastructure and open digital environment in Lormes, interconnection of integrated and widely used digital-based services for:

- Conducting the geriatric teleconsultations in Lormes Senior Care Home- the first Bourgogne facility.

- Applying smart energy standards to primary schools, using digital platforms in schools to increase interaction between teachers and students.

- Installing free wi-fi points for the community, sensors to monitor water, air and energy quality.

- Building a Knowledge cooperative to share skills with people in the community area.

Some factors to consider:

- Developing a strategy and vision requires a clear analysis of the rural context, as well as costs that need to be calculated specifically.

- Clearly defining the project's goals and expected results via promoting the participation of the people, the political system, etc. , which ensures optimal use of the built utilities.

- Prioritizing activities to ensure initiatives will be the foundation for promoting local socio-economic development.

- Connecting the local digital system with the regional and national onesto to ensure maximum exploitation of the potentials of a digital ecosystem.

- Synchronizing digital transformation with economic, social transformation and environmental regeneration of the village, town or region.

Electric car sharing in the city in the commune of Villerouge-Termenès, France.

Villerouge-Termenès is a small village with 140 inhabitants, located in Corbières, Aude department in the Occitanie region. This area has a low population density and no major public services such as medical centers, large stores, degraded transport systems, which hinders transportation, etc.

The Objective of the project is to improve access to public services, reduce the purchase of personal vehicles, and increase the use of sharing applications for electric vehicle services.

Specific activities: In 2017, build an electric charging station on the square at the center using solar panels to charge electric cars to serve local residents and visiting tourists.

Consultation meetings between the parties were held to collect ideas for the initiative to develop electric car sharing services. In 2017, the city council invited around 15 village representatives and local stakeholders to gather twice a year to identify best practices for use and sharing.

The results of the consultations have led to the establishment of criteria for electric car sharing services, such as criteria on price, service time, users to design management platform and payment service called 'Clem'.

Project budget: With a total budget of 46,355 euros, of which EAFRD funds 29,667 euros. The remaining capital is contributed by regional and private funds to the project. In which, EAFRD supports 63% of the investment in electric vehicles and 03 years of operating costs, the rest of the costs are financed by the budget of the local government and other social organizations in the area.

Some results:

- Tram service has been widely used meeting the needs of local people and visitors
- Create jobs for local people
- Reduce environmental emissions, converting ecology, meeting the requirements of the green agreement of the region, winning the innovation award.

Mouans-Sartoux's "Smart Village" strategy

Mouans-Sartoux is a town of more than 10,000 inhabitants, located in the central region of (Cannes-Grasse-Antibes) with more than 450 000 inhabitants. The challenge facing the region is the lack of supply of organic agricultural products. Therefore, the smart village initiative of Mouans-Sartoux is the application of digital solutions to improve the ability to produce and supply sustainable agricultural products.

Some smart solutions are proposed: (1) Strengthen linkages in the supply chain between neighboring agricultural production areas; (2) Support resettlement for farmers; (3) Promote the production ability of households; (4) Use digital tools to improve food production and supply.

Involvement of parties in Smart Village strategy development: Model connects with the participation of parties such as local communities, Center for Sustainable Food Education (MEAD) and local government. In which, the Center for Sustainable Food Education (MEAD) is responsible for the project coordination role. The local government, headed by the Mayor, is responsible for overall direction of the project's activities, and the Project Steering Committee is composed of experts responsible for technical advice. In addition, the project also mobilizes the participation of business associations and networks of rural development experts, social organizations, etc.

Specific activities

- Training awareness for people and local government on digital skills
- Building a website about local food
- Publishing publications announcing project results
- Organizing meetings between project stakeholders to find solutions to the problem of supplying agricultural products via electronic and technical applications.

In short, a Smart Village in France is the use of smart technology and digital solutions to promote potentials, minimize challenges, and aim to improve the quality of people's lives. socioeconomic growth in rural areas.

4.3. Smart village model in Italy.

4.3.1. The context of implementing smart village models.

Like many other European member countries, the Italian rural area also faces challenges such as population aging, lack of rural public services, job opportunities for rural workers, increasing income disparity between rural people and urban areas, growing migration for urban working opportunities etc.

In order to find solutions to this problem, the Italian Government has approved a rural development strategy “National Strategy for Inner Areas (NSIA)” for the period 2014-2020. The policies in the program are outlined covering 60% of the territory with 23% of the population in more than 4000 local areas.

Programs and funding sources (for implementing projects based on the classification of rural areas in the program) are implemented based on people's access to basic services in three areas: transportation, education and health care, or urban networks to determine access distances to these services. Accordingly, the “Inner area” is divided into “Belt areas”, “Intermediate areas”, “Remote areas”, and “Ultra – remote areas”.

The implementation of the strategy is based on four innovation elements including (1) an innovation policy is aimed at improving the provision of essential services such as primary, secondary and vocational education, and transport and health care services, promoting local initiatives in the areas of land management, local product development, renewable energy, and cultural heritage; (2) the program is implemented with high national priority; (3) the budget for the implementation of the program has a combination of regional budgets through the ERDF, ESF, EAFRD, EMFF funds, the regional development program and the National Stability Fund, and (4) The program is implemented with the participation of many parties, in which the local community is identified as a central factor in developing ideas and implementing activities.

4.3.2. Case Study Ostana

Ostana is one of the 100 smallest villages in Italy, located at an elevation of 1000-2000 m above sea level in northwest of the Alps. One of the biggest challenges that Ostana has faced over the past decades is population decline (people in villages migrate, find jobs in large urban areas). The population reduction is up to 99.5% (from 1200 inhabitants in 1921 to 5 inhabitants at the end of the 20th century) (ernd, 2021). Currently, Ostana has become a liveable rural area with more than 50 residents and 500 private investors (who own houses, hotels for tourism). The

strategic implementation solutions for smart village development in Ostana are drawn from experience and disseminated to not only Italy but also shared and applied with many other regions throughout the EU.

Thus, the context for the formulation of the Ostana smart village strategy is the lack of public investment by the government in remote and isolated areas, the lack of regional connectivity and governance in the region, poor treatment of infrastructure (roads, transport) as well as services and negative impacts on climate change.

The Ostana smart village development strategy is built on the evaluation and collection of the initiatives of local residents, and community actors. This strategy is seen as an opportunity to develop a medium and long-term vision, as well as refine the plan based on the participation of local residents. Thus, it is to increase the attraction of investment from businesses.

The success of a smart village strategy is to build a strategy based on promoting local initiatives, coherence with strategies at both national, regional and local levelsincluding: (1) The government's strategy for the development of rural areas; (2) Local development strategies associated with architectural heritage values: Restoration of traditional cultural values and protection of cultural heritages; (3) Strategic energy strategy: Implement smart solutions on using renewable energy such as installing solar panels for public lights; (4) Carbon emissions reduction: Organize shuttle bus services for tourists; (5) Sustainable agro-forestry management; (6) Maintainance of basic services and social enterprises development for the public sector.

Building a smart village development strategy through SWOT analysis

Strengths	**Weaknesses**
• Local community cohesion, inclusion and leadership • Public infrastructure • Cooperation with universities and research centers • Culture- the driving force behind economic and social growth • A strategy with clear goals towards sustainable development	• A small number of residents, seasonal tourism • Lack of broadband infrastructure • Pressure on shifting economic resources at peak times • Loss of biodiversity, creating barriers to management and development of agribusiness • Negative impacts of climate change
Opportunities	**Challenges**
• Increase in financial resources from	• Imbalance between tourist season and

government, regional programs • Potential for agriculture and tourism	non-tourist season • Lack of housing for immigrant residents, the rate of urbanization is increasing • Pressure on infrastructure during tourist season • Risk in investment, less attractive for investment.

Ostana smart village development strategy:

- *Building and developing Ostana into a green community:* Install solar street light systems by solar and wind energy, solar panels on buildings, servicing healthcare centers; Develop shuttle services during peak seasons to reduce carbon emissions, managing waste; Implement initiatives in the management of natural resources, conservation and economic development, etc.

- *Housing development:* Restore buildings in the village, activate social housing programs to attract young workers, as well as avoid tourist speculation; Regenerate communal service spaces and community heating, as well as improve economic efficiency, develop financial programs to drive innovation to social housing, manage public services on infrastructure to improve quality of life, implement communication strategies to raise awareness for residents.

- *Cultural and social renewal:* Restore traditional cultural heritages, keep the unique cultural features of the Ostana region; Organize cultural festivals such as the Ostana Awards in minority languages; science and art festival; Establish a social enterprise for the management of the Lou Pourtoun cultural center and the ethnographic museum; Create an attractive place in encouraging university students to learn about the culture and organization of events, conferences.

Evaluation:

- The strategies for the development of rural areas for the period 2014-2020 are considered as the foundation to support the implementation of smart village development initiatives in Italy.

- Ostana smart village development strategy has solved existing challenges such as population decline resulted from migration, spatial isolation, lack of dynamic economic development, etc.

- The construction of a Smart village development strategy is based on connecting stakeholders (people, businesses, social organizations, local authorities), SWOT analysis to assess potentials, opportunities, and challenges for building specific action plans.

- Exploiting and promoting potential, Ostana smart village strategy has focused on programs developing shuttle bus services, creating energy in order to create a green community, and attract tourists.

- Ostana smart village intents to restore and preserve traditional cultural heritages, keepthe unique cultural features of the Ostana region, organize cultural events to create highlights for tourists, as well as a place for experiences and discoveries of academia and research students.

Some general comments:

The recent pilot implementation of smart village initiatives in the European Union has focused mainly on remote rural areas in order to improve the lives of people in the rural areas.

Smart village initiatives are the result of institutionalizing a concrete action plan from the Cork 2.0 Declaration (Cork, Ireland) entitled “A Better Life in Rural Areas.

Digital solutions used in smart village models following integration, innovation and creativity are considered as the foundation to promote the effectiveness of smart village models.

The smart village model is currently being applied flexibly to each region and locality on the basis of determining the local context and needs. Therefore, a specific policy framework applied to smart villages has not been developed until now, the initiatives and programs approved by the European agenda are based on the already established policies (Rural Development Program, Digitization Program, Enhancing Rural Innovation Policy, Renewable Energy and Sustainable Rural Development)

Thus, in order to solve emerging challenges in rural areas in recent years, the EU has been implementing a series of solutions and action programs and one of which is the "Smart Village". On the basis of flexible application, member countries are proactive in exploiting and promoting local initiatives, promoting digitization, e-commerce. Technologically connected solutions are considered an effective solution to solve the problems of isolation in rural areas, increase connectivity of public services, production, business efficiency, and balance the disparity between urban and rural areas.

PART V: LESSONS LEARNT FOR VIETNAM

5.1. Vietnam context

In Vietnam, on the ground of the " Vietnam's National Target Program on the New Rural Development" 's implementing framework in recent years, some localities have also been more active in piloting development models of "Smart villages and communes".

Specific policies, regulations and guidelines on smart villages have not been implemented, they are just regulations and criteria of the National Program on the New Rural Development with 19 sets of criteria developed on national goals. However, with more than 10 years of implementation, many policy problems have been revealed up to now: (1) The capacity of local managers is still limited; (2) Policies to attract enterprises to invest in large-scale commodity-producing agriculture are growing widespread, contributing to the shift of economic, labor structure in agriculture to other restricted fields; (3) Incentive policies such as fee reduction of land use, rent land and water surface lavy exemption still limited in terms of enforcement mechanism (Vu Van Dat, 2020). The implementation of mock tests of models in some localities is considered a good signal for the application of innovations and technologies to the new rural development program for the period of 2020 - 2025 and 2030 - 2045.

The implementation of Smart Village projects will create opportunities for rural areas to become more competitive than urban areas in terms of productivity, labor productivity and meet the issues of economic development, welfare and benefit from social services. In addition, the pilot models will also contribute to creating a livable space for people in rural areas, narrowing the gap between rural and urban areas. In particular, this model also creates a driving force for the fields of eco-tourism, health tourism, medical tourism, experience tourism, research tourism, etc to evenly develop.

In the context that digital transformation is an inevitable trend, the application of high technology, digital technology, and large database systems are a basis for application in the "Smart village"construction model.

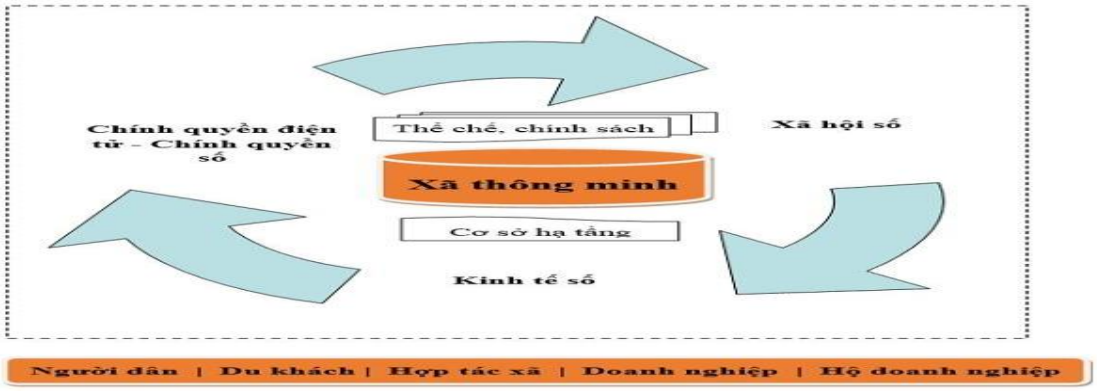
Some models in Vietnam have been implemented

Piloted "Smart Commune" model in Quang Tho commune, Quang Dien district and Vinh Hung commune, Phu Loc district.

Objective: Perfect commune-level e-government and aim at digital government, the "smarter" management of commune-level government; Ensure social security, safety and order in rural areas; Apply science and technology to serve agricultural

production and develop hi-tech agriculture; Increase the value of agricultural products and expand transactions on the Internet.

Figure 5.1. Model of Smart Commune in Thua Thien Hue Province



https://www.nongnghiepso.com/bai-viet/mo-hinh-xay-dung-xa-thong-minh-134.html

Some specific implementation programs:

- Developing a set of criteria for “Smart Commune” and operating mechanism for “Smart Commune”;
- Completing e-Government, towards Digital Government;
- Building integrated information systems for digital society;
- Building a digital cooperative model, agro-enterprise applying digital technology and gradually deploying a number of services for the Digital Economy.
- Building institutions and policies; Propaganda and awareness raising; Completing the commune-level e-Government; Building a Digital Society; Building a Digital Economy, etc

The "Smart Village" model in Bach Dang commune, Tan Uyen town, Binh Duong province

Objective: Combine technological achievements with the content of new rural development to highlight the key issues of economic and social infrastructure; Focus on traffic development associated with environmental landscapes; Ensure environmental protection.

Specific solutions:

Traffic: Apply modern lighting systems such as energy-saving LED lights or solar lights; Install security cameras at important intersections of the area; Sort and apply advanced technology to the waste collection system.

Production: Apply smart agricultural farm management, disease control, environmental pollution and product traceability is close to ecotourism development; Build and deploy online trading applications for participating farms.

State management and community participation: Provide online public services at levels 3 or 4; Install a free high-speed wifi system in concentrated residential areas creating conditions for people to access information; Build information technology applications to receive and benefit people in various fields of production, life and society.

In particular, Bach Dang commune will mobilize the wisdom and creativity of the community via collecting opinions of the people, organizing contests on ideas, models, technologies and solutions to further improve the "Smart Village" model.

Model village results

After a period of use, the model initially brought into play many benefits regarding helping people to be proactive in natural disasters, rainstorms; environmental monitoring to serve aquaculture; promoting the tourism system by virtual reality technology for local socio-economic; assisting the prevention and control of the Covid-19 epidemic effectively, especially in localities that many people work or study far away, etc.

5.2. Policy recommendations

The smart village development strategy in Vietnam does not currently have a specific policy. Although the implementation of a New Rural Development Program with 19 sets of criteria is generally applicable to all rural areas, it also reveals many limitations especially regarding highlight of rural development. Based on the application of technology, some localities have proposed to build a pilot smart village model for the period 2021-2023 to promote the development of rural areas. Although not yet implemented, the breakthroughs of some localities will serve as a basis for policy-making agencies and new rural program development agencies to make adjustments in terms of policies and practical present rural development programs.

Based on the analysis of policies and models of smart village in some EU member states, the research team draws a number of recommendations, specifically as follows:

Firstly, it is necessary to clarify the theoretical framework for smart village development, which is able to apply to the context of rural areas in Vietnam. The concept of "village", an approach to clarifying the theory of rural areas, is widely applied in the group of OECD countries and the European Union in particular.

Therefore, the development of policies and projects in Vietnam needs to clarify the theoretical framework associated with the rural context in Vietnam.

Secondly, it is necessary to integrate the criteria for assessing the level of intelligence into the New Rural Development Program. The experience of the EU shows that the EU does not rigidly impose a model of one country on another, but the formulation of a given strategy is to engage stakeholders in the assessment of potentials, opportunities, challenges to determine the most suitable strategy. To Vietnam, it is also necessary to test smart village development programs with a bottom-up approach while applying assessment methods to determine the potential of each locality.

Third, pilot smart village models is based on existing strategies. Vietnam has had quite a few policies on rural development, digital development strategies, science and technology application strategies, innovation, policies to attract investment in rural areas.

Fourth, Vietnam's pilot smart village models need to clearly define governance structure and management capacity. This is the first step in building a local development strategy in general and a smart village strategy in particular. The "Smart Village" strategy requires the participation of many actors at both central and local levels, as well as independent and intermediary actors for policy review (non-governmental organizations, research, think-tank from institutes/universities). Local governments need to play an important role in connecting these factors.

Fifth, pilot models need to be more proactive in engaging local community groups. On the basis of promoting local initiatives and intellectual properties combined with digital technology solutions for regional economic development, the cohesion of local community groups will ensure the proposed programs and projects to achieve higher efficiency.

Sixth, the "Smart Village" strategy needs to be realistic. The goals set for the implementation of the project need to be more specific to see concrete results, which directly impacts the local community.

Seventh, administrative procedures should be simple. Accessing resources to implement projects should be simplified and avoid procedures that cause difficulties for specific implementation at the local level.

Finally, Vietnam needs to build a network of smart village experts that will help solve difficulties for underprivileged areas. Smart village projects focus a lot on technological solutions, energy saving, smart services, etc. Therefore, with limited resources, it is necessary to build a network of experts and create favorable conditions for sharing worthwhile experiences.

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