

**SYSTEM INNOVATION APPROACH FOR
ENCOURAGING SOCIAL AND ECONOMIC RESILIENCE
IN “LEFT BEHIND AREAS” IN EUROPE:**

CASE OF “APADRINA UN OLIVO”

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Transition Innovation and Sustainable Environments

submitted by

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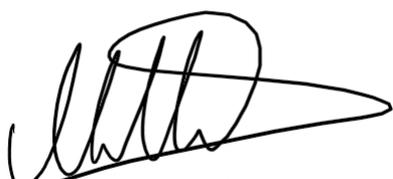
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ABSTRACT

Rural depopulation presents a significant challenge in Europe, characterized by profound socio-economic and cultural impacts due to the migration of populations from rural areas to urban centers. This study investigates the multifaceted causes and consequences of population decline, underscoring the urgent need for innovative and sustainable solutions. The research delves into the drivers behind this decline, such as globalization, economic policies, and social dynamics, and their implications for rural communities. By integrating a system innovation framework, the study focuses on large-scale transformations across interconnected socio-technical systems to address these challenges comprehensively. Key elements, including technological advancements, social interventions, policy changes, and stakeholder engagement, are examined to elucidate sustainable development practices. A focal case study of "Apadrina un Olivo" in Oliete, Spain, demonstrates the practical application of these principles. This project revitalizes abandoned olive groves through a sponsorship model, securing funding, promoting sustainable agriculture, and enhancing community cohesion. The case study highlights the project's success in job creation, economic development, and social integration, providing valuable insights into the practicalities of implementation. The development of an integrated system model that incorporates economic, social, and environmental variables offers a comprehensive framework for understanding and mitigating population decline. The findings underscore the critical importance of holistic approaches and collaborative efforts in fostering resilient and thriving rural communities. This research serves as a blueprint for future strategies and interventions aimed at reversing demographic decline and promoting sustainable development in Europe's marginalized regions.

Keywords:

Rural depopulation, system innovation, rural communities, sustainable development.

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1 INTRODUCTION

Rural depopulation is an issue of growing concern in Europe, with profound socio-economic and cultural implications. This phenomenon, characterized by the steady outflow of residents from rural areas to urban centers, threatens the sustainability of communities that have existed for centuries. One striking example is Spain's "España Vacíada," or "Emptied Spain," where vast stretches of the rural interior have seen their populations plummet, transforming vibrant villages into near ghost towns (Castelló, 2023; Llorent-Bedmar et al., 2021; MacKinnon et al., 2022). Understanding the complexities of rural depopulation is not only crucial for preserving cultural heritage but also for fostering resilient and thriving communities in the face of modern challenges.

This thesis embarks on a comprehensive exploration of rural depopulation, delving into the multifaceted causes and consequences that drive this trend. The initial chapters lay a robust theoretical foundation, examining the impacts of globalization and neoliberal economic policies on demographic shifts. By analyzing economic disparities, migration patterns, and social cohesion, the research uncovers the intricate web of factors that contribute to the decline of rural populations (Capello & Nijkamp, 2009; Piontek, 2019). This analysis is pivotal for identifying the systemic issues that exacerbate depopulation and for formulating effective policy interventions (Harvey, 2007; Jessop, 2002).

A critical focus of this thesis is the integration of system innovation as a framework for addressing rural depopulation. System innovation emphasizes large-scale transformations across interconnected socio-technical systems, extending beyond incremental changes to foster holistic improvements in societal structures (Geels, 2004; OECD, 2013). By incorporating technological, business, and organizational innovations, this approach aims to create sustainable development pathways that can revitalize left-behind regions. The research highlights the importance of stakeholder involvement and the Multi-Level Perspective (MLP) in driving these transformations, ensuring that solutions are both comprehensive and inclusive (Leonidou et al., 2020; Satalkina & Steiner, 2022).

The thesis further demonstrates the practical application of system innovation through a detailed case study of "Apadrina un Olivo," a project in Oliete, Spain. "Apadrina un Olivo" is a non-profit initiative aimed at revitalizing abandoned olive groves in the depopulated village of Oliete by allowing individuals to "adopt" an olive tree for an annual fee (A. Pordomingo, interview, May 2024). This sponsorship model secures funds for the maintenance and recovery of the trees, promotes sustainable agricultural practices, and fosters a sense of connection between the sponsors and the local community. By restoring the landscape and creating jobs, the project not only revives the olive groves but also stimulates economic growth and strengthens social cohesion within the village (Gascón, 2023). This case study provides invaluable insights into the practicalities of implementing system innovation in real-world settings and compares it with the theoretical system that is developed by studies for this phenomenon.

Ultimately, this research underscores the necessity of a holistic approach to rural depopulation, integrating economic, social, and environmental dimensions. By developing a comprehensive system model that accounts for the interconnected variables influencing depopulation, the thesis offers a blueprint for sustainable rural development. This approach is crucial for crafting targeted interventions that can reverse the decline of rural areas and promote long-term resilience (MacKinnon et al., 2022; Pike et al., 2023). As the thesis will show, future research can build upon these findings to refine and expand the integrated system model, enhancing its applicability across diverse rural contexts.

2 UNDERSTANDING DEPOPULATION

The multifaceted phenomenon of rural depopulation in Europe stands as a significant challenge with far-reaching implications for social and economic development. In this chapter, the aim is to embark on a comprehensive exploration of the causes, consequences, and implications of rural depopulation, aiming to provide a nuanced understanding of the complex processes driving population decline in rural Europe. This chapter serves as the foundational framework upon which subsequent analyses and discussions within the thesis, laying the groundwork for a holistic examination of rural depopulation and its implications for social and economic development strategies. The structure of this chapter is designed to guide readers through a systematic exploration of the various dimensions of rural depopulation, starting with an examination of the overarching forces shaping rural Europe within the context of globalization and neoliberal economic structures (Capello & Nijkamp, 2009). By delving into the dynamics of globalization and its impacts on rural economies, the aim is to elucidate how interconnected global processes have influenced demographic trends and migration patterns in rural areas (Piontek, 2019). Additionally, examining the role of economic policies, including those influenced by market principles, can illuminate how they may have shaped regional disparities and influenced rural depopulation. This analysis can then inform a more comprehensive understanding of the economic drivers behind population decline.

Furthermore, this chapter delves into the concept of rural polarization, a key aspect of rural depopulation characterized by the concentration of population growth in urban centers juxtaposed with demographic decline in rural areas (Piontek, 2019). By unpacking the concept of rural polarization, the aim is to highlight the spatial disparities and social inequalities that underpin rural depopulation, providing insights into the structural factors driving population shifts across Europe. An examination of left-behind places and abandoned villages, underscores the profound socio-economic consequences of depopulation, emphasizing the urgent need for policy interventions to address the

challenges faced by rural communities. Overall, this chapter sets the stage for a comprehensive analysis of rural depopulation, laying the foundation for subsequent chapters to delve deeper into specific aspects of this complex phenomenon and its implications for sustainable development strategies in rural Europe.

2.1 GLOBALIZATION

Over the past few decades, globalization has emerged as a dominant force reshaping economies and societies worldwide, with profound implications for regional development and population dynamics (Capello & Nijkamp, 2009; Piontek, 2019). One of the definitions that was used in the research of the Director of the Geneva Centre for Security Policy, Doctor Gérard Stoudmann was "globalization represents the triumph of a capitalist world economy tied together by a global division of labour." (Stoudmann, 2006; Wallerstein, 2011) Within the European context, some argue that the economic structures associated with globalization have been a significant factor influencing urbanization and rural depopulation. These structures are often characterized by principles such as deregulation, privatization, and a reduced role for government intervention in economic activity. This environment can facilitate the increased mobility of capital across borders and potentially lead to resource allocation being driven primarily by market forces. (Harvey, 2007). In addition, there are different practical studies of Europe that provide different roots of the complexity of depopulation, an important consideration within population decline is the concept of selective migration. This refers to the tendency for specific demographics, often younger and more highly skilled individuals, to migrate from rural areas to urban centers. This phenomenon, sometimes termed "brain drain," can it impact the local economy in several ways (Mladenov & Ilieva, 2012). Brain drain refers to the emigration of highly skilled or educated individuals from a particular region, typically rural areas or developing countries, to locations offering greater opportunities and prospects. These individuals often possess advanced degrees, specialized training, or valuable experience in various fields. Their departure can have significant social and economic consequences for the origin location. This

phenomenon starts with the reduces the pool of available labor, potentially impacting the viability of existing businesses. Secondly, the out-migration of skilled individuals diminishes the tax base, further limiting resources for local development (Warsaw University of Life Sciences & Wojewodzka-Wiewiorska, 2019). This loss of human capital can create a self-perpetuating cycle of decline.

However, it is important to acknowledge spatial variations in these migration patterns. Some rural areas, particularly those surrounding large cities, may experience positive net migration. This can be driven by factors such as the affordability of housing and a desire for a quieter lifestyle (Pénzes et al., 2015). Understanding the reasons behind these variations, and the factors that make certain rural locations more attractive, can be crucial for informing policies aimed at revitalizing struggling regions.

In the context of contemporary globalization, characterized by emphasis on market-driven approaches, rural areas and regions encountering difficulties attracting investment or maintaining competitiveness within a globalized economic landscape may experience challenges in retaining their populations and sustaining local economies. (Capello & Nijkamp, 2009). This is particularly evident in the context of the European Union, where policies promoting economic integration and market liberalization have led to uneven development patterns, exacerbating disparities between urban and rural areas (Jessop, 2002).

2.1.1 ECONOMY OF SCALE

The concept of economy of scale, deeply intertwined with globalization and the neoliberal economic structure, plays a crucial role in understanding the phenomenon of depopulation. In highly developed nations, the pursuit of economy of scale has been a driving force behind economic policies aimed at maximizing efficiency and productivity (Piontek, 2019). Globalization, characterized by the increased mobility of capital, goods, and labor across borders, has further accelerated this pursuit by facilitating the integration of economies into larger, interconnected markets. Economic development strategies in some contexts prioritize economies of scale, which can be particularly advantageous under conditions of deregulation and market-driven approaches. This focus can

lead to a concentration of economic activity in urban centers and metropolitan regions. (Capello & Nijkamp, 2009).

Some argue that a persistent focus on economies of scale within certain economic development frameworks may contribute to depopulation trends, particularly in rural areas. This perspective suggests that as resources and investment concentrate in larger, more dynamic urban centers, rural communities may face challenges in attracting resources and maintaining economic viability. (Piontek, 2019). This process of urbanization and rural decline is further compounded by demographic shifts and changing labor dynamics, as younger generations migrate to cities in search of better opportunities, exacerbating the issue of depopulation. Therefore, while economy of scale may yield benefits in terms of efficiency and productivity, its unchecked pursuit within the context of globalization and neoliberalism can exacerbate spatial inequalities and contribute to the marginalization of 'left behind areas' in Europe and beyond (Pike et al., 2023).

Policymaking within certain European contexts may have historically emphasized the role of urban centers and metropolitan regions as drivers of economic growth. This focus could potentially lead to a situation where rural areas receive less attention and their specific development needs are not fully addressed. (Harvey, 2007). As a result, rural communities across Europe have been left grappling with declining populations, economic stagnation, and social disintegration, leading to a vicious cycle of depopulation and decline. In this context, understanding the structural dynamics of neoliberal globalization and its impact on rural depopulation is essential for addressing the multifaceted challenges facing 'left behind areas' in Europe (Capello & Nijkamp, 2009). Within the context of globalization characterized by increased mobility of capital and labor, the competition between regions has intensified. This phenomenon may be linked to widening spatial inequalities and potentially contribute to outmigration trends in rural areas. (Jessop, 2002). Policy approaches that prioritize market-driven solutions may not always fully capture the social and cultural aspects of development in rural areas. This could potentially lead to a situation where the specific needs of these communities, which may be facing vulnerabilities, are not

adequately addressed. (Harvey, 2007). Therefore, any efforts to promote social and economic resilience in 'left behind areas' must critically engage with the neoliberal economic structure that shapes their development trajectories, seeking alternative approaches that prioritize inclusive and sustainable forms of growth and development.

2.1.2 URBAN AGGLOMERATION

Contemporary globalization, with its interconnected economic and social processes, has undoubtedly influenced urban growth patterns worldwide. The past few decades have witnessed a significant increase in urban populations, with urbanization remaining a dominant trend. This global phenomenon can be attributed to two key mechanisms: firstly, the natural growth of existing cities due to higher birth rates than death rates, and secondly, the movement of people from rural areas to urban centers. (Manrubia et al., 1999). Urban agglomerations, characterized by interconnected socioeconomic networks, have emerged as the hallmark of this system. These agglomerations represent not only geographic continuity but also the intensification of economic, social, and cultural interactions among central and peripheral cities. Unlike mere clustering of cities, an urban agglomeration represents a complex system characterized by dynamic interactions among its components (Fang & Yu, 2017). This phenomenon is not only geographically continuous but also demonstrates strong socioeconomic ties among their constituent parts. They evolve, expanding and integrating as networks of people, goods, capital, and information become more interconnected. Developed by the surplus capital of the 1960s and 1970s, urban areas experienced unprecedented development and expansion, epitomized by iconic landmarks like the World Trade Center (Harvey, 2007).

The phenomenon of urban growth and urban agglomeration underscores the transformative nature of cities as hubs of economic, social, and cultural activity. However, it also highlights the challenges associated with managing rapid urbanization, including issues of infrastructure development, resource allocation, and social equity (Jessop, 2002). Moreover, the growth of urban areas often coincides with depopulation and neglect in rural areas, exacerbating spatial

inequalities and contributing to the phenomenon of 'left behind areas' in Europe and beyond (Pike et al., 2023). Understanding the dynamics of urban growth and agglomeration is essential for addressing these complex challenges and promoting sustainable development across regions.

The repercussions of urban growth under neoliberalism have been particularly pronounced in rural areas, where depopulation and economic decline have become increasingly prevalent. As capital flowed into urban centers, rural regions faced neglect and disinvestment, exacerbating spatial inequalities (Harvey, 2007). The lure of urban opportunities, coupled with the lack of investment and economic opportunities in rural areas, has driven migration away from the countryside. Consequently, smaller communities struggle to sustain themselves, leading to dwindling populations and diminishing resources (Manrubia et al., 1999). This trend has not only undermined the socio-economic fabric of rural areas but also eroded their cultural heritage and identity. Thus, while urban agglomerations thrive under neoliberalist policies, rural regions are left grappling with the consequences of depopulation and neglect, perpetuating spatial polarization in contemporary societies (Jessop, 2002).

2.2 CONCEPTUALIZATION OF DEPOPULATION

Defining the concept of depopulation within the context of your thesis on system innovation for encouraging social and economic resilience in "left behind areas" in Europe is necessary for the theoretical background of this research. This definition serves as the cornerstone for analyzing the specific challenges faced by rural communities grappling with population decline (Capello & Nijkamp, 2009). By precisely delineating depopulation, you establish a clear understanding of its implications for social cohesion, economic vitality, and cultural heritage within these marginalized regions (Piontek, 2019). This clarity not only informs your subsequent analyses but also guides the formulation of targeted interventions and policy recommendations tailored to address the unique needs of "left behind areas." Moreover, a well-defined concept of depopulation facilitates a focused exploration of how system innovation can be leveraged to foster resilience and

sustainable development in these communities, offering practical insights for fostering inclusive growth and revitalizing rural Europe.

The first approach for the definition of depopulation for this research comes from the economist Wojciech Piontek (Piontek, 2019). Depopulation can be defined as a complex socio-economic and demographic phenomenon characterized by a sustained decline in the population of a region or country. Rooted in historical contexts such as eugenics and influenced by contemporary global dynamics, depopulation represents a departure from sustainable development principles, challenging notions of family institution, equitable remuneration, and reproductive rights. The concept gained momentum notably after the International Conference on Population and Development in 1994, marked by the Cairo consensus, which emphasized values like gender equality and reproductive health. In economic terms, depopulation is advocated by certain proponents, including influential figures like former UN Secretary Ban Ki-Moon and economist Jeffrey Sachs, as a strategy to alleviate resource scarcity and promote intergenerational equity. This approach posits that reducing population size while enhancing resource efficiency could sustain economic growth, alleviate environmental pressures, and mitigate social inequalities. However, the implementation of depopulation strategies raises concerns about potential systemic risks, such as financial instability and demographic imbalances. The ramifications of depopulation extend beyond demographic shifts, impacting various facets of society, including economic activity, land use, and cultural vitality, particularly in rural areas and smaller municipalities. Thus, depopulation represents a multifaceted challenge requiring nuanced analysis and innovative solutions to ensure social and economic resilience in affected regions (Piontek, 2019).

A second approach of a definition for depopulation comes from Wolfgang Lutz and Nicholas Gailey in their article *Depopulation as a Policy Challenge in the Context of Global Demographic Trends* (Lutz, 2020). They defined this concept as a multifaceted demographic phenomenon characterized by a sustained decline in the population size of a region or country. Historically, fluctuations in population size were primarily driven by changes in death and migration rates, with declining

birth rates emerging as a significant factor in the late 1800s. Examples from European history, such as the "Great Famine" in Ireland, underscore the societal disruptions and subsequent recovery associated with depopulation events. Malthusian perspectives on population growth, rooted in concerns about resource limitations and diminishing returns to labor input, have shaped discourse around depopulation and fertility rates. Contemporary demographic transitions, marked by shifts from high birth and death rates to controlled and low levels of both, highlight the dynamic nature of population change. Factors contributing to depopulation include aging populations, declining fertility rates, and persistent out-migration from certain regions. Economic implications of depopulation encompass challenges related to workforce participation, pension systems, and economic dependency ratios. Furthermore, depopulation can lead to imbalances in regional development, with population clustering in urban areas and subsequent challenges in rural areas. While depopulation may reduce total GDP or growth rates at the aggregate level, it can also yield benefits such as higher per capita income, increased female labor force participation, and enhanced human capital investment opportunities. Overall, depopulation poses complex policy challenges that necessitate nuanced approaches to mitigate its socio-economic impacts and promote sustainable development (Lutz, 2020).

Depopulation, within the purpose of this thesis, embodies a multi-dimensional phenomenon encompassing socio-economic and demographic shifts (Lutz, 2020; Piontek, 2019). As elucidated by Capello and Nijkamp (2009), the central places theory accentuates how economic decline ensues in central locales as delivery distances increase or shipping costs fluctuate, leading to geographic polarization (Capello & Nijkamp, 2009). This phenomenon manifests as a sustained decline in population size, rooted in historical contexts like eugenics and shaped by contemporary global dynamics, thus challenging principles of sustainable development (Piontek, 2019). Proponents of depopulation advocate for its implementation to alleviate resource scarcity and foster intergenerational equity by reducing population size while enhancing resource efficiency (Piontek, 2019).

However, this approach raises concerns about potential systemic risks, including financial instability and demographic imbalances. The repercussions of depopulation extend beyond demographic shifts, significantly impacting various facets of society, particularly in rural areas and smaller municipalities. Therefore, depopulation represents a complex policy challenge necessitating nuanced approaches to mitigate socio-economic impacts and promote sustainable development, thereby offering practical insights for fostering inclusive growth and revitalizing rural Europe (Lutz, 2020).

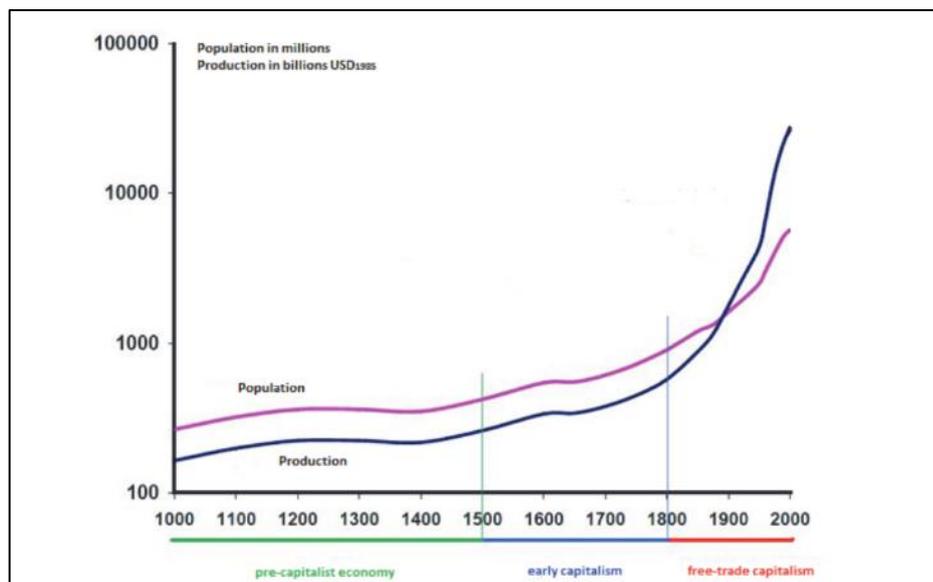


Figure 1. Trends in Rural Depopulation. Adapted from "Depopulation in the Concept of Sustainable Development," by W. Piontek, 2019.

This graphic is closely linked to population growth trends and economic development over the past ten centuries. It demonstrates that production has experienced exponential growth in recent centuries, with population growth following a similar trajectory (Piontek, 2019). However, the question arises: why is the trend in rural areas opposite to these two factors studied by Piontek?

This discrepancy highlights the need to investigate the unique challenges and dynamics faced by rural communities, which diverge from the general patterns of growth and development observed at a broader scale. Understanding these opposing trends is crucial for formulating effective strategies to address the complex phenomenon of rural depopulation and its socio-economic consequences. (Piontek, 2019).

The link between population growth, economic development, and the depopulation of rural areas underscores the complex interplay between global and local forces. While globalization has driven economic growth and urbanization, it has also led to the marginalization of rural regions. This chapter aims to unpack these dynamics, exploring how neoliberal policies and economies of scale have contributed to rural decline and emphasizing the need for innovative strategies to foster resilience and sustainable development in these "left behind" areas (Capello & Nijkamp, 2009; Pike et al., 2023).

2.3 LEFT BEHIND PLACES

The concept of "left behind places" has emerged as a significant framework for understanding geographical inequalities, particularly in regions negatively impacted by factors such as austerity, globalization, and technological change (MacKinnon et al., 2022). This term, though lacking an explicit definition, encapsulates the plight of former industrial and rural areas that have experienced economic decline and marginalization (Rodríguez-Pose, 2018). It has gained resonance among academics, policymakers, and communities, serving as a shorthand to denote the geography of discontent and the rise of economic nationalism and populism. The identification of "left behind places" highlights the spatial dimensions of socio-economic challenges, shedding light on the differentiated problems faced by various regions while emphasizing the need for nuanced approaches to address their predicaments (Pike et al., 2023). Furthermore, environmental degradation often accompanies depopulation, as abandoned land leads to neglect and blight, further compounding the socio-economic challenges (Pike et al., 2023). Intangible consequences of depopulation include the erosion of cultural heritage and identity (Martin, 1988). Abandoned villages and towns become ghost towns, devoid of vitality and historical significance (Rodríguez-Pose, 2018). Reviving these areas becomes increasingly difficult due to a lack of human capital and the challenges of maintaining essential services and infrastructure with a dwindling population (Million et al., 2021).

Furthermore, "left behind places" are not solely defined by economic decline but also by feelings of marginalization and abandonment expressed by their

inhabitants. This term resonates economically and politically, providing a lens through which policymakers and academics internationally can understand and address the challenges faced by these regions (MacKinnon et al., 2022). Importantly, it acknowledges the historical lineage of spatial disparities and uneven development, situating contemporary issues within a broader context of socio-economic dynamics (MacKinnon et al., 2022; Pike et al., 2023). For this thesis, the concept of "left behind places" is pivotal as it forms the basis for understanding the socio-economic and spatial dimensions of depopulation in Europe. By recognizing these areas as sites of economic lagging and declining opportunities, the thesis aims to explore how system innovation can encourage social and economic resilience in such regions. Understanding the dynamics of "left behind places" allows for a more comprehensive analysis of the interconnected factors driving depopulation, including globalization, neoliberalism, and territorial disparities. Ultimately, by focusing on these marginalized regions, the thesis seeks to contribute to broader discussions on inclusive development and policy responses that address spatial inequalities (MacKinnon et al., 2022; Pike et al., 2023).

One variable that is important to mention is the role that have government policies that neglect rural development and exacerbate depopulation in 'left behind' areas (MacKinnon et al., 2022). Proactive policies aimed at supporting local industries and fostering economic diversification can mitigate this trend and promote resilience in these regions. However, prevailing policy frameworks often overlook the unique challenges faced by 'left behind' areas, prioritizing urban-centric strategies (Rodríguez-Pose, 2018). Addressing the multifaceted challenges of depopulation in these regions requires alternative approaches that prioritize inclusive development and recognize the importance of rural communities in the broader socio-economic (Pike et al., 2023).

Dimension	Examples
Economic	Falling real wages Limited and/or poor-quality opportunities for training and/or employment Limited wealth
Social	Lack of social and/or spatial mobility Limited bridging social capital (but high levels of bonding social capital) High levels of attachment and belonging to place Low levels of civic participation
Environmental	Degraded physical environments Poor air quality
Political	Neglect by mainstream political parties and politicians Disengagement from representative democracy Populist, nativist and/or nationalist beliefs and views
Institutional and governance	Absent or weak local leadership Limited decentralized powers, resources, and/or capacity Lack of political voice
Cultural	Inferior, subordinate, common, proletarian, or plebeian worldviews Disconnection from and/or rejection of dominant attitudes/values Backward-looking, behind the zeitgeist outlooks
Infrastructural	Lack of public investment Limited and/or uneven access to public services Unequal provision of infrastructure systems and services

Table 1. *Economic Indicators of Rural Depopulation. Adapted from "Shifting Horizons in Local and Regional Development," by A. Pike, A. Rodríguez-Pose, & J. Tomaney, 2023.*

The table presented by Pike et al. (2023) encapsulates a comprehensive analysis of the dimensions that contribute to the complexity of "left-behind areas." The author identifies seven principal dimensions: economic, social, environmental, political, institutional, cultural, and infrastructure. These dimensions play a crucial role in the methodological process of defining the system for both the theoretical and practical development of this research. By integrating these dimensions, the research framework aims to holistically understand and address the multifaceted nature of depopulation and marginalization in "left-behind areas," thereby

informing strategies to foster social and economic resilience in these regions.(Pike et al., 2023).

Each of these dimensions plays a vital role in developing a comprehensive framework for analyzing and addressing the challenges faced by these regions. The economic dimension focuses on the decline in industrial activity, loss of employment opportunities, and reduced investment in "left-behind areas." Economic decline exacerbates poverty and limits the capacity for local communities to sustain themselves, driving further depopulation. Addressing economic issues through targeted interventions, such as supporting local industries and fostering economic diversification, is vital for promoting resilience and revitalization (Rodríguez-Pose, 2018). The social dimension encompasses demographic shifts, including aging populations and the outmigration of younger generations, which lead to a shrinking workforce and weakened social structures. Social isolation and the erosion of community networks contribute to a sense of marginalization and abandonment among residents, highlighting the need for social policies that strengthen community ties and enhance the quality of life in rural areas (MacKinnon et al., 2022).

Environmental degradation often accompanies depopulation, as abandoned land leads to neglect and blight, further compounding socio-economic challenges (Pike et al., 2023). Sustainable land management practices and environmental restoration efforts are essential to mitigate the adverse effects of depopulation and promote ecological resilience. The political dimension highlights the role of government policies that often neglect rural development and exacerbate depopulation in "left-behind" areas. Proactive policies aimed at supporting local industries and fostering economic diversification can mitigate this trend. However, prevailing policy frameworks often prioritize urban-centric strategies, overlooking the unique challenges faced by rural communities (Rodríguez-Pose, 2018). Institutional factors involve the capacity and effectiveness of local governance structures in addressing the needs of "left-behind areas." Weak institutional frameworks can hinder the implementation of development strategies and exacerbate inequalities. Strengthening local institutions and enhancing

governance capacity are crucial for fostering sustainable development in these regions (Pike et al., 2023).

The cultural dimension considers the erosion of cultural heritage and identity as a consequence of depopulation. Abandoned villages and towns become ghost towns, devoid of vitality and historical significance (Rodríguez-Pose, 2018). Preserving cultural heritage and promoting cultural activities are essential for maintaining the social fabric and identity of rural communities. Infrastructure deficits in transportation, healthcare, education, and digital connectivity further isolate "left-behind areas" and limit their development potential. Investing in infrastructure improvements is critical for enhancing accessibility, fostering economic activities, and improving the overall quality of life in these regions (Pike et al., 2023). By integrating these seven dimensions into the research framework, this study aims to provide a holistic understanding of the complexities of depopulation and marginalization in "left-behind areas." This comprehensive approach will inform the development of targeted interventions and policy recommendations to promote social and economic resilience in these regions, contributing to broader discussions on inclusive development and spatial equality (MacKinnon et al., 2022; Pike et al., 2023).

2.4 SPACE POLARIZATION

The theory of space polarization, as articulated by John Friedmann in his seminal work on polarized development, offers valuable insights into the dynamics of rural depopulation and the emergence of "left behind places" in Europe (Friedmann, 1967). This theory underscores the systematic interaction between space and development, highlighting the profound impact of spatial dynamics on socio-economic phenomena. Friedmann's framework, developed amidst the backdrop of shifting academic discourse, represents a departure from traditional conceptions of space as merely an analytical category external to human thinking. The "spatial turn," characterized by a reevaluation of space's role in critical analysis, marked a significant intellectual shift towards recognizing space as a core determinant of economic, social, political, and cultural transformations (Million et al., 2021). In integrating diverse strands of academic work across disciplines such

as geography, architecture, urban planning, and sociology, scholars have attempted to contextualize spatial dynamics within broader theoretical frameworks (Million et al., 2021). This interdisciplinary approach has facilitated a nuanced understanding of spatiality, enabling scholars to explore spatial phenomena from various perspectives. However, efforts to systematize spatial concepts have often replicated disciplinary boundaries, limiting the synthesis of spatial thinking across different fields.

The theory of space polarization contrasts with historical geographical development patterns observed from the mid-20th century onwards (Million et al., 2021). During this period, there was a narrowing of variation in interstate incomes in the United States, accompanied by significant growth in suburban and metropolitan areas (Jaszczak et al., 2018). However, contemporary trends reflect a polarization of opportunities, with sharp divides in employment, income, and education between urban and less urban, prosperous and less prosperous regions. Moreover, the postcolonial challenge to the spatialization of modernity underscores the reproduction of colonial logics in contemporary neoliberal times (Million et al., 2021). Modernity, characterized by violent processes of boundary extension and population homogenization, perpetuates spatial inequalities and reinforces structural barriers to mobility (Capello & Nijkamp, 2009). Addressing these challenges necessitates collective accountability and social democratic reparative action, emphasizing the importance of equitable policies in mitigating spatial disparities.

At its core, the theory of space polarization describes the phenomenon where population growth becomes concentrated in specific urban centers, leading to spatial imbalances between urban and rural areas (Million et al., 2021). As urban centers attract more people and economic activities, rural regions experience depopulation and economic decline. This spatial imbalance exacerbates social and economic inequalities, creating disparities between regions. Furthermore, the theory of space polarization intersects with evolving landscapes and changing patterns of land use associated with globalization and economic transformation (Jaszczak et al., 2018). As traditional functions of landscapes evolve, rural areas

experience land abandonment and population decline, further exacerbating spatial inequalities.

Rural depopulation, a significant consequence of space polarization, is driven by factors such as shifts in economic activities and technological advancements (Million et al., 2021). As globalization accelerates, traditional industries in rural areas face challenges, leading to job losses and outmigration to urban centers (Lutz, 2020). The digital divide further marginalizes rural communities, exacerbating rural-urban disparities. The root of agglomeration and globalization can be traced back to the 1970s, when technological innovations stimulated growth in high-tech and finance sectors, favoring large metropolitan areas (Capello & Nijkamp, 2009). This wave of technological change, coupled with the expansion of world trade, magnified the forces of divergence, leading to increased regional disparities.

Understanding the interconnectedness between spatial dynamics, economic activities, and societal changes is essential for addressing the challenges faced by "left behind places" in Europe (Jaszczak et al., 2018). By elucidating the spatial imbalances and structural factors driving depopulation, this theory provides a framework for analyzing the root causes of rural decline and urban concentration. Understanding these dynamics is crucial for formulating effective system innovation approaches aimed at fostering social and economic resilience in "left behind areas". By addressing the spatial inequalities exacerbated by space polarization, the thesis aims to explore innovative strategies to revitalize these marginalized regions and promote more equitable development pathways (Pike et al., 2023).

3 KEY VARIABLES SHAPING RURAL DEPOPULATION

In the first chapter, it is laid the groundwork by introducing the overarching themes and objectives of our research. It is discussed the historical context and theoretical frameworks that shape our understanding of the key issues at hand. With this foundation in place, it is now turn our attention to a detailed analysis of the principal variables that are central to our investigation.

This chapter is dedicated to exploring the six critical variables that form the core of our research: economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. Each of these variables plays a significant role in shaping the dynamics and outcomes of the phenomena it is are studying. By examining these factors in depth, the aim to uncover the complex interrelationships and provide insights that will inform our overall conclusions.

3.1 RELEVANT VARIABLES FOUND

Rural depopulation across Europe presents a multifaceted challenge, intertwining socio-economic disparities, migration patterns, and cultural dynamics (*Lutz, 2020*). Understanding this complexity is essential for crafting effective strategies to foster economic resilience and social cohesion in marginalized regions. To address this, our thesis delves into six key variables that intricately shape and are shaped by rural depopulation dynamics, these variables are: economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. The purpose of understanding these variables for this thesis is to have a solid foundation of the variables that were found in the literature and analyze these variables in the creation of a theoretical system to understand the complexity of depopulation in left-behind areas that is the core of the next chapter.

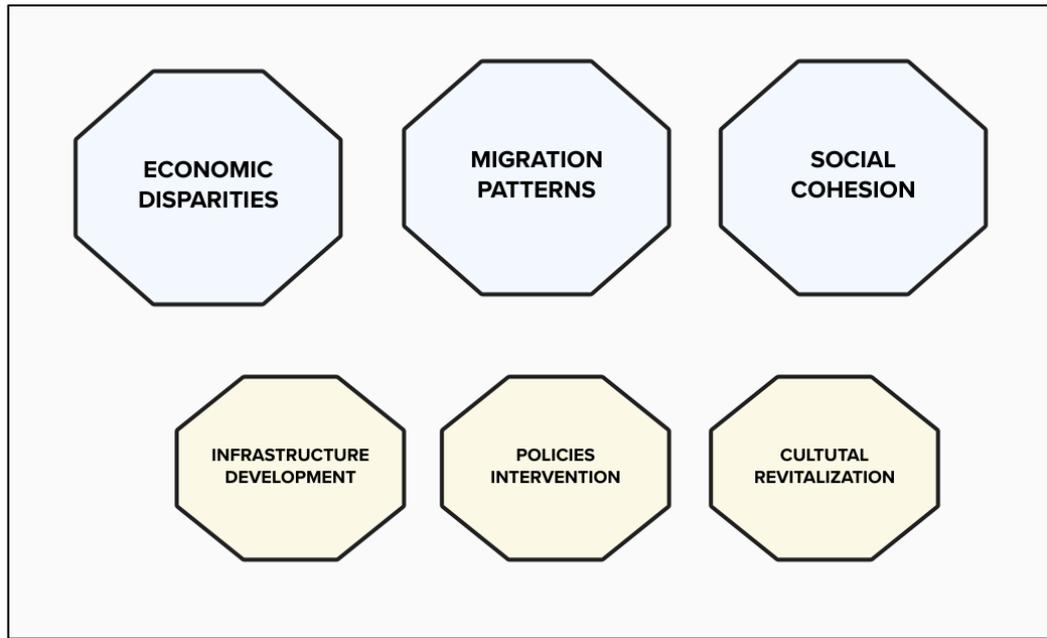


Figure 2. *Relevant Variables for Depopulation, Source: author's own work. Based on: Piontek, 2019; Lutz, 2020; Capello & Nijkamp, 2009; Jessop, 2002.*

Firstly, economic disparities underscore the unequal distribution of resources and opportunities between urban centers and rural areas, exacerbating depopulation trends (Capello & Nijkamp, 2009; Jessop, 2002). Meanwhile, migration patterns reflect the movement of populations influenced by global economic forces, further contributing to demographic shifts in rural regions (Piontek, 2019; Rodríguez-Pose, 2018). Additionally, social cohesion emerges as a critical factor, highlighting the interconnectedness and resilience within communities undergoing depopulation (Harvey, 2007; Million et al., 2021). Infrastructure development plays a pivotal role, as disparities in essential services between urban and rural areas exacerbate spatial inequalities (Jaszczak et al., 2018; Piontek, 2019)). Policy interventions aimed at addressing depopulation challenges are crucial, requiring innovative approaches to foster inclusive growth and revitalization efforts (Jessop, 2002)). Lastly, cultural revitalization initiatives are essential for preserving community identity and fostering resilience amidst demographics (Capello & Nijkamp, 2009). By comprehensively examining these variables, our thesis seeks to unravel the systemic factors driving rural depopulation while proposing innovative strategies for sustainable development in "left behind areas" across Europe.

3.1.1 ECONOMIC DISPARITIES

Economic disparities refer to the unequal distribution of economic resources and opportunities across geographical areas. This can encompass factors like income inequality, employment opportunities, and access to investment, and may contribute to a situation where some regions experience disadvantages compared to others. Within the context of Europe, some argue that economic structures associated with globalization can exacerbate these disparities, potentially leading to a cycle of marginalization for certain regions. (Pike et al., 2023). Economic disparities encompass a wide range of factors, including income inequality, employment opportunities, and investment disparities. In rural areas, limited job prospects and lower wages compared to urban counterparts often force younger generations to migrate to cities in search of better opportunities. This migration further contributes to depopulation in rural regions, exacerbating the economic challenges they face (Piontek, 2019).

Moreover, neoliberal economic policies prioritize market-driven approaches and reduced government intervention, which can disadvantage rural areas that struggle to compete with urban centers. These policies often neglect the unique needs of rural communities, further widening the gap between urban and rural areas in terms of economic development and access to essential services (Jessop, 2002). In the context of this thesis, understanding economic disparities is crucial for developing effective strategies to address rural depopulation and foster economic resilience in marginalized regions. By examining the unequal distribution of resources and opportunities, it is possible to identify targeted interventions that aim to promote inclusive growth and support sustainable development in "left behind areas" across Europe. Through this comprehensive analysis, our thesis aims to shed light on the systemic factors driving rural depopulation and propose innovative solutions to mitigate its impact on vulnerable communities.

3.1.2 MIGRATION PATTERNS

A second relevant variable to be understood is Migration patterns, it is influenced by global economic forces and contributes significantly to demographic shifts in rural regions, shaping the movement of populations across geographical

boundaries. Within the context of rural depopulation across Europe, serves as a critical variable influenced by globalization and neoliberal economic structures. These patterns reflect the movement of populations between rural and urban areas, driven by various push and pull factors shaped by broader economic conditions and global processes (Rodríguez-Pose, 2018). One significant aspect of migration patterns is the phenomenon of rural-to-urban migration, which has been a predominant trend in recent decades. This migration is often motivated by the search for better economic opportunities, as rural areas grapple with limited job prospects and lower wages compared to urban centers (Piontek, 2019). Additionally, factors such as inadequate infrastructure and essential services in rural regions further contribute to the attractiveness of urban areas (Jaszczak et al., 2018).

Conversely, urban-to-rural migration, although less common, also influences migration patterns. This movement may be driven by factors such as lifestyle preferences, environmental concerns, or the pursuit of affordable housing options (Rodríguez-Pose, 2018). However, the scale of urban-to-rural migration is often insufficient to counterbalance the overall trend of rural depopulation. Furthermore, international migration plays a significant role in shaping migration patterns within Europe. Economic disparities between countries, coupled with geopolitical factors and policies, influence migration flows from less developed to more developed regions (Piontek, 2019). While international migration can contribute to population growth in urban centers, it may exacerbate depopulation in rural areas, particularly in regions with already declining populations.

The interplay between migration patterns and rural depopulation underscores the complexity of the phenomenon and its implications for social and economic development strategies. Addressing rural depopulation requires a nuanced understanding of migration dynamics and their underlying drivers, informed by both local and global contexts (Rodríguez-Pose, 2018). By comprehensively analyzing migration patterns, policymakers can develop targeted interventions aimed at fostering economic resilience and social cohesion in 'left behind areas' across Europe (MacKinnon et al., 2022).

3.1.3 SOCIAL COHESION

In the landscape of rural depopulation across Europe, a complex interplay of socio-economic disparities, migration patterns, and cultural dynamics unfolds, presenting a multifaceted challenge (*Lutz, 2020*). Amidst this intricate tapestry, the concept of social cohesion emerges as a critical cornerstone, illuminating the degree of connectedness and resilience within communities undergoing depopulation. Social cohesion refers to the degree of connectedness and solidarity within communities, particularly in areas experiencing depopulation and economic decline. This variable explores the social implications of depopulation, including changes in community dynamics, social networks, and cultural heritage preservation efforts in "left behind places" (*Million et al., 2021*). Rural depopulation across Europe presents a multifaceted challenge, intertwining socio-economic disparities, migration patterns, and cultural dynamics (*Lutz, 2020*). Understanding this complexity is essential for crafting effective strategies to foster economic resilience and social cohesion in marginalized regions. To address this, our thesis delves into six key variables that intricately shape and are shaped by rural depopulation dynamics. These variables include economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. The purpose of understanding these variables is to establish a solid foundation based on existing literature and analyze them within the context of a case study mentioned in the subsequent chapter.

Social cohesion emerges as a critical factor, highlighting the interconnectedness and resilience within communities undergoing depopulation (*Harvey, 2007; Million et al., 2021*). As rural areas experience demographic shifts and economic decline, maintaining social cohesion becomes increasingly challenging. Changes in population composition and the loss of community members can disrupt social networks and traditional support structures, impacting the overall well-being of residents. Moreover, social cohesion plays a crucial role in preserving cultural heritage and identity in "left behind places." Communities facing depopulation often struggle to maintain their cultural traditions and practices in the face of demographic changes and economic challenges (*Rodríguez-Pose, 2018*). Efforts to

promote social cohesion can involve community-building initiatives, cultural events, and programs aimed at preserving local traditions and customs.

Understanding the dynamics of social cohesion in the context of rural depopulation is essential for developing effective strategies to address the challenges faced by "left behind areas" across Europe (MacKinnon et al., 2022; Pike et al., 2023). By fostering connectedness and solidarity within communities, policymakers and practitioners can promote resilience and well-being in marginalized regions, ultimately contributing to more sustainable and inclusive development pathways. Through a comprehensive examination of social cohesion, our thesis aims to provide insights into the systemic factors driving rural depopulation while proposing innovative solutions to promote social and economic resilience in affected communities.

3.1.4 INFRASTRUCTURE DEVELOPMENT

As rural areas grapple with dwindling populations and economic vitality, understanding the intricacies of infrastructure development becomes paramount for fostering resilience and cohesion within these communities. Infrastructure development, within the context of rural depopulation and spatial imbalances in Europe, plays a pivotal role in shaping the landscape of opportunity and access to essential services. As rural areas face the challenge of declining populations and economic vitality, understanding the dynamics of infrastructure development becomes essential for fostering economic resilience and social cohesion in these marginalized regions. In the broader framework of this thesis, which focuses on system innovation approaches for encouraging social and economic resilience in "left behind areas" across Europe (Pike et al., 2023), infrastructure development emerges as one of the key variables intricately linked to rural depopulation dynamics. This variable scrutinizes the disparities in infrastructure investment, the availability of essential services, and the impact of infrastructure on population movements and spatial inequalities.

Economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization constitute the six key

variables under investigation. Each of these variables interacts with and influences the others, shaping the complex landscape of rural depopulation across Europe.

To illustrate, economic disparities underscore the uneven distribution of resources and opportunities between urban centers and rural areas, exacerbating depopulation trends (Capello & Nijkamp, 2009; Jessop, 2002). Migration patterns, on the other hand, reflect the movement of populations influenced by global economic forces, further contributing to demographic shifts in rural regions (Piontek, 2019). Additionally, social cohesion emerges as a critical factor, highlighting the interconnectedness and resilience within communities undergoing depopulation (Pike et al., 2023).

Infrastructure development, within this intricate web of variables, holds significant importance. Disparities in essential services between urban and rural areas exacerbate spatial inequalities (Jaszczak et al., 2018; Piontek, 2019). Lack of adequate infrastructure can hinder economic opportunities and quality of life in rural regions, further driving migration to urban centers. Understanding the role of infrastructure development in the context of rural depopulation is crucial for devising effective strategies to address the challenges faced by "left behind areas" in Europe. By comprehensively examining this variable alongside others, our thesis aims to unravel the systemic factors driving rural depopulation while proposing innovative solutions for sustainable development and the promotion of social and economic resilience.

3.1.5 POLICY INTERVENTIONS

Embedded within the framework of our thesis, which adopts a system innovation approach to foster social and economic resilience in Europe's "left behind areas," policy interventions represent a key variable under examination. This variable encapsulates a spectrum of governmental actions and initiatives aimed at combatting depopulation and advancing inclusive growth. Additionally, policy interventions play a crucial role in addressing the multifaceted challenges of rural depopulation and fostering economic resilience in marginalized regions across Europe (Capello & Nijkamp, 2009; Jessop, 2002). Within the framework of our thesis, which focuses on a system innovation approach for encouraging social and

economic resilience in "left behind areas," policy interventions constitute one of the key variables under investigation. This variable encompasses a range of government actions and initiatives aimed at tackling depopulation and promoting inclusive growth.

Rural depopulation presents a complex challenge, interwoven with socio-economic disparities, migration patterns, and cultural dynamics (*Lutz, 2020*). To effectively address this complexity, our thesis delves into six key variables that both shape and are shaped by rural depopulation dynamics. These variables include economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. By comprehensively examining these variables, the aim is to establish a robust foundation for understanding rural depopulation and its implications for sustainable development. Policy interventions are essential components of this framework. They encompass government measures related to regional development, economic diversification, social welfare, and rural revitalization efforts. Through innovative policy approaches, governments can mitigate the negative impacts of depopulation and promote resilience in marginalized regions.

For instance, economic disparities highlight the unequal distribution of resources and opportunities between urban and rural areas, exacerbating depopulation trends (*Jessop, 2002*). Meanwhile, migration patterns reflect the movement of populations influenced by global economic forces, further contributing to demographic shifts in rural regions (*Rodríguez-Pose, 2018*). Social cohesion emerges as a critical factor, emphasizing the interconnectedness and resilience within communities undergoing depopulation (*Harvey, 2007; Million et al., 2021*). Policy interventions must address these challenges through innovative and inclusive approaches. By fostering inclusive growth and revitalization efforts, governments can create opportunities for marginalized regions to thrive. Moreover, cultural revitalization initiatives are essential for preserving community identity and fostering resilience amidst demographic changes (*Capello & Nijkamp, 2009*).

3.1.6 CULTURAL REVITALIZATION

Cultural revitalization initiatives play a pivotal role in preserving and promoting the cultural heritage and identity of communities grappling with depopulation and economic decline. Within the broader context of rural depopulation across Europe, these initiatives constitute essential components for fostering community pride and resilience amidst demographic changes. For the thesis, which focuses on a system innovation approach to encourage social and economic resilience in Europe's "left behind areas," recognizes cultural revitalization as one of the key variables warranting investigation. This variable encompasses endeavors aimed at revitalizing traditional practices, arts, and cultural institutions in regions affected by depopulation and economic decline.

The complexity of rural depopulation necessitates a comprehensive understanding of its various dimensions, including socio-economic disparities, migration patterns, and cultural dynamics (*Lutz, 2020*). Hence, our thesis delves into six key variables, including economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. By examining these variables, the aim is to establish a robust foundation for analyzing rural depopulation dynamics and proposing innovative strategies for sustainable development. Economic disparities, for instance, underscore the unequal distribution of resources and opportunities between urban centers and rural areas, exacerbating depopulation trends (*Capello & Nijkamp, 2009*). Migration patterns reflect the movement of populations influenced by global economic forces, further contributing to demographic shifts in rural regions (*Piontek, 2019*). Social cohesion, on the other hand, emerges as a critical factor, emphasizing the interconnectedness and resilience within communities undergoing depopulation (*Million et al., 2021*).

Amidst these dynamics, cultural revitalization initiatives serve as mechanisms for preserving community identity and fostering resilience. By comprehensively examining these variables, our thesis endeavors to unravel the systemic factors driving rural depopulation while proposing innovative strategies for sustainable development in "left behind areas" across Europe. In essence, cultural

revitalization initiatives are integral components of efforts to address rural depopulation and nurture social and economic resilience (Kemeny & Storper, 2020; MacKinnon et al., 2022). Through our thesis, it is seek to shed light on the significance of these initiatives and their implications for the future of Europe's marginalized regions.

3.2 INSIGHTS OF THE ANALYSIS

In this chapter, it is have embarked on a detailed analysis of the six critical variables that are central to our investigation of rural depopulation in "left behind areas" across Europe: economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. By examining these factors in depth, the aim to unravel the complex interrelationships that influence the dynamics of rural depopulation.

Understanding economic disparities allows us to grasp the unequal distribution of resources and opportunities that exacerbate depopulation trends (Capello & Nijkamp, 2009; Jessop, 2002). Migration patterns, driven by global economic forces, contribute significantly to demographic shifts (Piontek, 2019; Rodríguez-Pose, 2018), while social cohesion highlights the importance of connectedness and resilience within communities (Harvey, 2007; Million et al., 2021). Infrastructure development is pivotal in addressing spatial inequalities and enhancing access to essential services (Jaszczak et al., 2018; Piontek, 2019). Policy interventions represent the strategic actions required to tackle the multifaceted challenges of depopulation (Jessop, 2002). Finally, cultural revitalization initiatives play a crucial role in preserving community identity and fostering resilience (Capello & Nijkamp, 2009).

The insights gained from this comprehensive analysis provide a solid foundation for the next chapter, where it is will integrate these variables into a theoretical framework on system innovation to understand the complexity of depopulation in left-behind areas. This understanding is crucial for developing innovative strategies to promote social and economic resilience, ultimately contributing to the sustainable development of marginalized regions in Europe.

The importance of this chapter lies in its ability to illuminate the systemic factors driving rural depopulation, offering a nuanced perspective that will inform our proposed solutions. By delving into the intricacies of these variables, it is can better comprehend the multifaceted nature of rural depopulation and craft effective strategies to mitigate its impact. This analysis serves as a critical stepping stone towards achieving the overarching goal of our research: fostering resilience and sustainable development in Europe's left-behind areas through a system innovation approach.

4 SYSTEM INNOVATION FRAMEWORK

System innovation refers to a holistic approach to fostering change across interconnected systems, aimed at addressing complex societal challenges through a coordinated and integrated process. This concept is increasingly vital in addressing sustainability and resilience, particularly in regions facing socio-economic disadvantages. System innovation involving large-scale transformations that occur through the interaction of multiple actors and elements within socio-technical systems, influencing various sectors, policies, practices, and infrastructures. It transcends incremental improvements, focusing instead on comprehensive shifts that reconfigure entire systems to achieve sustainable development goals (Geels, 2004; OECD, 2013).

The integration of social innovation within system innovation frameworks highlights the need for structural changes that go beyond technological advancements. Social innovation focuses on interventions that lead to systemic improvements in societal structures and functions (Satalkina & Steiner, 2022). This approach recognizes the interplay between technological, business, and organizational innovations and their impact on social practices. By developing a holistic view of system innovation as a portfolio of interconnected innovations, stakeholders can better understand and manage the complex dynamics involved in achieving sustainable development (Geels, 2004).

System innovation is characterized by several key aspects:

Large-Scale Transformations: These involve significant changes in systems that fulfill societal functions such as housing, mobility, and food. These transformations result from co-evolution between various elements within socio-technical systems, including technologies, markets, user practices, policies, and cultural meanings (Leonidou et al., 2020).

Multi-Level Perspective (MLP): This framework describes the dynamic interaction between niche innovations (spaces for radical innovation and experimentation), regime levels (dominant and stable systems), and the landscape level (broader political and economic context). Transitions occur through the alignment of developments at these different levels (Geels, 2004).

Stakeholder Involvement: Effective system innovation requires the engagement of a wide range of stakeholders, including public and private sector actors, civil society, and communities. This participatory approach ensures that the transition reflects diverse perspectives and needs, fostering broader acceptance and support (Leonidou et al., 2020).

System innovation is crucial for achieving sustainability as it addresses the interconnected nature of environmental, economic, and social challenges. Sustainability transitions require shifts in production and consumption patterns, governance structures, and socio-technical systems to create more resilient and equitable societies (Berkhout, 2006; Gaziulusoy, 2015). This aligns with the goals of the thesis, which seeks to explore how systemic changes can mitigate the adverse effects of rural depopulation and promote sustainable development in "left behind areas" (Pike et al., 2023).

System innovation offers a comprehensive framework for addressing the complex challenges of rural depopulation and promoting social and economic resilience in marginalized regions. By focusing on large-scale transformations, multi-level interactions, and stakeholder involvement, this approach provides valuable insights and strategies for fostering sustainable development. The integration of economic disparities, migration patterns, and social cohesion as core variables in the thesis underscores the interconnected nature of these challenges and the need for holistic solutions (Capello & Nijkamp, 2009; Geels, 2004). Through the lens of system innovation, the thesis aims to propose innovative pathways for revitalizing "left behind areas" in Europe, contributing to their long-term resilience and sustainability (Lutz, 2020; MacKinnon et al., 2022).

In conclusion, this chapter has examined the theoretical underpinnings of system innovation as a potential framework for tackling the multifaceted challenges confronting Europe's "left behind areas," initially outlined in Chapter 1 (focusing on depopulation and their characteristics). Chapter 2 analysis of key variables: economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization provided a foundation for understanding the interconnected nature of these issues. A system innovation approach offers a holistic lens to address these complexities (Geels, 2004).

System innovation emphasizes large-scale transformations across various levels, encompassing technological, economic, social, and political spheres (Geels, 2004). This approach recognizes the intricate interplay between these elements within a socio-technical system. Applied to "left behind areas," system innovation can foster the development of innovative solutions that target economic disparities by creating new income opportunities and bolstering local businesses (Lutz, 2020). Furthermore, it can influence migration patterns by making these regions more attractive places to live and work, potentially reversing the trend of out-migration (MacKinnon et al., 2022). Moreover, system innovation initiatives can strengthen social cohesion through collaborative projects that encourage community engagement and foster a sense of shared purpose (Satalkina & Steiner, 2022).

By promoting stakeholder involvement, system innovation ensures that diverse perspectives inform the development of solutions tailored to the specific needs of each "left behind area." This collaborative approach fosters a multi-level transition, where niche innovations at the local level gain traction and influence policy changes at the national level (Geels, 2004). Having established the theoretical foundation of system innovation in this chapter, the subsequent chapter will detail the methodological approach employed in this research. This includes a comprehensive literature review, as presented in the first three chapters, followed by a system analysis of the complex phenomenon under investigation and a case study examination of "Apadrina un Olivo."

5 METHODOLOGY

This thesis employs qualitative empirical research, it is developed a qualitative literature review and an in-depth qualitative case study analysis to explore how system innovation can enhance social and economic resilience in Europe's "left behind areas." Over three months, the literature review rigorously examined themes such as rural depopulation, economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. The review was structured to summarize and critically evaluate existing research, identifying strengths, weaknesses, and gaps (Denney & Tewksbury, 2013; Knopf, 2006). This review was divided into three key sections: understanding rural depopulation and its socio-economic impacts, analyzing the critical variables influencing left-behind areas, and introducing the system innovation framework. The framework highlighted the importance of large-scale transformations across interconnected systems and the role of stakeholder involvement in driving sustainable development (Geels, 2004; OECD, 2013).

The empirical component of the research focuses on the "Apadrina un Olivo" project in Oliete, Spain, which aims to revitalize the village through sustainable agricultural practices. This case study utilized semi-structured interviews with eight key stakeholders, selected through purposive sampling to ensure diverse representation, including migrants and local residents. Thematic analysis of the interview data, revealed critical themes such as employment opportunities, housing and infrastructure, community integration, rural depopulation and migration, economic development, environmental conservation, educational opportunities, healthcare services, tourism, challenges of rapid organizational growth, and future visions for the community (Clarke & Braun, 2017). By integrating the literature review findings with empirical insights from the case study, this thesis provides a comprehensive understanding of how system innovation can address the multifaceted challenges of rural depopulation. The methodology ensures a holistic analysis, combining theoretical insights with

practical applications to propose innovative solutions for sustainable development in marginalized regions of Europe.

5.1 LITERATURE REVIEW

The literature review for this thesis was conducted over a period of three months, to ensure a comprehensive examination of existing research. This literature review was essential for establishing a solid foundation for exploring the potential of system innovation to revitalize Europe's left-behind areas. The process involved summarizing and evaluating a body of writings on rural depopulation and system innovation, following methodologies (Denney & Tewksbury, 2013; Knopf, 2006). This approach ensured that the literature review would not only summarize existing research but also critically assess its findings, identify gaps, and contextualize the proposed research within the broader scholarly dialogue.

The literature review process began by collecting fifty academic papers related to rural depopulation, system innovation, and related topics. These papers were meticulously reviewed to identify the most relevant studies for the initial approach of the thesis. Through this process, the conceptualization of the theoretical framework was refined, ultimately incorporating 39 papers that were deemed most pertinent to the research objectives. The first two steps involved determining what each individual study had examined and what conclusions were drawn. The third step was to summarize the collective results by categorizing them into common findings, disagreements, and overlooked areas. Finally, the fourth step was to assess the overall quality of the literature, identifying key valid findings and areas needing further research (Knopf, 2006).

This selection was guided by their relevance to the core themes of economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. The literature review was conducted in the first three chapters in the following form:

The first three sections of this thesis establish the groundwork for exploring system innovation's potential to revitalize Europe's left-behind areas. The initial

section examines rural depopulation, its impact on left-behind areas, and the resulting social, economic, and demographic challenges. The second section delves deeper into key variables influencing left-behind areas, such as economic disparities (Capello & Nijkamp, 2009), migration patterns, and social cohesion. Analyzing these interconnected factors provides a nuanced understanding of left-behind areas challenges.

Building on this foundation, the third section introduces the system innovation framework. This framework emphasizes large-scale transformations across technological, economic, social, and political systems (Geels, 2004). It acknowledges the interdependence of these elements and highlights the importance of stakeholder involvement in driving change (Leonidou et al., 2020). By adopting a system innovation approach, this research aims to identify and analyze holistic solutions that address the multifaceted challenges facing left-behind areas and promote sustainable development (Berkhout, 2006; Gaziulusoy, 2015). The chosen case study of "Apadrina un Olivo," explored in the following sections, will serve as a concrete example of how system innovation can be implemented in practice.

5.2 EMPIRICAL RESEARCH

5.2.1 CASE STUDY

The empirical research component of this thesis will involve a detailed case study of "Apadrina un Olivo." This initiative is a social, environmental, and sustainable project implemented in the Teruel region of Spain, specifically within the town of Oliete. The case study methodology will begin with a comprehensive description of the region itself. This will provide context for the complexities faced by the town of Oliete and its current situation. Subsequently, a thorough description of the "Apadrina un Olivo" project will be presented, offering a clear understanding of its goals, operations, and potential impact. Through this in-depth analysis, the case study aims to illuminate the project's potential as an example of system innovation in action, contributing to the revitalization of "left behind areas" in Europe (Geels, 2004; Pike et al., 2023).

5.2.2 SEMI-STRUCTURED INTERVIEWS

To complement the theoretical framework established through the literature review, the empirical research of this thesis employs a qualitative approach through semi-structured interviews. The researcher traveled to Oliete to meet the stakeholders, establish bonds with the organization, and gather preliminary information. This initial engagement laid the foundation for a series of online semi-structured interviews. Eight key stakeholders involved in the "Apadrina un Olivo" project were selected for these interviews to gain a deeper understanding of the project's on-the-ground implementation and its potential alignment with the theoretical system innovation framework (Harrell & Bradley, 2009).

This purposeful sample comprised four individuals directly involved in the project's operations and management, and four external stakeholders who could offer diverse perspectives on the project's impact. To ensure a balanced representation of the community, half of the interviews were migrants who had participated in the project, while the other half were Spanish residents of Oliete. By triangulating the perspectives of both internal and external stakeholders, as well as migrant and resident populations, this research aimed to develop a nuanced understanding of the practical system enacted by "Apadrina un Olivo" and its potential to contribute to the revitalization of Oliete (Gascón, 2023; Leonidou et al., 2020). This practical system was then compared and contrasted with the theoretical framework established earlier, fostering a rich dialogue between theory and practice.

5.2.3 INTERVIEW DESIGN

The semi-structured interview guide for this research was designed to elicit valuable insights into the key variables identified in Chapter 2. Specifically, the interviews aim to analyze stakeholder perspectives on the project's impact across various dimensions, including economic impact, social cohesion, policy interventions, and cultural revitalization (Harrell & Bradley, 2009). These themes

serve as a starting point for the discussions, while the interview format allows for open-ended exploration of additional themes or viewpoints that may emerge from the stakeholders themselves. This approach ensures that the research captures the rich tapestry of experiences and perspectives surrounding "Apadrina un Olivo" and its potential contribution to system innovation in "left behind areas".

5.2.4 DATA ANALYSIS

For the case study this research on the "Apadrina un Olivo" project and its potential to revitalize Europe's "left behind areas" hinges on the effective analysis of qualitative data gathered through semi-structured interviews with key stakeholders. Thematic analysis emerges as the preeminent method for this task due to its inherent strengths and adaptability (Clarke & Braun, 2017).

Thematic analysis flexibility is a cornerstone of its suitability for this research. Unlike some qualitative methodologies that are tethered to rigid theoretical frameworks, TA allows for a more organic approach. This flexibility is crucial for capturing the dynamic nature of the interviews and ensuring a comprehensive understanding of diverse stakeholder perspectives (Leonidou et al., 2020). Thematic analysis will facilitate the exploration of the project's impact across various domains identified in Chapter 2, such as economic impact, social cohesion, and cultural revitalization (Clarke & Braun, 2017). Furthermore, thematic analysis allows for the emergence of new themes that may surface during the interviews, extending beyond the initial framework. Stakeholders' unforeseen insights can enrich the understanding of the project's multifaceted influence on the community (Leonidou et al., 2020).

By employing this approach and built-in quality procedures inherent to thematic analysis, this research guarantees a rigorous and high-quality analysis of the interview data. This methodological approach ensures the credibility and trustworthiness of the findings, allowing for robust conclusions to be drawn about "Apadrina un Olivo" as a potential system innovation approach for revitalizing Europe's marginalized regions.

5.3 LIMITATIONS OF THE RESEARCH AND METHODOLOGY

This research, while offering valuable insights into the potential of "Apadrina un Olivo" as a system innovation approach, acknowledges certain limitations that necessitate further exploration in future research endeavors.

Generalizability: The case study approach inherent to this thesis, while providing an in-depth analysis of "Apadrina un Olivo," necessitates acknowledging limitations in generalizability. The specific geographic, cultural, and socio-economic context of Oliete, Spain, may not be directly replicable across all "left behind areas" in Europe. Future research could benefit from comparative case studies exploring system innovation initiatives in diverse regions to identify commonalities and variations in their effectiveness.

Methodological Considerations: The chosen methodology approach, employing both qualitative interviews and a literature review, offers a comprehensive perspective. However, it is essential to acknowledge potential methodological challenges. The qualitative interviews might be susceptible to sampling bias depending on the selection of participants. Mitigating this requires employing a purposive sampling strategy that ensures a representative range of stakeholder perspectives. Additionally, ensuring data validity and reliability is crucial. Techniques such as member checking and triangulation with secondary data sources can enhance the trustworthiness of the findings.

Complexity of System Innovation: The very nature of system innovation presents challenges. These initiatives involve intricate interactions between various stakeholders (e.g., local communities, policymakers, businesses), institutions, and socio-economic factors. Capturing the full complexity of these dynamics within the scope of a single research project can be demanding. Future research could benefit from a multi-level research design that analyzes the project's impact across different ecological levels (individual, community, institutional). This could provide a more holistic understanding of the system innovation process.

Scope of Literature Review: The literature review, while comprehensive, may be limited by the availability of relevant and up-to-date sources on specific topics such as space polarization and "left behind areas." These are emerging areas of research, and the knowledge base is constantly evolving. Future research could benefit from staying abreast of new publications and exploring alternative data sources like policy documents or reports by regional development agencies.

Interview Sample Size: The sample size of eight interviews, while carefully chosen to represent key stakeholder groups, is relatively small. This may limit the generalizability of the findings from the interviews. The insights gained will be specific to the "Apadrina un Olivo" project and may not fully represent the experiences of other "left behind areas" in Europe. Future research could consider expanding the sample size or employing focus groups to capture a broader range of perspectives.

By acknowledging these limitations and outlining avenues for further investigation, this research paves the way for a more comprehensive understanding of system innovation as a potential catalyst for revitalizing Europe's "left behind areas."

5.4 ETHICAL IMPLICATIONS

This research investigates the multifaceted issue of rural depopulation in Europe. While the ultimate goal is to develop solutions that foster social and economic resilience in these "left-behind areas," ethical considerations are paramount throughout the research process (MacKinnon et al., 2022). A consequentialist perspective highlights the potential for positive outcomes, such as improved living standards and economic opportunities for residents (Kohno et al., 2023). However, unintended consequences, like gentrification spurred by revitalization efforts, must also be acknowledged. These could lead to the displacement of existing residents or a fundamental alteration of the community's character.

To ensure an ethical approach, the research adheres to a deontological framework that prioritizes the rights and dignity of individuals in these areas. Informed

consent guarantees participants' full understanding of the research objectives and their role within the study. Confidentiality safeguards their privacy by anonymizing data and ensuring personal information is not disclosed without explicit permission. Transparency is maintained by informing participants about the research process, potential conflicts of interest, and how their contributions will be utilized (Kohno et al., 2023). Furthermore, researchers approach sensitive topics with respect and sensitivity, particularly those related to economic disparities, migration patterns, and social cohesion.

Adhering these ethical principles, the research strives to strike a balance between potential benefits and harms. Minimizing risks to participants and maximizing the positive impact of its findings are crucial. Ultimately, this research aims to generate knowledge that can be used to develop practical solutions for fostering resilience in depopulated areas (Pike et al., 2023). These solutions, if implemented effectively, can contribute to a more just and equitable development pathway for marginalized regions across Europe.

6 THEORETICAL SYSTEM MODEL

Rural depopulation requires a holistic approach that considers the interplay of various factors. This research proposes a system model, built upon the theoretical framework established in the first three chapters of the thesis. This model integrates key variables identified as crucial for comprehending the complexities of depopulation: economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization (Chapter 2). By analyzing these interconnected elements, the model provides a more comprehensive understanding of the phenomenon compared to examining each factor in isolation (Satalkina & Steiner, 2022).

The system model aligns perfectly with the principles of system innovation, a powerful framework for tackling intricate societal challenges. System innovation goes beyond incremental improvements, focusing on large-scale transformations across interconnected systems (Geels, 2004; OECD, 2013). It emphasizes the co-evolution of technological advancements, social interventions, and policy changes to achieve sustainable development goals. This research aligns with this approach because rural depopulation is not just an economic issue; it interacts with social and infrastructural aspects as well.

The model's focus on large-scale transformations and stakeholder involvement aligns with the core principles of system innovation. It considers the interplay between niche innovations at the local level, existing systems like infrastructure and policies, and the broader economic and political context (Geels, 2004; Leonidou et al., 2020). Furthermore, the model acknowledges the importance of engaging diverse stakeholders, a crucial aspect for ensuring solutions reflect various needs and fostering broader support for the transition. By employing this system model within a system innovation framework, the thesis aims to propose innovative pathways for revitalizing Europe's "left behind areas," ultimately contributing to a more sustainable future for these regions (Kemeny & Storper,

2020; MacKinnon et al., 2022). The variables that are included in this system and the aim to understand the complexity of depopulation in rural areas are:

- Depopulation
- Left behind areas
- Infrastructure
- Cultural Identity
- Spatial Inequalities
- Regional Policies
- Economic Disparities
- Urban Agglomeration
- Selective Migration

Theoretical System Model:

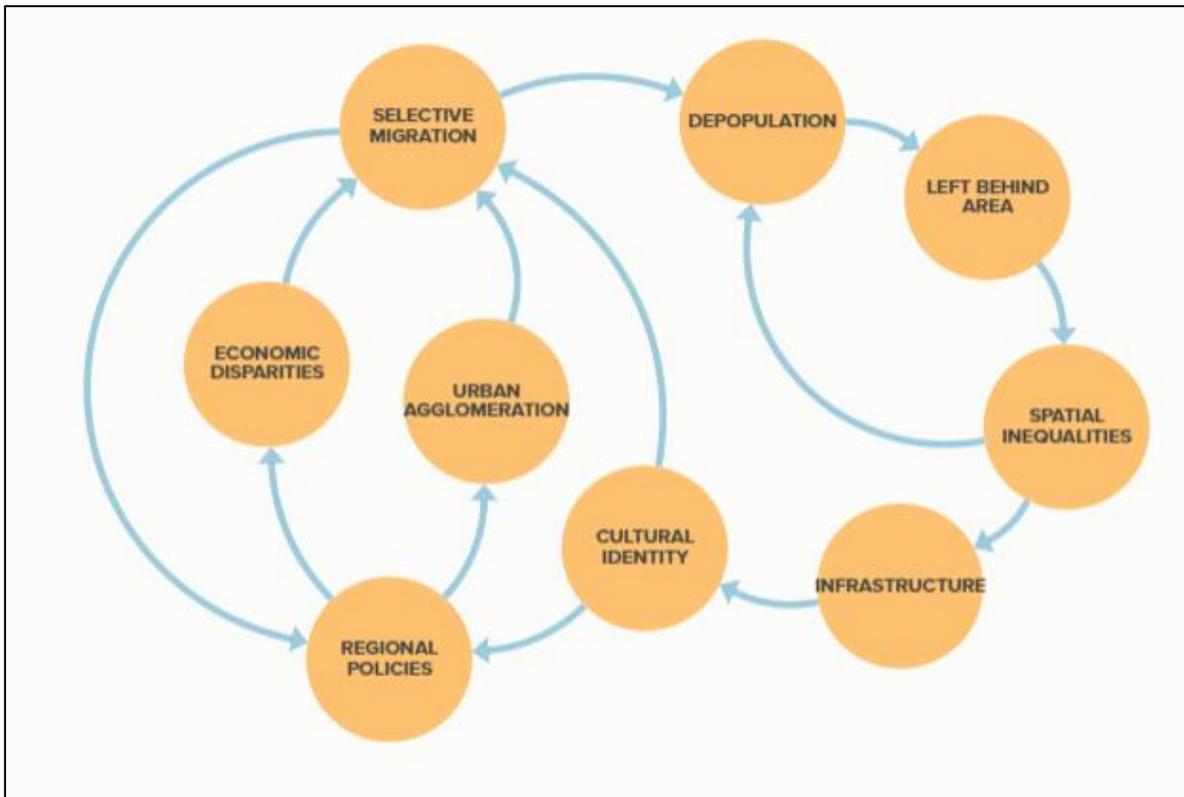


Figure 3. *Theoretical System Model, Source: author's own work.*

Through the analysis of these variables and their dynamic interactions within the system model, the research endeavors to achieve a more nuanced comprehension of the underlying forces that propel rural depopulation. This investigation will serve as a foundation for exploring potential solutions geared toward fostering social and economic resilience in these marginalized regions. The model integrates key variables identified as crucial for comprehending the complexities of depopulation: economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization (Satalkina & Steiner, 2022). By analyzing these interconnected elements, the model offers a comprehensive understanding of the phenomenon, moving beyond isolated examinations of individual factors. This integrated approach aligns with the principles of system innovation, which emphasizes large-scale transformations across interconnected systems, focusing on the co-evolution of

technological advancements, social interventions, and policy changes to achieve sustainable development goals (Geels, 2004).

The system model's emphasis on large-scale transformations and stakeholder involvement is crucial for addressing the complexities of rural depopulation. It considers the dynamic interactions between niche innovations at the local level, existing systems such as infrastructure and policies, and the broader economic and political context (Leonidou et al., 2020). By engaging diverse stakeholders, the model ensures that solutions reflect various needs and foster broader support for the transition. This approach is particularly relevant for revitalizing Europe's "left behind areas," as it highlights the importance of comprehensive, multi-level strategies that promote economic development, social cohesion, and cultural revitalization (MacKinnon et al., 2022). The model's insights into the feedback loops driving rural depopulation, such as the reinforcement of economic disparities and selective migration, provide a foundation for developing effective policy interventions and fostering social and economic resilience in marginalized regions (Pike et al., 2023; Piontek, 2019).

6.1 LOOPS

6.1.1 FIRST LOOP

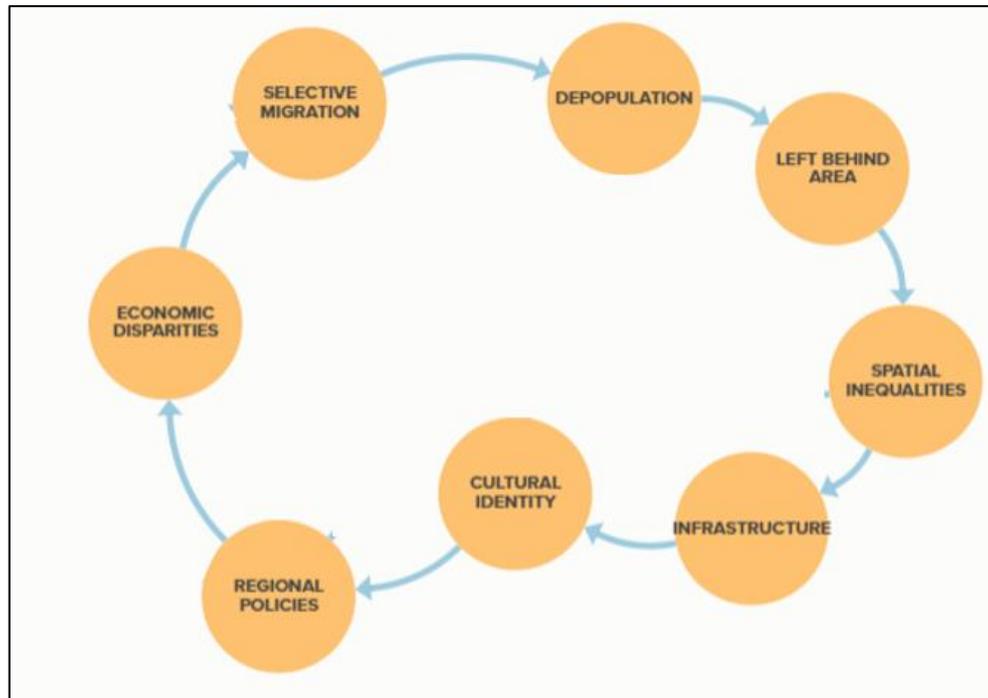


Figure 4. *Theoretical System Model; Loop 1, Source: author's own work.*

This is the core feedback loop of the system model centers around eight interconnected variables, each playing a critical role in perpetuating the complex phenomenon of rural depopulation. Depopulation acts as a catalyst, triggering the creation of "left-behind areas" – regions experiencing population decline and subsequent marginalization (Pike et al., 2023). These areas are further burdened by spatial inequalities, where the loss of population negatively impacts both economic opportunities and social cohesion. This economic decline manifests as a lack of investment and service provision, which directly correlates with the deteriorating infrastructure capacity within these abandoned regions (Piontek, 2019). The quality of infrastructure, in turn, affects the cultural sphere by limiting access to cultural services and potentially eroding residents' sense of identity within an underdeveloped region.

Furthermore, the cultural identity of the population influences the formulation of regional policies that govern resource allocation and impact both community development and the rural economy (MacKinnon et al., 2022). These policies, often

designed to prioritize and manage resources in these "left-behind areas," can inadvertently exacerbate economic disparities within the region (Kemeny & Storper, 2020). This disparity fuels a further trend of "selective migration," where younger, more skilled individuals migrate out, ultimately reinforcing the cycle of depopulation in rural areas.

6.1.2 SECOND LOOP

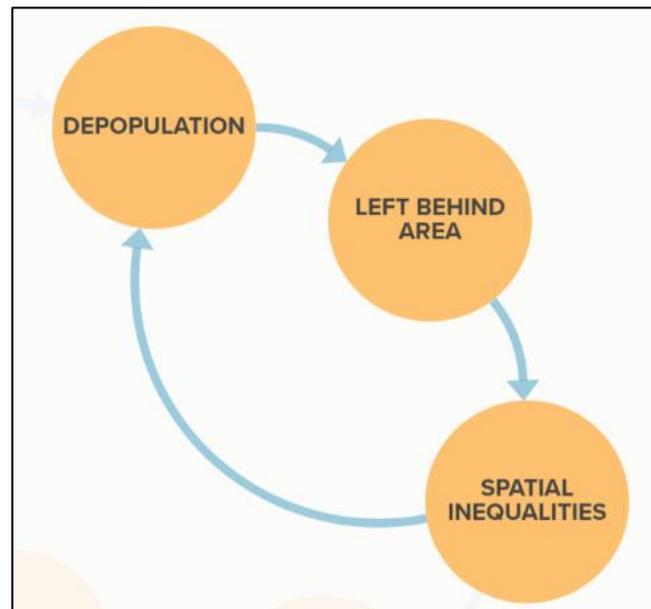


Figure 5. *Theoretical System Model; Loop 2, Source: author's own work.*

The second loop within the system model revolves around the well-established association between depopulation and the creation of "left-behind areas" – a foundational concept underpinning the theoretical framework (Pike et al., 2023). Depopulation serves as a trigger, initiating a downward spiral that marginalizes regions experiencing population decline. This aligns with the concept of spatial polarization, this theory posits a geographically uneven distribution of resources and economic opportunities, concentrating them in urban centers (Capello & Nijkamp, 2009). Consequently, rural areas experiencing out-migration are further hindered, as the decline in population density weakens their ability to attract investment and essential services. This dynamic perpetuates the existing spatial inequalities, creating a self-reinforcing cycle of depopulation and marginalization.

6.1.3 THIRD LOOP

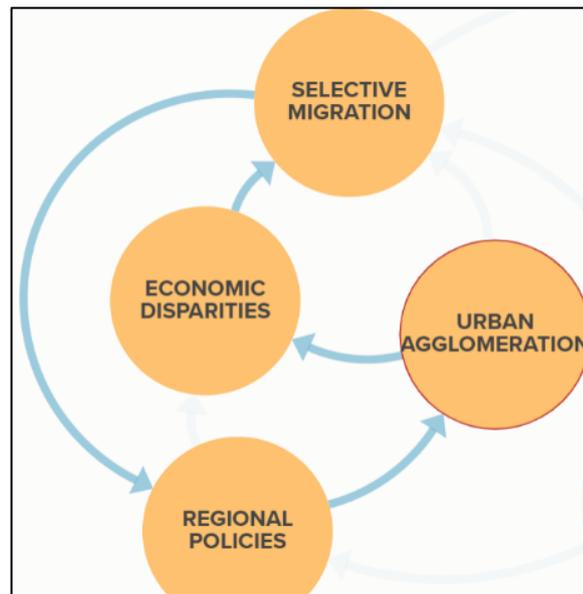


Figure 6. *Theoretical System Model; Loop 3, Source: author's own work.*

The final loop within the system model centers around the reinforcing feedback loop driven by urban agglomeration and its multifaceted consequences for rural depopulation. Urban agglomeration, as characterized by a concentration of economic activity and population in urban centers (Fang & Yu, 2017), exacerbates existing economic disparities between urban and rural areas. This phenomenon aligns with the theory of uneven development, (Capello & Nijkamp, 2009), where geographically uneven distribution of resources widens the gap between developed and underdeveloped regions. Consequently, these economic disparities fuel "selective migration" (Mladenov & Ilieva, 2012), a trend where younger, more skilled individuals out-migrate from rural areas in search of better opportunities concentrated in urban centers. This out-migration further weakens the economic base of rural regions, prompting them to rely more heavily on regional policies – often designed to bridge these economic disparities and incentivize population retention (Lutz, 2020). However, the effectiveness of these regional policies can be hindered by the very forces that necessitated them – the continued dominance of urban agglomeration. In such instances, a vicious cycle emerges, where urban agglomeration reinforces economic disparities, leading to

selective migration, which in turn necessitates regional policies that may struggle to gain traction due to the persistent influence of urban agglomeration.

6.1.4 INSIGHTS OF THE THEORETICAL SYSTEM

This master thesis delves into the intricate issue of rural depopulation by proposing a novel system model. By employing a system innovation framework (Geels, 2004; OECD, 2013), the research transcends traditional, isolated approaches to uncover the root causes of depopulation (Pike et al., 2023). The significance of this system model lies in its ability to provide a holistic understanding of the phenomenon. It reveals the complex interconnectedness between various factors, such as economic disparities, infrastructure decline, social aspects, and policy interventions (Kemeny & Storper, 2020; MacKinnon et al., 2022; Piontek, 2019). This comprehensive view is crucial for developing effective solutions to address rural depopulation. Additionally, the model exposes the self-perpetuating cycles that exacerbate depopulation, allowing for informed policy and intervention strategies. Additionally, pinpointing the key drivers, the model can guide policymakers in crafting targeted interventions that promote economic development, improve infrastructure, and address social and cultural concerns in rural areas. Ultimately, this approach contributes to a more sustainable future for these regions by fostering social and economic resilience.

Building upon this foundation, the next step of the thesis involves applying the system model to a specific case study. By comparing this case study with a contrasting system, the research aims to further refine the model and gain deeper insights into the nuances of rural depopulation across different contexts (Capello & Nijkamp, 2009; Warsaw University of Life Sciences & Wojewodzka-Wiewiorska, 2019). This comparative analysis, which will be presented in the following chapters, will draw upon frameworks like spatial polarization and uneven development to understand how these concepts interact with the system model in different settings.

7 CASE STUDY

7.1 CONTEXT

7.1.1 EMPTY SPAIN

Throughout the last six decades, rural Spain has experienced a massive depopulation; a process that continues today. The notion of "la España Vacía" refers to this phenomenon that covers a vast area of Spain's rural interior so sparsely populated that it is on the verge of being categorized as a demographic desert with a population density below the critical level of 10 inhabitants per square kilometer (Pinilla & Sáez, 2021). About 90% of the Spanish population is spread out over only 1,500 cities and towns, thereby inhabiting less than one third of Spain's total territory. Recently, as a political statement, the notion "la España Vaciada" [the 'Emptied Spain'] is increasingly replacing "la España Vacía" in the public debate (Castelló, 2023; Recaño, 2017). By using "vaciada" [emptied] instead of "vacía" [empty], proponents emphasize how this process has not been 'natural' but politically created by inactivity. Throughout this thesis, I will use the term "España Vaciada" to underscore this inherent critique (Castelló, 2023).

Although rural-urban migration during the last 60 years is not unique to Spain, the rural depopulation here has been more immense and sudden than in other European countries. During the second half of the 20th century, rural areas lost 40% of their population (some areas even up to 50%) (Pinilla & Sáez Pérez, 2016). Spain takes the fourth place (after Estonia, Finland, and Latvia) in being the European country with most municipalities at risk of being totally depopulated (Del Arco Blanco, 2023). More than 40% of all Spanish municipalities are currently considered at risk (Ibid.); for villages with less than 1,000 inhabitants, the risk is twice as high, at 80% (Castelló, 2023). In contemporary rural Spain, it is find the areas with the worst access to basic services in the entire EU (Recaño, 2017). To make the contrasts stand out even more clearly, Spain encompasses both some of the least populated areas in Europe, with densities as low as 5 inhabitants per square kilometer (Castelló, 2023).

The rural depopulation of Spain is a complex phenomenon with a complex history. It might be understood as another story in line with the larger industrialization narrative, in which the rural exodus in Europe during the 19th and 20th centuries is commonly understood as the inevitable 'prize' of 'modernization' (Baudin & Stelter, 2022). However, this explanation does not account for why the depopulation did not take place before the mid-20th century and occurred in such an urgent manner. The particular historical, political, and economic context matter if it is to understand the rupture of rural depopulation in Spain. Scholars usually attribute much of the explanation, and responsibility, to the agricultural and economic policies of General Francisco Franco (Del Arco Blanco, 2023). The Spanish Civil War (1936-1939) and the post-war period brought both terror and ruptures in urban as well as rural Spain. The post-war years from 1939-1952, known as *Los Años del Hambre* [the Years of Hunger], were characterized by economic stagnation, hunger, disease, and continued terror by the new dictatorial regime (Blanco, 2021). Franco's isolationist policies based on a model of autarchy (self-sufficiency) led to immense economic stagnation, particularly affecting rural areas (Del Arco Blanco, 2023).

Although the biggest drop in rural depopulation took place in just a few decades during the 20th century, rural depopulation and its aftermath continue today. Inhabitants, especially young people, continue to leave rural sites for education or employment in the cities, while an aging population stays behind, creating a demographic crisis with death rates far exceeding birth rates (Pinilla & Sáez, 2021). This in turn has economic consequences since the working-age population is low while the aging population with higher needs for public health care is high. With a growing neoliberal assessment of the distribution of public services (the Spanish state being infamous for its high level of austerity measures following the financial crisis), the rural areas often experience a vicious circle where cuts in services go hand in hand with further depopulation (Del Arco Blanco, 2023; Recaño, 2017). When, for instance, the school closes, it is considered the 'death punch' for a village. Precarious public services, lack of infrastructure, and job opportunities are just some of the everyday challenges that people face in rural areas.

7.1.2 TERUEL REGION

The phenomenon of rural depopulation in Spain, "España Vacía," is acutely evident in the province of Teruel. Over the last sixty years, Teruel has experienced a dramatic reduction in its population, with many areas now on the brink of being classified as demographic deserts, having less than ten inhabitants per square kilometer (Pinilla & Sáez, 2021)(Pinilla & Sáez Pérez, 2016). Approximately 90% of the Spanish population is concentrated in just 1,500 urban centers, leaving vast rural territories sparsely populated and struggling with access to basic services (Gascón, 2023). The term "España Vacía" reflects the argument that this depopulation is not merely a natural phenomenon but a result of political neglect and lack of proactive policies. The massive rural exodus during the mid-20th century, influenced by the harsh economic and agricultural policies of the Franco regime, saw rural Spain lose up to 50% of its population in some areas. This demographic shift has led to a continued decline in rural vitality, with young people moving to urban areas for better opportunities and an aging population left behind, exacerbating the economic and social challenges (Del Arco Blanco, 2023; Pike et al., 2023).

In this context, the role of grassroots movements like Teruel Existe has been crucial in bringing attention to the plight of rural areas. Formed in 1999, Teruel Existe has successfully transitioned from a citizen platform to a political force, winning representation in Spain's national parliament in the 2019 elections (Gascón, 2023). The movement campaigns against the economic and social marginalization of rural regions, advocating for infrastructural improvements and equitable access to public services and employment opportunities (Gascón, 2023; Recaño, 2017). The fieldwork for this thesis, conducted in Oliete, a small village in Teruel, aims to explore the local initiatives and community efforts that are emerging in response to these ongoing challenges, offering insights into the resilience and creativity of rural populations in Spain's most depopulated areas.

7.1.3 OLIETE

Oliete is a small village with a population of around 330 inhabitants located in the province of Teruel, part of the autonomous community of Aragón. Villages in España Vacía are often depicted as ghost-like, with decaying infrastructure and a dwindling population due to the state's inability to counter the cycle of depopulation (Castelló, 2023; Montañana, 2016). The issue of rural depopulation gained national attention when the citizen platform Teruel Existe (Teruel Exists) emerged in 1999 to advocate for the region. In the 2019 election, Teruel Existe won a historic seat in the Congress and two seats in the Senate, highlighting the political and social marginalization of rural areas and the urgent need for infrastructure improvements and equal access to public services and job opportunities (Gascón, 2023; Recaño, 2017).

Fieldwork conducted in Oliete focused on local initiatives aimed at revitalizing the area in response to the consequences of depopulation. The village's history is marked by a significant population decline from over 2,500 inhabitants in the 1910s to around 343 in 2020. Despite this, Oliete has a rich agricultural heritage, particularly in olive cultivation, which is central to the local economy (Montañana, 2016; Urrecho, 2018). The efforts to rejuvenate Oliete are part of a broader trend observed in España Vacía, where local residents and those with ancestral ties to the area strive to revive their communities. These initiatives often involve leveraging the natural and cultural heritage of the region to create sustainable economic opportunities, such as promoting agroecological practices and rural tourism (Gascón, 2023; Montañana, 2016).

7.2 APADRINA UN OLIVO

"Apadrina un Olivo" is an innovative initiative rooted in the Spanish village of Oliete, located in the comarca of Andorra-Sierra de Arcos. Oliete, like many rural villages in Spain, has experienced significant depopulation over the past century. In 2020, the population stood at 343, down from over 2,500 in the 1910s (Gascón,

2023). Despite its rich agricultural heritage, particularly in olive cultivation, the village faced economic challenges exacerbated by rural exodus.

In response to these challenges, a group of young descendants of emigrants decided to take action. They aimed to rejuvenate the village's olive groves, which had been neglected due to depopulation. In 2014, they founded the Asociación para la Recuperación del Olivar Yermo de Oliete, known as Apadrina un Olivo. This non-profit organization seeks to revitalize abandoned olive trees through sponsorship and sustainable agricultural practices (A. Pordomingo, interview, May 2024).

The process and evolution of "Apadrina un Olivo" encapsulate a comprehensive approach to rural revitalization and agricultural sustainability. Initially, the project focused on securing funds through a combination of private sponsorships and public grants. The innovative model allowed individuals or companies to "adopt" an olive tree for an annual fee of 60 euros. These sponsors, referred to as padrinos, received regular updates about their specific tree and an annual yield of olive oil, fostering a personal connection to the project (Gascón, 2023). This sponsorship model not only provided the necessary financial backing to kickstart the initiative but also engaged a wider community of supporters invested in the success of Oliete's olive groves. In addition to sponsorships, Apadrina un Olivo negotiated custody agreements with owners of abandoned olive groves. These agreements were crucial for gaining access to and managing the neglected trees. Typically, these contracts spanned ten years, with the first five years focused on the recovery and revitalization of the olive trees. The subsequent five years included a provision for the original owners to receive a 10% share of the olive oil produced, thereby offering a financial incentive for cooperation (A. Pordomingo, interview, May 2024). This approach ensured a sustainable and mutually beneficial relationship between the association and the grove owners, allowing for effective long-term management and restoration of the land.

The association employed sustainable and agroecological methods to restore the productivity of the olive trees. This involved rigorous processes such as clearing,

pruning, and nurturing the trees using environmentally friendly practices to ensure high-quality olive oil production. By adhering to these principles, Apadrina un Olivo not only aimed to boost olive oil yield but also to maintain ecological balance and promote soil conservation. This commitment to sustainable agriculture served as a cornerstone for the project's mission, aligning economic objectives with environmental stewardship. The impact of Apadrina un Olivo extended beyond agricultural practices to significant socio-economic benefits. In 2016, the project received substantial funding to construct a new olive mill, reviving the local economy by processing olive oil locally after a 13-year hiatus. By 2021, the initiative had created 22 jobs and successfully recovered approximately 15,000 olive trees (Gascón, 2023) (C. Serna, interview, May 2024). Moreover, the project catalyzed local tourism and community engagement. The influx of padrinos and tourists bolstered local businesses, including rural accommodations and restaurants, and prevented the closure of the local school by attracting new families to the area. The association's expansion efforts continued, with over 9,000 padrinos supporting ongoing projects and the production of gourmet-quality olive oil under the brand "Mi Olivo," as well as cosmetics and other products (Gascón, 2023). This multifaceted growth underscores Apadrina un Olivo's success in fostering a sustainable, economically viable, and vibrant rural community.

7.2.1 APADRINA AS A SYSTEM INNOVATION

"Apadrina un Olivo" serves as an exemplary case of system innovation, demonstrating a comprehensive approach to socio-economic and environmental revitalization. System innovation is paramount for addressing intricate societal challenges through coordinated and integrated processes spanning interconnected systems (Geels, 2004; OECD, 2013). This model underscores the significance of incorporating diverse actors in driving systemic change, which is a fundamental principle of system innovation.

The strategic custody agreements with owners of abandoned olive groves further highlight the project's alignment with system innovation principles. These agreements, allowing the association to manage the groves for ten years, with the

first five years dedicated to recovery and the subsequent five years including a 10% share of the olive oil production for the owners, ensured a sustainable and mutually beneficial arrangement (Gascón, 2023). This approach embodies the multi-level perspective (MLP) framework, wherein niche innovations (tree recovery efforts) interact with regime levels (agricultural practices) and the broader landscape (economic and policy context) to facilitate transitions (Geels, 2004). By fostering such co-evolution, Apadrina un Olivo effectively integrated various elements within the socio-technical system, catalyzing large-scale transformations.

The project's commitment to sustainable and agroecological practices is another key aspect of its systemic innovation. Employing environmentally friendly methods to restore productivity to the olive trees aligns with the principles of system innovation, which emphasize shifts in production and consumption patterns, governance structures, and socio-technical systems to achieve sustainability (Berkhout, 2006; Gaziulusoy, 2015). These practices not only enhanced the quality of the olive oil but also contributed to soil conservation and ecological balance, exemplifying the project's holistic approach to sustainability. This integration of technological, business, and organizational innovations reflects the interconnected nature of system innovation, wherein improvements in one area precipitate positive changes across the entire system (Satalkina & Steiner, 2022).

The substantial socio-economic impacts of Apadrina un Olivo further underscore its role as a system innovation. The construction of a new olive mill in 2016, funded through substantial investment, revitalized the local economy by facilitating local olive oil processing, which had been absent for 13 years. Additionally, the influx of padrinos and tourists bolstered local businesses and prevented the closure of the local school, enhancing social cohesion and reversing rural depopulation trends (Gascón, 2023). This participatory approach ensures the project's benefits are widely distributed, fostering broader acceptance and support, which are crucial for successful system innovation (Leonidou et al., 2020).

"Apadrina un Olivo" exemplifies the principles of system innovation by integrating economic, social, and environmental dimensions in a coordinated effort to revitalize rural areas (Capello & Nijkamp, 2009; MacKinnon et al., 2022). The project's multifaceted approach, involving large-scale transformations, multi-level interactions, and broad stakeholder involvement, provides valuable insights into the complex dynamics of achieving sustainable development. By focusing on systemic changes and fostering collaborative efforts, Apadrina un Olivo demonstrates how targeted interventions can address the interconnected challenges of rural depopulation and economic disparity, contributing to the long-term resilience and sustainability of marginalized regions (Lutz, 2020; Gascón, 2023).

7.2.2 STAKEHOLDERS PROFILES

Through comprehensive thematic analysis of stakeholder interviews, the research explores the project's impact on various critical areas such as employment opportunities, housing and infrastructure, social cohesion, and environmental conservation. Each stakeholder brings unique insights into the complexities of rural life and the transformative potential of community-driven initiatives.

Carolina Serna:

Carolina Serna works in human resources at Apadrina, where she focuses on creating a positive work environment. She brings attention to the noble purpose of the organization, which encompasses both environmental and social aspects. Carolina highlights the significant impact of Apadrina on providing quality jobs, contributing to a circular economy, and enhancing social cohesion within the community. She also addresses the challenges of finding adequate housing for new residents and the broader implications of Apadrina's work on rural depopulation and community resilience. Carolina envisions a future where Oliete continues to thrive with opportunities for young people, possibly through partnerships with universities for specialized training (C. Serna, interview, May 2024).

Guillermo Cano:

Guillermo Cano is a computer scientist who initially collaborated with Apadrina in a freelance capacity before taking on a full-time role to address the organization's growing technological needs. Motivated by a desire for a rural lifestyle discovered during his time abroad, Guillermo highlights the challenges of rural infrastructure, particularly internet connectivity, and the contrasts between rural and urban living. He notes the social integration in Oliete, where diverse populations, including migrants, are welcomed and form strong community bonds. Guillermo emphasizes the importance of providing career opportunities for local youth to encourage their return after education, and he reflects positively on raising children in a close-knit rural community (G. Cano, interview, May 2024).

Pilar Carbonell:

Pilar Carbonell is an agricultural engineer from Barcelona who has lived in Oliete for 22 years. Her move was motivated by her maternal ties to the town and a desire to experience rural life. Pilar addresses significant economic challenges in Oliete, particularly the need for stable employment and affordable housing. Despite advancements like fiber optics, the lack of public transportation and basic services, such as medical facilities and educational opportunities, remain significant barriers. Pilar underscores the transformative impact of the Apadrina project in creating jobs and boosting the local economy but also highlights local residents' concerns about potential overshadowing of traditions (P. Carbonell, interview, May 2024).

Alberto Pordomingo:

Alberto Pordomingo has a background in business administration and telecommunications and is a proactive leader in addressing the socio-economic challenges facing Oliete. His project, "A Padrina," leverages the town's endogenous resources, particularly olive trees, to create a sustainable model that combines rural development, social inclusion, and environmental protection. Alberto emphasizes the project's holistic approach, which integrates tourism with

economic development, and highlights the creation of around 40 jobs. He also discusses the importance of embracing new technologies and innovative practices to modernize traditional processes and make rural living viable and attractive, despite local skepticism and defeatism (A. Pordomingo, interview, May 2024).

Maria Luz Joviana:

Maria Luz Joviana has deep-rooted ties to Oliete through her maternal lineage and decided to return to the town with her husband at the age of 50 to start a new project. She highlights the significance of community support and collaborative efforts involved in revitalizing Oliete. Maria Luz acknowledges the positive aspects of the "sponsor" project, such as increased visibility and economic opportunities, but also points out areas for improvement, particularly in job creation and integration with the local population. Her perspective emphasizes the need for balancing commercial growth with community satisfaction and tailored educational programs for sustainable development (M. L. Joviana, interview, May 2024).

Jose Luis Burillo:

Jose Luis Burillo has closely observed the "sponsor" project's impact on Oliete, particularly in reclaiming abandoned olive groves and creating jobs. He emphasizes the importance of community-driven initiatives and external support in addressing rural depopulation and economic stagnation. Jose Luis discusses the historical context of Oliete, noting the decline following the closure of local mines and the subsequent reliance on agriculture. Despite the challenges of limited administrative support and migration to larger cities, he remains optimistic about the future, noting the positive integration of immigrants and the potential for further development through tourism and other projects (J. L. Burillo, interview, May 2024).

Jaime Grimaldo:

Jaime Grimaldo joined the Apadrina project for employment reasons and describes his role in facilitating visits from sponsors, which indirectly promotes rural tourism. He highlights the project's impact on job creation and local economic activity, noting an increase in employment opportunities and the influx of visitors. Jaime discusses the challenges of living in a small town like Oliete, including infrastructure and communication issues, such as the lack of public transportation and limited access to essential services. Despite these challenges, Jaime emphasizes the strong sense of community in Oliete, where residents support one another, contributing to a positive social dynamic (J. Grimaldo, interview, May 2024).

Paola Caracoche:

Paola Caracoche recently relocated to Oliete from Andorra for work-related reasons. She discusses her positive transition despite the town's smaller size, highlighting the quiet and peaceful nature of the town and the friendly and welcoming attitude of its residents. Paola addresses the limited healthcare services in Oliete, such as fewer medical hours and lack of emergency services, and the need to travel to Andorra for larger purchases due to fewer stores and services. She appreciates efforts to improve local infrastructure and discusses the importance of community projects like Apadrina in promoting tourism and economic activity. Paola expresses satisfaction with her life in Oliete and a willingness to continue living there as long as job stability and peace are maintained (P. Caracoche, interview, May 2024).

The perspectives gathered from the stakeholders in Oliete are invaluable for understanding the practical implications of system innovation methodologies. The collective insights from the stakeholders highlight critical variables such as employment opportunities, housing and infrastructure, social cohesion, migration patterns, economic development, and environmental conservation. These elements are essential for developing a holistic approach to rural revitalization.

The stakeholders' experiences provide a comprehensive view of the local socio-economic landscape, illustrating how community-driven initiatives can foster sustainable development. This aligns with the principles of system innovation, which emphasize the importance of stakeholder involvement and the integration of diverse perspectives to drive systemic change (Geels, 2004; Leonidou et al., 2020). Their input not only sheds light on the current challenges and successes of projects like "Apadrina un Olivo" but also offers a roadmap for future interventions aimed at enhancing the resilience and sustainability of rural areas (MacKinnon et al., 2022).

7.2.3 THEMATIC ANALYSIS

The thematic analysis of the interviews was meticulously structured based on variables derived from a comprehensive literature review, including economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. The process began with designing the interview structure around these key variables, followed by conducting online semi-structured interviews with the stakeholders that are involved in Apadrina and the community of Oliete. A summary of the principal information from these interviews was then compiled, allowing for a thematic approach to identify common threads and differences. By comparing the themes across interviews, it is established connections to the literature review variables, providing a cohesive analysis of the data.

The analysis reveals a multifaceted picture of rural development, emphasizing the significance of employment opportunities, housing and infrastructure, community integration, rural depopulation, and economic development. One of the primary insights is the pivotal role of Apadrina in creating quality jobs, which has significantly contributed to Oliete's economic growth (Gascón, 2023). As highlighted by Carolina Serna and Guillermo Cano, the organization has provided numerous job opportunities, especially for the local youth, encouraging them to stay or return after pursuing education elsewhere. However, the challenge of

finding stable employment remains, particularly for those without local connections, underscoring the need for sustained efforts in job creation.

Housing and infrastructure emerge as critical themes, reflecting both the progress and ongoing challenges faced by the community. The interviews reveal that while initiatives have improved certain aspects of infrastructure, such as plans for a school and park enhancements, issues like inadequate housing and limited public transportation persist. Carolina Serna and Jaime Grimaldo pointed out the difficulties in finding adequate housing for new residents and the lack of essential services like medical facilities and public transportation. These infrastructural challenges are significant barriers to attracting and retaining new residents, highlighting the need for comprehensive planning and investment in local amenities.

Community integration and social cohesion are highlighted as strengths of Oliete, with residents displaying a welcoming attitude towards newcomers and fostering a strong sense of community. Guillermo Cano and Maria Luz Joviana emphasized the positive social dynamics in Oliete, where diverse populations, including migrants, form strong bonds and support each other (Gascón, 2023). However, social integration can be challenging, especially for those without local lineage. This underscores the importance of community-driven projects and initiatives that promote social cohesion and inclusivity, thereby enhancing the quality of life for all residents.

Efforts to combat rural depopulation through initiatives like Apadrina have shown positive results, attracting families and individuals to Oliete and revitalizing the local economy. Carolina Serna and Jaime Grimaldo discussed how Apadrina's work has helped address depopulation by creating economic opportunities and fostering community resilience. The integration of immigrants and the creation of a welcoming environment have further contributed to these efforts. Nonetheless, challenges remain, including the need for better infrastructure and support services to sustain this growth and ensure long-term community stability.

Economic development and the concept of a circular economy are central to the success of Apadrina, as discussed by Carolina Serna and Alberto Pordomingo. By connecting urban and rural environments and leveraging local resources, Apadrina has significantly boosted Oliete's economic fabric. The project's holistic approach, combining environmental conservation with job creation and social inclusion, has created a sustainable model for rural development. The emphasis on sustainable practices, such as recovering abandoned olive trees and orchards, reflects the potential for innovative initiatives to drive economic growth while preserving the environment. This multifaceted approach not only addresses immediate economic challenges but also lays the groundwork for long-term community resilience and sustainability.

This model underscores the significance of incorporating diverse actors in driving systemic change, which is a fundamental principle of system innovation. The thematic analysis of the interviews conducted with stakeholders involved in the "Apadrina un Olivo" project reveals several key themes that highlight the multifaceted impact of the initiative on the community of Oliete. The primary themes identified include employment opportunities, housing and infrastructure, community integration and social cohesion, rural depopulation and migration, economic development and circular economy, environmental conservation, educational opportunities, healthcare services, tourism and local economy, challenges of rapid organizational growth, and future vision and opportunities. Stakeholders discussed the creation of jobs, challenges in finding adequate housing, limited medical services, and the importance of community projects in fostering social cohesion and combating rural depopulation (Piontek, 2019). The project's holistic approach to sustainable development, which includes environmental conservation and leveraging local resources, was emphasized, along with the need for improved infrastructure and educational programs to support continued growth.

7.2.4 VARIABLES FOR THE CASE STUDY SYSTEM

The interviews provided eleven principal variables crucial to understanding the project's impact: employment opportunities, housing and infrastructure, community integration and social cohesion, rural depopulation and migration, economic development and the circular economy, environmental conservation, educational opportunities, healthcare services, tourism and the local economy, challenges of rapid organizational growth, and future vision and opportunities. Through these variables, the interviews provide a rich, detailed picture of how "Apadrina un Olivo" contributes to the revitalization of Oliete, highlighting both successes and areas needing further development. This exploration not only underscores the project's role in fostering economic growth and community resilience but also emphasizes the importance of strategic planning, innovation, and inclusive practices in ensuring sustainable rural development. These variables are:

- **Employment Opportunities**
- **Housing and Infrastructure**
- **Social Cohesion**
- **Migration**
- **Circular Economy**
- **Environmental Conservation**
- **Educational Opportunities**
- **Healthcare Services**
- **Tourism and Local Economy**
- **Challenges of Rapid Organizational Growth**
- **Future Vision and Opportunities**

7.2.4.1 ANALYSIS OF THE VARIABLES

Employment Opportunities

The creation of jobs through projects like Apadrina has significantly contributed to economic growth in Oliete by providing quality employment opportunities. However, challenges remain in finding stable employment, especially for those without local connections. Carolina Serna, in her role in human resources, highlighted how Apadrina has created numerous job opportunities, positively impacting the local economy. Guillermo Cano echoed this sentiment, emphasizing the importance of career opportunities for local youth to encourage their return after pursuing education. Additionally, Alberto Pordomingo showcased the effectiveness of the Apadrina project in addressing employment challenges in rural areas, noting that it has created around 40 jobs, which is a substantial contribution to the community's economic revitalization.

Housing and Infrastructure

Availability of adequate and affordable housing for new residents remains a pressing issue in Oliete. Carolina Serna addressed the difficulties new arrivals face in finding housing, a problem exacerbated by increased demand due to the town's growth. Jaime Grimaldo pointed out the challenges related to infrastructure and communication, such as the lack of public transportation and limited access to essential services like gasoline stations. Paola Caracoche mentioned her own challenges in finding a rental that accepted pets and noted the limited healthcare services available in the town. Despite these issues, there are ongoing efforts to improve local infrastructure, including plans for a new school and park enhancements.

Community Integration and Social Cohesion

The welcoming attitude of Oliete's residents towards newcomers fosters a strong sense of community, though challenges in social integration exist, especially for those without local lineage. Guillermo Cano spoke about the significant social integration in Oliete, where diverse populations, including migrants, are welcomed and form strong community bonds. Maria Luz Joviana emphasized the importance of community support and collaborative efforts in revitalizing the town. Jaime Grimaldo noted the strong sense of community in Oliete, where residents know and support each other, contributing to a positive social dynamic.

Rural Depopulation and Migration

Efforts to combat rural depopulation through initiatives like Apadrina attract families and individuals to Oliete, helping to stabilize the population. Carolina Serna discussed the broader implications of Apadrina's work on rural depopulation and community resilience, noting how the project has helped attract more families to Oliete. Maria Luz Joviana highlighted the significance of community support in addressing depopulation and revitalizing the town. Jaime Grimaldo emphasized the role of productive projects like Apadrina in fostering economic growth and combating rural depopulation, showcasing the project's impact on the community's demographic stability.

Economic Development and Circular Economy

Apadrina have a substantial impact on local economic development and contribute to a circular economy by connecting urban and rural environments. Carolina Serna mentioned Apadrina's role in creating quality jobs and enhancing social cohesion in Oliete. Guillermo Cano highlighted the project's impact on the town's economic fabric, noting its contributions to job creation and community cohesion. Alberto Pordomingo focused on leveraging Oliete's endogenous resources, particularly its olive trees, to create a sustainable model integrating rural development, social inclusion, and environmental protection, showcasing the holistic approach needed for sustainable economic growth.

Environmental Conservation

Environmental conservation initiatives are a crucial aspect of projects like Apadrina, focusing on recovering abandoned olive trees and orchards. Carolina Serna discussed Apadrina's efforts in environmental conservation, emphasizing the project's role in sustainable rural development. Alberto Pordomingo highlighted the importance of combining rural development with social inclusion and environmental protection, illustrating how the Apadrina project fosters an emotional bond between people and the land. These efforts not only preserve the natural environment but also contribute to the economic and social vitality of the community.

Educational Opportunities

Apadrina positively impact local schools and foster educational opportunities, though challenges remain due to the lack of higher education facilities. Carolina Serna highlighted Apadrina's role in keeping the local school open by attracting more families to Oliete. Guillermo Cano emphasized the importance of creating pathways for local youth to return to Oliete after pursuing education and careers elsewhere. Alberto Pordomingo discussed the potential for partnerships with universities to offer specialized training in olive oil production, further enhancing Oliete's economic and social infrastructure and addressing the educational needs of the community.

Healthcare Services

Limited healthcare services in Oliete, including fewer medical hours and a lack of emergency services, pose significant challenges for residents. Paola Caracoche highlighted these limitations, noting that they complicate access to necessary medical care. Pilar Carbonell also emphasized the lack of medical facilities as a significant barrier, underscoring the need for improved healthcare infrastructure to support the town's population. Enhancing healthcare services is crucial for ensuring the well-being of residents and making Oliete a more attractive place to live.

Tourism and Local Economy

Rural tourism plays a vital role in boosting local businesses and economic activity in Oliete, with projects like Apadrina indirectly promoting tourism by attracting visitors. Jaime Grimaldo described how the Apadrina project, while not explicitly focused on tourism, helps draw visitors who spend money locally, benefiting businesses in Oliete. Paola Caracoche discussed the importance of community projects in promoting tourism and economic activity, highlighting the potential for further service improvements to enhance the quality of life in the town and attract more tourists.

Challenges of Rapid Organizational Growth

Rapid growth in organizations like Apadrina brings internal challenges that require better planning, adaptation, and technological infrastructure. Carolina Serna pointed out the internal challenges due to rapid organizational growth, emphasizing the need for better planning and adaptation to sustain Apadrina's impact. Guillermo Cano stressed the importance of improved technological infrastructure and strategic planning to support the organization's growth. Jaime Grimaldo highlighted the challenges related to organizational growth and the need to address infrastructure limitations to maintain the project's success and sustainability.

Future Vision and Opportunities

Envisioning a thriving future for Oliete involves providing opportunities for young people and leveraging partnerships with universities to foster further development. Carolina Serna envisioned a future where Oliete continues to thrive, offering young people opportunities to stay and build their lives in the town. Guillermo Cano highlighted the potential for rural regeneration through strategic, multifaceted initiatives that create pathways for local youth. Alberto Pordomingo emphasized the importance of embracing new technologies and innovative practices to modernize traditional processes, making rural living viable and attractive, and ensuring sustainable development for Oliete.

7.3 SYSTEM INNOVATION OF THE CASE STUDY

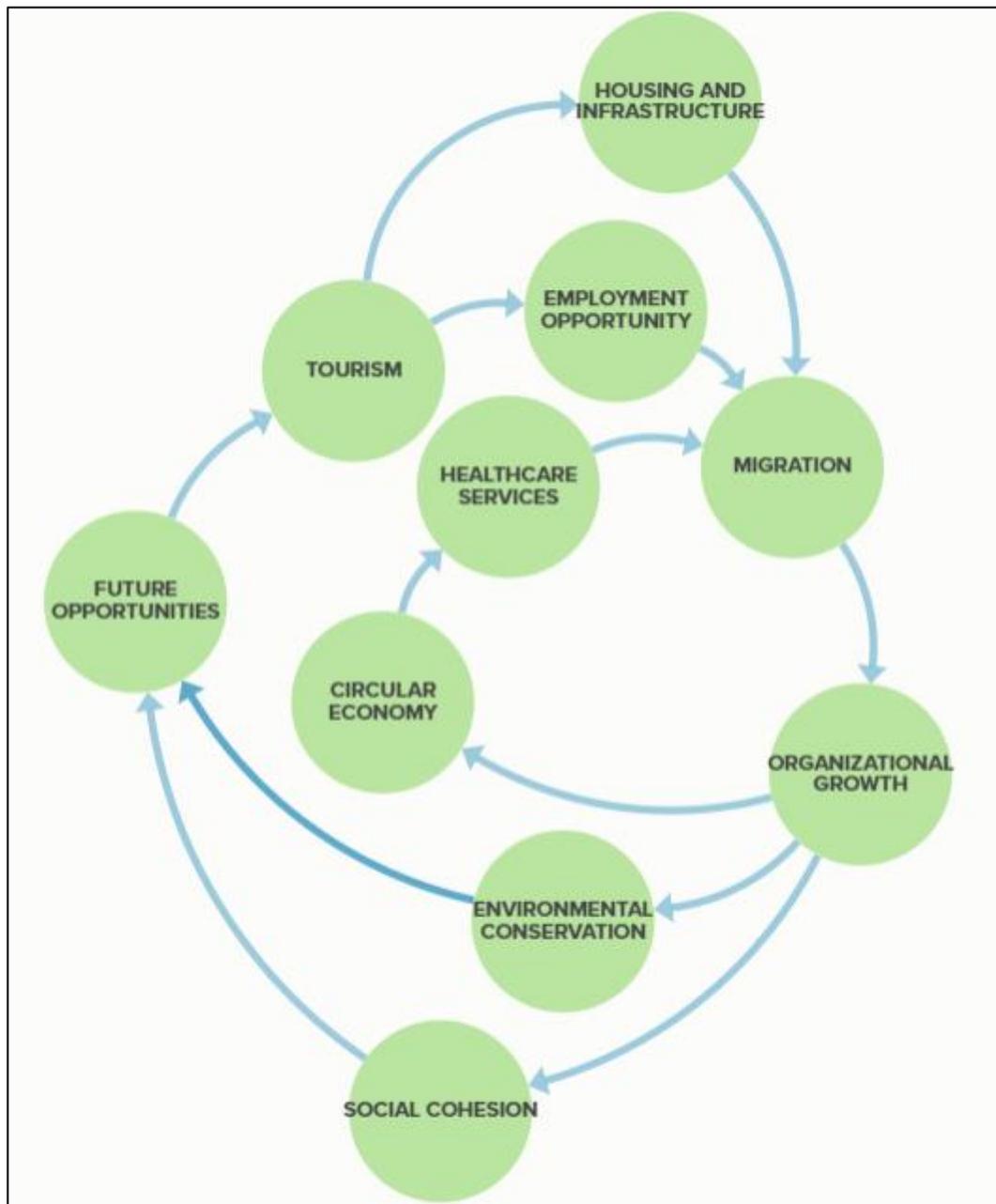


Figure 7. Case Study System Model, Source: author's own work.

The analysis of the "Apadrina un Olivo" project through thematic interviews reveals a complex system of interconnected variables that highlight the project's impact on the revitalization of Oliete. This system innovation framework includes eleven principal variables: employment opportunities, housing and infrastructure, community integration and social cohesion, rural depopulation and migration, economic development and the circular economy, environmental conservation, educational opportunities, healthcare services, tourism and the local economy,

challenges of rapid organizational growth, and future vision and opportunities. These variables are critical in understanding the multifaceted influence of the project, illustrating how strategic planning and inclusive practices contribute to sustainable rural development.

The primary feedback loop in this system centers around six interconnected variables: employment opportunities, migration, organizational growth, social cohesion, economic development, and tourism. Employment opportunities generated by Apadrina attract both local residents and migrants, as noted by stakeholders like Carolina Serna and Guillermo Cano. This influx of new residents fosters organizational growth, which in turn enhances social cohesion and community integration. Maria Luz Joviana emphasized the importance of collaborative efforts in revitalizing the town, highlighting how the growth of Apadrina strengthens community bonds. This social cohesion fuels further economic development, creating a dynamic environment where local resources are leveraged for sustainable growth. Additionally, tourism plays a vital role in this loop, with initiatives like Apadrina indirectly promoting rural tourism, thus benefiting local businesses and enhancing the overall economic fabric of Oliete (Harrell & Bradley, 2009; Geels, 2004).

Another critical feedback loop in the system model emphasizes the interconnectedness between migration and organizational growth, which significantly impacts the circular economy and regional services, particularly healthcare. As Apadrina expands, it attracts more migrants to Oliete, thereby enhancing the circular flow of economic resources within the community. Stakeholders like Paola Caracoche and Pilar Carbonell highlighted the importance of improving healthcare services to support the growing population, which is essential for retaining residents and ensuring community sustainability. The integration of environmental conservation with economic and social initiatives further strengthens this loop, as discussed by Alberto Pordomingo, who emphasized the role of leveraging local resources to promote both economic sustainability and environmental protection. These interconnected systems illustrate the importance of comprehensive strategies that address economic,

social, and environmental dimensions to foster community resilience and attract migration, ultimately contributing to the sustainable development of Oliete (OECD, 2013; Gascón, 2023).

7.4 LOOPS

7.4.1 FIRST LOOP

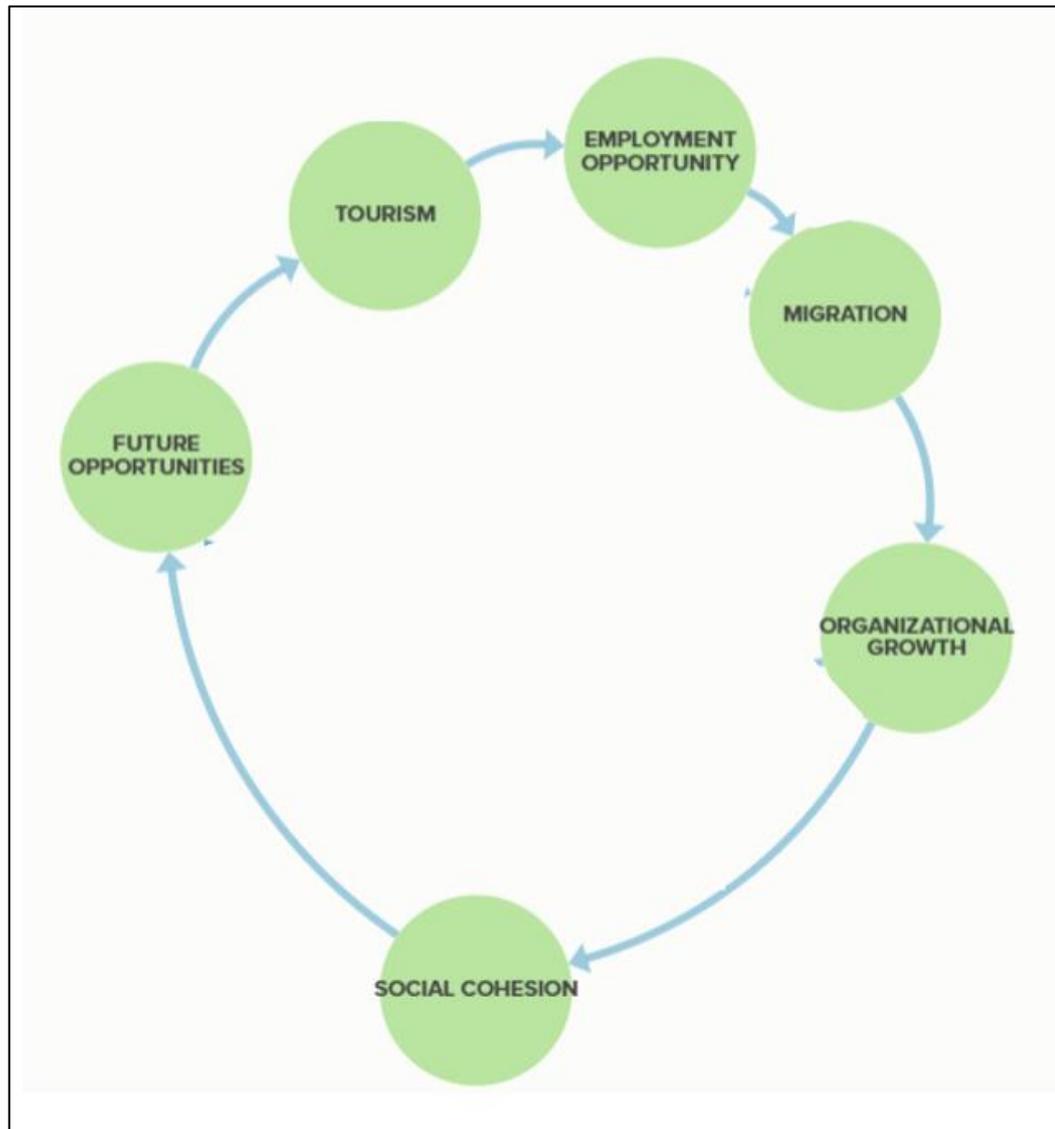


Figure 8. Case Study System Model; Loop 1, Source: author's own work.

The primary feedback loop of the system model centers around six interconnected variables. Firstly, employment opportunities are closely related to migration patterns, as evidenced by the interviews. For instance, Carolina Serna highlighted how the Apadrina project has created numerous job opportunities, which have

attracted both locals and migrants to Oliete, thereby stabilizing the population and combating rural depopulation. This influx of new residents, in turn, stimulates the growth of the organization, as Guillermo Cano pointed out that the demand for services and infrastructure increases with population growth.

The expansion of Apadrina significantly impacts social cohesion within the region. As the organization grows, it integrates various stakeholders, including local residents and migrants, fostering a sense of community and shared purpose. Maria Luz Joviana emphasized the importance of community support and collaborative efforts in revitalizing the town, underscoring the role of Apadrina in enhancing social cohesion.

Social cohesion is further linked to economic opportunities in the region. As the community becomes more integrated, the collaborative environment fosters economic development. Alberto Pordomingo illustrated this connection by discussing how leveraging local resources and integrating rural development with social inclusion and environmental protection has created a sustainable economic model for Oliete.

Additionally, the opportunities generated within the community have a direct impact on tourism. The interviews revealed that tourism plays a pivotal role in the economic development of Oliete. Jaime Grimaldo noted that while Apadrina is not explicitly focused on tourism, it indirectly promotes it by attracting visitors who spend money locally, thus benefiting local businesses. Paola Caracoche echoed this sentiment, emphasizing the importance of community projects in enhancing tourism and economic activity.

Thus, the interconnectedness of these variables—employment opportunities, migration, organizational growth, social cohesion, economic development, and tourism illustrates a comprehensive feedback loop. Each variable influences and is influenced by the others, creating a dynamic system that supports the sustainable development and revitalization of Oliete. The holistic approach of

Apadrina in addressing these variables underscores the project's effectiveness in fostering community resilience and economic stability.

7.4.2 SECOND LOOP

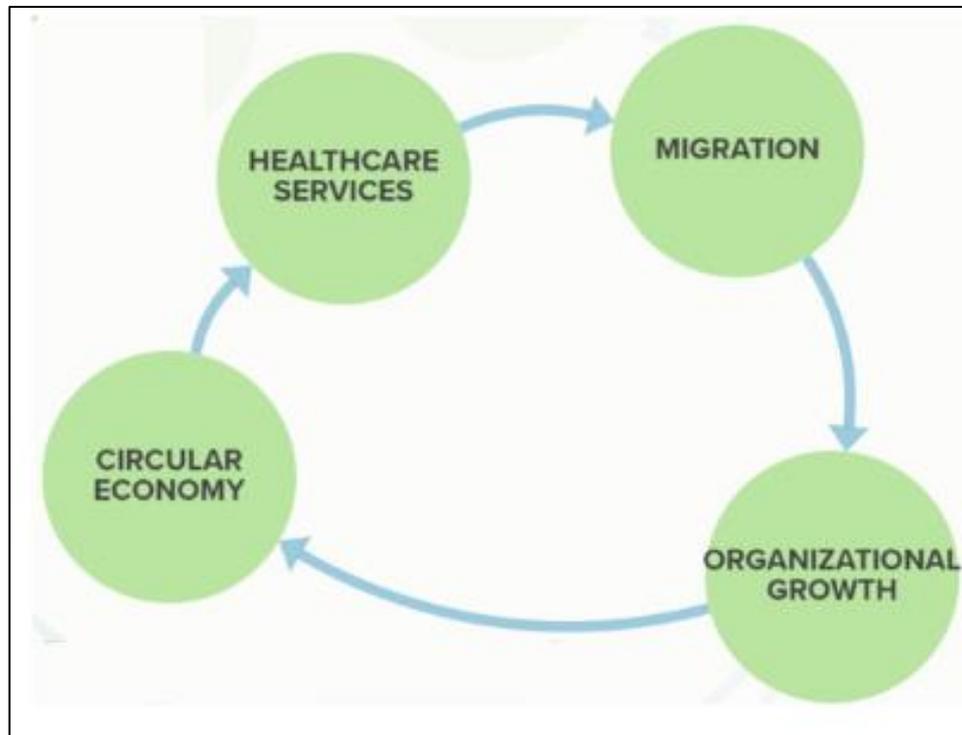


Figure 9. Case Study System Model; Loop 2, Source: author's own work.

The second critical feedback loop in the system model emphasizes the interconnectedness between migration and organizational growth, as initially established in the first loop. The expansion of Apadrina has proven instrumental in attracting migrants, thereby stabilizing Oliete's demographics. This organizational growth stimulates local economic activities and significantly impacts the circular economy of the region. For instance, Carolina Serna highlighted how Apadrina's expansion has facilitated job creation, drawing more people to Oliete and enhancing the circular flow of economic resources within the community. The influx of residents driven by Apadrina's growth necessitates improved regional services, particularly healthcare, as underscored by Paola Caracoche, who pointed out the significant challenges posed by limited healthcare services.

The growth of Apadrina and the resulting demand for better healthcare services form a crucial link in this feedback loop. Adequate healthcare is essential for attracting and retaining residents, making Oliete a more desirable place to live. Pilar Carbonell emphasized the need for improved healthcare facilities to support the growing population, highlighting its importance for community sustainability. Enhanced healthcare services, in turn, encourage further migration to Oliete, which supports the continued growth of Apadrina, reinforcing the circular economy. Alberto Pordomingo discussed how leveraging local resources through Apadrina not only promotes economic sustainability but also enhances social inclusion and environmental protection. This interconnected system, where each variable influences the others, supports the sustainable development and demographic stability of Oliete, demonstrating the importance of integrated strategies that address economic, social, and environmental dimensions for fostering community resilience and attracting migration.

7.4.3 THIRD LOOP

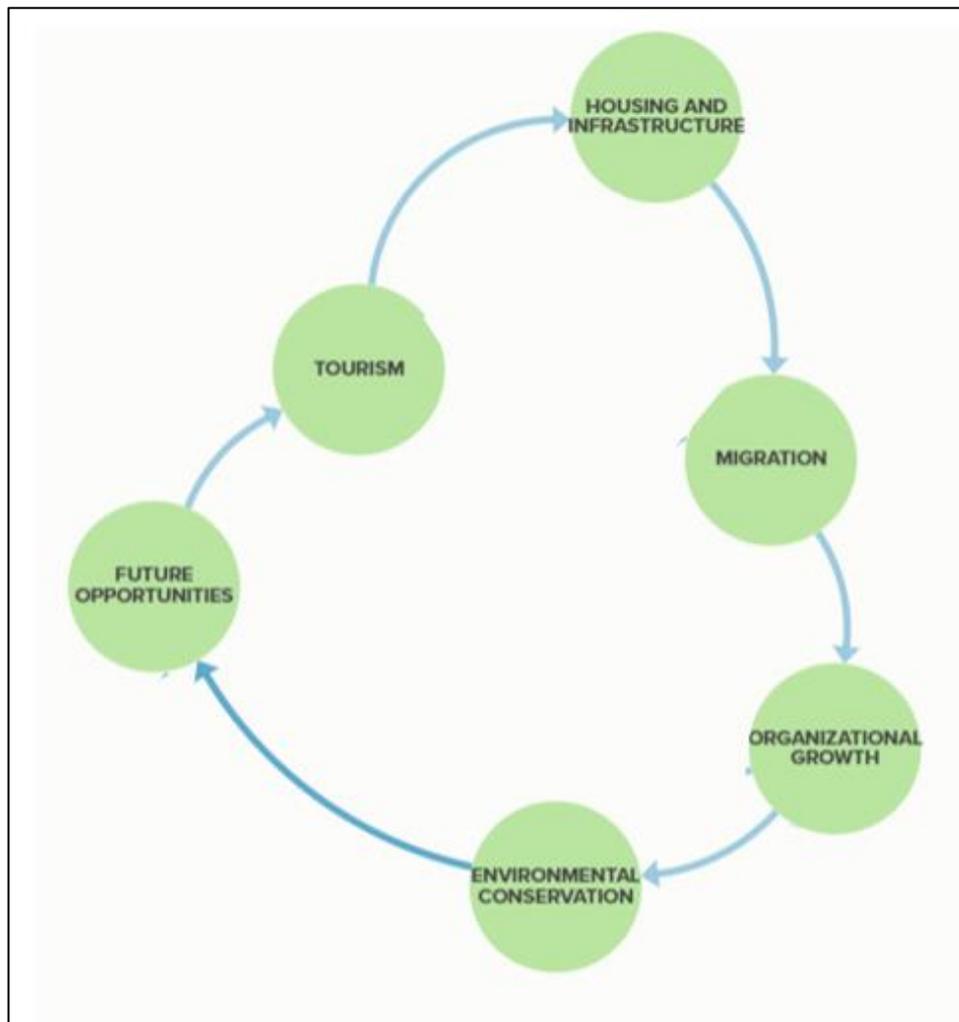


Figure 10. Case Study System Model; Loop 3, Source: author's own work.

The final feedback loop to be analyzed in this system emphasizes the intricate connections between organizational growth and environmental conservation. The expansion of Apadrina not only fosters economic development but also prioritizes the preservation of Oliete's natural resources. Alberto Pordomingo highlighted how leveraging local resources, particularly olive trees, promotes both economic sustainability and environmental protection. This organizational growth directly supports environmental conservation efforts, which, in turn, creates future opportunities for the region. The role of regional and national governments in promoting environmental policies is crucial in this context, as it enhances the viability of projects like Apadrina and encourages sustainable practices.

The interplay between environmental conservation and future opportunities extends to tourism, which is vital for Ollite's economic vitality. Carolina Serna and Jaime Grimaldo discussed how Apadrina indirectly promotes rural tourism by attracting visitors interested in the region's natural and cultural heritage. This influx of tourists underscores the need for adequate housing and infrastructure, a challenge frequently mentioned by interviews like Paola Caracocha. The scarcity of affordable housing and limited infrastructure impede the ability to accommodate new residents and tourists alike. As noted by Carolina Serna, addressing these challenges is crucial for facilitating migration and ensuring the sustainable growth of the community.

8 DISCUSSION

The analysis of the "Apadrina un Olivo" project reveals eleven principal variables crucial to understanding its impact on the revitalization of Oliete: employment opportunities, housing and infrastructure, community integration and social cohesion, rural depopulation and migration, economic development and the circular economy, environmental conservation, educational opportunities, healthcare services, tourism and the local economy, challenges of rapid organizational growth, and future vision and opportunities. These variables highlight both the successes and areas needing further development, emphasizing the importance of strategic planning, innovation, and inclusive practices in ensuring sustainable rural development. The exploration underscores the project's role in fostering economic growth and community resilience through a system innovation framework.

The system model for rural depopulation integrates key variables identified as crucial for understanding the complexities of depopulation, such as economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization (Chapter 2). This model provides a comprehensive understanding of depopulation by analyzing these interconnected elements. It aligns with the principles of system innovation, focusing on large-scale transformations across interconnected systems (Geels, 2004; OECD, 2013). This approach emphasizes the co-evolution of technological advancements, social interventions, and policy changes to achieve sustainable development goals, recognizing that rural depopulation interacts with social and infrastructural aspects as well.

"Apadrina un Olivo" exemplifies system innovation by demonstrating a comprehensive approach to socio-economic and environmental revitalization. The project's strategy of securing funds through private sponsorships and public grants, such as enabling individuals or companies to adopt an olive tree, engaged a diverse array of stakeholders, fostering community involvement and personal

investment in the project's success (Gascón, 2023) (A. Pordomingo, interview, May 2024). This model underscores the significance of incorporating diverse actors in driving systemic change, a fundamental principle of system innovation. Strategic custody agreements with owners of abandoned olive groves further align the project with system innovation principles, ensuring a sustainable and mutually beneficial arrangement.

Both models align with the core principles of system innovation, which emphasize large-scale transformations and stakeholder involvement. The rural depopulation model considers the interplay between niche innovations at the local level, existing systems like infrastructure and policies, and the broader economic and political context (Geels, 2004; Leonidou et al., 2020). Similarly, "Apadrina un Olivo" integrates various elements within the socio-technical system, catalyzing large-scale transformations through niche innovations like tree recovery efforts and their interactions with regime levels (agricultural practices) and the broader landscape (economic and policy context) (G. Cano, interview, May 2024). Both models highlight the importance of engaging diverse stakeholders to ensure solutions reflect various needs and foster broader support for the transition (Kemeny & Storper, 2020; MacKinnon et al., 2022).

"Apadrina un Olivo" serves as a practical example of system innovation, integrating economic, social, and environmental dimensions in a coordinated effort to revitalize rural areas. The project's multifaceted approach, involving large-scale transformations, multi-level interactions, and broad stakeholder involvement, provides valuable insights into achieving sustainable development (Satalkina & Steiner, 2022). By focusing on systemic changes and fostering collaborative efforts, the project addresses the interconnected challenges of rural depopulation and economic disparity, contributing to the long-term resilience and sustainability of marginalized regions (Capello & Nijkamp, 2009).

Comparing these two system models reveals both commonalities and distinct approaches to addressing rural depopulation. Both models emphasize the importance of interconnected variables and feedback loops in understanding and

addressing the complex dynamics of rural depopulation. The theoretical model provides a broader framework that includes economic, social, and policy factors, highlighting the importance of addressing spatial inequalities and selective migration. It offers a macro-level perspective on the systemic issues contributing to rural depopulation and emphasizes the need for comprehensive policy interventions and infrastructure development (Pike et al., 2023).

In contrast, the Apadrina un Olivo model offers a micro-level, practical application of system innovation principles. It focuses on the specific context of Oliete and demonstrates how targeted interventions, such as job creation, community integration, and environmental conservation, can effectively address rural depopulation (Castelló, 2023; Pike et al., 2023). This model highlights the importance of leveraging local resources, fostering social cohesion, and promoting sustainable practices to achieve economic and community resilience. The emphasis on stakeholder involvement and the holistic approach to economic, social, and environmental dimensions make this model particularly relevant for practical implementation in similar rural contexts (Gascón, 2023).

Finally, while the theoretical system model provides a comprehensive framework for understanding rural depopulation on a macro level, the Apadrina un Olivo model offers valuable insights into practical, community-based solutions. Both models underscore the importance of integrated strategies that address economic, social, and environmental factors, highlighting the need for innovative and inclusive approaches to promote sustainable development and resilience in rural areas.

9 CONCLUSIONS

This master thesis has provided an in-depth exploration of rural depopulation in Europe, beginning with a comprehensive framework to understand its multifaceted causes, consequences, and implications. The thesis delved into the overarching forces of globalization and neoliberal economic structures, revealing how these global processes significantly influence demographic trends and migration patterns in rural areas (Capello & Nijkamp, 2009; Piontek, 2019). By examining the role of economic policies in shaping regional disparities and exacerbating rural depopulation, this research provided a nuanced understanding of the economic drivers behind population decline. It also highlighted the urgent need for policy interventions to address these challenges, laying the foundation for subsequent analyses and discussions on sustainable development strategies (Harvey, 2007; Jessop, 2002).

The thesis focused on six critical variables essential for understanding and addressing rural depopulation in Europe: economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization. Each variable plays a significant role in shaping the dynamics and outcomes of rural depopulation, offering insights into the complex interrelationships that influence these processes (Lutz, 2020; Pike et al., 2023)(Pike et al., 2023; Lutz, 2020). The comprehensive analysis of these variables underscored the importance of considering economic, social, and infrastructural factors in developing innovative strategies to promote social and economic resilience in left-behind areas. This understanding is crucial for crafting targeted interventions and policy recommendations to address rural depopulation and promote inclusive growth (Capello & Nijkamp, 2009; Rodríguez-Pose, 2018).

The theoretical foundations and practical applications of system innovation were examined as a framework for addressing the challenges faced by Europe's "left behind areas." System innovation emphasizes large-scale transformations across interconnected socio-technical systems, focusing on structural changes that

extend beyond technological advancements (Geels, 2004; OECD, 2013). This approach highlighted the interplay between technological, business, and organizational innovations and their impact on social practices, ensuring a comprehensive understanding of sustainable development. By emphasizing the Multi-Level Perspective (MLP) and stakeholder involvement, this research established a robust theoretical foundation for applying system innovation to the challenges of rural depopulation (Leonidou et al., 2020; Satalkina & Steiner, 2022).

The methodological approach employed in this research utilized a qualitative empirical research to explore the system innovation approach for fostering social and economic resilience in "left behind areas" (Clarke & Braun, 2017; Pike et al., 2023). The methodology included a comprehensive literature review, system analysis, and a detailed case study of "Apadrina un Olivo," incorporating empirical research through semi-structured interviews. This approach ensured a rigorous analysis of the complex dynamics driving rural depopulation and the development of innovative solutions (Geels, 2004; Harrell & Bradley, 2009). The thematic analysis of interview data provided valuable insights into the project's contributions to economic resilience, social cohesion, and cultural revitalization in Oliete, demonstrating the practical implementation of system innovation in a specific context (Clarke & Braun, 2017).

The necessity of a holistic approach to understanding and addressing rural depopulation was underscored. By integrating key variables such as economic disparities, migration patterns, social cohesion, infrastructure development, policy interventions, and cultural revitalization, the proposed system model provided a comprehensive framework for analyzing the complexities of depopulation (OECD, 2013). The core feedback loops within the system model highlighted the interconnected nature of these variables and their collective impact on rural depopulation, revealing the intricate interplay between economic, social, and infrastructural factors (Geels, 2004; Satalkina & Steiner, 2022). This understanding is crucial for developing effective solutions that address the multifaceted nature of rural depopulation.

The analysis of the "Apadrina un Olivo" project revealed critical variables integral to understanding its impact on the revitalization of Oliete. The project exemplifies system innovation by integrating economic, social, and environmental dimensions into a coordinated effort to revitalize rural areas ((Gascón, 2023). The comprehensive exploration of themes such as employment opportunities, housing and infrastructure, social cohesion, migration, and environmental conservation underscores the project's role in fostering economic growth and community resilience. By addressing these interconnected challenges through strategic planning, innovation, and inclusive practices, "Apadrina un Olivo" highlights the potential of system innovation as a holistic framework for promoting sustainable development in marginalized regions (Berkhout, 2006; Leonidou et al., 2020). Future research could build on these findings to develop an integrated system model that combines both theoretical and practical approaches, further enhancing the ability to address the complexities of rural depopulation and promote sustainable growth.

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11 ANNEXES

- A. Interviews Questions.
- B. Interviews Recopilation.
- C. Thematic Analysis.