

DIGITAL TOOLS FOR RESILIENT REMOTE REGIONS: ONLINE SERVICES, REMOTE WORK AND SUSTAINABLE RURAL DEVELOPMENT

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Abstract

The article examines how digital tools, particularly remote work arrangements and online public services, can support the resilience and sustainable development of remote rural regions facing depopulation, ageing and declining access to essential services. The aim of the paper is to examine how digital tools, in particular remote work and online public services, can support the resilience and sustainable development of remote rural regions, and under what conditions they are most effective. Drawing on a scoping review of recent international literature on remote work, digitalisation of services, rural resilience and smart adaptation strategies, the paper organises the evidence into three interrelated strands: 1) remote work and rural coworking, 2) digital delivery of key services such as healthcare, administration and education, and 3) broader place-based governance approaches to shrinkage. The findings suggest that digital tools can enhance quality of life and indirectly support population retention, but only under specific conditions, including high-quality connectivity, inclusive digital skills, adequate local and multi-level governance capacity, and alignment between digital solutions, transport and physical service networks. The article concludes that digitalisation offers important but conditional opportunities for remote regions and should be treated as part of integrated, people-centred adaptation strategies rather than as a stand-alone response to rural depopulation.

Keywords: rural resilience, digitalisation, remote work, telehealth, population retention, smart adaptation.

Introduction

Remote rural regions across Europe and beyond face persistent structural challenges linked to depopulation, ageing, and declining access to essential services. Low population density, long distances to urban centres, and weaker economies of scale make it increasingly difficult to maintain conventional models of service provision in areas such as healthcare, education, public administration and transport (ESPON, 2020; OECD, 2025). At the same time, rapid advances in digital technologies, from high-speed broadband and telehealth to e-government platforms and remote work arrangements, are reshaping the spatial organisation of economic activity and public services (Brunori et al., 2022; Gullslett et al., 2024). For remote regions, these developments create both new opportunities and new risks: digital tools can help overcome distance, improve service accessibility and enhance quality of life, but they may also widen existing inequalities where connectivity, digital skills and institutional capacity are lacking (Komorowski, 2024; Monasterio et al., 2025).

The relevance of this paper lies in the fact that digitalisation is increasingly presented in policy and academic debates as a possible response to the structural disadvantages of remote regions, yet its actual contribution to resilience and sustainable rural development remains conditional and uneven. Existing studies often examine remote work, digital services, or rural resilience separately. The novelty of this paper lies in bringing these strands together and interpreting them within one integrative framework focused on remote rural regions.

Research aim: to examine how digital tools, in particular remote work and online public services, can support the resilience and sustainable development of remote rural regions, and under what conditions they are most effective.

The following objectives have been set to achieve the aim:

1. To synthesise recent international evidence on remote work, digitalisation of services and rural resilience in remote regions.
2. To assess how remote work and online service delivery can mitigate the constraints of remoteness, demographic decline and limited accessibility.
3. To identify the main enabling conditions and barriers affecting the effectiveness of digital tools in remote rural regions.
4. To derive policy-relevant insights for place-based strategies that seek to keep remote regions liveable, connected and socially sustainable.

Research object and methods

Research object - The research object is the relationship between digital tools, particularly remote work and online public services, and the resilience and sustainable development of remote rural regions.

Research methods. The research is based on a structured review of international literature, including peer-reviewed articles, comparative reports (e.g. OECD, Eurofound, ESPON) and policy documents related to rural depopulation, digitalisation and service delivery. Sources published mainly after 2019 were identified through database searches and targeted snowballing using combinations of keywords such as “remote regions”, “rural depopulation”,

“digitalisation”, “remote work”, “telehealth” and “e-services”. The selected studies were analysed through thematic synthesis, grouping evidence into three strands: remote work and mobility patterns, digitalisation of services (e.g. e-health, e-government), and rural resilience or smart adaptation. On this basis, the paper develops an integrative, conceptually oriented framework and derives policy-relevant insights rather than conducting new quantitative empirical analysis.

Research results and discussion

This section presents the main themes emerging from the literature review and discusses their implications for the resilience and sustainable development of remote rural regions. The findings are organised into three interrelated strands:

1. Remote work and changing mobility patterns,
2. Digitalisation of key services such as health,
3. Administration and education, and broader effects on rural resilience, quality of life and territorial cohesion.

Taken together, these strands provide the basis for an integrative interpretation of how digital tools can mitigate some of the constraints associated with remoteness and demographic decline.

The Nordregio report *Remote Work in Rural Areas: Possibilities and Uncertainties* (Bogason et al., 2024) examines how remote work can contribute to the resilience of rural and remote municipalities, based on a policy review and interviews with planners and practitioners in Nordic regions. Remote and hybrid work are presented as an increasingly normalised part of working life, with hybrid arrangements emerging as the dominant pattern for eligible occupations. However, formal remote-work policies are often lacking, and implementation is frequently left to individual organisations or managers, which produces uneven practices across workplaces (Bogason et al., 2024). At the municipal and regional level, remote work is widely viewed as a useful instrument for recruiting and retaining highly qualified labour, especially in smaller places facing staff shortages or high turnover, and is linked to broader demographic goals such as retaining current residents, attracting new inhabitants and supporting return migration. The report stresses that the potential of remote work is highly sector-dependent, as many jobs in rural and remote economies still require on-site presence, and therefore highlights the importance of enabling conditions, particularly digital infrastructure and the expansion of co-working spaces, as prerequisites for making remote work feasible outside metropolitan areas (Bogason et al., 2024). Co-working hubs are described not only as alternative workplaces but also as local innovation environments that strengthen networks and support regional development, yet the report emphasises that remote work alone is not sufficient to shape relocation or staying decisions, which also depend on access to services, housing and community life, and must be supported by coordinated, multi-actor strategies combining legal frameworks, infrastructure investment, skills development and institutional cooperation (Bogason et al., 2024). From the perspective of this paper, the Nordregio evidence confirms that remote work can strengthen the resilience of remote regions only when it is combined with investments in digital connectivity, co-working infrastructure and accessible local services.

The Eurofound working paper *Remote work in rural and peripheral areas: Characteristics, challenges and initiatives to support it* positions rural and peripheral coworking as a relevant mechanism for strengthening rural development in the context of expanding remote and hybrid work, while also noting that a large-scale post-pandemic “urban exodus” did not materialise (Bisello, Litardi, 2024). Rural coworking is presented to attract knowledge-based workers and entrepreneurs, diversify local economies and support digital infrastructure investment, while helping businesses broaden recruitment beyond major urban centres. Importantly for a population-retention perspective, the paper explicitly links coworking in rural areas to the retention of people (especially younger residents) and economic activity. At the same time, Eurofound emphasises that positive effects are conditional and that temporary relocations of remote workers may create adverse outcomes, including what the literature describes as an “invasion of urban hipsters”: increased demand for housing and land, gentrification pressures and additional strain on already fragile public service infrastructure (Bisello, Litardi, 2024). For this reason, the report argues for “resilient” coworking spaces that address local needs and generate community benefits (for example through training and learning activities), rather than functioning only as service points for a narrow group of mobile professionals. This logic is illustrated by the South Working initiative in Southern Italy, which emerged in 2020 to build sustainable remote-working conditions, improve territorial cohesion and reduce the outflow of human capital from southern and marginalised areas. The South Working network sets minimum hub requirements that combine social and accessibility conditions—an active local community, high-speed secure internet and proximity to major transport infrastructure—explicitly linking remote work expansion to broader mobility access in underserved regions (Bisello, Litardi, 2024). Many hubs operate in Italy’s “Inner Areas”, defined as territories distant from centres offering essential services and characterised by depopulation and decline, and rural hubs are described as particularly strong in fostering community ties, collaboration and knowledge exchange. The hubs are not treated merely as workplaces but as spaces for innovation and dialogue, often with amenities that improve everyday usability for local populations and returnees, including childcare and other facilities (Bisello, Litardi, 2024). A comparable but distinct model is the Kupland network in Southeast Estonia, a peripheral cross-border region facing a lack of well-paid jobs and out-migration of the working-age population. Kupland is described as a coordinated network of mostly rural local businesses providing remote-work facilities, supported by a dedicated network coordinator and quality standards tailored to individual workers, teams and families, which makes the initiative particularly relevant for family-oriented population retention strategies (Bisello, Litardi, 2024). The case shows how remote-work infrastructure can be embedded in a wider regional attractiveness and service ecosystem, combining workspaces with local hospitality, leisure and nature-based amenities, while building collaboration among businesses and local development actors. Visitor numbers increased strongly over time, and Eurofound points to broader regional benefits such as networking, local business cooperation and

a growing role for the network in public debate, suggesting that remote-work hubs can evolve into governance and development platforms rather than remain isolated workplaces. Overall, the Eurofound analysis supports a population-retention interpretation in which remote work contributes most effectively when it is integrated with digital and transport accessibility, local service capacity and community-based institutional arrangements.

One implication of the Eurofound evidence is that coworking and remote-work hubs should be seen as one specific expression of a broader digitalisation agenda, whose success depends on wider local capacities and digital inclusion in rural and remote areas. This broader perspective is developed by Komorowski (2024), who analyses digitalisation as a structural challenge for smart villages in Poland and shows that uneven access to high-quality connectivity and digital skills can significantly limit the ability of rural municipalities to benefit from such digital tools.

The article by Łukasz Komorowski, *Digitalisation as a challenge for smart villages: The case of Poland*, analyses digitalisation as a specific development challenge for rural areas in Poland within the EU's smart villages agenda. The starting point is that rural decline (including depopulation and ageing) and digitalisation are two parallel processes shaping contemporary countryside trajectories, and that smart villages explicitly aim to use the latter to counteract the former. The study operationalises the "digitalisation challenge" through two dimensions: access to fast internet infrastructure and the digital competences of residents, treated as complementary conditions for meaningful use of digital tools (Komorowski, 2024). Empirically, the paper covers all rural municipalities in Poland and combines a static perspective (current state of digitalisation) with a dynamic one (intensity of recent change), using multivariate comparative analysis to construct hierarchical classifications of municipalities. The results reveal strong spatial differentiation: some rural areas show relatively advanced digital infrastructure and competences, while others lag behind on both dimensions. Municipalities with predominantly ageing populations are found to face the greatest difficulties in adopting new digital technologies, which intensifies risks of marginalisation and weakens their ability to benefit from smart village initiatives. Digitalisation deficits also tend to overlap with other symptoms of rural decline, such as demographic shrinkage and weaker socio-economic performance. On this basis, the article argues that digitalisation cannot be treated as a uniform, low-cost solution for rural development, but rather as a place-specific challenge that requires targeted, territorially sensitive interventions. The author concludes that closing digital gaps, in both infrastructure and skills, is a precondition for improving quality of life, strengthening resilience and enabling smart village strategies in Polish rural areas. More broadly, the findings provide evidence to justify place-based digital investments in remote and declining rural regions as part of sustainable rural development and cohesion policy.

Building on this argument that uneven digital infrastructure and skills constrain the benefits of smart village strategies, the broader European evidence on telehealth development shows in very concrete terms how digital tools can (or cannot) sustain access to essential services such as healthcare in remote and sparsely populated regions (Gullslett et al., 2024).

The article *Telehealth development in the WHO European Region: Results from a quantitative survey and insights from Norway* (Gullslett et al., 2024) analyses how telehealth has evolved across the 53 Member States of the WHO European Region in the wake of the COVID-19 pandemic. It draws on the 2022 WHO/Europe Digital Health Survey, focusing specifically on telehealth programmes and three core service types: teleradiology, telemedicine and telepsychiatry. The study shows that these three services are now the most widespread telehealth applications in the Region, with teleradiology leading adoption and telemedicine and telepsychiatry also becoming increasingly common. Telehealth expanded rapidly during the pandemic, but the authors emphasise that its long-term role as a normal mode of care provision is still being defined and requires deliberate policy choices (Gullslett et al., 2024). Funding is identified as the most significant barrier to sustained telehealth implementation, followed by infrastructure gaps and shortages of human resources and capacity, especially in less advantaged settings. The paper also underlines that many countries lack comprehensive national strategies or robust monitoring and evaluation frameworks for telehealth, which limits the ability to assess safety, cost-effectiveness and equity impacts. Norwegian experience is used as an illustrative case, showing how long-standing teleradiology, newer telemedicine and telepsychiatry services, and regulatory changes can together embed telehealth more firmly in routine care (Gullslett et al., 2024). Across the Region, telehealth is presented as a way to improve access to services and move towards universal health coverage, particularly for people living in remote or underserved areas, provided that connectivity and service design are adequate. At the same time, the authors caution that simply having telehealth solutions in place is not sufficient: services must be integrated into redesigned, person-centred health and social care systems and adapted to local contexts (Gullslett et al., 2024). Overall, the article concludes that telehealth use is on the rise in the WHO European Region, but that regional disparities and structural barriers remain, and that overcoming them will be crucial if telehealth is to contribute systematically to resilient, equitable and geographically inclusive health systems.

Taken together, these findings position telehealth as a key digital tool for improving access to healthcare in remote and underserved regions, but they also raise the question of who is actually able to use such services in practice, an equity dimension examined directly by Monasterio et al. (2025) in their systematic review of digital inequalities in eHealth use.

The article *Digital Inequalities in the Use of eHealth Services in European Public Health Care Systems* (Monasterio et al., 2025) is a systematic review of observational studies that examines who actually uses key eHealth tools in Europe and who is being left behind. It focuses on four core interaction points between patients and public health systems: online appointment booking, teleconsultations, access to electronic health records, and integrated eHealth portals, which are increasingly promoted as ways to improve access and efficiency, including in underserved rural and remote areas. The authors systematically searched four major databases for studies published between 2015 and 2025 and identified 18 eligible quantitative studies, most of them cross-sectional and concentrated in northern and western Europe. Across these studies, they find consistent social gradients: older adults, people with lower education or socioeconomic status, ethnic minorities, migrants, those with limited digital skills or poorer health, and in some cases rural residents are systematically less likely to use eHealth tools than younger, better-educated and more affluent groups (Monasterio et al.,

2025). The review adopts a three-level digital divide framework, distinguishing inequalities in connectivity and devices, in digital skills and willingness to use technology, and in the actual health outcomes derived from digital tool use; breakdowns at any level tend to reinforce the next (Monasterio et al., 2025). The evidence shows that, even within universal public health systems, digital transformation has not benefited all population groups equally and may risk amplifying pre-existing health and territorial inequalities if equity is not explicitly addressed. Although many included studies are of high methodological quality, heterogeneity in designs, measures and populations limits comparability and makes it difficult to generalise precise effect sizes across countries. The authors argue that current monitoring of eHealth roll-out rarely includes robust, harmonised indicators of equity and that quantitative analyses disaggregated by key social determinants are still rare (Monasterio et al., 2025). They call for intersectional, equity-focused digital health policies that combine infrastructure and platform development with investment in digital skills, targeted support for disadvantaged groups and better measurement of digital inclusion (Monasterio et al., 2025). The article is highly relevant to debates on the sustainable development and resilience of remote regions, as it suggests that eHealth and other online services can be powerful tools for sustaining access in peripheral territories, but only if digital inequalities are systematically reduced so that rural, older and lower-income populations can actually use and benefit from these services.

These findings on digital inequalities in eHealth use point to a broader governance challenge: in many shrinking rural and remote areas, the capacity to deploy and coordinate digital tools is constrained by deeper structural patterns of decline and peripheralisation, which are examined in a more comprehensive territorial perspective by the ESPON ESCAPE project on European shrinking rural areas.

The ESPON ESCAPE project *The Future of Europe's Shrinking Rural Regions* (ESPON, 2020) analyses rural depopulation across Europe and shows that many territories are not only losing population but are also experiencing “complex shrinking”, in which demographic decline interacts with economic, social and institutional weaknesses. Rather than focusing solely on reversing out-migration, the project argues for adaptation strategies that maintain quality of life and well-being under conditions of long-term shrinkage. A key message is that digitalisation and advanced service models can help sustain access to essential services in sparsely populated areas, especially where traditional place-based delivery becomes financially or organisationally unsustainable (ESPON, 2020). ESCAPE explicitly highlights the importance of “smart” solutions, such as smart villages, shared and mobile services, and digital access points, as part of new territorial governance approaches for shrinking regions. In this view, investments in high-quality connectivity, digital public services, and remote access to healthcare or education are not merely efficiency measures, but core instruments of territorial cohesion for remote rural regions (ESPON, 2020). The project links these digital and organisational innovations to a broader place-based strategy that recognises the heterogeneous “syndromes” of decline, from locational disadvantage and peripheralisation to economic restructuring, and argues that responses must be tailored to specific territorial trajectories. Digitalisation can, for example, support the reconfiguration of service networks by concentrating some functions in regional centres while ensuring that citizens in more remote settlements retain access through online channels, mobile units, or hybrid service hubs (ESPON, 2020). ESCAPE therefore treats digital tools as enablers of both adaptation and selective mitigation: they can help sustain liveability for remaining residents and, where conditions allow, make some shrinking regions more attractive for return migrants, remote workers, and new residents. At the same time, the project warns that digital solutions cannot compensate for all structural disadvantages; they must be combined with improvements in governance capacity, local economic development, and multi-level coordination. For an agenda centred on rural population retention, the ESCAPE findings suggest that digitalisation is most effective when embedded in integrated, place-based strategies that realign service provision, infrastructure, and governance with realistic demographic expectations (ESPON, 2020). In other words, managing rural depopulation smartly is less about restoring past population levels and more about using digital and institutional innovation to keep shrinking regions liveable, connected, and socially sustainable.

Building on this perspective of “smart” adaptation to shrinking, the OECD report *Reinforcing Rural Resilience* further develops the idea that digitalisation, alongside other place-based interventions, is a core lever for strengthening the capacity of remote rural regions to absorb shocks, adapt and sustain quality of life over time.

The OECD report *Reinforcing Rural Resilience* (OECD, 2025) describes both the unique features (positive and negative) and the untapped opportunities of rural regions. Rural resilience is understood as the capacity of rural regions to maintain and improve well-being while adapting to shocks and long-term structural transitions, rather than merely “coping” with decline. The OECD frames this agenda as a roadmap for strengthening rural resilience through people-centred, place-based policies that explicitly recognise the heterogeneity of rural territories (e.g., rural regions near cities versus remote rural regions) and therefore the need for differentiated strategies. Rural regions face simultaneous megatrends such as the green transition, digitalisation and demographic change, and despite new opportunities many continue to experience persistent challenges such as population decline and ageing. Importantly, demographic outcomes vary by rural type: regions with stronger rural-urban linkages tend to perform better, whereas remote rural regions face greater risks of economic decline and population loss. The OECD stresses that, where population decline is severe, regions may be pushed into “downward spirals”, which makes targeted action urgent if shrinking is to be managed while retaining quality of life. A key mechanism behind such spirals is the erosion of access to essential services: low population density, remoteness and weak economies of scale raise per-capita costs for education, health care and other services, while limited infrastructure and longer travel times constrain practical accessibility. In this setting, weakening service availability and accessibility can amplify a perceived lack of opportunity and reinforce geographic inequality, thereby undermining the conditions under which households can plausibly remain in, or move to, rural places. Against this backdrop, rural resilience requires both leveraging local assets and competitiveness drivers and strengthening enabling conditions such as skills, entrepreneurship and digital connectivity. The report also points to implementation-relevant solutions, such as

blended digital-physical service delivery, co-location of services and addressing transport constraints. Overall, the OECD framework implies that durable population retention is closely tied to resilience-building: without coordinated, place-based investments that keep livelihoods, accessibility and essential services viable, any attempt to slow rural depopulation is unlikely to be sustainable.

Complementing this broad resilience framework, the OECD report *Shrinking Smartly and Sustainably: Strategies for Action* focuses more specifically on regions facing long-term demographic decline and develops a “smart adaptation” agenda in which digital service models and telehealth play a central role in maintaining quality of life under shrinking conditions.

The OECD report *Shrinking Smartly and Sustainably: Strategies for Action* (OECD, 2025) treats digitalisation as a core tool for maintaining quality of life in shrinking and ageing regions rather than as a secondary technological upgrade. The report argues that in places facing persistent depopulation, adaptation policies should prioritise continued access to essential services, especially healthcare, education and transport, using flexible delivery models such as digital platforms and mobile service hubs. A key example is the Swedish region of Norrbotten, where video healthcare consultations were introduced to serve low-density areas, illustrating how digital service delivery can support resilience without relying on unrealistic assumptions of renewed population growth. More broadly, the OECD recommends using digital technology and innovation to sustain service provision in sparsely populated territories, with explicit emphasis on education, healthcare and administrative services. In this perspective, investments in digital infrastructure and digital skills are not only efficiency measures but also instruments of territorial equity, because they help preserve access to services where conventional delivery models become costly or difficult to maintain. The report also highlights the role of AI-supported tools, particularly in healthcare and elderly care, which can extend service capacity by automating administrative tasks, supporting clinical decision-making and enabling remote care in regions facing workforce shortages and fiscal pressure. At the same time, the OECD stresses that digital adaptation must remain socially inclusive: governments should promote digital inclusion in underserved areas and ensure that older adults can access free digital-skills training through libraries, senior centres and helplines. Importantly, digitalisation is not framed as a substitute for physical accessibility; instead, the report recommends combining digital solutions with age-friendly transport, on-demand mobility and mobile service delivery (e.g. pharmacies, groceries, banking and public services), especially in remote areas. This integrated logic is reinforced by the recommendation to strengthen regional service centres that co-locate healthcare, education and digital access, with geospatial analysis used to optimise their location and improve service accessibility. In education, the OECD similarly recommends combining school network consolidation with targeted transport support and digital learning solutions, highlighting that accessibility and digital delivery should be designed together. For a population-retention agenda, these recommendations are highly relevant: they imply that digitalisation can help shrinking rural regions remain liveable and attractive, but only when embedded in broader place-based strategies that link digital access, local services, mobility and age-friendly community design.

Taken together, the reviewed studies suggest that digital tools can strengthen the resilience and sustainable development of remote rural regions in three main ways: by enabling remote work and new workspaces, by supporting digital delivery of key services (especially health and administration), and by underpinning smarter territorial governance and “smart adaptation” to shrinkage. At the same time, the evidence consistently shows that these benefits are conditional on a set of cross-cutting enablers: high-quality connectivity, digital skills and inclusion, and the capacity of local and multi-level governance to integrate digital solutions with service networks, transport and broader place-based strategies. In this perspective, digitalisation is not a stand-alone remedy for rural depopulation, but a powerful lever that can help remote regions remain liveable and attractive when combined with coherent investments in local services, accessibility and community-oriented institutional arrangements.

The SHERPA Discussion Paper *Digitalisation in Rural Areas* frames digitalisation as both a major opportunity and a structural challenge for rural and remote regions in the EU. It starts from the observation that rural and remote rural areas, while covering around 83% of EU territory, host a shrinking and ageing share of the population and face persistent deficits in access to essential services, infrastructure and fast broadband, which heighten risks of social exclusion and poverty. In this context, digitalisation is presented as a key enabler of sustainable development, capable of shortening distances, supporting the green transition and helping rural areas contribute to EU priorities such as the Green Deal, the Long-Term Vision for Rural Areas and the CAP/Farm to Fork agenda (Brunori et al., 2022). The paper emphasises that digital tools can make rural communities more attractive places to live by enabling remote work, online access to banking and public administration, participation in digital public spaces and easier interaction with healthcare and education systems. A central concept is the rural digital divide, described as a new layer of spatial inequality arising from gaps not only in infrastructure but also in skills and motivation to use digital technologies. Digital inclusion in rural areas depends on the interaction of three determinants: connectivity (e.g. high-capacity networks), digital capital (skills, devices, organisational capacity) and motivation (perceived usefulness and trust), all of which tend to be weaker in remote regions (Brunori et al., 2022). The paper also highlights the idea of Smart Villages as rural communities that use innovative, often digital, solutions to improve resilience by building on local strengths and opportunities, including new models of service delivery and local economic diversification. Digital technologies are shown to be “game changers” across domains: in agriculture and forestry (sensors, data analytics, automation) they can reduce physical labour, improve decision-making and indirectly reduce farm abandonment and depopulation; in rural life more broadly, cloud services, platforms and e-health tools can extend access to services and reinforce well-being in sparsely populated areas. At the same time, the paper warns that digitalisation can generate new risks, privacy and data-security concerns, new forms of digital social divide, potential job losses or cultural erosion, if not governed carefully and adapted to the specific needs of different rural territories (Brunori et al., 2022). Overall, SHERPA argues for sustainable digitalisation: strategies that combine infrastructure investment, skills

development and locally tailored digital solutions with strong local governance, so that digital tools genuinely support resilient, liveable and attractive rural and remote regions rather than reinforcing existing inequalities.

Overall, the reviewed studies show that digitalisation should be understood as a strategic but conditional resource for remote rural regions. Remote work, telehealth, e-services and smart village solutions can mitigate some of the disadvantages of remoteness, improve access to opportunities and support quality of life, but only when embedded in integrated, place-based policies. Across the literature, the most important enabling conditions are reliable connectivity, digital skills, social inclusion, accessible local services and effective governance. Without these foundations, digital tools may reproduce or even deepen existing territorial and social inequalities instead of reducing them.

Conclusions

The conclusions build on the identified patterns rather than individual case results and can be summarised in several general statements:

- Digitalisation offers structural, not marginal, opportunities for remote regions. Across the reviewed literature, digital tools emerge as potential levers for reshaping labour markets, service delivery and territorial governance in remote areas. Remote work, telehealth and e-services do not simply “add” a technological layer but can alter the conditions under which remote regions remain liveable and functionally connected to wider economies and institutions.
- The benefits of digital tools are strongly conditional and unevenly distributed. A consistent pattern is that positive effects depend on prior endowments: high-quality connectivity, digital skills, institutional capacity and a minimum level of service and housing provision. Where these conditions are weak, digitalisation can reproduce or even deepen existing socio-spatial inequalities, particularly for older, low-income and peripheral populations.
- Digitalisation works best as part of broader resilience and adaptation strategies, not as a stand-alone fix for depopulation. The literature on shrinking regions and rural resilience points to a shift from growth-oriented responses towards “smart adaptation”, where maintaining quality of life becomes as important as reversing population loss. Within this logic, digital tools are most effective when combined with investments in accessible services, mobility, age and family-friendly environments and community-based institutions.
- Remote work and digital services contribute to population retention indirectly, through liveability and opportunity structures. Rather than triggering a simple “urban exodus”, remote work and digital service provision influence rural population dynamics by shaping perceived opportunities, access to services and the attractiveness of everyday life. Their contribution to population retention therefore depends on how they are embedded in local ecosystems of workspaces, services, mobility and social infrastructure.

Taken together, these conclusions indicate that the objectives of the study have been met: the literature review not only maps existing initiatives but also reveals recurring mechanisms through which digital tools shape resilience and sustainable development in remote regions. Future research should therefore move beyond documenting individual projects towards systematically analysing how different combinations of digital interventions, institutional arrangements and territorial conditions affect long-term liveability and demographic outcomes in diverse types of remote rural regions.

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