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REPRODUCTION OF HUMAN CAPITAL IN RURAL AREAS OF THE EUROPEAN UNION: DEMOGRAPHIC, INSTITUTIONAL AND DIGITAL DIMENSIONS

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The article examines the reproduction of human capital in rural areas of the European Union as a continuous process of developing, utilising, renewing, and transmitting knowledge, skills, health, entrepreneurial potential, and social competencies across generations. The analytical focus is placed on the structural challenges common to European rural regions, including population ageing, the selective outmigration of young people, unequal access to education and healthcare services, the digital divide, the limited scope of local labour markets, and disparities in institutional capacity. The theoretical framework is established through the integration of classical human capital theory, endogenous growth theory, the concept of social capital, and the institutional approach. The analysis draws on recent data and materials from Eurostat and the European Commission, the instruments of the EU Common Agricultural Policy (CAP) 2023–2027, the Long-Term Vision for the EU's Rural Areas, LEADER, and Agricultural Knowledge and Innovation Systems (hereinafter – AKIS), as well as findings from contemporary academic research on rural development issues. It is substantiated that the sustainability of human capital is determined not only by individual investments in education and health but also by territorial conditions that enable the accumulation and productive utilisation of the competencies. An ecosystem model of human capital reproduction is proposed, in which the population and local communities constitute the core, educational, healthcare, entrepreneurial, advisory, and innovation organisations form the operational level, while the instruments of the EU and its member states constitute the strategic level of coordination and resource provision. The complementarity of policies aimed at generational renewal, digital inclusion, lifelong learning, service accessibility, economic diversification, and place-based governance is demonstrated. It is determined that human capital reproduction policy should take into account not isolated sectoral indicators but rather the capacity of a territory to develop, retain, attract, and productively utilise human capabilities. The proposed provisions can be applied to comparative analyses of rural regions in EU member states and to the development of integrated territorial development programmes.

Keywords: human capital; rural areas; European Union; demographic change; digital divide; lifelong learning; CAP; LEADER; rural development.

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ВІДТВОРЕННЯ ЛЮДСЬКОГО КАПІТАЛУ СІЛЬСЬКИХ ТЕРИТОРІЙ ЄВРОПЕЙСЬКОГО СОЮЗУ: ДЕМОГРАФІЧНИЙ, ІНСТИТУЦІЙНИЙ ТА ЦИФРОВИЙ ВИМІРИ

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У статті досліджено відтворення людського капіталу сільських територій Європейського Союзу як безперервний процес формування, використання, оновлення та передачі знань між поколіннями, навичок, здоров'я, підприємницького потенціалу й соціальних компетентностей. Аналітичний акцент зосереджено на структурних викликах, спільних для європейських сільських регіонів: старінні населення, вибірковому відпливі молоді, нерівному доступі до освіти й медичних послуг, цифровому розриві, вузькості локальних ринків праці й неоднаковій інституційній спроможності. Теоретичну основу сформовано завдяки поєднанню класичної теорії людського капіталу, теорії ендогенного зростання, концепції соціального капіталу й інституційного підходу. Для аналізу використано сучасні матеріали Eurostat, Європейської Комісії, інструменти Спільної аграрної політики ЄС 2023–2027, Довгострокове бачення розвитку сільських територій ЄС,

LEADER і систем сільськогосподарських знань й інновацій (далі – AKIS), а також результати сучасних наукових досліджень проблематики сільського розвитку. Обґрунтовано, що сталість відтворення людського капіталу визначається не лише індивідуальними інвестиціями в освіту й здоров'я, а й територіальними умовами для накопичення та продуктивного використання компетентностей. Запропоновано екосистемну модель відтворення людського капіталу, у якій населення і місцеві спільноти формують ядро, освітні, медичні, підприємницькі, консультаційні й інноваційні організації – операційний рівень, а інструменти ЄС і держав-членів – стратегічний рівень координації та ресурсного забезпечення. Доведено взаємодоповнюваність політик поколіннєвого оновлення, цифрової інклюзії, навчання впродовж життя, доступності послуг, диверсифікації економіки й територіально орієнтованого врядування. Визначено, що політика відтворення людського капіталу має враховувати не окремі галузеві показники, а здатність території формувати, утримувати, залучати й продуктивно використовувати людські спроможності. Запропоновані положення можуть застосовуватися для порівняльного аналізу сільських регіонів держав-членів ЄС і розроблення комплексних програм територіального розвитку.

Ключові слова: людський капітал; сільські території; Європейський Союз; демографічні зміни; цифровий розрив; навчання впродовж життя; CAP; LEADER; сільський розвиток.

Табл.: 4. Літ.: 20.

Formulation of the problem. In contemporary economic scholarship, human capital is increasingly viewed not merely as an individual stock of education and professional experience but, to a greater extent, as a resource for territorial development. This distinction is of particular importance for rural regions. An individual may possess a high level of formal education, digital competencies, or entrepreneurial skills; however, the developmental impact of these assets depends on whether the territory provides employment opportunities, accessible services, adequate transport and digital connectivity, effective institutions, and social networks within which such capabilities can be realised. Therefore, the reproduction of human capital in rural areas should be analysed not solely as investment in the individual but as a system of interaction between people and the territory.

Rural regions of the European Union are simultaneously affected by long-term demographic, economic, and institutional factors. Eurostat data indicate a less favourable age structure of the population in rural regions compared with urban regions: in 2023, the share of the working-age population was approximately 57% in rural regions, compared with 60% in urban regions, while the proportion of people aged 65–79 accounted for 17% and 14%, respectively [14]. Such an age structure affects labour supply, demand for healthcare and care services, the intergenerational transmission of knowledge, and the financial capacity of local institutions.

The problem is further exacerbated by selective migration. Young and highly educated people are more mobile and tend to gravitate towards urban agglomerations, university centres, and more diversified labour markets. The resulting effect is not limited to population decline but also entails a qualitative loss of skills, entrepreneurial potential, leadership, and innovation capacity. Such losses may initiate a cumulative process: declining population density undermines the economic viability of schools, healthcare facilities, retail services, and public transport, while

the weakening of the service sector, in turn, reduces the attractiveness of the territory for households and businesses.

At the same time, the European policy environment creates opportunities to slow down or reverse these trends. The EU Common Agricultural Policy (CAP) for 2023–2027 explicitly includes generational renewal, the viability of rural areas, knowledge, and innovation among its ten key objectives [16]. LEADER supports community-led local development, while Agricultural Knowledge and Innovation Systems (AKIS) bring farmers and other members of local communities together with advisory services, research, education, and innovation. Digitalisation strategies within the national CAP Strategic Plans increasingly encompass broadband access, digital skills, Smart Villages, and the adoption of advanced technologies. Taken together, these instruments make the EU an important context for studying institutional mechanisms for the reproduction of human capital in rural areas.

Thus, the scientific problem addressed in this article lies in determining the nature of the interaction among demographic, educational, digital, economic, and institutional factors in the process of human capital reproduction in EU rural areas, as well as identifying combinations of policy instruments that most effectively transform the individual capabilities of the population into sustainable territorial development.

Analysis of recent research and publications. The theoretical foundations of the human capital concept were shaped by H. Congna and N. Saad, G. Becker, J. Mincer, who treated education, professional training, and health as investments capable of increasing labor productivity and future earnings [1–3]. Their contribution remains fundamental as it explains the long-term economic return on human development expenditures. At the same time, a purely individualistic interpretation is insufficient to explain rural development, where the return on skills significantly depends on spatial accessibility, local labor demand, and the quality of institutions.

Endogenous growth theory expanded this approach by directly incorporating knowledge accumulation and innovation into the mechanism of economic growth. R. Lucas demonstrated that human capital creates externalities that increase the productivity not only of an individual worker [4], while P. Romer emphasized the role of knowledge as a non-rival resource of technological change [5]. For rural areas, these propositions substantiate the need to develop the knowledge dissemination, advisory systems, clusters, demonstration farms, vocational education, and digital networks, rather than formal schooling alone.

Another research direction links human capital with social and institutional capital. M. Granovetter proved the importance of social networks and «weak ties» for access to information and opportunities [6], whereas J. Coleman viewed social capital as a resource embedded in relations and capable of facilitating joint action [7]. These findings are particularly important for sparsely populated areas, where trust, cooperation, and local leadership partially compensate for limited market scale. Consequently, place-based development depends on both competencies and the networks through which these competencies are mobilized.

Contemporary European studies increasingly examine the human capital of rural areas through demographic and digital dimensions. M. Klonowska-Matynia defines human capital as a source of socio-economic differentiation of rural areas in Poland and proves its connection to development potential [8]. M.-Á. Esteban-Navarro and co-authors show that the rural digital divide in Europe is associated not only with infrastructure access, but also with the ability to effectively utilize digital technologies [9]. L. Norris emphasizes that broadband internet acquires economic significance only when rural enterprises are able to translate connectivity into new markets, organizational models, and productivity gains [10]. Research on depopulation also demonstrates that population decline must be analyzed in interconnection with aging, selective migration, and changing service accessibility [11–13].

At the same time, a gap persists in the scientific literature between separate analytical directions. Demographic studies predominantly focus on population decline, digital studies on connectivity, and agrarian policy works on farmers' activities or farm modernization. Less attention is paid to the actual mechanism of human capital reproduction that connects these dimensions: how rural areas form competencies, retain or attract population, ensure the productive use of skills, and renew them across generations. This article proposes bridging this research gap through an integrated EU-level approach.

Formulation of the goals of the article. The purpose of the article is to substantiate an integrated approach to the reproduction of human capital in rural areas of the European Union and to determine the demographic, educational, digital, economic, and institutional mechanisms for its long-term renewal.

Presentation of the main research material. The human capital of rural areas should be defined as a place-based set of knowledge, skills, health status, experience, entrepreneurial abilities, and adaptive competencies of the rural population, activated through local labor markets, institutions, and social networks. The concept of «place-based» (or «territorially anchored») is of fundamental importance, since the value of human capital is partially determined by local opportunities for its application. A highly skilled resident who lacks access to appropriate work, reliable internet, or professional networks will either underutilize the acquired competencies or migrate. In both cases, the territory receives a lower return on prior educational and social investments.

From this perspective, the reproduction of human capital encompasses four interrelated stages: formation, productive use, development, and intergenerational renewal. Formation includes schooling, professional training, health, the family environment, and early access to digital technologies. Productive use is realized through employment, entrepreneurship, and civic participation. Development implies lifelong learning, retraining, and access to innovations. Intergenerational renewal is associated with demographic replacement, youth retention, succession in farming and business, as well as the transfer of formal and informal knowledge. A disruption at any of the stages weakens the entire reproduction cycle.

The generalization of theoretical approaches to the reproduction of rural human capital is presented in Table 1.

Table 1

Theoretical Approaches to the Regeneration of Human Capital in Rural Areas

Approach	Basic provision	Importance for rural areas in the EU	Political conclusion
Classical theory of human capital	Education, training, and health increase productivity and income.	Returns depend on access to education, healthcare, and job.	Expand access to education, health, and lifelong learning.
Endogenous growth	Knowledge and innovation create long-term growth.	AKIS, advisory and technology networks spread knowledge.	Combine science, education, farms, SMEs and innovation networks.
Social capital	Trust and networks facilitate cooperation and information exchange.	Local connections support entrepreneurship and joint projects.	Develop LEADER, cooperatives, associations and partnerships.
Institutional approach	The quality of governance determines incentives and resource allocation.	Weak institutions reduce the return from investment of people.	Strengthen local governance, coordination, and funding stability.
Capability approach	Development is the expansion of substantive opportunities to choose and act.	Human capital policy must address services, mobility, inclusion and quality of life, not only employment.	Evaluate outcomes in terms of opportunities and accessibility.

Source: compiled by the author based on [1–7]

The theoretical approaches presented in Table 1 indicate that the reproduction of human capital in rural areas is a complex process and cannot be reduced solely to investments in education and professional training. Its effectiveness is determined by the interplay of individual characteristics of human capital, processes of knowledge accumulation and dissemination, social ties, the quality of the institutional environment, and the availability of basic opportunities for the population. In the context of rural areas in the EU, this justifies the need for an integrated approach in which educational, social, digital, innovation, and institutional policies interact with local development mechanisms. Accordingly, the reproduction of human capital should be viewed as a territorially determined process, the effectiveness of which depends not only on the accumulation of knowledge, skills, and competencies, but also on the availability of conditions for their application.

Demographic trends are the most obvious constraint on the reproduction of human capital in rural areas of the EU. Population aging reduces the proportion of the working-age population relative to the number of people requiring pensions, medical care, and long-term care. It also alters the structure of local demand and increases the importance of succession in farms, small businesses, and community organizations. The problem lies not only in the aging of the age structure of the rural population, but in its combination with selective migration and low population density.

According to Eurostat, a comparison of EU countries by type of territory in 2023 shows that people aged 65–79 accounted for 17% of the population in rural regions, compared with 14% in urban areas, while the share of the working-age

population was three percentage points lower in rural regions [14]. EU averages mask significant differences among the member states; however, the overall trend of this gap is consistent enough to justify a separate policy on human capital in rural areas. When young people leave and the older population remains, local knowledge is preserved for a time, but the ability to revitalize businesses, adopt technology, and maintain service systems gradually weakens.

The problem is particularly evident in the generational renewal of agriculture. The European Commission identifies access to land, high land prices, low profitability, limited access to credit, and insufficient availability of the services and broadband internet as key barriers for young farmers [17]. The CAP 2023–2027 requires member states to allocate resources to support young farmers and allows for the combination of income support, start-up assistance, investment tools, and cooperation mechanisms for farm succession. This is not merely an agricultural measure, but a mechanism for revitalizing of rural entrepreneurship and retaining of young, skilled residents.

At the same time, generational renewal should be viewed in a broader context.

Human capital in rural areas is replenished not only through farmers, but also through teachers, healthcare workers, engineers, care professionals, entrepreneurs, public administrators, and cultural figures. Policies focused solely on succession in the agricultural sector will not solve the demographic problem if the partners and children of young farmers do not have access to schools, healthcare, housing, transportation, or jobs outside of agriculture. Therefore, a territorial approach should combine generational renewal with infrastructure that supports quality of life and diversified local labor markets.

Education is the primary mechanism for building human capital; however, in rural policy, it is important to consider not only the educational outcomes but also the geographical accessibility of education. The distance to upper secondary, vocational, and higher education institutions can affect participation in education, especially when public transportation is inadequate. Closing or consolidating of local schools can improve the efficiency of individual institutions but, at the same time, increase travel times and weaken the school's role as a hub of the local community. Therefore, the quality and spatial organization of education should be evaluated together.

The transition from education to employment also has territorial specificity. In 2023, 11.2% of young people aged 15–29 were not in employment, education or training at EU level [15]. In rural areas, an additional constraint is the concentration of entry-level jobs in a narrow range of sectors.

This creates a paradox: raising educational levels without expanding local opportunities can accelerate population outflow, as better-prepared youth possess higher mobility. Consequently, policy must combine skill-building with the creation of jobs where these skills are actually in demand.

Lifelong learning acquires special significance amidst the technological and ecological transformation of the rural economy. Precision agriculture, renewable energy, digital services, food processing, the care sector, tourism, and the circular bioeconomy require a combination of technical, entrepreneurial, and digital competencies.

Short modular courses, micro-credentials, mobile training centers, blended learning, and workplace-based learning can reduce the spatial barrier that often limits the adult population's participation in education. A practical institutional foundation for this is provided by AKIS (Agricultural Knowledge and Innovation Systems). Within the CAP 2023–2027, advisory services for farmers are integrated into national agricultural knowledge and innovation systems and are designed to cover economic, environmental, and social issues, as well as innovation and digitalization [18]. Despite the agricultural focus of AKIS, the logic of their functioning is valuable for broader rural human capital policy: knowledge must circulate through networks connecting science, advisory services, businesses, public institutions, and end-users, rather than being transmitted solely in a one-way direction from educational establishments.

Digital connectivity has become a basic condition for human capital reproduction. Broadband internet can mitigate the negative impact of distance by expanding access to online education, telemedicine, public services, e-commerce, remote work, and professional networks. However, infrastructure is only the first level of digital inclusion. Research on rural areas in Europe demonstrates the existence of a second digital divide – in skills, user confidence, and the ability to translate network access into economic and social value [9].

This distinction is of fundamental importance for policy formulation. A village may formally have broadband coverage, yet older residents, micro-enterprises, or low-income households may remain disconnected from digital opportunities. Conversely, digital skill programs have limited efficiency if connection quality is unstable or modern digital services are unavailable. Therefore, an effective human capital development policy should simultaneously coordinate three levels: infrastructure, competencies, and productive applications of digital technologies. The CAP 2023–2027 explicitly integrates digitalization strategies into national strategic plans. Among the support instruments are investments in broadband networks and digital technologies, precision agriculture, Smart Villages, advisory services, digital skills training, cooperation, and knowledge exchange [19]. The significance of such instruments for human capital is substantial: digitalization expands the market geography for rural specialists and enterprises, makes specialized services accessible remotely, and creates new incentives for qualified people to stay or move to rural areas.

At the same time, digitalization can deepen inequality. Innovative farms and enterprises are able to adopt technologies faster, while micro-businesses and older residents risk falling behind. Automation can reduce the demand for routine labor if it is not accompanied by retraining. That is why the digital transition should be viewed as a human capital development strategy rather than a hardware purchasing program. Performance indicators should reflect actual technology adoption, skill levels, business model changes, service utilization, and employment outcomes, rather than just the number of connections or devices.

The reproduction of human capital in EU rural areas is constrained by a combination of interconnected demographic, educational, digital, economic, and institutional barriers. Their systematization and the corresponding EU-level response mechanisms are summarized in Table 2.

Table 2

Key barriers to the reproduction of human capital in rural areas of the EU and response mechanisms

Barrier	Mechanism of human capital loss	EU-level response
Aging and youth drain	Reduction of labor, successors, and entrepreneurial potential.	Generational renewal, provision of housing, utilities, mobility, youth entrepreneurship.
Educational and competency gap	Skills mismatch with new sectors and weaker participation in learning.	Mixed vocational education, microqualifications, lifelong learning, AKIS.
Digital divide	Limited access to remote work, e-services and markets.	Broadband Internet + Digital Skills + Smart Villages.
Narrow employment structure	Underuse of skills and increased migration.	Recycling, services, care, tourism, renewable energy and bioeconomy.
Weak access to healthcare and care	Lower quality of life, reduced labour participation and attractiveness to families.	Telemedicine, mobile services, integrated local service hubs and care innovation.
Institutional fragmentation	Duplicated measures, weak implementation and low trust.	Place-based strategies, LEADER, multi-level governance and integrated funding.

Source: summarized by the author based on [8–13]

The barriers to the reproduction of rural human capital are complex and mutually reinforcing, which necessitates an integrated approach to overcoming them. The reproduction of human capital requires not only the formation of competencies, but also the availability of opportunities for their utilization. Rural labor markets are often smaller and less diversified than urban ones, and employment can be concentrated in agriculture, public services, and a limited number of local enterprises. Such a structure increases vulnerability to sectoral shocks and narrows professional trajectories for educated youth.

Therefore, economic diversification is a direct instrument for human capital development. The food industry, rural tourism, renewable energy, environmental services, the care economy, crafts, cultural and creative industries, logistics, and digital professional services can expand employment choices. Diversification is of particular value when it creates complementarity with the territory's existing resources, rather than trying to copy the urban economic structure. For example, renewable energy projects create technical and service jobs; tourism generates demand for competencies in hospitality, marketing, and cultural heritage; short food supply chains stimulate skills in processing, branding, and e-commerce.

Remote and hybrid work opens up additional opportunities because it allows separating the place of residence from the employer's location and potentially attracting or retaining highly qualified workers. However, remote work on its own does not ensure the restoration of the local economy. Its territorial effect depends on housing, childcare, broadband internet, transport, social integration, and whether new residents interact with local businesses and organizations. The task of policy is to

transform individual migration into sustainable territorial rooting.

Entrepreneurship is of no less importance, as small enterprises dominate many rural economies. Access to finance, mentoring, digital trading platforms, and business networks determines whether local ideas can transform into viable enterprises. Therefore, rural business support policy must combine financial instruments with advisory and educational support. This reduces the risk of a situation where grants finance individual assets but do not improve the managerial capacity of entrepreneurs.

Health is a component of human capital because it affects productivity, labor force participation, learning ability, and the capacity to remain economically active at an older age. In sparsely populated areas, significant distances to primary healthcare, specialized medicine, and long-term care can be a substantial limitation. Given the aging population of rural regions, the significance of this factor is steadily growing.

The availability of services also influences migration decisions. A young professional may agree to work in a rural area, but leave it in the absence of adequate childcare, quality education, or medical care. Therefore, labor shortages in rural areas cannot always be overcome solely by raising wages. Quality-of-life infrastructure is part of the «territorial employment package». For this reason, the long-term viability of rural services should be viewed as an investment in human capital retention.

Digital and mobile service delivery models can increase accessibility, but they must complement rather than completely replace physical infrastructure. Telemedicine is most effective when digital skills, appropriate devices, reliable connectivity, and access to local specialists capable of conducting examinations or follow-up patient care are available. Similarly, multifunctional community centers can combine administrative, educational, cultural, and social functions in a single space, increasing efficiency without completely losing the local presence of services.

There is no single policy in the European Union named «rural human capital». Relevant measures are distributed among agricultural policy, cohesion policy, social, digital, research, and educational policies. Therefore, the analytical task consists of determining ways to combine these instruments around territorially significant outcomes.

The most pronounced framework for rural areas is formed by the CAP 2023–2027. Its ten objectives include generational renewal, the viability of rural areas, and knowledge and innovation [16]. National CAP strategic plans transform these objectives into measures adapted to the conditions of member states, while LEADER implements a «bottom-up» approach in which local action groups develop and implement local development strategies. The significance of LEADER is not limited to project financing: this approach is capable of strengthening trust, leadership, and networking capacity – that is, the components of social and institutional capital.

The European Commission's rural development policy architecture also supports Smart Villages approaches and digitalization. Their importance lies in the possibility of organizing policy around functional problems – mobility, energy, care, competencies, or access to services – instead of dividing it solely by administrative sectors. The reproduction of human capital is inherently a cross-sectoral process, which is why strategies like Smart Villages can serve as a platform for integrating these directions.

At the same time, the policy framework should avoid excessive fragmentation. The rural population perceives education, employment, mobility, healthcare, and digital access as a single living environment, whereas public programs often treat them separately. A place-based strategy should begin with the demographic and competency profile of the territory, and then combine the instruments of various funds around a limited number of measurable outcomes. In this context, key EU instruments and approaches relevant to the reproduction of rural human capital are systematized in Table 3.

Table 3

European Union instruments relevant to the reproduction of rural human capital

EU Instrument / Approach	Human Capital Function	Expected Territorial Effect
CAP 2023–2027	Generational renewal, knowledge exchange, investments, rural development.	Farming and entrepreneurship renewal; stronger innovation capacity.
LEADER / CLLD	Local participation, networking, project design, and leadership.	Social capital, locally tailored solutions, institutional learning.
AKIS and Advisory Services	Knowledge transfer, training, innovation brokerage, digital advisory.	Faster adoption of technologies and new competencies.
Smart Villages / Digitalisation	Combining digital solutions with services, business, and community needs.	Better access to opportunities and reduced spatial constraints.
Cohesion and Social Policy Instruments	Infrastructure, employment, skills, social inclusion, and regional convergence.	Broader labour markets and improved quality of life in lagging territories.
Long-Term Vision for EU Rural Areas	Cross-policy orientation towards stronger, connected, resilient, and prosperous rural areas.	Strategic coordination and rural proofing of policies.

Source: summarized by the author based on [16–20]

The diversity of EU rural areas makes it impossible to mechanically copy a single national model; however, European practice demonstrates common principles. Poland illustrates the importance of EU funding for farm modernization, entrepreneurship, and infrastructure. Germany combines dual vocational education, service accessibility, and a policy of more equal living conditions. Nordic member states emphasize digital infrastructure and remote services in sparsely populated areas, while southern countries more actively use innovation, tourism, and place-based initiatives to counteract depopulation.

The European Union should be viewed as a separate level of analysis that establishes shared goals, funding rules, networks, and regulatory frameworks. Its role is to stimulate coordination, experimentation, and knowledge exchange among member states. The EU CAP Network, EIP-AGRI, LEADER networks, and transnational projects accelerate the spread of successful practices.

Successful human capital policy is predominantly comprehensive in nature: training is more effective when linked to employment or entrepreneurship; grants are more impactful alongside advisory services; retaining young people requires housing and childcare; broadband works best when combined with digital skills and business transformation. Such an approach reduces the risk of removing one barrier while leaving others intact. The specifics of implementing this comprehensive approach at the EU level and across individual groups of member states, as well as the relevant guidelines for strengthening rural human capital, are summarized in Table 4.

Table 4

Comparative approaches to strengthening human capital in rural areas

Territory / Level	Key Tools	Human Capital Focus	Lesson
European Union	CAP, LEADER, AKIS, Smart Villages, cohesion policy.	Generational renewal, skills, innovation, networks.	Coordinate funds around territorial outcomes.
Poland	CAP modernization, entrepreneurship, LEADER, infrastructure.	Retaining active population and skills upgrading.	Combine physical investments with entrepreneurship development.
Germany	Dual education, accessible services, digital initiatives.	Professional skills and attractiveness for young specialists.	Combine the labour market with quality of life.
Nordic EU countries	Digital services, broadband, remote models, innovation.	Digital capacity in sparsely populated areas.	Treat digitalisation as an infrastructure of services and skills.
Southern EU rural regions	Diversification, tourism, local products, renewable energy and anti-depopulation initiatives.	Entrepreneurship and new income sources outside conventional agriculture.	Use territorial assets to create diversified career pathways.

Source: author's synthesis based on [8–20]

The analysis conducted provides grounds to treat the reproduction of human capital in rural areas as an ecosystem. Its core is formed by residents and households who make decisions regarding education, work, migration, entrepreneurship, and family. The operational level encompasses educational and medical institutions, businesses, farms, advisory services, local authorities, civil society, and digital platforms. The strategic level – comprising EU policy, national, and regional instruments – provides regulation, funding, standards, data, and coordination.

Unlike a linear model, the ecosystem approach implies continuous feedback. The population signals its needs through labor market behavior, migration, service usage, and civic engagement; local institutions translate these into projects and strategies; higher policy levels provide resources and receive data on outcomes. Knowledge also flows bidirectionally – from science and advisory services to local community members, and from practice to research and programs.

The goal is not merely to increase the educational potential of communities, but to build a self-sustaining territorial system in which the population can acquire,

utilize, update, and pass on competencies to the next generation without forced migration due to structural shortcomings. This requires basic accessibility of services and a sufficiently diversified structure of opportunities.

For assessment purposes, a dashboard of indicators is appropriate, covering demographic renewal, education, health, access to services, employment diversification, entrepreneurship, digital skills, social participation, innovation, and institutional capacity. Monitoring must distinguish between input resources, intermediate results, and final impacts – population retention, productivity, income, quality of life, and demographic stability.

Strategic priorities for EU rural areas:

1. Turn generational renewal into a territorial goal – support for young farmers must be aligned with housing policy, childcare, mobility, partner employment, access to land, and start-up financing. Rural youth policy should cover both agricultural and non-agricultural career paths.

2. Build a lifelong learning infrastructure in rural areas – member states should expand blended vocational training, short modular programs, micro-credentials, and mobile forms of training. Programs should be co-designed with employers, advisory organizations, and local authorities to reduce the mismatch between skills supply and demand.

3. Shift from broadband coverage policy to digital capacity policy – digital policy must combine high-quality connectivity, digital literacy, cybersecurity awareness, business digital transformation, e-governance, and remote service delivery. Targeted support is needed for older residents and micro-enterprises.

4. Diversify rural labor markets – policy should support processing/manufacturing, the care sector, tourism, renewable energy, circular bioeconomy, creative industries, and remote professional services so that rising educational attainment does not automatically heighten incentives for migration.

5. View basic services as productive infrastructure – healthcare, education, childcare, mobility, and cultural services directly affect labor supply and territorial attractiveness. Their value should be evaluated through long-term demographic and economic outcomes, rather than solely through current maintenance costs.

6. Strengthen place-based institutions and social capital – governance modeled on LEADER, local action groups, cooperatives, and cross-sectoral partnerships can mobilize local knowledge, build trust, and reduce the fragmentation of interventions.

7. Integrate policy evaluation – EU and member state monitoring systems must measure whether interventions genuinely improve the formation, retention, and utilization of human capabilities. The absorption rate of funding alone is not a sufficient indicator of impact on human capital.

Conclusions. The study confirms that the reproduction of human capital in EU rural areas is a multidimensional territorial process. Classic investments in education, vocational training, and healthcare remain necessary, but they are not sufficient on their own. The developmental impact of human capital depends on whether rural areas provide opportunities for skill utilization, accessible services, digital connectivity, diversified employment, and institutions capable of coordinating local development.

Demographic aging and youth outflow represent core risks, as they weaken both the quantitative labor base and the qualitative capacity for entrepreneurship, leadership, and innovation. EU-level data indicate a structurally older population in rural regions and a lower proportion of working-age individuals compared to urban areas. Therefore, generational renewal should be interpreted more broadly than merely transferring farms to the younger generation; it must be linked to the overall attractiveness of rural areas for young households and professionals.

The analysis of human capital also demonstrates that digitalisation is simultaneously an infrastructure policy and a human capital policy. Broadband internet yields limited territorial returns if the population and businesses lack the skills and organizational capacity to utilize it. Conversely, digital competencies cannot compensate for inadequate connection quality. Consequently, integrated strategies must coordinate infrastructure, training, and the practical application of digital technologies.

The CAP 2023–2027, LEADER, AKIS, Smart Villages approaches, and cohesion policy instruments form the institutional foundation of such integration. Their impact can be enhanced if interventions are organized around territorially defined human capital development outcomes, rather than isolated sectoral indicators.

The ecosystem model proposed in the article connects residents and local communities, operational institutions, and strategic policy levels through continuous flows of knowledge, resources, and feedback.

Further research should focus on the comparative empirical testing of the proposed model across various types of EU rural regions. A promising direction for rural development is the establishment of a dashboard of human capital reproduction indicators for rural areas, which would combine demographic, educational, labor-market, digital, health, social, and institutional metrics. Such an approach will make it possible to distinguish territories where human capital is successfully renewed from those territories where investments in education and human development transform into outward migration and territorial decline.

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СТРАТЕГІЧНА РОЛЬ ЦИРКУЛЯРНОЇ ЕКОНОМІКИ У ПІДВИЩЕННІ КОНКУРЕН-ТОСПРОМОЖНОСТІ ПІДПРИЄМСТВ ХАРЧОВОЇ ПРОМИСЛОВОСТІ ТА ЗМІЦНЕННІ ПРОДОВОЛЬЧОЇ БЕЗПЕКИ УКРАЇНИ

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