

POLICY BRIEF

Rural Digitalisation for a Resilient Rural Europe

What the Evidence Says and What Policymakers Should Do

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Executive Summary

Rural digitalisation is central to EU policy, from CAP Strategic Plans and LEADER to Smart Villages and the Long-Term Vision for Rural Areas. But the gap between policy ambition and on-the-ground reality remains significant. As of mid-2024, only 61.9% of rural households have access to Very High Capacity Networks, compared to 82.5% overall. Rural 5G coverage stands at 79.6% against 94.3% overall. Nearly 4 in 10 rural households still lack the connectivity needed to run precision agriculture systems, access digital advisory services, or participate in data-driven farming.

A systematic bibliometric analysis of 24,361 publications on technological innovation for rural development reveals three shifts that matter for EU policymakers. First, the research field has reoriented decisively toward sustainability: the Sustainability/SDG theme now appears in 75.8% of recent publications, while the old development-aid framing has declined to 4.1%. Second, artificial intelligence has become the fastest-rising technology focus, growing from 6.8% to 24.8% of the literature. Third, equity concerns have intensified rather than faded: Digital Divide research has grown from 8.4% to 22.5%, suggesting that connectivity and access remain unresolved priorities even as technology advances.

The brief identifies six evidence-based priorities for EU rural digitalisation policy. Each is grounded in identifiable data patterns from the bibliometric corpus and linked to EU policy instruments.

Key Findings at a Glance

- Sustainability shift: 75.8% of recent research frames rural digitalisation through SDG lens
- AI surge: AI/ML research grew from 6.8% to 24.8% — fastest-rising theme
- Equity persistent: Digital Divide research reached 22.5% despite technology advances
- Technology hierarchy: Remote Sensing (25.9%), IoT (14.9%), GIS (12.6%) lead
- Governance imperative: Policy/Governance appears in 56.4% of publications

The EU Rural Connectivity Gap

Before examining what the research says, it is worth being clear about the infrastructure reality. The Digital Decade Policy Programme 2030 has set binding targets: gigabit connectivity for all EU households, and 5G coverage for all populated areas. Progress has been substantial, but the rural-urban gap persists.

Table 1. EU broadband and 5G coverage: overall versus rural (2025)

Technology	2025 countrywide coverage	2025 rural-only coverage
FTTP	74.1%	62.6%
Fixed VHCN (FTTP & DOCSIS 3.1+)	85.5%	66.7%
5G	96.8%	88.9%
5G in the 3.4-3.8 GHz	74.8%	33.7%

Source: Connectivity coverage in Europe 2025¹

These figures matter because they define what rural digitalisation policy can realistically achieve. A precision agriculture system that relies on real-time data analytics, cloud-based AI models, and remote sensing inputs needs gigabit-equivalent connectivity. A farm advisory service delivered via video conferencing needs stable broadband. The Gigabit Infrastructure Act (Regulation (EU) 2024/1309, entered into force 11 May 2024, fully applicable from 12 November 2025²) is designed to accelerate rollout, but rural areas remain the hardest and most expensive to serve. The research evidence, examined below, reflects this tension: Digital Infrastructure is the second-fastest rising research theme, and Digital Divide research has grown steadily alongside it.

What the Research Says

Technology priorities: a clear maturity hierarchy

The bibliometric analysis tracked fourteen technologies across seven temporal bins. The result is a clear hierarchy of research maturity that policymakers can use to guide investment decisions.

At the top, Remote Sensing remains the single most prevalent technology at 25.9% of recent publications. It has been present since the earliest period (10.0% in 1974–1984) and has shown sustained growth. IoT (14.9%), GIS (12.6%), Machine Learning (12.6%), and Artificial Intelligence (12.0%) form a second tier of established, rapidly growing

¹ European Commission: Directorate-General for Communications Networks, Content and Technology, Grant Thornton Advisory and LS telcom AG, Connectivity coverage in Europe 2025 – Mapping progress towards the coverage objectives of the digital decade – Final report, Publications Office of the European Union, 2026, <https://data.europa.eu/doi/10.2759/4017086>

² Regulation (EU) 2024/1309 of the European Parliament and of the Council of 29 April 2024 on measures to reduce the cost of deploying gigabit electronic communications networks, amending Regulation (EU) 2015/2120 and repealing Directive 2014/61/EU (Gigabit Infrastructure Act). (2024). Official Journal of the European Union. Retrieved June 30, 2026, from <https://eur-lex.europa.eu/eli/reg/2024/1309/oj/eng>

technologies. UAV/Drone technology, virtually absent before 2010, has reached 6.2% and is in clear growth phase.

Table 2. Technology Prevalence Across Temporal Bins (% of documents mentioning technology)

Technology	1974– 1984	1985– 1994	1995– 2004	2005– 2009	2010– 2014	2015– 2019	2020– 2026
Remote Sensing	10.0	—	16.1	19.8	12.7	16.9	25.9
GIS	—	3.4	20.4	15.8	11.9	12.6	12.6
GPS	—	—	—	2.3	2.3	2.1	1.5
IoT	—	—	1.1	2.3	2.3	5.9	14.9
Machine Learning	20.0	—	1.1	3.4	5.0	3.1	12.6
Deep Learning	—	—	—	1.1	0.4	1.8	5.6
Artificial Intelligence	—	—	1.1	1.1	1.2	1.8	12.0
Big Data (tech)	—	—	—	—	0.4	0.5	4.0
Blockchain	—	—	—	—	—	0.5	2.1
Digital Twin	—	—	1.1	0.6	—	0.3	2.4
UAV/Drone	—	—	—	—	0.8	1.3	6.2
Smartphone/Mobile	—	—	—	—	1.2	1.5	1.5
Cloud Computing	—	—	—	—	0.4	0.3	3.2
5G	—	—	—	—	—	0.3	1.1

Source: Report by Dr. Ahmadov for COST Action CA24170

At the bottom of the maturity scale, three technologies remain nascent: Blockchain (2.1%), Digital Twin (2.4%), and 5G (1.1%). These appear in the literature but have not accumulated the research evidence base of the established technologies. GPS conversely shows decline (2.3% to 1.5%), suggesting it has become so embedded in agricultural practice that researchers no longer name it explicitly — a useful reminder that research attention is an imperfect proxy for practical importance.

Thematic reorientation: sustainability has displaced development aid

Fifteen thematic categories were coded across the corpus. The most consequential finding is the normative shift captured by the Sustainability/SDG theme, which rose from 56.0% to 75.8% — making it the single most dominant theme. This was accompanied by the emergence of the Circular Economy discourse (0% to 3.6%) and the Smart Agriculture discourse (1.0% to 7.6%).

Table 3. Thematic Prevalence by Temporal Slice (% of documents containing theme)

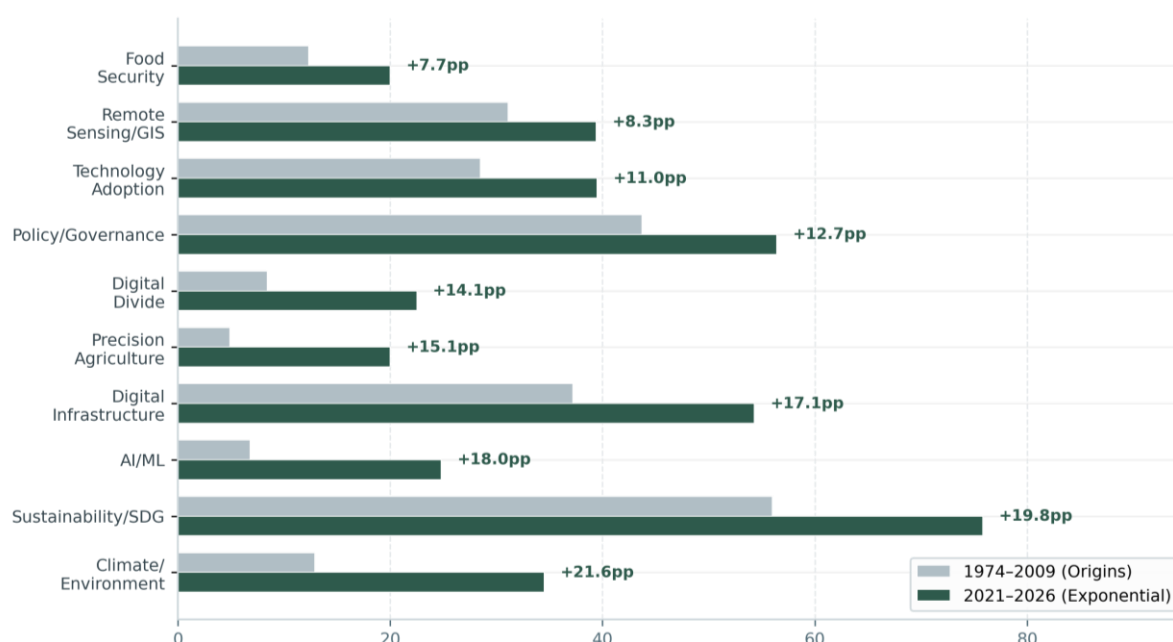
Theme	Origins (1974– 2009)	Foundation (2010–2015)	Acceleration (2016–2020)	Exponential (2021–2026)
AI/ML	6.8	5.3	12.0	24.8
Big Data	0.3	1.2	3.3	8.0
Climate/Environment	12.9	24.8	27.7	34.5
Digital Divide	8.4	9.7	14.2	22.5
Digital Infrastructure	37.2	37.2	47.2	54.3
Digital Transformation	0.0	0.0	2.7	7.6
Food Security	12.3	11.8	13.7	20.0
Policy/Governance	43.7	48.7	54.3	56.4
Precision Agriculture	4.9	6.5	9.1	20.0

Remote Sensing/GIS	31.1	26.0	28.6	39.4
Rural Development	45.6	43.7	39.5	30.0
Socioeconomic	27.8	23.3	22.8	25.8
Sustainability/SDG	56.0	63.4	67.8	75.8
Technology Adoption	28.5	30.7	35.7	39.5
Water Management	8.7	8.0	6.2	8.8

Source: Report by Dr. Ahmadov for COST Action CA24170

AI/ML shows the fastest absolute rise of any theme, from 6.8% to 24.8%. Digital Infrastructure rose from 37.2% to 54.3%. Digital Divide research grew from 8.4% to 22.5%. The counterpart to these rises is the decline of Development Aid discourse, which fell from 13.6% to 4.1%, and the Rural Development theme, which declined from 45.6% to 30.0% — not because rural development has become less important, but because it has become so pervasive an assumption that it no longer requires explicit naming.

Figure 1. Thematic prevalence shifts: comparison between early period (1974–2009) and current period (2021–2026). pp = percentage points.



Source: Report by Dr. Ahmadov for COST Action CA24170

Discourse frames: equity concerns resurface after techno-optimism

Eight discourse frames were tracked across four temporal slices. The Development Aid frame has collapsed from 13.6% to 4.1% — a 70% relative decrease. Three new framings have emerged: Smart Agriculture (1.0% to 7.6%), Digital Transformation (0% to 5.3%), and Circular Economy (0% to 3.6%).

Table 4. Discourse Frame Prevalence by Temporal Slice (% of documents)

Discourse Frame	Origins (1974–2009)	Foundation (2010–2015)	Acceleration (2016–2020)	Exponential (2021–2026)
Development Aid	13.6	11.5	9.5	4.1
Digital Divide Frame	1.9	0.3	2.0	2.5

Digital Transformation Frame	0.0	0.0	1.8	5.3
Smart Agriculture Frame	1.0	1.2	1.8	7.6
Climate-Smart Agriculture	0.0	0.9	2.0	2.2
Food Systems Approach	0.3	2.1	3.8	3.9
Sustainable Intensification	2.9	0.9	2.0	1.1
Circular Economy	0.0	0.0	1.6	3.6

Source: Report by Dr. Ahmadov for COST Action CA24170

The Digital Divide discourse follows a distinctive U-shaped trajectory: it fell from 1.9% to 0.3% during 2010–2015, a period of techno-optimism, then resurged to 2.5% in the current period. This pattern is worth noting: equity concerns do not fade as technology spreads. They resurface once the initial enthusiasm wears off and the practical barriers become visible.

What the Evidence Means for Policy

The bibliometric data, read against the EU connectivity data and policy framework, point to six priorities. The recommendations below vary in structure because the problems they address are different. Some require Commission-level coordination; others sit primarily with Member States.

1 Frame rural digitalisation as a sustainability and cohesion instrument

The Sustainability/SDG theme now appears in 75.8% of publications. The Circular Economy discourse has emerged at 3.6%. This is the dominant normative orientation of the global research community. Rural digitalisation is now understood as a tool for environmental governance and resource efficiency, not merely productivity enhancement. CAP Strategic Plans³, Smart Villages initiatives⁴, and Cohesion Policy programmes should explicitly frame digitalisation investments as sustainability instruments. Under Article 114 of Regulation (EU) 2021/2115⁵, Member States are already required to include a digitalisation strategy in their CAP Strategic Plans. These strategies should be reviewed to ensure they align with the sustainability orientation evident in the research, incorporating circular economy considerations and SDG-relevant indicators.

³ European Commission, Directorate-General for Agriculture and Rural Development. (2026). CAP Strategic Plans: 2023–27 Common Agricultural Policy implementation in EU countries. Retrieved June 30, 2026, from https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans_en

⁴ European Commission, Directorate-General for Agriculture and Rural Development. (2026). Supporting Smart Village strategies. Retrieved June 30, 2026, from https://agriculture.ec.europa.eu/cap-my-country/rural-development/supporting-smart-village-strategies_en

⁵ Regulation (EU) 2021/2115 of the European Parliament and of the Council of 2 December 2021 establishing rules on support for strategic plans to be drawn up by Member States under the common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013. (2021). Official Journal of the European Union, L 435, 1–186. Retrieved June 30, 2026, from <https://eur-lex.europa.eu/eli/reg/2021/2115/oj/eng>

2 Close the rural connectivity gap before funding the technologies that depend on it

Digital Divide research has grown to 22.5% of publications. Digital Infrastructure is the second-fastest rising theme (37.2% to 54.3%). The U-shaped trajectory demonstrates that equity concerns reassert themselves after initial periods of techno-optimism. With 38.1% of rural households still lacking Very High Capacity Network access, large-scale deployment of IoT-dependent precision agriculture or AI-based advisory services is impossible in significant parts of rural Europe. The Gigabit Infrastructure Act⁶ should help, but rural rollout requires coordinated action between CAP Pillar 2 rural development funding⁷, ERDF, and national broadband plans. Member States should treat broadband as prerequisite infrastructure: digital farming investments without verified connectivity availability risk being stranded assets.

3 Invest in proven technologies; pilot-test the rest

The technology lifecycle data reveal a clear maturity hierarchy. Remote Sensing (25.9%), IoT (14.9%), GIS (12.6%), and Machine Learning (12.6%) have established, multi-year evidence bases. UAV/Drone technology (6.2%) is in rapid growth. Blockchain (2.1%), Digital Twin (2.4%), and 5G (1.1%) remain nascent. This suggests a straightforward investment rule: allocate the majority of rural digitalisation funding to established technologies with demonstrated research traction and support nascent technologies only through controlled pilot deployments with explicit evaluation criteria. Under Article 73 of Regulation (EU) 2021/2115, CAP investments can support “digital technologies in agriculture, forestry, and rural areas, such as investments in precision farming, smart villages, rural businesses, and ICT infrastructures.” This flexibility is useful, but Member States should distinguish between established and nascent technologies in their investment criteria. The European Innovation Council and EIP-AGRI operational groups under Article 77 are appropriate channels for piloting emerging technologies.

4 Build AI and data-science capacity in rural institutions — or watch the knowledge gap widen

AI/ML is the fastest-rising research theme (6.8% to 24.8%). Rural research institutions, extension services, and advisory bodies need investment in data science infrastructure and training. Article 15 of Regulation (EU) 2021/2115 already mandates that farm advisory services cover digital technologies. Article 114

⁶ European Commission, Directorate-General for Communications Networks, Content and Technology. (2026). Gigabit Infrastructure Act: Facilitating the rollout of very high-capacity networks in the EU. Retrieved June 30, 2026, from <https://digital-strategy.ec.europa.eu/en/policies/gigabit-infrastructure-act>

⁷ European Parliament. (2022). Second pillar of the CAP: Rural development policy (Fact Sheets on the European Union). https://www.europarl.europa.eu/RegData/etudes/fiches_techniques/2017/N51786/doc_en.pdf

requires Member States to describe their AKIS (Agricultural Knowledge and Innovation System) organisational setup and show how advisory services, research, and the national CAP network cooperate. These provisions create a legal basis for action, but implementation varies. Some Member States have made genuine progress: Lithuania has implemented a digital collaboration platform for agricultural knowledge⁸; Ireland has developed digital platforms for advisory delivery outside the CAP framework⁹. Others have not. The Commission should use the CAP Strategic Plan review process to assess whether AKIS strategies include concrete provisions for data-science training and computational infrastructure. Horizon Europe Cluster 6 calls should continue to support AI capacity building in rural research institutions.

5 Sustain investment in precision agriculture and food-system digitalisation

Precision Agriculture has grown from 4.9% to 20.0% of publications. UAV/Drone technology has surged from zero to 6.2%. Food Security themes have risen from 12.3% to 20.0%. The Farm to Fork Strategy explicitly calls for “satellite imaging, AI-based advisory, sensors, and data analytics” to achieve its pesticide reduction and organic land targets. CAP eco-schemes under Pillar 1 already support precision farming technologies that optimise input use. The evidence and the policy framework are aligned here; the task is to maintain funding and ensure advisory services provide practical guidance on adoption, including cost-benefit analysis and interoperability standards.

6 Do not fund technology without governing it

Policy/Governance is the second-most prevalent research theme at 56.4%. Researchers regard institutional and regulatory dimensions not as peripheral concerns but as central to effective rural digitalisation. The LTVRA¹⁰ explicitly prioritises “data and improved data management in support of multi-level rural development.” The Rural Observatory¹¹ and Rural Revitalisation Platform¹² collect and aggregate rural data. The Rural Pact serves as a multi-stakeholder governance network. But governance is not merely about having platforms — it is about having rules. Member States should establish clear protocols for data ownership

⁸ ModernAKIS & ATTRACTISS. (2024). AKIS coordination body in Lithuania. Retrieved June 30, 2026, from <https://akisconnect.eu/en/akis-in-practice/akis-in-practice-details?id=33&title=AKIS+Coordination+body+in+Lithuania>

⁹ Department of the Taoiseach. (2022). Harnessing Digital – The Digital Ireland Framework (last updated 5 June 2025). Retrieved June 30, 2026, from <https://www.gov.ie/en/department-of-the-taoiseach/publications/harnessing-digital-the-digital-ireland-framework/>

¹⁰ European Commission. (2026). A long-term vision for the EU’s rural areas: Rural Vision initiative up to 2040. Retrieved June 30, 2026, from https://rural-vision.europa.eu/index_en

¹¹ European Commission. (2026). Rural Observatory: Statistics and analyses on EU rural areas. Retrieved June 30, 2026, from <https://observatory.rural-vision.europa.eu/?lng=en&ctx=RUROBS>

¹² European Commission. (2026). Rural revitalisation platform: Resources for rural communities facing demographic decline. Retrieved June 30, 2026, from https://ruralpact.rural-vision.europa.eu/rural-revitalisation_en

(precision agriculture data must remain under producer control while enabling anonymised aggregation for research), AI regulatory frameworks for agricultural decision support systems, and interministerial coordination mechanisms that bring agriculture, digital, and regional development ministries together. Article 114 of Regulation (EU) 2021/2115 requires Member States to describe how their digitalisation strategy will improve CAP effectiveness; this should include explicit governance components, not just technology wish-lists.

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