

## European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI): Systematic Literature Review and Future Research Agenda

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### Abstract

This systematic literature review synthesizes current knowledge on the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) by analyzing 31 peer-reviewed studies published between 2013 and 2025. The review identifies three interconnected research directions: implementation mechanisms and governance structures, multi-actor collaboration and knowledge co-creation processes, and impact assessment. Findings reveal substantial heterogeneity in national and regional governance approaches, with critical structural barriers including horizontal and vertical fragmentation, inadequate funding, and compartmentalized implementation. The research highlights the importance of boundary-spanning actors, trust-building mechanisms, and structured facilitation in enabling effective multi-actor collaboration. Evidence suggests that EIP-AGRI contributes to sustainable agricultural innovation through enhanced knowledge exchange and network formation; however, impact assessment remains challenging due to methodological limitations and temporal constraints. The review establishes a future research agenda that emphasizes longitudinal evaluation, cross-country comparative analysis, and the potential for systemic transformation.

### Keywords

EIP-AGRI, agricultural innovation systems, multi-actor collaboration, operational groups, interactive innovation.

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### Introduction

The European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), established in 2012 as part of the Europe 2020 Flagship Initiative "Innovation Union," represents a paradigm shift in European agricultural innovation policy (Cioloş and Geoghegan-Quinn 2013). This initiative aims to bridge the gap between agricultural research and practice through an interactive innovation approach, fundamentally challenging the traditional linear model of knowledge transfer. The EIP-AGRI framework operates through Operational Groups (OGs), which bring together farmers, researchers, advisors, businesses, and other stakeholders to co-create innovative solutions addressing real-world agricultural challenges (Arzeni et al., 2023; Fieldsend et al., 2021).

Since its inception, EIP-AGRI has generated

substantial scholarly attention, with researchers examining various dimensions of its implementation, effectiveness, and transformative potential. This review synthesizes findings from 31 peer-reviewed studies published between 2013 and 2025, revealing three distinct yet interconnected research directions that have emerged in the literature: (1) implementation mechanisms and governance structures, (2) multi-actor collaboration and knowledge co-creation processes, and (3) impact assessment and effectiveness evaluation. Each direction addresses critical questions about how this innovation framework operates in practice, its capacity to facilitate genuine collaboration, and its contribution to agricultural sustainability and competitiveness.

Within the EIP-AGRI literature, the concept of 'innovation' carries varied meanings, reflecting

both the breadth of the initiative and divergent theoretical framings. At the most general level, the European Commission defines innovation in EIP-AGRI as the introduction of new or significantly improved products, processes, or organisational methods in agricultural practice or along agri-food value chains. However, the reviewed studies employ a spectrum ranging from narrow technical innovation (e.g., fertiliser management optimisation, new crop varieties) to broader process innovations (co-creation mechanisms, brokerage practices, governance models) and systemic innovations (transformative changes to Agricultural Knowledge and Innovation Systems). For the purposes of this review, we adopt an inclusive understanding of innovation that encompasses all three levels, while distinguishing between them when interpreting findings, particularly in relation to impact assessment, where the type of innovation strongly conditions the measurability and timeframe of outcomes.

This review aims to synthesize the current state of knowledge on EIP-AGRI by systematically analyzing peer-reviewed literature to identify key research directions, evaluate the effectiveness of implementation mechanisms across different European contexts, and establish a research agenda for strengthening multi-actor collaboration and innovation outcomes in agricultural systems

## Material and methods

This review article employed a systematic literature search to identify and analyze relevant publications addressing the EIP-AGRI. The search strategy was designed to capture peer-reviewed articles that discuss the implementation, outcomes, and impacts of EIP-AGRI initiatives across European Union member states.

The literature search was conducted in two major citation databases: Web of Knowledge and Scopus. These databases were selected due to their comprehensive coverage of academic literature in the fields of agricultural sciences, innovation studies, and rural development. The search query utilized the Boolean operator "AND" to combine the keywords "EIP" and "AGRI", ensuring that retrieved publications addressed both the innovation partnership framework and its agricultural focus. The search was restricted to the document type "article" to maintain focus on peer-reviewed research contributions. The keyword search was applied

across three bibliographic fields: article titles, author-assigned keywords, and abstracts, thereby capturing publications where EIP-AGRI featured as either a central focus or a significant component of the research.

The initial search yielded 30 articles from the Web of Knowledge database and 34 articles from the Scopus database. Following the identification of potentially relevant publications, all retrieved articles underwent a detailed assessment of their relevance. This screening process evaluated whether each publication substantively addressed EIP-AGRI themes, implementation experiences, or related policy mechanisms. Articles that mentioned the keywords only peripherally or in unrelated contexts were excluded from further analysis. Table 1 demonstrates the selection process.

PRISMA Stage	Action	Records
Identification	Records identified in Web of Knowledge (search: EIP AND AGRI, article type)	30
Identification	Records identified in Scopus (search: EIP AND AGRI, article type)	34
Identification	Total records before deduplication	64
Screening	Duplicates removed	17
Screening	Records after deduplication	47
Screening	Records excluded after title/abstract screening (peripheral mention)	16
Eligibility	Full-text articles assessed for eligibility	31
Eligibility	Articles excluded after full-text review	0
Included	Final corpus for in-depth content analysis	31

Source: authors

Table 1: PRISMA-style study selection flow.

After completing the relevance screening and removing duplicate entries appearing in both databases, a final corpus of 31 articles was compiled for in-depth content analysis. Authors applied explicit inclusion/exclusion criteria:

Inclusion criteria:

- Published in peer-reviewed journals or conference proceedings indexed in Web of Knowledge or Scopus.
- Document type: article (no editorials, book chapters, grey literature, or policy reports).
- Keyword 'EIP' AND 'AGRI' present in title, abstract, or author keywords.
- Substantive empirical or conceptual treatment of EIP-AGRI - not merely peripheral mention.

- No temporal restriction (to capture full trajectory since 2010 inception).
- No ranking restriction to Q1/Q2 journals.

Exclusion criteria:

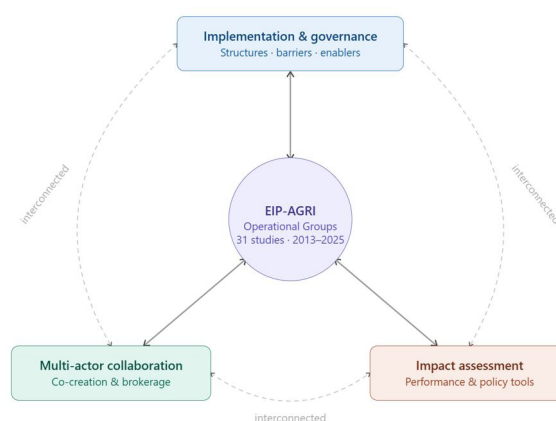
- Articles in which EIP-AGRI appears only in references or as a passing footnote.
- Duplicate entries across the two databases (removed after deduplication).
- Non-English articles without available English abstract sufficient for assessment.

The selected 31 articles were subjected to qualitative content analysis using an inductive thematic coding approach. Each article was read in full and coded along the following dimensions: (1) primary research topic and stated objectives, (2) conceptualisation of EIP-AGRI and of innovation, (3) governance structures and actor roles described, (4) key empirical findings, (5) identified barriers and enabling factors, and (6) policy recommendations. Initial codes were generated openly and subsequently grouped into broader themes using constant comparison. Three iterative rounds of coding were conducted to ensure consistency and to resolve ambiguities. The resulting themes were compared across studies to identify convergences, divergences, and research gaps, providing the basis for the three research directions reported under Results and Discussion and for the future research agenda articulated in the Conclusions section.

## Results and discussion

Figure 1 presents a hub-and-spokes conceptual framework illustrating the three interconnected research directions identified in this systematic review. EIP-AGRI and its Operational Groups occupy the central position, reflecting their role as the primary unit of analysis across all 31 reviewed studies published between 2013 and 2025. Three research directions radiate outward from this hub: implementation mechanisms and governance structures (top), multi-actor collaboration and knowledge co-creation (bottom left), and impact assessment and effectiveness evaluation (bottom right). The solid bidirectional spokes connecting the hub to each direction indicate that EIP-AGRI both operates through and is continuously shaped by each of these research domains - governance arrangements condition what kinds of collaboration are possible, collaboration processes in turn influence how

implementation is adapted at the local level, and the outcomes captured through impact assessment feed back into both governance redesign and collaborative practice. The dashed bidirectional arcs linking the three directions to one another reflect a second layer of interdependence: the quality of multi-actor collaboration directly affects the measurability and magnitude of impacts, while evaluation findings inform the institutional conditions under which governance structures are reformed. Equally, governance fragmentation - one of the most consistently documented structural barriers in the reviewed literature - constrains both the depth of co-creation processes and the capacity to conduct robust longitudinal impact assessments. The framework is therefore not hierarchical but cyclical, suggesting that advances in understanding EIP-AGRI require simultaneous attention to all three directions rather than isolated investigation of any single one.



Source: authors

Figure 1: Research directions.

### Research direction: implementation mechanisms and governance structures

The first major research direction addresses how EIP-AGRI has been translated from EU policy into national and regional implementation frameworks. This stream of literature reveals substantial variation in governance approaches and highlights critical structural factors that enable or constrain the interactive innovation model.

#### National and Regional Governance Approaches

The implementation of EIP-AGRI across European member states demonstrates considerable heterogeneity in governance structures and regulatory frameworks. Giarè and Vagnozzi (2021) conducted a comparative analysis of four Italian regions (Veneto, Emilia-Romagna, Umbria,

and Basilicata), revealing that regional governance significantly affects crucial dimensions of the EIP-AGRI approach, including co-creation between research and practice, centrality of farm needs, promotion of networks, and interactive action among innovation actors. Their findings indicate that while all examined regions demonstrated substantial consistency with the interactive approach emerging from international literature, they employed different methods and degrees of consistency, with some factors clearly implemented through adequate rules and criteria, while others lacked appropriate implementation mechanisms.

Similar governance challenges emerge in other national contexts. Eckerberg et al. (2023) critically examined Sweden's implementation of EIP-AGRI, finding that despite expectations for cross-sectoral collaboration, implementation rests on compartmentalized networking within the agricultural sector, prioritizing increased competitiveness over environmental development, and interpreting innovation mainly in technical rather than systemic terms. This Swedish case illustrates how state steering capacity faces obstacles when overall policy goals from the top are both too numerous and too vague, leaving administration to interpret which features should be prioritized from below. Contrary to previous research suggesting that European agricultural policymaking has recently become more integrated, the Swedish case demonstrates that steering relies mostly on internal agricultural expertise.

#### *System failures and structural barriers*

Beyond governance design, research has identified fundamental system failures that impede effective EIP-AGRI implementation. Stoeva and Pickard (2020) applied system innovation theory to examine the capacity of Bulgarian agricultural policy to implement the interactive innovation approach, revealing a low potential to address limited cooperation and knowledge transfer among science, farms, and other institutions. Their analysis, viewed through the lens of the system failures concept, exposed misalignments between top-down programming and bottom-up understandings of interactive innovation among Agricultural Knowledge and Innovation System (AKIS) actors.

Hermans et al. (2015) adapted the Innovation System Failure Matrix to investigate structural conditions across eight European countries (England, France, Germany, Hungary, Italy, Latvia,

the Netherlands, and Switzerland), identifying lack of funds combined with horizontal and vertical fragmentation as among the most important threats to effective collaboration in innovation networks. Their study emphasized that the lack of proper evaluation criteria for collaborative innovation networks represents a significant structural barrier. The research demonstrates that each national Agricultural Innovation System (AIS) possesses unique features, necessitating that implementation of policies promoting collaboration and social learning depend on critical reflection of existing structural elements and whether certain innovations for collective goods should be promoted.

#### *Prerequisites and enabling conditions*

Research has also identified positive conditions that facilitate successful implementation. Kruzmetra et al. (2021) identified eight prerequisites for promoting the development of innovation projects in agriculture, based on an analysis of the views of European Innovation Partnership project managers in Latvia. Their findings emphasize the importance of institutional support, adequate funding mechanisms, and capacity building among innovation actors. Similarly, Maziliauskas et al. (2018) employed force field analysis to examine external and internal factors influencing EIP effectiveness in Lithuania, revealing that negative factors outnumbered positive factors. However, they also identified factors that enable the timely identification of potential negative consequences and opportunities to predict project effectiveness.

The German experience, documented by Göbel et al. (2022), provides insights into how comprehensive support structures can enhance implementation. Their analysis of over 320 EIP projects implemented since 2014 demonstrates how continuous exchange between science and practice, supported by innovation service providers, can accelerate knowledge transfer and establish new innovation culture for the agricultural sector. The Portuguese case study by Oliveira et al. (2019) in the Lis Valley Irrigation District further illustrates implementation challenges, particularly highlighting how restrictive concepts of innovation within Rural Development Programs may fail to embrace the full range of activities intended within AKIS frameworks.

#### *Regional variations and context specificity*

The literature consistently emphasizes that effective implementation requires attention to regional specificities and local contexts (Table 2).

Agricultural system type	Regional context	Key implementation barriers	Key enabling factors
Intensive arable farming	Emilia-Romagna (IT)	Short timeframes for environmental outcomes, reluctance to adopt soil management changes	Strong governance; propensity score matching evaluation
Mixed/organic farming	Italy (national)	Fragmented topics, underfunding (<0.1% of sector value)	Multi-disciplinary projects; multi-actor approach recognition
Grassland systems	8 EU member states	Cross-border knowledge gaps, language barriers	Thematic network; farmer-to-farmer exchange (Inno4Grass)
Dairy/bioeconomy	Ireland	Farmer passivity in decision-making; segmented actor roles	Social network structure; clear OG coordinators
Protein crops (arable)	EU-wide (11 countries)	Market structure constraints; cultural factors	EIP consultation process with experts
CEE agricultural sectors	Central & Eastern Europe	Structural disadvantage in R&I; productivity gaps vs. EU-15	Greater structural support needed; context-specific approaches
Wine sector	Italian regions	Regional governance heterogeneity; coordination deficits	Mixed-methods facilitation; stakeholder perception mapping

Source: authors

Table 2: Contextual factors and OG success.

Pokrivčák et al. (2019) examined perspectives from Central and Eastern European countries, arguing that despite evident productivity gaps between EU-CEE and EU-15 farms, greater support for research and innovation is not a priority for EU-CEE countries due to structural differences in agricultural sectors and comparative disadvantage in research and innovation relative to more developed EU countries. This finding challenges the assumption of the universal applicability of innovation support mechanisms and highlights the importance of contextualizing EIP-AGRI implementation within broader agricultural and economic development trajectories.

Costantini et al. (2020) further emphasized the necessity of local adaptation strategies for addressing specific agricultural challenges, demonstrating how soil organic carbon management under arable farming requires techniques tailored to local conditions, including combinations of environmental factors (climate and soil characteristics), farming systems (land use type, farm specialization, crop management), and social and cultural contexts (market conditions, subsidies, farmers' education, and propensity for innovation). Their case studies across Europe illustrate how OGs must be designed to facilitate local adaptation rather than imposing standardized solutions.

Table 3 synthesises the contextual factors shaping EIP-AGRI Operational Group implementation

across twelve distinct agricultural systems and regional settings documented in the reviewed literature. Reading across the barrier column, several challenges recur irrespective of context: funding constraints, fragmented governance, short project timeframes, and difficulties in measuring outcomes beyond the project period appear in studies from Bulgaria and Sweden as much as from Ireland and Italy, suggesting that these are structural features of the EIP-AGRI framework itself rather than local anomalies. The enabling factors column tells a different story: the conditions that support successful OG implementation - from results-based payment design in Irish high-nature-value areas to thematic network infrastructure for cross-border grassland innovation - tend to be specific to the agricultural system, institutional setting, and local knowledge base in question. This asymmetry has a direct policy implication: while structural barriers may be addressable through common EU-level reforms, enabling conditions cannot be transplanted wholesale from one context to another but must be designed in response to the particular combination of farming system characteristics, regional governance capacity, and actor relationships present in each setting.

Agricultural system type	Country / region	Key study/studies	Key implementation barriers	Key enabling factors
Intensive arable farming	Emilia-Romagna, Italy	Bonfiglio (2023)	<ul style="list-style-type: none"> <li>Short project timeframes prevent environmental outcomes from becoming measurable</li> <li>OG participation does not reduce pesticide use, energy, or water consumption</li> <li>Difficulty distinguishing genuine innovation from conventional farm practices</li> </ul>	<ul style="list-style-type: none"> <li>Propensity score matching provides a replicable counterfactual evaluation design</li> <li>Performance-based conditionality (ex-ante plans, ex-post reporting) recommended as systemic fix</li> <li>OG participation positively associated with fertiliser efficiency and farm profitability</li> </ul>
Mixed and organic farming systems	Italy (national level)	Canali et al. (2020); Arzeni et al. (2023)	<ul style="list-style-type: none"> <li>Research and innovation funding scattered across topics, disciplines, and supply chains</li> <li>Funding extremely limited (&lt;0.1% of sector value for R&amp;I; &lt;10% of available RDP funds for OGs)</li> <li>Low internal and external communication reduces OG effectiveness</li> <li>Limited dissemination of results to broader farming community</li> </ul>	<ul style="list-style-type: none"> <li>Relatively high share of multi- and interdisciplinary projects</li> <li>Multi-actor approach recognised as fundamental step toward co-research and co-innovation</li> <li>OG implementation helps capture real farmer and rural entrepreneur issues</li> </ul>
Diverse farming systems (regional governance focus)	Veneto, Emilia-Romagna, Umbria, Basilicata (Italy)	Giarè and Vagnozzi (2021)	<ul style="list-style-type: none"> <li>Significant regional variation in how co-creation, farm-centricity, and networking are operationalised</li> <li>Some governance factors implemented through adequate rules; others lack appropriate mechanisms</li> <li>No standardised quality criteria for OG governance across regions</li> </ul>	<ul style="list-style-type: none"> <li>All four regions demonstrate substantial consistency with interactive innovation principles</li> <li>Regional governance can be designed to reinforce co-creation between research and practice</li> <li>Comparative regional analysis reveals which governance dimensions are most transferable</li> </ul>
Productionist/ commercial agriculture (competitiveness-oriented)	Sweden (national level)	Eckerberg et al. (2023)	<ul style="list-style-type: none"> <li>Implementation compartmentalised within agricultural sector; cross-sectoral collaboration absent</li> <li>Innovation interpreted primarily in technical terms; systemic and environmental innovation sidelined</li> <li>Policy goals from EU level too numerous and vague; national administration forced to prioritise selectively</li> <li>Governance relies on internal agricultural expertise rather than broader AKIS integration</li> </ul>	<ul style="list-style-type: none"> <li>Explicit mission-oriented framing could redirect implementation toward sustainability transitions</li> <li>Documented as a cautionary case highlighting risks of narrowing innovation scope in national programming</li> </ul>
Post-socialist/ transitional agricultural systems	Bulgaria (national level)	Stoeva and Pickard (2020)	<ul style="list-style-type: none"> <li>Low institutional capacity to implement interactive innovation approach</li> <li>Limited cooperation and knowledge transfer among science, farms, and other AKIS actors</li> <li>Misalignment between top-down EU programming and bottom-up understanding of interactive innovation</li> <li>System failures across multiple dimensions: infrastructure, institutions, interactions, capabilities</li> </ul>	<ul style="list-style-type: none"> <li>System innovation theory (Innovation System Failure Matrix) provides a structured diagnostic tool</li> <li>Identifying specific system failures enables targeted rather than generic policy responses</li> </ul>
Diverse national Agricultural Innovation Systems	England, France, Germany, Hungary, Italy, Latvia, Netherlands, Switzerland	Hermans et al. (2015)	<ul style="list-style-type: none"> <li>Lack of funds combined with horizontal and vertical fragmentation: most frequently cited threats</li> <li>Absence of proper evaluation criteria for collaborative innovation networks</li> <li>Each national AIS has unique features that prevent uniform policy transfer</li> </ul>	<ul style="list-style-type: none"> <li>Innovation System Failure Matrix adapted as a cross-country analytical tool</li> <li>Critical reflection on existing structural elements before introducing collaboration policies</li> <li>Differentiated support for collective goods innovation vs. private innovation activities</li> </ul>

Note: Barriers and enablers are drawn directly from the findings reported in the cited studies. Where a study addresses multiple themes, only those findings pertaining to contextual factors and OG implementation are included. Studies reporting primarily on methodological contributions (e.g. Barauskienė et al. 2021; Maziliauskas et al. 2018) are not included in this table as they do not report context-specific implementation findings.

Source: authors

Table 3: Agricultural system type, regional context, and key contextual factors shaping EIP-AGRI Operational Group implementation. (to be continued).

Agricultural system type	Country / region	Key study/studies	Key implementation barriers	Key enabling factors
Permanent grassland and forage systems	8 EU member states (Inno4Grass network)	Krause et al. (2021)	<ul style="list-style-type: none"> <li>• Cross-border knowledge gaps and language differences complicate multi-country exchange</li> <li>• Grassland-related knowledge often not tailored to local conditions</li> <li>• Extension services, education, and research historically work in silos</li> </ul>	<ul style="list-style-type: none"> <li>• Thematic network model creates collaborative spaces across national boundaries</li> <li>• Farmer-led idea collection stimulates bottom-up innovation agenda</li> <li>• Farmland-specific information management systems support local knowledge adaptation</li> </ul>
Dairy farming and bioeconomy value chains	Ireland	Harrahill et al. (2022); McCarthy et al. (2021)	<ul style="list-style-type: none"> <li>• Farmers highly connected but exert limited influence in decision-making in certain OG areas</li> <li>• Segmented actor roles: farmers contribute as input suppliers while scientists handle technical aspects</li> <li>• Depth and quality of knowledge integration remains questionable despite multi-actor structure</li> </ul>	<ul style="list-style-type: none"> <li>• Social network analysis reveals actor connectedness and relative influence - actionable diagnostic</li> <li>• Assemblage-based framing captures how actor motivations emerge from relational context</li> <li>• Diverse actor motivations can be mobilised if OG design allows anticipation of future scenarios</li> </ul>
Viticulture and wine value chains	Italian regions (multiple)	Mignani et al. (2025)	<ul style="list-style-type: none"> <li>• Regional governance heterogeneity creates uneven OG quality across wine-producing areas</li> <li>• Coordination and facilitation deficits limit knowledge network density</li> <li>• Perceived barriers to innovation identified through stakeholder perception surveys</li> </ul>	<ul style="list-style-type: none"> <li>• Mixed-methods approach (quantitative + qualitative) provides richer picture of OG performance</li> <li>• Sector-specific OG design allows addressing viticulture-specific challenges</li> <li>• Best practices identified for enhancing EIP-AGRI policies at regional, national, and EU levels</li> </ul>
Structurally disadvantaged agricultural sectors	Central and Eastern European countries (EU-CEE)	Pokrivčák et al. (2019)	<ul style="list-style-type: none"> <li>• Persistent productivity gap between EU-CEE and EU-15 farms not easily addressed by innovation support</li> <li>• Greater R&amp;I support not a declared priority in CEE due to structural disadvantage</li> <li>• Comparative disadvantage in research and innovation capacity relative to more developed EU countries</li> </ul>	<ul style="list-style-type: none"> <li>• Recognition that universal innovation support mechanisms are not appropriate for all contexts</li> <li>• Contextualising EIP-AGRI within broader agricultural and economic development trajectories is essential</li> </ul>
Arable farming systems (soil management focus)	Multiple European case study sites	Costantini et al. (2020)	<ul style="list-style-type: none"> <li>• Soil organic carbon management requires combinations of climate, soil, and social factors - standardised solutions fail</li> <li>• Local adaptation constrained by land use type, farm specialisation, market conditions, and farmer education</li> <li>• Cultural factors and propensity for innovation vary considerably across sites</li> </ul>	<ul style="list-style-type: none"> <li>• OG design that facilitates local adaptation rather than imposing standardised solutions</li> <li>• Integration of environmental, farming system, and social/cultural contextual variables into OG scoping</li> <li>• Cross-European case studies reveal which adaptation strategies are transferable and which are context-bound</li> </ul>
Extensive/high-nature-value farming in designated areas	Aran Islands, Hen Harrier areas, Pearl Mussel catchments (Ireland)	McLoughlin et al. (2020)	<ul style="list-style-type: none"> <li>• Conventional output-based payments fail to incentivise habitat quality maintenance</li> <li>• Biogeographical specificity makes generalisation of payment schemes difficult</li> <li>• Environmental outcomes require longer timeframes than standard project cycles</li> </ul>	<ul style="list-style-type: none"> <li>• Results-based payment approach rewards habitat quality as surrogate for ecosystem services</li> <li>• Adaptive management tailored to specific biogeographical areas</li> <li>• Wide range of ecosystem services (biodiversity, carbon, water, flood resilience) deliverable simultaneously</li> </ul>

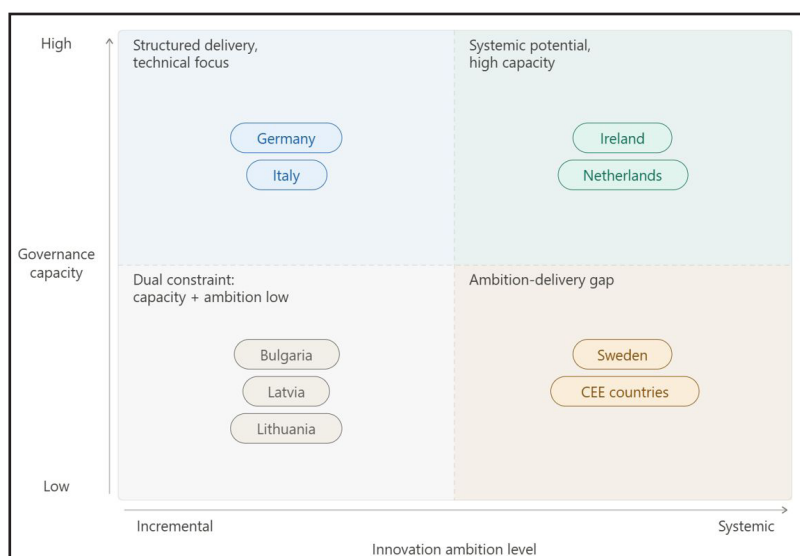
Note: Barriers and enablers are drawn directly from the findings reported in the cited studies. Where a study addresses multiple themes, only those findings pertaining to contextual factors and OG implementation are included. Studies reporting primarily on methodological contributions (e.g. Baranauskienė et al. 2021; Maziliauskas et al. 2018) are not included in this table as they do not report context-specific implementation findings.

Source: authors

Table 3: Agricultural system type, regional context, and key contextual factors shaping EIP-AGRI Operational Group implementation. (Continuation).

Figure 2 distils the same contextual variation into a two-dimensional framework, contrasting governance capacity with innovation ambition

level to reveal four distinct national implementation patterns.



Source: authors

Figure 2: National EIP-AGRI implementation patterns by governance capacity and innovation ambition level.

The matrix positions eight country cases across the four quadrants, and each pill is clickable for deeper discussion. The quadrant logic follows directly from the reviewed literature:

Top-left (high governance, incremental) - Germany and Italy represent contexts with well-developed institutional support structures and strong OG governance, but where innovation is pursued in technical and productivity terms rather than as systemic change. Germany's 320+ EIP projects operate within a dense advisory infrastructure; Italy's Emilia-Romagna case shows measurable farm-level improvements yet limited environmental transformation.

Top-right (high governance, systemic) - Ireland and the Netherlands anchor the "ideal" quadrant. Ireland's results-based payment schemes and bioeconomy-oriented OGs reflect genuine systemic ambition backed by institutional capacity; Hermans et al. (2015) identify the Netherlands as among the higher-capacity national AIS in their eight-country comparison.

Bottom-left (dual constraint) - Bulgaria, Latvia, and Lithuania face low governance capacity and limited innovation ambition simultaneously, with Stoeva and Pickard (2020) diagnosing systemic failures across multiple AIS dimensions in Bulgaria, while Kruzmetra et al. and Maziliauskas et al. document that enabling prerequisites are largely absent in the Baltic states.

Bottom-right (ambition-delivery gap) - the most theoretically instructive quadrant. Sweden enters

with explicitly systemic, green-transition policy goals but delivers compartmentalised, technically narrow implementation (Eckerberg et al. 2023). CEE countries as a group show the reverse problem: structural disadvantage suppresses both governance capacity and the political appetite for systemic innovation ambition (Pokrivčák et al. 2019).

### Research direction: multi-actor collaboration and knowledge co-creation

The second major research direction examines the collaborative dynamics within EIP-AGRI initiatives, focusing on how diverse actors interact, share knowledge, and co-create innovations. This body of literature interrogates the fundamental premise of the multi-actor approach and assesses whether it achieves its intended goal of bridging the gap between research and practice.

#### *Theoretical foundations and implementation of the multi-actor approach*

The multi-actor approach represents a core principle of EIP-AGRI, premised on the assumption that heterogeneous groups of actors with complementary expertise can effectively co-create and share knowledge (Arzeni et al. 2023). Feo et al. (2022) examined how Horizon 2020 Thematic Networks operationalize this approach, revealing that not all types of actors are equally involved in consortium and participatory activities. This suggests that networks may not be sufficiently demand-driven, and the uptake of results may be suboptimal. Their analysis of multiple thematic networks demonstrated that facilitators

play key roles in contributing to relationships and mutual understanding among different actors, while user-friendly digital knowledge platforms linked to demonstration activities and peer-to-peer exchange can enhance knowledge sharing and improve long-term impact.

Fieldsend et al. (2021) provided a comprehensive assessment of user involvement across 200 diverse European Union-funded and non-EU multi-actor partnerships, revealing that all reviewed policy instruments, not just those funded within EIP-AGRI, can be used to involve users in co-innovation in agriculture, forestry, and related value chains. Their research demonstrated that EIP-AGRI constitutes just one part of a complex matrix of multi-actor co-innovation activities involving farmers and foresters in Europe, with many effective methods of supporting co-innovation "sharing the space" within AKIS. The diversity of collaborative structures extends beyond traditional business-to-business models to include business-to-consumer, consumer-to-business, and hybrid relationships, facilitating mutual learning, innovation, and value co-creation that is crucial for the resilience and adaptability of local food systems.

Hauggaard-Nielsen et al. (2021) documented a practical workshop approach for translating the multi-actor approach into research practice, involving 63 participants from an EU H2020 project on species mixtures. Their methodology involved researchers who were mostly unfamiliar with participatory approaches, engaging them in direct interaction with eight actor positions within an agri-food cooperative value chain. The workshop format proved effective in gaining a common understanding of pertinent issues, though expressions of frustration served both as motivation for group members to become more aware of colleagues' scientific concerns and as recognition that some researchers possess better skills in integrating qualitative approaches than others. This study emphasized that working with actor networks was identified as an essential means to overcome existing barriers between academia and practice.

#### *Knowledge integration and co-creation processes*

The effectiveness of multi-actor collaboration depends substantially on mechanisms for integrating different forms of knowledge. Müller and Riekötter (2025) examined knowledge integration within EIP-AGRI Operational Groups in Rhineland-Palatinate, Germany, employing communities

of practice theory to analyze broker practices, knowledge integration mechanisms, and enabling conditions for co-creation. Their findings revealed that innovation brokers function as knowledge orchestrators, facilitating integration through adaptive facilitation, multi-modal translation, and network cultivation. Successful OGs demonstrated characteristics of communities of practice, including mutual engagement, joint enterprise, and shared repertoire. Key enabling conditions included trust-building, process transparency, and field-based co-learning, while challenges encompassed administrative delays, institutional silos, and rigid regulations.

The co-creation process requires not merely bringing actors together but establishing genuine conditions for collaborative knowledge production. Mosquera-Losada et al. (2025) analyzed 28 Horizon 2020 thematic networks to understand how the deployment of innovation is associated with EU land uses, implementation areas, and farming types. Their results indicated that thematic networks primarily focus on arable lands across all farming types, with most concentrating on rural areas and addressing bioeconomy topics by linking rural, peri-urban, and urban areas. The analysis demonstrated how a multi-actor approach to projects can provide insights into expanding agricultural innovation by identifying underrepresented areas of study and practice, thereby promoting them in future initiatives.

Krause et al. (2021) described a novel approach for creating collaborative spaces for grassland innovations through the Inno4Grass thematic network across eight European member states. Their methodology serves to collect farmers' innovative ideas and stimulate collaboration among various stakeholders, including farmers' groups, extension services, education, and research, even across borders. This interactive innovation model promotes knowledge exchange and establishes farmland-specific information management systems, aiming to stimulate a renewed collaborative innovation culture for EU grasslands, where grassland-related knowledge is tailored to local conditions.

#### *Power dynamics and actor participation*

A critical examination of multi-actor collaboration reveals significant power asymmetries and differential participation among the actors. Harrahill et al. (2022) analyzed Irish dairy farmers' participation in a bioeconomy-focused EIP-AGRI Operational Group, employing power theory

to explore how farmers' knowledge shaped OG development and innovation. Their social network analysis illustrated diverse actors involved, their relative degrees of connectedness, and differing levels of influence. While farmers were highly connected with other members and viewed their involvement positively, their influence in decision-making processes in certain OG areas was relatively limited. Different member types tended to work in relatively segmented ways, with farmers contributing as input suppliers at the farm level while scientists worked on more technical aspects. This segmentation raises questions about the depth and quality of knowledge integration achieved through the multi-actor approach.

McCarthy et al. (2021) explored the motivations of actors who established and coordinated a collaborative group within an Irish EIP-AGRI initiative, including three farmers, an agri-environmental policy advocate, and a research scientist. Drawing on assemblage literature, they illustrated how each actor's motivations emerged based on specific relationships in which they operated and on their imagining of potential future scenarios they sought to actualize through EIP-AGRI. This qualitative account illustrates how motivations emerge as different actors creatively navigate complex sets of relationships, revealing that the capacity of collaborative approaches to appeal to actors from diverse backgrounds relies heavily on actors' ability to envision and anticipate new possibilities.

#### *The role of intermediaries and innovation brokers*

Research increasingly recognizes the crucial role of intermediaries and innovation brokers in facilitating effective multi-actor collaboration. Piñeiro et al. (2021) identified innovation intermediary functions of Spanish Operational Groups through exploratory factor analysis of member survey responses, revealing that Spanish OGs perform three main functions: innovation process management, demand articulation, and institutional support and innovation brokering. These findings suggest that OGs serve not merely as vehicles for project implementation, but also as innovation intermediaries, performing complex facilitation and coordination roles.

The importance of skilled facilitation emerged across multiple studies. Mignani et al. (2025) examined the role of EIP-AGRI Operational Groups as drivers of innovation in the wine sector

across Italian regions, employing a mixed-methods approach to analyze stakeholders' perceptions. Their research addressed the extent to which OGs serve as drivers of innovation, provide networks fostering knowledge exchange, and identified perceived barriers to innovation. The study offers valuable insights and best practices for enhancing EIP-AGRI policies at regional, national, and European levels, highlighting the crucial role of effective coordination and facilitation in achieving innovative outcomes.

#### *Challenges in achieving genuine collaboration*

Despite the theoretical appeal of multi-actor collaboration, research documents significant challenges in achieving genuine co-creation. Arzeni et al. (2023) found that while the implementation of OGs in Italy helped capture real issues faced by farmers and rural entrepreneurs, it also supported the creation and strengthening of relationships between partners. However, low levels of internal and external communication, as well as a lack of efforts to disseminate results, reduced group effectiveness. Their analysis revealed the complexity of describing processes triggered by the interactive approach, which is influenced by the relationship types existing between partners and external factors. They recommended that the implementation of the next generation of OGs could be strengthened by improving the capacity to address issues of large groups of farmers, promoting the presence of intermediaries to facilitate dialogue between partners, and facilitating the active participation of advisors.

Stoeva et al. (2024) analyzed 14 short food supply chain initiatives across Europe to understand the dynamics of collaboration, identifying seven key interaction mechanisms: information sharing, decision synchronization, goal congruence, incentive alignment, resource sharing, joint knowledge creation, and collaborative communication. Their findings demonstrated that collaborations operate as dynamic ecosystems characterized by complex interdependencies among diverse actors, with the presence of robust interaction mechanisms essential for fostering effective partnerships and generating relational benefits. However, not all mechanisms were consistently present in every type of collaborative relationship, suggesting variability in the quality and depth of collaboration across different initiatives.

### **Research direction: impact assessment and effectiveness evaluation**

The third major research direction addresses fundamental questions about EIP-AGRI's effectiveness and impact. This stream of literature employs diverse methodological approaches to assess whether the initiative achieves its stated objectives of enhancing agricultural productivity, sustainability, and competitiveness. Research in this area reveals both promising outcomes and significant challenges in measuring and attributing impacts.

#### *Economic and environmental performance assessment*

Rigorous impact assessment requires comparing the performance of participating farms with appropriate counterfactuals. Bonfiglio (2023) conducted one of the most methodologically sophisticated analyses, applying propensity score matching techniques to Italian farm accountancy data network samples, comparing 45 OG participants with 225 non-participants in Emilia-Romagna from 2017 to 2020. Results indicated that the analyzed OGs might have contributed to improving fertilizer management and profitability levels in participating farms, but failed to preserve biodiversity and reduce consumption of pesticides and other inputs such as water, energy, and fuels. This mixed picture suggests that while economic improvements may be achievable, environmental sustainability goals prove more challenging to realize. Bonfiglio recommended that to increase OG effectiveness, policymakers should condition projects on actual experimentation and implementation of agricultural innovations and apply performance-based indicator systems for ex-ante and ex-post impact assessment.

The challenge of achieving environmental outcomes appears across multiple contexts. McLoughlin et al. (2020) examined three Irish EIP initiatives - Caomhnú Árann, the Hen Harrier Project, and the Pearl Mussel Project - that employ results-based payment approaches, where farmers are rewarded for the habitat quality they maintain on their farms, in addition to the food products they produce. These initiatives enable adaptive approaches tailored to the specific needs and challenges of specific biogeographical areas, allowing for the delivery of vital ecosystem services, including biodiversity conservation, carbon sequestration and storage, improved water quality, agricultural biodiversity, flood

resilience, and fire resilience. The results-based approach, which uses habitat quality as a surrogate for ecosystem services linked to payment levels, provides a model demonstrating how a wide range of ecosystem services can be delivered while farmers are rewarded for doing so.

The difficulty of achieving environmental objectives within EIP-AGRI is not attributable to any single cause but reflects the convergence of methodological, organisational, and structural barriers that operate at different levels and on different timescales, and which therefore require differentiated responses.

At the methodological level, the fundamental problem is one of temporal mismatch. Meaningful environmental outcomes - changes in biodiversity, soil health, water quality, or carbon sequestration - typically require years or decades to become measurable, while EIP-AGRI project cycles operate on timeframes of two to five years. Bonfiglio (2023) captures this directly: even in a methodologically sophisticated quasi-experimental evaluation using propensity score matching, no significant effect on pesticide use, energy consumption, or biodiversity could be detected within the observation window, despite positive findings on fertiliser management and profitability. The absence of standardised environmental indicators applicable across different OG types and national contexts compounds this further, as Baranauskienė et al. (2021) demonstrate in their work on evaluation methodology: without agreed metrics established at project inception, ex-post environmental assessment becomes largely impressionistic. The implication is not that environmental impacts are absent but that current evaluation designs are structurally incapable of detecting them.

At the organisational level, the barrier is one of dissemination and follow-through. Arzeni et al. (2023) found that Italian OGs frequently succeeded in capturing real farm-level issues and building inter-partner relationships, yet their environmental effectiveness was curtailed by low levels of internal communication and limited efforts to disseminate results beyond the immediate project consortium. Canali et al. (2020) document a related fragmentation in the organic farming research and innovation landscape, where funded interventions are scattered across topics, disciplines, and supply chain types in ways that prevent the accumulation of knowledge and the scaling

of environmentally beneficial practices. Both studies point to the same organisational deficit: the multi-actor structure creates the conditions for knowledge co-creation but does not automatically generate the dissemination and uptake pathways through which environmental benefits are realised at scale.

At the structural level, the barrier is political and programmatic. Eckerberg et al. (2023) show that in Sweden, national programming systematically prioritised agricultural competitiveness over environmental development, interpreting innovation in technical rather than systemic terms and leaving sustainability transition goals effectively unoperationalised. This is not a Swedish peculiarity but an expression of a broader tension within the EIP-AGRI framework itself, which formally endorses both productivity and sustainability objectives while leaving member states discretion over how to balance them in practice. Where administrative traditions and agricultural sector interests favour productivist framings, environmental objectives are routinely subordinated. Borgia et al. (2025) add a further structural dimension: the respondents in their survey of 90 project coordinators identified the need for reinforced public policies to improve the environmental dimension of sustainability as one of the most pressing gaps in the current instrument mix, suggesting that practitioners themselves recognise the structural underfunding of environmental ambition within the existing policy architecture.

Addressing environmental objectives in EIP-AGRI therefore requires simultaneous action at all three levels: longitudinal monitoring plans and standardised environmental indicators embedded at project design stage, stronger organisational requirements for dissemination and knowledge transfer beyond the project consortium, and an explicit rebalancing of national programming priorities toward sustainability outcomes rather than leaving that balance to administrative discretion.

#### *Evaluation methodologies and frameworks*

The diversity of EIP-AGRI objectives and implementation contexts necessitates development of robust evaluation frameworks. Baranauskienė et al. (2021) developed an evaluation methodology for assessing the effectiveness of innovation partnerships in agriculture, detailing selected evaluation indicators, establishing their significance, and providing guidelines

for interpreting effectiveness evaluation results. Their methodology was tested using data from Lithuanian EIP groups, providing both scientific and practical relevance. This work addresses the fundamental problem of evaluating the effectiveness of innovation partnership projects in agriculture and identifying the indicators that should define and measure it, recognizing that without appropriate evaluation methodologies, the true contribution of these initiatives remains unclear.

Maziliauskas et al. (2018) employed force field analysis to determine external and internal factors influencing EIP effectiveness, involving experts with scientific and practical experience, including scientists, policymakers, and innovators. Their analysis revealed that the number of negative factors exceeds the number of positive factors; however, the factors analyzed enable the timely identification of potential negative consequences and provide opportunities to predict the effectiveness of EIP-based projects. This diagnostic approach offers valuable insights for anticipating and mitigating implementation challenges before they undermine project outcomes.

#### *Sector-specific impact analysis*

Research examining specific agricultural sectors offers insights into how the effectiveness of EIP-AGRI varies across different production systems and value chains. Canali et al. (2020) analyzed the dynamics of organic food and farming research and innovation in Italy, examining 70 research projects funded with 21.081 million euros (less than 0.1% of sector value) launched 2009-2018, and 53 regional innovation projects with 14.299 million euros (less than 10% of available funding) activated 2007-2019. Their analysis revealed that the implementation of interventions in research and innovation areas was often scattered in terms of topics, disciplines, and types of supply chains or networks addressed. However, the relatively high share of multi- and interdisciplinary projects and acknowledgement of the multi-actor approach as a fundamental step toward co-research and co-innovation emerged as positive developments. The study's outcomes can inform competent national and regional authorities in designing future research and innovation policies and interventions.

De Visser et al. (2014) examined Europe's dependency on soya bean imports for the animal feed industry through an EIP-AGRI consultation

process involving 20 experts from 11 EU countries. The process assessed present-day yield gaps of protein crops using an approach based on market values of protein, starch, and plant oil components, finding that oil-based protein crops seemed overall better positioned than starch-based protein crops because oil price levels are higher than starch prices. The study identified opportunities and constraints to be encountered by the innovation process, combining knowledge and physical infrastructure, market structure, cooperation and interaction, and the influence of culturally determined values and beliefs. This case demonstrates how EIP-AGRI consultation processes can identify strategic innovation priorities with significant implications for European agricultural self-sufficiency and sustainability.

#### *Social and non-economic outcomes*

Beyond economic and environmental metrics, research increasingly recognizes the importance of social dimensions and well-being outcomes. Conway et al. (2022) addressed the mental health and well-being of older farmers in the context of generational renewal policies, arguing that policies aimed at stimulating generational renewal pay meager regard to older farmers' mental health and well-being, overlooking their identity and social circles, which are inextricably intertwined with their occupation and farm. The paper proposes "farmer-sensitive" actions at both policy and societal levels to alleviate the fear and anxiety associated with stepping aside and retirement from farming, with a particular focus on the social and emotional well-being benefits of membership in social groups that reflect farmer-relevant values and aspirations in later life. The potential of the multi-actor EIP-AGRI initiative and the established livestock mart sector in facilitating the successful rollout of social organizations designed to fit the specific needs and interests of older farming community generations was outlined, beginning a broad international conversation on transforming farming into an age-friendly sector aligned with the World Health Organization's age-friendly environments concept.

This social dimension extends to how innovation partnerships themselves create or strengthen social capital and networks. Arzeni et al. (2023) found that while Italian OG implementation helped capture the real issues faced by farmers and rural entrepreneurs, and supported the creation and strengthening of relationships between partners, its effectiveness was reduced by low levels of communication and limited dissemination

efforts. This suggests that social and relational outcomes, while potentially significant, are not automatically achieved through multi-actor structures; rather, they require deliberate attention to communication and knowledge-sharing processes.

#### *Policy effectiveness and instrument design*

Evaluation research is increasingly examining which policy instruments prove most effective in stimulating innovation (Table 4).

Instrument type	Study	Finding on effectiveness
Financial (subsidies, grants)	Borgia et al. (2025)	Perceived as most important by 90 project coordinators
Advisory & extension services	Borgia et al. (2025)	Most in need of stronger public support (paradox)
Results-based payments	McLoughlin et al. (2020)	Effective for ecosystem service delivery in Irish EIP
Peer-to-peer & knowledge platforms	Feo et al. (2022)	Enhance uptake; under-utilised relative to potential
Institutional/capacity support	Kruzmetra et al. (2021)	One of 8 prerequisites for innovation project success in Latvia
Performance-based conditionality	Bonfiglio (2023)	Recommended to ensure genuine innovation activity

Source: authors

Table 4: Policy instrument effectiveness.

Borgia et al. (2025) examined the significance of various policy instruments in promoting sustainable innovation in fruit and vegetable value chains, drawing on the perceptions of 90 project coordinators from the EIP-AGRI platform. The study showed that most respondents, although belonging to different kinds of organizations in terms of typology, provenance, and area of work, converged in recognizing financial instruments as the most important ones. Conversely, educational and informational instruments, such as advisory and extension services, as well as peer-to-peer initiatives, were largely seen as most in need of stronger public support. Most respondents also demanded reinforced public policies to improve the environmental dimension of sustainability and boost technological innovations along agri-food value chains.

The evidence across the reviewed studies points to a structured hierarchy of policy instrument effectiveness, though one that carries an internal tension requiring explicit policy attention. Financial instruments - grants, project subsidies, and results-based payments - are consistently identified as the most important by practitioners.

Borgia et al. (2025), drawing on the perceptions of 90 project coordinators from diverse organisational backgrounds across Europe, found near-universal convergence on this point regardless of country of origin or type of organisation. Yet the same study reveals a paradox: advisory and extension services, while rated as least adequately funded, are simultaneously seen as most in need of stronger public support. This gap between perceived importance and actual investment levels suggests that current policy mixes are structurally skewed toward visible, project-based expenditure at the expense of the relational and capacity-building infrastructure on which OG functioning ultimately depends.

Translating this into concrete recommendations, the reviewed literature collectively supports four actionable directions. First, financial support should be conditioned on genuine innovation activity rather than procedural compliance, with ex-ante innovation plans and ex-post performance reporting required as conditions of project approval - a reform Bonfiglio (2023) identifies as essential to ensuring that funded OGs involve actual experimentation rather than repackaging of conventional practices. Second, public investment in advisory and extension services requires stabilisation and expansion, as the current underfunding documented by Borgia et al. (2025) undermines precisely the facilitation capacity that multiple studies identify as a prerequisite for effective multi-actor collaboration. Third, peer-to-peer knowledge exchange platforms should be embedded as a structural component of OG support architecture rather than treated as an optional supplement, given the evidence from Feo et al. (2022) that user-friendly digital platforms linked to demonstration activities measurably improve knowledge uptake and long-term impact. Fourth, and most specifically for environmental objectives, results-based payment schemes of the kind documented by McLoughlin et al. (2020) in Ireland - where farmers are rewarded for demonstrable habitat quality rather than for following prescribed management actions - offer a model that combines financial incentive with outcome accountability and warrants broader replication across member states. Taken together, these recommendations suggest that instrument effectiveness in EIP-AGRI is not simply a question of funding volume but of the design logic governing how instruments are combined, conditioned, and sequenced across the project lifecycle.

### *Limitations and measurement challenges*

The literature reveals significant challenges in measuring the impacts of EIP-AGRI robustly. Temporal dimensions pose particular difficulties, as innovation processes often require extended periods before outcomes become apparent, while evaluation frameworks typically operate on shorter project timeframes. Attribution challenges arise from the complexity of factors influencing farm performance and the difficulty of establishing clear causal links between participation in OGs and observed outcomes. Additionally, the diversity of OG objectives, from technical innovation to social learning to market development, complicates the development of standardized evaluation metrics applicable across different contexts.

Bonfiglio (2023) noted that actual experimentation and implementation of agricultural innovations should be conditions for project approval, suggesting that many funded projects may not involve genuine innovation activities. This observation raises fundamental questions about what constitutes innovation within the EIP-AGRI framework and whether current selection and monitoring mechanisms adequately distinguish between innovative and conventional activities. The challenge of measuring systemic and transformative impacts, as opposed to incremental improvements, remains largely unaddressed in the existing literature, highlighting significant gaps in current evaluation approaches.

## **Conclusion**

### **Summary of findings and methodological limitations**

The present review yields three clusters of findings that differ substantially in the robustness of their evidentiary base, and it is important to distinguish between them before turning to the future research agenda.

Several findings can be considered robust in the sense that they are supported by multiple studies using methodologically diverse approaches across different national contexts. The substantial heterogeneity in national and regional EIP-AGRI governance is the most consistently documented result in the corpus: comparative analyses covering Italy, Sweden, Bulgaria, Germany, Latvia, Lithuania, Portugal, and eight European countries collectively confirm that administrative traditions, funding

architectures, and interpretations of the interactive innovation model diverge markedly across member states, producing very different conditions for OG operation even within the same EU regulatory framework (Giarè and Vagnozzi 2021; Eckerberg et al. 2023; Stoeva and Pickard 2020; Hermans et al. 2015). Equally well-supported is the pivotal role of boundary-spanning actors and innovation brokers: this finding emerges from social network analysis, communities of practice theory, and exploratory factor analysis applied in Ireland, Germany, Spain, and EU-wide thematic networks, lending it considerable cross-methodological credibility (Müller and Riekötter 2025; Piñeiro et al. 2021; Feo et al. 2022). The perceived primacy of financial instruments over advisory and extension services is also backed by a relatively large perception survey of 90 project coordinators drawn from diverse organisational backgrounds across Europe (Borgia et al. 2025).

Other findings, while plausible and theoretically coherent, rest on a narrower evidentiary base and should be treated as tentative. The contribution of OGs to environmental outcomes is genuinely uncertain: the only quasi-experimental study in the corpus - Bonfiglio (2023), comparing 45 OG-participating farms with 225 controls in Emilia-Romagna - found improvements in fertiliser management and profitability but no significant effect on pesticide use, biodiversity, or energy consumption. No comparable counterfactual study exists for other regions or production systems, making generalisation premature. The claim that EIP-AGRI has the potential to catalyse systemic or transformative change in agricultural innovation systems likewise remains largely aspirational: it is grounded in qualitative policy analysis from Sweden (Eckerberg et al. 2023) and in normative argumentation rather than in observed outcomes. Similarly, the finding that farmers frequently occupy passive roles in OG decision-making, while theoretically important, is documented primarily through two Irish case studies (Harrahill et al. 2022; McCarthy et al. 2021) and may reflect features specific to the Irish agricultural context rather than a universal pattern.

The review itself is subject to several methodological limitations that readers should bear in mind when interpreting these findings. The keyword search strategy - combining "EIP" and "AGRI" across titles, abstracts, and author keywords in Web of Knowledge and Scopus - was intentionally broad, but it may have missed relevant articles that

discuss the initiative under alternative terminology such as "Operational Groups", "interactive innovation approach", or "AKIS reform". The resulting corpus is heavily weighted towards qualitative and interpretive case studies; only one study employs a quasi-experimental design capable of supporting causal inference, which means that conclusions about what EIP-AGRI actually produces, as opposed to what participants perceive or what documents prescribe, must be drawn with caution. Geographic coverage skews notably towards Ireland, Italy, Germany, and Sweden, while Central and Eastern European countries - which account for a substantial share of EU OG activity and face distinct structural challenges - are underrepresented. The coding and thematic analysis were conducted by the two authors without a formal inter-rater reliability procedure, introducing a potential source of interpretive bias. Finally, the review does not encompass grey literature such as EIP-AGRI network publications, national Rural Development Programme evaluations, or European Commission monitoring reports, all of which contain implementation data that peer-reviewed studies frequently cite but do not themselves constitute.

### **Directions for future research**

Drawing on a comprehensive analysis of 31 studies and integrating insights from recent research conducted between 2023 and 2025, we identify seven critical directions for future research that can advance the understanding of agricultural innovation partnerships and strengthen their contribution to sustainable agricultural transformation.

### **Developing robust performance-based evaluation frameworks**

Future research must address the fundamental challenge of measuring EIP-AGRI impacts beyond project-period assessments. Recent evidence suggests that many funded projects primarily involve feasibility studies rather than actual experimentation and innovation implementation (Bonfiglio 2023). Research should develop methodologies distinguishing genuine innovation activities from conventional practices, establishing clear indicators for ex-ante project selection and ex-post impact assessment.

Evaluation research should employ longitudinal approaches tracking OGs from inception through multiple years post-completion to reveal delayed effects and systemic transformations. Particular attention should be paid to developing metrics

for non-economic outcomes, including social capital formation, learning outcomes, network development, and ecosystem service delivery (McLoughlin et al. 2020). The challenge of attribution in complex multi-actor contexts requires sophisticated methodological approaches such as contribution analysis, realist evaluation, synthetic control methods, and carefully constructed matched comparison groups.

### **Understanding and strengthening innovation brokerage**

The critical role of innovation brokers has been consistently identified, yet significant gaps remain regarding optimal brokerage practices and support structures. Müller and Riekötter (2025) identified adaptive facilitation, multimodal translation, and network cultivation as key practices; however, questions remain about how these competencies can be systematically developed.

Future research should examine different brokerage models, comparing the effectiveness of dedicated broker organizations versus rotating roles, external versus embedded brokers, and professional versus peer brokers. Investigating the specific competencies required across various agricultural contexts can inform training curricula and professional development pathways. The role of digital platforms in supporting brokerage represents an emerging frontier, with potential to expand reach while maintaining relational quality. Research should also address political dimensions of brokerage, examining how brokers navigate power asymmetries, mediate conflicts between competing goals, and maintain legitimacy across diverse stakeholder groups.

### **Addressing power dynamics and enhancing farmer agency**

Research consistently reveals that farmers often occupy passive roles, despite nominal participation (Arzeni et al., 2023; Harrahill et al., 2022). Future research must move beyond measuring participation rates to analyzing the quality and depth of farmer engagement in decision-making processes. Power-sensitive methodologies, including network analysis that examines centrality and influence, as well as participatory action research approaches, can reveal how governance structures affect farmer influence in agenda-setting, resource allocation, and knowledge validation.

Particular attention should be paid to farmers in marginal positions, including smallholders,

women farmers, and farmers in less-favored areas. Research should examine the barriers these groups face and develop targeted strategies for inclusive participation. Investigation of "innovation sovereignty" – farmers' capacity to determine innovation agendas, control processes, and retain ownership of innovations – represents an important dimension, particularly in relation to intellectual property arrangements and data governance in precision agriculture contexts.

Power-sensitive methodologies that future research should employ include: (a) social network analysis (SNA) to quantify actor centrality, brokerage positions, and information flow asymmetries - as demonstrated by Harrahill et al. (2022) - with particular attention to 'betweenness centrality' as a proxy for influence in OG decision-making; (b) participatory mapping techniques such as stakeholder influence/interest matrices, power cubes, or power mapping exercises conducted with OG members at different project stages, allowing farmers themselves to visualise and articulate perceived power gaps; (c) discourse analysis applied to OG meeting minutes and project documentation to detect whose framings and priorities dominate the agenda; and (d) longitudinal participant observation to track shifts in farmer agency as trust and collaborative norms develop over time. In terms of OG design improvements, research should examine whether structural changes - such as farmer-led OG governance, farmer-controlled data ownership agreements, and rotating facilitation roles - measurably shift decision-making influence toward primary producers.

### **Advancing understanding of knowledge co-creation processes**

While knowledge co-creation is central to EIP-AGRI, substantial gaps remain in understanding how different knowledge forms are integrated and transformed. Müller and Riekötter (2025) demonstrated that successful OGs function as communities of practice, yet questions remain about conditions fostering such communities within institutionalized frameworks.

Future research should examine microlevel processes of knowledge interaction through ethnographic approaches, investigating how farmers, researchers, and advisors communicate and develop shared understandings. The role of boundary objects, shared experiments, and demonstration activities in facilitating

knowledge integration deserves attention. Temporal dimensions of knowledge co-creation require investigation, tracking how understanding evolves through iterative cycles of experimentation and adaptation. Digital technologies create new possibilities and challenges; research should examine how online platforms, decision support systems, and data analytics transform knowledge production while potentially creating new exclusions and dependencies.

### **Exploring sector-specific and context-dependent innovation pathways**

The reviewed literature demonstrates substantial variation in EIP-AGRI effectiveness across different agricultural sectors and territorial contexts (Canali et al., 2020; Mosquera-Losada et al., 2025). Future research should develop a nuanced understanding of how innovation pathways differ across production systems, value chains, and territorial characteristics.

Comparative research can identify sector-specific innovation challenges, appropriate knowledge sources, and effective support mechanisms. Innovation dynamics differ substantially between annual crops, perennial systems, livestock, and mixed farming, requiring tailored approaches. Territorial dimensions deserve greater attention, particularly in innovation pathways for marginal agricultural areas, less-favored regions, and territories that provide ecosystem services where conventional productivity-focused models may be inappropriate. Research on bioeconomy and circular economy should examine governance arrangements that enable farmers to capture appropriate value while contributing to sustainability goals, addressing the questions of equity raised by Harrahill et al. (2022).

### **Strengthening integration between research, advisory, and extension systems**

Difficulties in research-practice collaboration, documented across multiple studies (Arzeni et al., 2023; Hermans et al., 2015), point to fundamental challenges in Agricultural Knowledge and Innovation Systems that require systemic research attention. Future research should examine how different AKIS configurations affect innovation outcomes, comparing the effectiveness of public extension services, privatized advisory systems, farmer-to-farmer networks, and hybrid models.

The changing role of agricultural advisors warrants investigation, examining how advisors mediate between research and practice while respecting

the autonomy of farmers. Borgia et al. (2025) found a paradox: while financial instruments are perceived as most important, advisory and extension services are seen as most in need of stronger support. Research should examine barriers to investment in advisory systems and the relationship between EIP-AGRI and other innovation mechanisms. Fieldsend et al. (2021) demonstrated that EIP-AGRI constitutes just one part of a complex matrix of activities; research should develop systemic perspectives identifying strategies for enhancing coherence across multiple innovation support mechanisms.

### **Investigating transformative innovation and sustainability transitions**

The most significant research frontier concerns EIP-AGRI's potential contribution to transformative change rather than incremental improvements. Eckerberg et al. (2023) demonstrated that technical innovations and competitiveness objectives dominate over sustainability transition goals in Swedish implementation. This raises fundamental questions about whether current mechanisms can catalyze the structural changes required for agricultural sustainability.

Future research should examine the conditions that enable transformative rather than incremental change, investigating how sustainability visions are articulated and operationalized within contexts where competing values coexist. The concept of mission-oriented innovation policy offers promising frameworks for orienting efforts toward specific societal challenges. Research should examine how mission-oriented approaches can be implemented, developing methodologies for portfolio management balancing diverse projects while maintaining strategic coherence around priority missions. Critical perspectives interrogating whose interests are served by particular innovation trajectories and how marginalized alternatives might be supported offer important contributions. Ultimately, research should examine agricultural innovation within broader sustainability transitions that encompass food systems, rural development, and the bioeconomy, generating insights relevant to policy integration across multiple domains.

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