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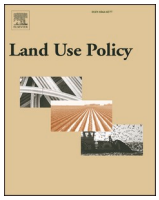

The prospects of innovative agri-environmental contracts in the European policy context: Results from a Delphi study

Eszter Kelemen [a,*], Boldizsár Megyesi [a,m], Bettina Matzdorf [b,n], Erling Andersen [c], Lenny G.J. van Bussel [d,1], Myriam Dumortier [e], Céline Dutilly [f,o], Marina García-Llorente [g], Christine Hamon [h], Annabelle LePage [i], Roberta Moruzzo [j], Katrin Prager [k], Francesco Riccioli [j], Carolina Yacamán-Ochoa [l]

[a] ESSRG Nonprofit Kft, Ferenciek tere 2, Budapest H-1053, Hungary
[b] Working Group 'Governance of Ecosystem Services', Leibniz Centre for Agricultural Landscape Research (ZALF), Eberswalder Straße 84, 15374 Müncheberg, Germany
[c] Department of Geosciences and Natural Resource Management, University of Copenhagen, Rolighedsvej 23, 1958 Frederiksberg C, Denmark,
[d] Environmental Systems Analysis, Wageningen University & Research, P.O. box 47, 6700 AA Wageningen, the Netherlands
[e] Instituut voor Natuur, en Bosonderzoek, Havenlaan 88 bus 73, 1000 Brussels, Belgium,
[f] Centre de Coopération Internationale en Recherche Agronomique pour le Développement, CIRAD, UMR MoISA, F-34398, Montpellier, France,
[g] Social-Ecological Systems Lab, Autonomous University of Madrid, Darwin 2, 28049 Madrid, Spain,
[h] Deutscher Bauernverband, Claire-Waldoff-Straße 7, 10117 Berlin, Germany
[i] Natural England, Natural England Mail Hub, Worcester County Hall, Spetchley Road, Worcester WR5 2NP, UK
[j] University of Pisa, Department of Veterinary science – Rural Economic Section, Viale Delle Piagge 2, 56124 Pisa, Italy,
[k] University of Aberdeen, Geography and Environment, St Mary's, Elphinstone Road, Aberdeen AB24 3UF, UK,
[l] Autonomous University of Madrid, Department of Geography, Road Francisco Tomas y Valiente 1, 28049 Madrid, Spain
[m] Institute for Sociology, Centre for Social Sciences, Tóth K. u. 4, Budapest H-1097, Hungary
[n] Institute of Environmental Planning, Leibniz University of Hannover, Hannover, Herrenhäuser Str. 2, 30419 Hannover, Germany
[o] MoISA, Univ Montpellier, CIRAD, CIHEAM-IAMM, INRAE, Institut Agro, IRD, Montpellier, France

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ABSTRACT

Innovative agri-environmental contracts are increasingly studied in the literature, but their adoption has been relatively slow and geographically scattered. Action-based agri-environmental measures remain the predominant policy mechanism across Europe. A three-round Policy Delphi study was conducted with policy makers, scientific experts, farmers' representatives, and NGOs from across 15 different European countries, to investigate how and under which circumstances novel contractual solutions could be implemented more widely. The expert panel perceived result-based and collective contractual elements as the most promising. Although considered beneficial from several aspects, value chain contracts were perceived less relevant to the policy environment. The Common Agricultural Policy (CAP) Pillar 2 measures were highlighted by the experts as the key policy area to implement novel contracts by national or regional authorities, but Pillar 1 eco-schemes, being launched in the CAP 2023–2027, were also considered as a potentially suitable framework for testing and implementation. The Delphi panel envisaged innovative contracts should be adopted by governments in iterative steps and not as a complete substitute for current payment schemes, but rather as an additional incentive to them. Such an incremental approach allows contractual innovations to capitalise on existing best practices. But it also implies the risk that innovative contracts could remain marginal and fail to substantially change farmers' behaviour, resulting in a failure to improve environmental conditions.

* Corresponding author.
E-mail addresses: kelemen.eszter@essrg.hu (E. Kelemen), megyesi.boldizsar@essrg.hu (B. Megyesi), matzdorf@zalf.de (B. Matzdorf), eran@ign.ku.dk (E. Andersen), lenny.vanbussel@pbl.nl (L.G.J. van Bussel), myriam.dumortier@inbo.be (M. Dumortier), celine.dutilly@cirad.fr (C. Dutilly), marina.gllorente@uam.es (M. García-Llorente), C.Hamon@bauernverband.net (C. Hamon), Annabelle.LePage@naturalengland.org.uk (A. LePage), roberta.moruzzo@unipi.it (R. Moruzzo), katrin.prager@abdn.ac.uk (K. Prager), francesco.riccioli@unpi.it (F. Riccioli), carolina.yacaman@uam.es (C. Yacamán-Ochoa).
[1] Present address: PBL-Netherlands Environmental Assessment Agency, Wageningen University, P.O. box 30314, 2500 GH The Hague, The Netherlands.

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1. Introduction

The greening of the EU's Common Agricultural Policy (CAP) has been accelerating since the millennium, leading to the implementation of new measures both in Pillar 1 direct payments and Pillar 2 rural development funds (EEA, 2012). Still, evidence is mixed on how far the CAP could and should support land management practices to enhance delivery of both environmental public goods and biodiversity (e.g., Reed et al., 2020; Hristov et al., 2020; Gamero et al., 2017). Research in the last few years has identified several reasons for the CAP's limited environmental effectiveness. Some of these are rooted in vested interests and power battles that characterise the broader political context and are difficult to address without systemic change, particularly a fundamental re-balancing of the way payments are distributed. For example, the uneven distribution of Pillar 1 and Pillar 2 payments means pro-biodiversity payments under Pillar 2 are outweighed by production-linked subsidies in Pillar 1 which can lead to environmental harm (Arnott et al., 2019; Pe'er et al., 2019). The distribution of payments across farmers is also biased towards large intensive farms and landowners (Navarro and López-Bao, 2018; Pe'er et al., 2019). Other obstacles reported in the literature are more pragmatic and relate to actual implementation. Examples include: the limited willingness of farmers to participate in Pillar 2 agri-environmental schemes (Alliance Environnement, 2019); the information asymmetry between policymakers and farmers (Gómez-Limón et al., 2019; Olivieri et al., 2021; Mennig and Sauer, 2020); and the difficulty in adapting centralised payment schemes to local environmental, social, and economic factors (Brown et al., 2021; Hristov et al., 2020).

It seems inevitable that system-level change is needed to tackle the more deeply rooted causes of the CAP's limited environmental effectiveness. But gradual improvement within the current political framework is also possible and could help overcome the more operational obstacles listed above. Even with a strategic reorientation of the CAP towards payments for providing environmental public goods, how those payments are designed will be crucial to ensure they are taken up by farmers and achieve the expected environmental effects.

Approaches that have been discussed in practice and research for several years are results-oriented remuneration (Burton and Schwarz, 2013), improved spatial coordination of measures (Uthes and Matzdorf, 2013), and targeted (nature conservation) advisory services (Labarthe and Beck, 2022). Innovative contracts that take these aspects into account can be seen as important building blocks for more effective agri-environmental measures. Results-oriented contracts and collective or cooperative approaches that include aspects of spatial coordination as well as targeted advice are thus in the spotlight. They are also being promoted as innovative approaches within the strategic orientation of the EU agri-environmental policy (e.g. EC, 2020a, 2020b).

Besides improving the contract design of public payment schemes, there is an ongoing debate on how better to consider the whole agri-food-system within the policy framework (EC, 2020c). For instance, contracts between farmers and food processors or retailers that valorise environmental public goods and biodiversity within the value chain offer possibilities to use innovative contract features for a system-level change that can transform the wider institutional setting (Bredemeier et al., 2022). Contracts between landowners and land managers (e.g. lease contracts) provide another potential route to secure environmental benefits. They can be reformed to link environmental management requirements to land tenure rights and potentially secure long-term provision of environmental public goods. This also offers a solution to the limited effectiveness of agri-environmental contracts which stems from their relatively short-term nature (Robinson et al., 2018).

The Contracts2.0 project co-created and assessed novel contractual solutions to explore if these can better incentivise farmers to produce environmental public goods on their land, while at the same time reconcile the profitability of their farms with environmental objectives. Our paper, arising from this project, aims to investigate how and under which circumstances novel contractual solutions could be incentivised by the EU's Common Agricultural Policy to make them more widespread across Europe. We conducted a Europe-wide, three-round online Policy Delphi study with policymakers, scientific experts, farmers' representatives and NGOs and sought answers to the following research questions: 1) What options do policy experts consider as relevant to improve the contractual design for incentivizing the provision of environmental public goods? 2) How can implementation challenges of innovative contracts be overcome? and 3) Can innovative contracts be made coherent with the CAP, and if so, where do they fit in to the current architecture?

The next section briefly overviews the relevant literature to highlight shortcomings of mainstream agri-environmental contracts as well as the main contractual innovations which are the focus of this paper. Then, our methodological approach is detailed. The results section presents our findings on the barriers and opportunities of implementing novel contractual solutions, the options available to overcome implementation challenges, and the degree to which innovative contracts fit the current policy landscape. Finally, the discussion and conclusion sections explain some of the more controversial topics that emerged during the analysis and reflect upon the achievable scale of change.

2. Innovative contractual solutions

The effectiveness of mainstream agri-environmental-climate measures (AECMs) is limited by several weaknesses. These include: that contracts are agreed with individual farmers, thereby neglecting wider rural and food chain actors; that contracts operate at field or farm scale and hence have limited capacity to address environmental outcomes which need coordinated management at landscape scale; and that contracts rely on the prescription of specific management actions (an action-based approach) which limits both the farmer's ability to tailor management to local environmental and farm conditions and also the scope for them to fully understanding and support the requirements (Bredemeier et al., 2022; Riley et al., 2018). To overcome such weaknesses, and to focus better on the whole agri-food system, innovative contractual solutions are needed (Tyllianakis et al., 2023).

'Innovative contracts' are contractual arrangements that incentivise farmers to produce environmental public goods alongside private goods, but which are (in part) still experimental and deviate from mainstream AECMs. The differences can be either in their characteristics, the (re) combination of their characteristics, or the way in which they are implemented including contract governance (Bredemeier et al., 2022). We focus our analysis on four specific contractual innovations that are discussed in research and policy: (a) result-based and (b) collective approaches that could be used to improve mainstream AECMs, (c) value chain approaches to broaden the approach of public payments by using the capacity of the whole agri-food system, and (d) land tenure contracts as an alternative to regulatory law for securing the provision of environmental public goods in the long term.

(a) Result-based approaches have been discussed for several decades as promising options to improve the targeting of AECMs and provide a means through which the information asymmetries that exist within action-based approaches could be overcome and farmers incentivised to provide environmental public goods (Matzdorf et al., 2008; Herzon et al., 2018). The main idea is to link the payment directly to the environmental output and thus increase farmers' flexibility and responsibility. In contrast to current mainstream action-based AECM contracts, where management measures are prescribed and the payment is based on the measures' implementation costs, in result-based contracts the payment rate is linked to measurable environmental effects. Different examples have been implemented around Europe e.g., payment schemes linked to grassland indicator species (e.g., Šumrada et al., 2021; Zabel, 2019). Challenges exist with regard

to implementing this approach in landscapes dominated by arable farming, tailoring to the environmental context, addressing the perceived risk of no payment to the farmer if they fail to meet a minimum target standard, and building sufficient institutional capacities for implementation.

(b) Collective or cooperative contractual approaches are discussed as options for spatial coordination at the landscape scale (van Dijk et al., 2015; Nguyen et al., 2022) and to foster social capital for the provision of environmental public goods (De Vries et al., 2019). The Netherlands has implemented this collective approach nationwide for their agri-environmental programmes. Dutch farmers must be a member of an agricultural collective to be eligible for AECMs. The agricultural collectives in the Netherlands are legal entities that receive governmental AECM payments to coordinate scheme implementation in their defined territories which aims to meet area-specific environmental targets (Barghusen et al., 2021). In other countries, e.g., France and the UK, collective contracts are implemented on collectively managed land such as communal pastures (Dodsworth et al., 2020). Despite several good examples, some studies offer evidence on farmers' reluctance to join such schemes as social norms shift from landscape-level collaborations to individualistic land management and peer-to-peer trust building (Riley et al., 2018).

(c) Value chain contracts involve additional actors to those typical in AECMs, in particular from the demand side i.e., food processors, retailers and consumers. In combination with labelling (Golan et al., 2001) and certification schemes (Jaung et al., 2019) they can act as information-based policy instruments (Simoncini et al., 2019) and strengthen the market position of environmentally friendly producers and the role of consumers. Such contracts focus on a commodity with a well-established market (e.g., a food crop), where non-provisioning ecosystem services (i.e., environmental outputs) are jointly produced alongside the commodity sold. While several examples exist to public and private labels that successfully accommodate ecological aspects (Berthet et al., 2021), some authors warn that specialty labels and value chains can be driven by strong economic interests and lack transparency about their real environmental impacts (see e.g., Ilbery and Maye, 2005).

(d) Land tenure contracts involve additional actors from the supply side, in particular landowners and municipalities, who are often not directly involved in land management but have a significant role especially when conflicting land uses are present (Wästfelt-Zhang, 2018). Land tenure arrangements between landowners and land managers can define sustainable land use practices in a land lease contract which will generate non-provisioning ecosystem services. One example of such an approach is the BioBoden initiative in Germany. This initiative buys land to lease to organic farmers. These leases include specific conservation requirements for land management (Bredemeier et al., 2022). Such innovative land tenure contracts can help overcome some of the barriers that usually limit conservation practices on rented land, e.g., opposing financial interest and information asymmetry between land users and landowners (Ranjan et al., 2019). Although other challenges, such as the lack of systematic mapping and monitoring of areas managed sustainably under private land tenure contracts (Rissman et al., 2019), appear to persist.

Note that AECMs can have either or both of the contract design features (a) results-based and (b) collective, and these design features can also apply to value chain and land tenure contracts. Therefore, combinations of features may lead to innovative hybrid contracts. The option of combining different features and contract types in multiple ways was integrated into the questions for our Delphi study.

3. Material and methods

3.1. Collaborative research approach

As contractual innovations were at the centre of the Contracts2.0 project, engaging various stakeholders and knowledge holders was important. The Innovation Lab approach (Bergvall-Kareborn and Stahlbrost, 2009) was applied to this end. Contract Innovation Labs (CILs), as platforms for exchange, were created for local stakeholders such as farmers, farmers' unions, or environmental NGOs highly attached to farming landscapes. Simultaneous Policy Innovation Labs (PILs) were established for regional and national level policy decision-makers and experts (Andersen et al., 2020). CIL and PIL members worked together with researchers during the project to develop tailormade novel contractual solutions in nine European countries. The Delphi study presented in this paper was embedded in – and broadened – the science-policy interactions happening in the PILs.

Policy Labs have emerged in the 20th century as a new element in the public policy process (McGann et al., 2018; Olejniczak et al., 2020) and can be seen as a way of including more (and more diverse) actors in the policy process that enrich the pool of knowledge and expertise based on which decisions are made (Kimbell, 2015). In Contracts2.0, the main aim of the labs was twofold: first, to define the needs and expectations of local stakeholders in the CILs; and second, to involve decision-makers in the assessment of innovative contracts and to create fora for interaction and co-learning among locals, scientists, and policymakers in the PILs. A broad variety of regional and national stakeholders collaborated – representatives of NGOs, authorities, policymakers, experts, and scientists – to identify framework conditions and provide guidelines on how current policies can be adapted to support innovative agri-environmental contracts.

We chose the Delphi method to systematically investigate how innovative contracts can be implemented in the current European policy context. The Delphi method has become popular to explore expert opinions on controversial topics (De Carvalho et al., 2017; Mukherjee et al., 2015) and is increasingly used to study agricultural-environmental issues (see e.g., Allen et al., 2019; Balázs et al., 2021; Cole et al., 2020; Darnhofer et al., 2017). When targeted toward policy-relevant topics, it helps to reveal the multitude of the respondents' divergent and convergent opinions and attitudes (Turoff, 2002). It is organised as a sequential process, where experts get feedback and can comment on each other's opinion after each round of the survey, thus it does not only elicit knowledge, but creates space for discussion and learning (Meskell et al., 2014).

Despite its advantages, there are also limitations of the Delphi method, especially if administered online. Selecting experts involves two types of risks: if the aim is to have a larger and geographically more widespread panel one will risk the low level of engagement of participants, and if the aim is to engage panel members more intensively one will risk that only a small panel can be convened (Hirschhorn, 2019). In any case, the coordinator of an online Delphi survey has only limited control over the response rate and the intensity of interaction between panel members. Furthermore, since Delphi surveys usually combine closed and open-ended questions, the analysis of narratives can lead to misinterpretations, especially if they are not detailed enough. A detailed and transparent explanation of the data collection and analysis is thus of key importance to increase the reliability of the method (De Loë et al., 2016).

3.2. Data collection and analysis

This Delphi study was organised in three consecutive rounds. Each round consisted of approximately 30 questions, both quantitative and qualitative ones (Appendix A), administered through the Mesydel online platform (www.mesydel.com).

In the first round, being open during March and April 2021, we asked

respondents to assess whether and to what extent innovative contract features (result-based and collective design applied either in publicly funded AECMs or in private contracts) and novel contract types (value-chain and land tenure contracts) differ from the currently most widespread action-based AECMs. The respondents assessed innovative solutions across five dimensions: (1) whether they can effectively support sustainable production, (2) how costly their implementation is, (3) whether a broader knowledge base and a more developed infrastructure are necessary to implement them, (4) how well they are suited to existing institutions, and finally (5) how well they are suited to the social and cultural context. Responses could vary from 1 (highly disagree) to 5 (highly agree). Afterward, respondents were asked to imagine a "dream" contract that they would consider the ideal contract prototype (i.e., environmentally the most effective) in their own country or region. They could select different contract types and contract design features from a predefined menu to create their own contract solution, including public AECM contracts, land-tenure, and value-chain contracts, as well as action- or result-based, individual or collective, and short- (1 year), medium- (5–7 years) or long-term (over 10 years) contract features. Finally, they were asked to briefly describe their preferred contract solution and explain any further specification they would implement.

The second round, accessible during June and July 2021, further analysed the ideal contracts through specific open and close-ended questions on their (potential) policy applicability. Additionally, the second questionnaire invited respondents to assess different strategies to overcome implementation barriers frequently mentioned in the first round. Policy options to resolve the barriers were listed on the basis of a literature review, and respondents were allowed to select multiple options which they considered relevant and could also propose further potential solutions. Since the first round revealed a lack of experience with land tenure contracts, this contract type was dropped from the second and third rounds.

The third round was open from late November to late December 2021, exploring the synergies and contradictions among different contract types and CAP policy measures. We focused our analysis on internal policy coherence or the lack of it (Mortelmans and Carmen, 2021; Mortelmans et al., 2020), as coherence across and within different policies is necessary to ensure that common goals are achieved through synergistic actions (Nilsson et al., 2012). This analysis included CAP measures, such as Pillar 2 agri-environmental schemes, Pillar 2 voluntary interventions related to ecological constraints, investments, knowledge exchange, or cooperation, and the newly established Pillar 1 eco-schemes, as well as private value chain contracts through certification and labelling, and a flexible, mixed result- and action-based AECM contract identified in the previous rounds as the ideal prototype. First, each of these policy instruments was assessed on a five-item scale (from −2 to +2) along with four different criteria: economic impacts (livelihood security and competitiveness of farmers), environmental impacts (impacts on water, soil, natural habitats and protected species), value chain impacts (incl. farmers' position in the food value chain and the provision of better quality and healthier food), and climate impacts (incl. mitigation and adaptation measures taken up by farmers). Then, each policy instrument was paired with all the others and respondents were asked to score the relationship within these dyads from highly conflicting (−2) through neutral (0) to highly synergistic (+2). For each scoring question participants had the opportunity to explain their scores in a comment box.

For the quantitative analysis basic descriptive statistics were used: means and standard deviation were prepared in MS Excel. Answers for a specific question were considered consensual if at least 60 % of the respondents selected the same response option, or in the case of five-item scales, if at least 60 % leaned towards the same direction (i.e., responses of 'agree' and 'highly agree' were considered similar). For the qualitative analysis of the textual responses, the built-in coding function of the Mesydel platform was applied. An open-coding approach was followed, and a system of codes and categories (or facets) was generated through several iterations to cross-check our results. Finally, 93 codes in 14 categories were created. The list of the consensual and diverging topics, as well as the coding categories and the related codes, can be checked in Appendix B.

3.3. Recruiting and engaging panel experts

The expert panel composition followed an initial assessment of different types of potentially relevant expertise. We identified four main categories: policy (including both decision-makers and public administration staff), research (scientists with policy expertise), farmers' representatives (e.g., interest groups or farmers' associations), and NGOs (large NGOs who usually follow and try to influence agri-environmental policy developments). Experts from each of the nine PILs were invited based on their experience and language proficiency. Additionally, the coordinators of the PILs suggested further contacts from within their national and EU-level networks whom they considered to have relevant policy expertise. Besides, we reached out to other EU Horizon 2020 projects (EFFECT and CONSOLE) focusing on the same research topic, as well as research, practitioner, and NGO networks (including the Result-based Payments Network, Copa Cogeca, La Via Campesina, Birdlife International, Greenpeace), to reach a thematic representativity and increase the geographical and professional coverage of our panel (Fig. 1.).

From our total sample of 120 invited experts, we received 41 responses for the first round, 31 responses for the second round and 23 responses for the third Delphi round, provided by 51 different individuals (Fig. 2). Although this response rate is lower than in similar studies, the sample size is well within the normal range of a Policy Delphi, which usually falls between 10 and 50 participants (De Loë et al. 2016). It is worth noting that we deviated from the usual Policy Delphi methodology at one point: we did not drop non-responding participants from the sample after the first round if they were PIL members but kept them posted and invited them to the consecutive rounds, because we considered this Delphi as an additional engagement tool to foster interaction across the PILs.

Participating experts could access the platform through their secure, individual account and read each round's internally built report, including graphs of aggregated quantitative responses and anonymised narrative answers of the other respondents. The platform also allowed commenting on each other's narrative responses, but no participant used this function. Besides the internally built reports, we prepared a summary after each round, and shared it with the expert panel before a new round was rolled out (Megyesi et al., 2022).

Our approach had some limitations: the main shortcoming was choosing English as the lingua franca for our study, which was a barrier to participation in certain countries, especially for experts operating at the subnational level. It was also difficult to handle the heterogeneous social, economic, and environmental contexts among the EU member states (i.e., differences in land use, in attitudes toward cooperation, or in the status of biodiversity) that might significantly alter the respondents' perspectives. The general style of the quantitative questions did not provide much room for the experts to explain how their responses were rooted in their closer context – the analysis of textual answers was instrumental to alleviate this shortcoming. The fact that national and subnational level policymakers made up the majority of respondents might have resulted in some bias, especially regarding how the role of the CAP was perceived and how the room for manoeuvring for national-level policymaking was considered, as their views were shaped by their own national contexts and therefore might have been less representative for a general EU level perspective. The selected Delphi platform also caused some limitations, for example, the survey questions had to follow the predefined structure of the platform.

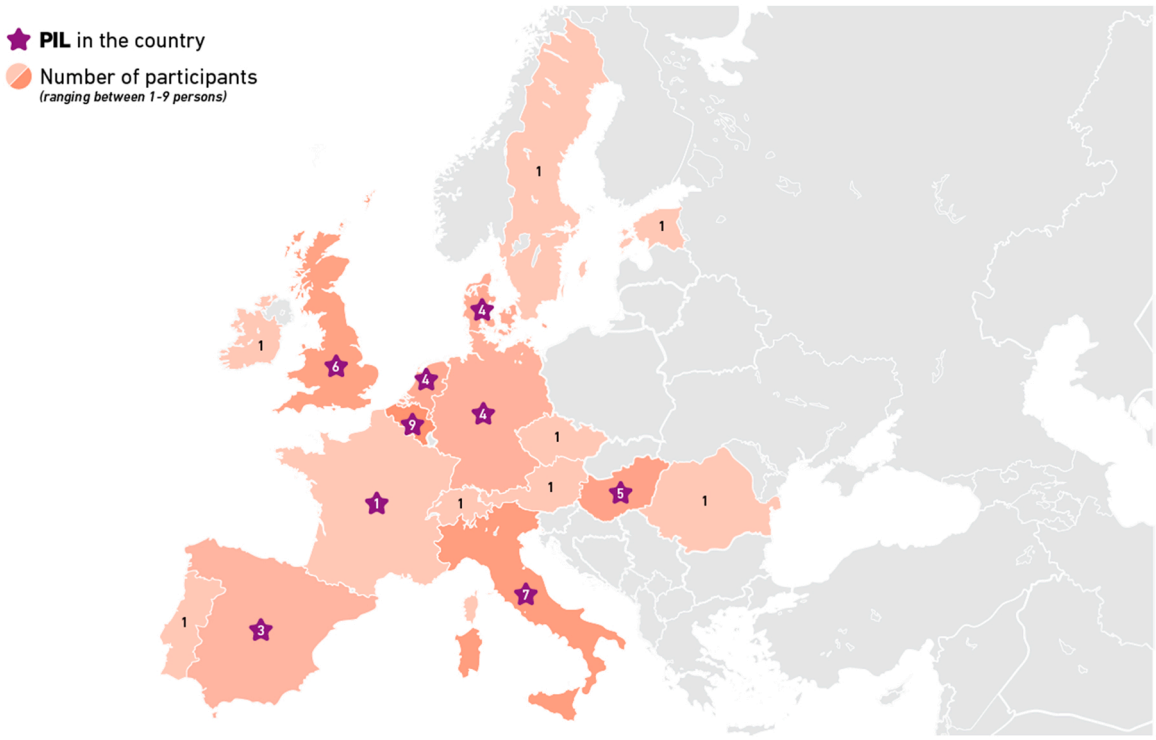

Fig. 1. The geographical coverage of the Delphi respondents (stars highlight the nine countries where Policy Innovation Labs were established, numbers indicate the number of experts participating in the Delphi from the given country).

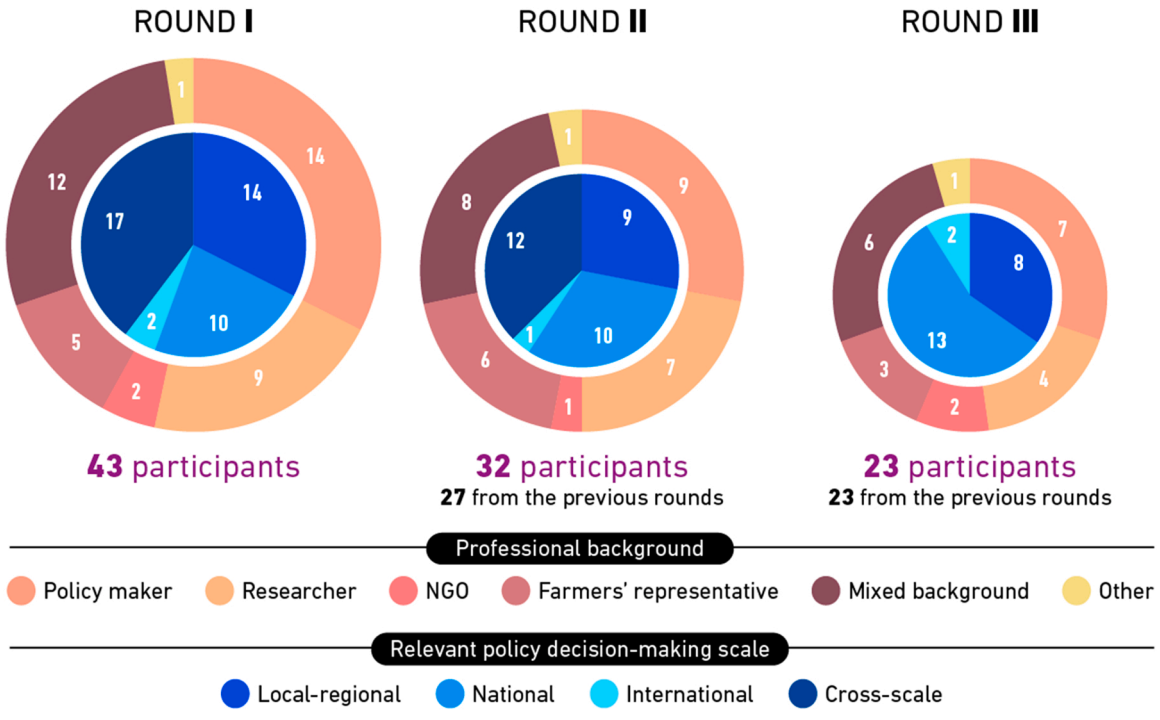

Fig. 2. Key characteristics of the Delphi experts participating in the three survey rounds.

4. Results

4.1. Novel contractual solutions: opportunities, barriers, and the ideal contract prototype

As our literature review highlighted, innovative contracts are expected to overcome the problems related to the current contractual design of AECM measures. The Delphi results echoed this expectancy: novel contractual solutions were considered to support sustainable agriculture more effectively than mainstream AECM contracts. At the same time, it was clear to the respondents that innovative contracts do not only open windows of opportunity but can raise new or magnify already existing challenges (Fig. 3.).

Concerning the innovative approaches, results-based contracts were

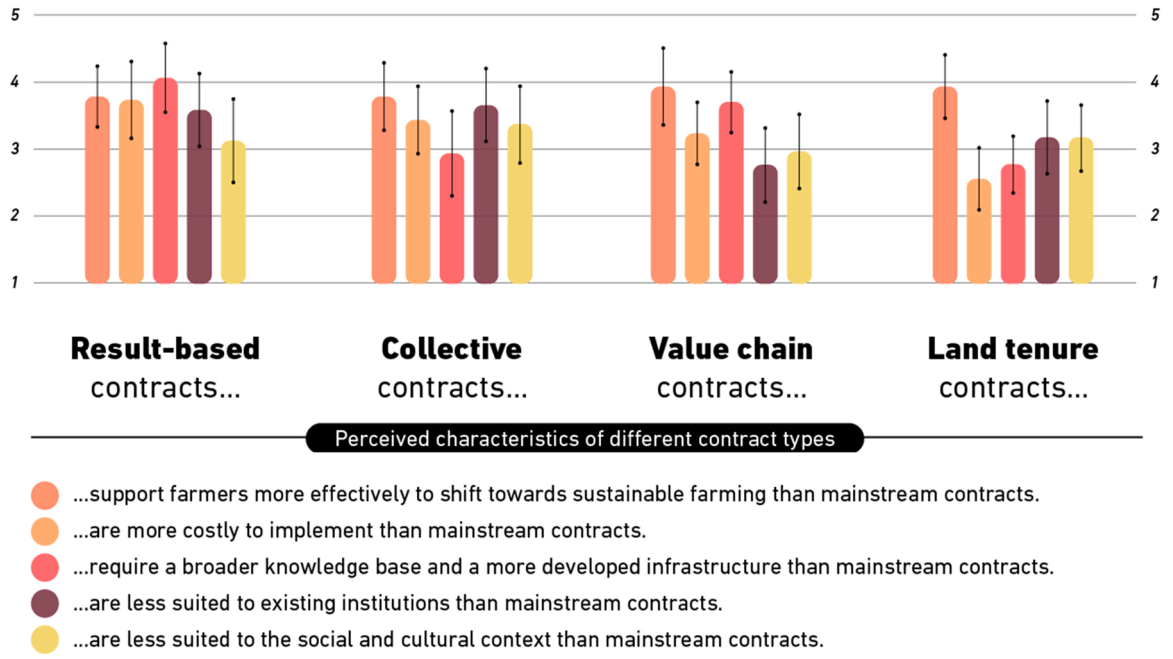

Fig. 3. The assessment of the novel contractual solutions in comparison with existing AECMs. Coloured bars indicate the mean values of the scores provided on a 5-item scale (from 1 =highly disagree to 5 =highly agree), black lines indicate standard deviation. Some results are very close to the centre of the scale, indicating that respondents tended to select the more neutral options, perhaps because they were unsure or undecided.
Source: own compilation.

perceived as potentially (highly) effective in achieving ecological (especially biodiversity-related) objectives due to clear and measurable targets agreed upon by the farmers and the public authorities. Respondents highlighted that rewarding farmers for their environmental performance (instead of compensating for their lost income or increased costs due to management adaptation) contributes to the attractiveness of this approach. While the increased flexibility and autonomy for farmers are additional advantages, issues like monitoring (e.g., definition of robust indicators, use of IT or farmers' expertise to bring down cost) and risk mitigation still pose a challenge and need further attention when adopting this approach. Many respondents stated that setting up such schemes would initially require large investments (e.g., in management, monitoring, and training), which might be a barrier to their implementation.

Regarding collective contracts, respondents assumed that they are more costly than currently used mainstream AECM contracts, they do not necessarily fit the current policy landscape, and in certain regions they also do not fit the socio-cultural context, as the following quote says: "[.] there's a myth too in collective approach, more precisely that farmers are collective executors. In my knowledge, farmers do collaborate but only when there's a business interest, not to achieve idealistic goals." [No.8. background: mixed policy, NGO, research). Collective contracts might require additional coordination and facilitation efforts, especially in the case of legal collaborations. The expert opinions were more optimistic when considering collective contracts' impact on biodiversity and sustainable production. Most respondents agreed that collective contracts could effectively deliver biodiversity-related objectives at relatively low transaction costs if adequate ecological expertise is involved. Their biggest added value is to enable a coordinated effort at the landscape scale. Therefore, collective contracts can be more suitable to realise geographically dispersed ecological benefits (e.g., conservation of species or habitats along a river, or raising the water table level in a region) than to achieve farm-specific objectives (e.g., measures related to animal welfare). However, there were also some arguments that collective contracts serve rather pragmatic and economic goals instead of ecological objectives.

Value chain contracts enjoyed a good reputation among the research participants: they agreed that these could support sustainable production along the value chain and reward farmers for their environmental performance. Some concerns were raised that value chain contracts require a broad knowledge base and extensive infrastructure, but respondents worried less about their suitability to the current institutional, social and cultural context. While value chain contracts were considered generally useful to support sustainable production, it was debated whether these contracts could effectively deliver ecological objectives. Another controversial issue was related to mixing public and private funding sources in value chain contracts. Some respondents highlighted that public funds should only support the provision of public goods; consequently, if consumers pay higher prices for the goods produced by the farmer, additional public support is not appropriate. Others argued, in contrast, that public funds through AECMs are more focused on compensating farmers for their increased costs or lost revenues and combining these sources with value chain contracts can provide additional motivation to farmers. However, it was undoubted that the role of public actors in value chain contracts is often unclear, and the specifications of the contract should be transparent about it.

Land tenure contracts, which are less widespread in the literature (Bredemeier et al., 2022), were the least known among the four novel contract types discussed (although this might have occurred partly because the survey mentioned only general land tenure contracts, and not specific types such as land stewardships or conservation easements). There was consensus that they can effectively support sustainable agriculture and that their implementation is not costly. However, knowledge gaps were present (several experts indicated in their textual answers that they did not have sufficient experience with this contract type), and uncertainties were reported by respondents around land tenure contracts' suitability to the institutional, social, and cultural context, especially regarding land property and land use rights in the different countries.

Considering the ideal contract that respondents could tailor make in the survey, publicly funded agri-environmental contracts were selected most frequently as the ideal contract type, and the closer they were to

practitioners, the less interest they showed towards value chain or land tenure contracts (i.e. farmers' representatives and NGOs did not choose these latter two types at all). Agri-environmental contracts were paired in most cases with innovative contract features. Result-based and collective contract features were more frequently selected by researchers and participants with diverse professional backgrounds. More mainstream contract features, such as action-based measures and bi-lateral contracts, were preferred by policymakers and farmers' representatives. There seemed to be some consensus around the length of the contracts: policymakers, researchers and respondents with diverse professional backgrounds favoured medium (5–7 years) and long term (over 10 years) contracts, while farmers' representatives preferred medium or short term (1 year) contracts.

Summing up the selected contract types and characteristics, we found that the most frequent contract design was a publicly funded AECM contract, where result-based and action-based elements are used in combination, the contract is signed for a medium duration (5–7 years) by individual farmers and the paying agency, but can include the option for collective contracts to enable spatial coordination among the farmers where it is relevant. Narrative answers reinforced that the flexible implementation (i.e. using innovative contract elements in combination with existing contracts) of mixed (action- and result-based) contracts is preferred as it is more adaptable by farmers and helps to balance the certainty of existing contracts with novelty and increased freedom provided by the innovative elements, as the following quote shows: "There is also the danger of destroying the already existing models of contracts, which are well accepted and very successful. For this reason, it is not really comprehensible if the expectations on innovative contracts are too high and include the danger that the use of all existing programmes is going to decline." [No.103. background: farmers' representative] The importance of cooperation among farmers was also highlighted, although several respondents acknowledged that the success of spatially coordinated collective contracts is highly dependent on the socio-cultural context.

4.2. Options to implement novel contractual solutions and overcome barriers

Previous discussions within the PILs (Kelemen et al., 2020), as well as the first round of the Delphi, highlighted that novel contractual solutions show a high diversity in terms of their design features. This richness allows contracts to be tailored to the specific contexts where they are implemented. However, it also raises the question of how such diversity can be integrated with the current policy landscape – is there a need to unify the available contractual innovations to ease their implementation, or should the policy environment become more flexible to accommodate diverse solutions? In the second Delphi round, one-third of the respondents thought that one (unified) innovative contract prototype could be implemented the same way in all member states. At the same time, the majority argued that a few innovative contract models should be defined at the EU level and member states should be allowed to adapt the contracts to their regional specificities. Only 10 % of the respondents thought that coordination across EU countries is unnecessary because only context-specific and tailor-made contracts can efficiently deliver ecological benefits.

In an open question, we further investigated the perceived role of the CAP in fostering the sustainability transition of European agriculture. Respondents attributed a significant responsibility to the EU agricultural policy, especially in terms of providing an overall strategic framework and common standards to all producers across the member states. While the overall strategy and guiding principles were mostly perceived as features to be centralised in the CAP, most respondents argued for flexibility and decentralisation in terms of concrete measures and contractual solutions, as the following quote shows: "The CAP should provide a general framework and should give more flexibility and freedom for developing the most suitable solutions in the member states, but must also ensure a level playing field for member states (.)" [No.37. background: policy]. While this general opinion mostly reflects the current institutional setup, there were three outlying responses that drew a unified alternative vision of a much stronger CAP, which sets high environmental and safety standards both to EU farmers and imported goods, redistributes public funding only for the provisioning of public goods, and combines monetary incentives with levies and bans imposed on unsustainable forms of production. In any case, innovative contracts to incentivise sustainable production were considered to fit the best under the CAP Pillar 2 measures, and especially within the current agri-environmental schemes. It was, however, debated whether Pillar 2 agri-environmental schemes in their current form should remain or should be completely redesigned to accommodate innovative contracts better.

Beside the cross-scale implementation challenges highlighted above, we also asked respondents about how to overcome some more specific barriers, which they identified in the first round of the Delphi: budgetary constraints, especially regarding the Pillar 2 payments, higher transaction costs associated with monitoring and enforcement, increased risks and uncertainties emerging from the difficulties of achieving desired environmental outcomes on the farms, and, finally, lack of knowledge and expertise on some of the innovative contract features (e.g., monitoring or spatial coordination) (Fig. 4.). Regardless of which barrier was scrutinised, EU or national level public policy interventions were preferred as the main strategy to overcome it.

According to the respondents, CAP Pillar 2 budgetary constraints could be handled by increasing the overall share of green payments in the CAP and by including innovative (biodiversity-focused) contracts not just in Pillar 2 but also in Pillar 1. We found two other relevant, but slightly less popular options: introducing specific biodiversity taxing or offsetting policies for agriculture (targeting e.g., projects which convert agricultural land to industrial use and reallocate the incoming money to support agri-environmental programs) and increasing private funding for environmental public goods provided by farmers. The least preferred solution was to complement the CAP payments with an increased contribution from national budgets. The fact that four of the listed five options were selected multiple times by the respondents shows the relevance of combining different financial sources (including public and private funds).

The results of the second Delphi round reinforced that transaction costs are expected to increase if novel contracts are implemented. The vast majority of participants suggested that public agencies should accommodate any increase in transaction costs in exchange for more certainty to achieve the desired environmental impacts and that farmers should be compensated if increased transaction costs are incurred at their side. As the second-best option, we found two equally popular solutions: either transaction costs are shared among the actors, or complexity is reduced to lower transaction costs. These two options, however, outline very different strategies: while sharing transaction costs assumes that contractual innovations focus on broadening the range of actors who participate in the contract and sharing responsibilities among them, reducing transaction costs requires that simplification and debureaucratisation are the focus of innovation, which, on the other hand, might go against flexibility.

Emerging risks and uncertainties were preferred to be handled either by top-ups which complement the flat payments (so if results are not met, farmers lose only the top-up, but still receive the flat payment), or by force majeure budgets (allowing the payment to be disbursed if there is a justified external reason of why the farmer does not provide the expected results). Only very few respondents thought that private insurance products could be used to manage the increased risks or that farmers have their own risk management strategies and therefore no extra interventions are needed. Alternatively, one of the respondents suggested that "Indicators which create payments to farmers need to be chosen in a way that external factors do not influence them. E.g., Instead of paying farmers for having specific bird species on their land it might

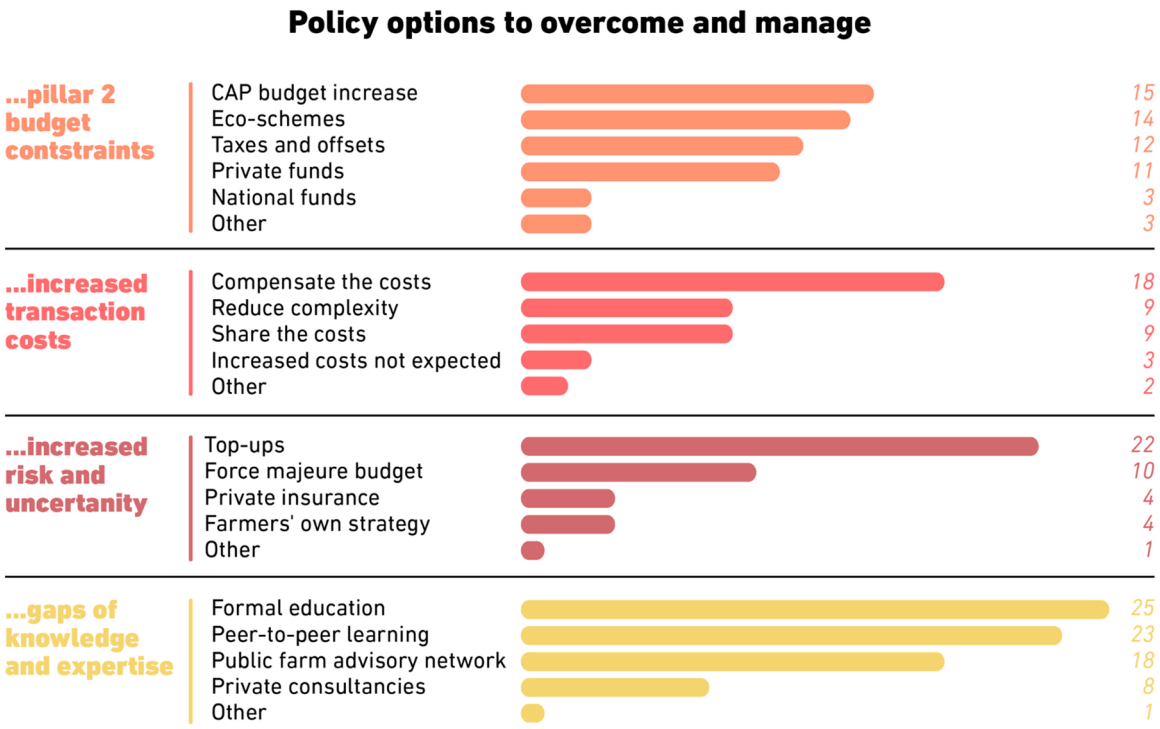

Fig. 4. The most preferred options to overcome some of the key barriers of implementing innovative contracts (numbers highlight the number of respondents who selected the given option a multiple-choice question).
Source: own compilation.

be better to pay them for providing specific habitat features that are needed by this bird species. In cases of force majeure farmers should still get their payments." [No.1. background: farmers' representative]. In other words, the careful selection of indicators and clear rules in cases of unexpected events could also help reduce uncertainties.

Although gaps in knowledge and expertise exist both on the farmers' and the public administration's side, the last question specifically focused on how to improve farmers' knowledge and skills regarding biodiversity-friendly farming practices and the environmental impacts of farming. Three popular solutions were found: better incorporating biodiversity and ecosystem-focused topics in the formal agricultural education, offering voluntary peer-to-peer learning opportunities through farming organisations, and providing an extensive farm advisory system based on public funds. Compared to these more centralised options (funded publicly or through the farming community), private consultancy services were found to be much less relevant.

4.3. Fitting innovative contracts into the current policy context: a policy coherence analysis

Since the second round of the Delphi highlighted some divergent opinions on how innovative contracts can be implemented as part of the CAP, we devoted the third Delphi round to better understand the relationship between novel contractual solutions and the policy instruments already available in the CAP. This analysis included Pillar 2 AECM measures, Pillar 2 voluntary interventions related to ecological constraints, investments, knowledge exchange, or cooperation, the newly established Pillar 1 eco-schemes, private value chain contracts through certification and labelling, and a publicly funded flexible, mixed result- and action-based contract identified previously as the ideal prototype (Table 1).

All five options – the three CAP policy instruments and the two contractual solutions – were assessed rather positively (or neutral) along with the four assessment criteria (see the first part of Table 1). However, the slightly positive average values were often the result of diverging opinions balancing each other, which is indicated by the relatively large standard deviation in some of the cells of Table 1. On average, the least positive impacts were attributed to the eco-schemes (with a relatively high standard deviation), although this result might mirror the fact that eco-schemes were still under development when the survey was administered. The highest positive impacts were attributed to the ideal contract type (with a relatively low standard deviation). No considerable difference in the policy instruments' impacts on farmers' livelihoods and profitability exists, but the other three criteria show well the perceived strengths and weaknesses of the instruments. Farmers' position in the value chain can be supported the most through labelling and certification schemes implemented through value chain contracts, positive environmental impacts are mainly attributed to the ideal contract type and to Pillar 2 AECMs, while benefits for climate change adaptation and mitigation are expected primarily from the ideal contract prototype and to a lesser extent from the eco-schemes. These results also show that although some effects of Pillar 2 measures and AECMs are dividing, these elements of the CAP are mostly assessed positively by experts.

When looking at the perceived synergistic or conflicting relationships between the selected policy instruments and contracts, we found that all dyads were positively interlinked, at least to some extent. The ideal innovative contract prototype is the most synergistic with the current AECMs or the voluntary measures within CAP Pillar 2. Some quotes even emphasised that from a regulatory perspective, since these contracts are novel, they are better implemented among the voluntary measures as completely new policy instruments, instead of using them to improve the current measures. If we consider the different strengths of the measures in terms of their value chain, environmental and climate change impacts, we can see that implementing the novel contracts within AECMs could lead to an improved environmental (and climate change) performance, while implementing novel contracts together with market-based certification schemes could realise benefits in a wider range, as this way farmers' positions in the value chain could also be enhanced. Implementing novel contracts together with voluntary measures or eco-schemes seems more controversial, because the benefits or

Table 1
Policy coherence matrix.

Different types of measures / contracts	Impact on…				Synergies between…				
	Livelihood security	Biodiversity and natural resources	Farmers position in the value chain & provision of food	Climate change mitigation and adaptation	AECMs in Pillar 2	Voluntary measures in Pillar 2	Eco schemes in Pillar 1	Value chain contract	Ideal/prototype contract
AECMs in Pillar2	0,682 (0,700)	**1,043** (0,806)	0,227 (0,734)	0,409 (0,834)		**0,933** (0,445)	**0,944** (1,033)	0,612 (0,740)	**0,947** (1,004)
Voluntary measures in Pillar2	0,762 (0,921)	**0,619** (0,653)	0,350 (0,726)	0,190 (0,663)	**0,933** (0,445)		0,544 (0,794)	0,694 (0,605)	**0,933** (0,678)
Eco schemes in Pillar1	0,778 (0,711)	**0,474** (1,141)	0,111 (0,875)	**0,526** (0,993)	**0,944** (1,033)	0,544 (0,794)		0,565 (0,736)	0,678 (0,936)
Value chain contract	**0,762** (0,921)	0,619 (0,722)	**1,000** (0,894)	0,263 (0,714)	0,612 (0,740)	0,694 (0,605)	0,565 (0,736)		0,600 (0,859)
Ideal/prototype contract	**0,650** (0,726)	**1,200** (0,510)	0,579 (0,674)	**1,118** (0,676)	**0,947** (1,004)	**0,933** (0,678)	0,678 (0,936)	0,600 (0,859)	

The first numbers in the cells show the average values ranging between −2 (negative impact / highly conflicting) to + 2 (positive impact / highly synergistic), while the numbers in brackets show the standard deviation. The darker the cells, the more positive the impact, or the more synergistic the relationship. Bold numbers highlight consensual responses (where at least 60 % of the respondents selected the positive / synergistic response). Source: own compilation based on the 3rd round of the Delphi survey (N = 17)

voluntary measures and eco-schemes are perceived less significant and less consensual.

5. Discussion

The result section highlighted high expectations towards innovative agri-environmental contracts regarding their environmental and climate impacts. Although their widespread implementation across Europe is thought to be challenging, flexible and adaptive contractual solutions are preferred, compared to a more revolutionary redesign of the contracts and the agri-environmental measures where they are currently fitted in. The most consensual contract design mixes action- and result-based elements in a medium-term contract under the CAP Pillar 2 measures. Preferentially, it is signed between individual farmers and the paying agency bilaterally, but it might include the option of spatially coordinated collective (group-based) agreements. Comparing this "ideal contract type" with the contractual solutions already available in several European countries (Bredemeier et al., 2022) – among others, result-based schemes in Baden-Württemberg, Germany (e.g., Matzdorf and Lorenz, 2010; Russi et al., 2016), collective implementation in the Netherlands (e.g., Westerink et al., 2020; Barghusen et al., 2021), or land tenure contracts in Spain (e.g., De la Varga Pastor and Solé, 2018) – the majority responses of this Delphi survey show a relatively low ambition to innovate, especially among policymakers and farmers' representatives. At the same time, outlying answers shed light on alternative understandings and some more radical options to renew current agri-environmental contracts. In this discussion section, we investigate three controversial topics which might also provide clarifications for the limited ambitions of the consensual opinion: the contextual heterogeneity across Europe, including the diverse ecological, social and political factors to be taken into account when contracts are designed; the multilevel governance system of the CAP and the associated challenges of vertical integration of regional, national and EU policies; and the divide between the public and private domain and the associated strong focus on public incentives.

5.1. Contextual heterogeneity

The diversity of ecological conditions, land property rights and farming styles across the EU member states largely affect European landscapes' public good provisioning capacity (e.g., Harlio et al., 2019; van der Ploeg and Ventura, 2014), and influence how different contract types fit into the context. Qualitative responses to the Delphi surfaced other factors, such as the capacities of the public administration and farm advisory systems, farmers' willingness to collaborate, general attitudes towards the environment, or trust in political institutions as also having a crucial impact on how contractual innovations are perceived. While some implementation challenges can be generalised across countries, others are highly context specific. Discussions with Contracts2.0 PIL members in an earlier project phase highlighted that the interplay between different challenges creates unique country- or region-specific environments for agri-environmental contracts (Kelemen et al., 2020). For instance, in regions where the barriers related to the general political context are more common, social norms and the lack of trust often create obstacles to the effective implementation of collective contracts. Similarly, where there is a lack of human resources at the level of public administration and advisory services, the general lack of knowledge and information has a substantial negative impact on the

implementation of knowledge-intensive contract models, such as result-based schemes.

To ensure that innovative contracts fit their purpose and effectively deliver environmental benefits, contracts need to be flexibly embedded into the specific socio-political and ecological contexts, which also means that some countries can more quickly and easily adopt innovative contract designs, while others might stick longer to the current mainstream solutions. Implementing innovative contracts might require more general investments regarding their knowledge base, their advisory, monitoring and administrative background, as well as the nature of the relationship between farmers and the public administration bodies. Fostering collaboration between public and private actors can enhance the knowledge base and improve motivations (McCarthy et al., 2021), while testing new approaches in pilot projects enables adaptive planning and infrastructure development (Colombo and Rocamora-Montiel, 2018). In agreement with the findings of van Dijk et al. (2016) our results suggest that context-specific and bottom-up contract design is important because it can mobilise local ecological and technical knowledge and strengthen the sense of ownership and self-identity, both being important factors of farmers' participation in agri-environmental schemes. However, if the implementation of agri-environmental contracts is fully dispersed and decentralised, locally relevant environmental benefits might get prioritised against global environmental public goods, and the overall environmental outcomes might fall behind the expectations (Bareille and Zavalloni, 2020).

5.2. Vertical policy alignment and path dependency

The post-2022 CAP strengthens the responsibility of member states, as it follows a result-oriented policy focus and requires member states to prepare national CAP strategic plans both for Pillar 1 and Pillar 2 payments in accordance with the multiannual financial framework. While this new delivery model enables EU countries to flexibly adapt their funding schemes and contract designs to their own context – as was requested by many of our Delphi respondents, too – it does not take into account the national differences in available capacities and political commitments, which might not be everywhere suitable to carry out the planning and implementation of agri-environmental measures and innovative contracts with due diligence (Šumrada et al., 2020). Discrepancies in the flexibility of member states have already been observed for the period of 2014–20, distinguishing quickly adapting countries from the less flexible ones, where national path dependencies strongly influenced how the member states coped with economic, social and political constraints (Henke et al., 2018).

The duality of the Delphi responses reflects the above dilemma: more flexibility is needed at the member state level in planning and designing the agri-environmental measures and contracts, but at the same time stronger coordination and monitoring are required from the EU to ensure a level playing field. How to reach these two seemingly contradictory ambitions is unclear, especially if we consider the multi-actor nature of agricultural policy formation, which implies that competing interests of multiple players can strongly influence the integration of environmental objectives. Studies show that the Europeanisation of agri-environmental policies contributes to the emergence of a sectoral policy style which balances between governmental impositions and consultations with the key agricultural actors, sometimes even rewarding the interests of the established clientele (Candel et al., 2021). As a result, progressive changes in the national (and EU-level) agricultural policy – including the implementation of innovative contract designs – might be trapped by vested interests (Alons, 2017).

5.3. Coherence of public policies and market-based solutions

Non-state-initiated contracts, like different certification schemes and value chain approaches, are fairly widespread and also supported by the CAP. Respondents assume that certification systems have a favourable impact on farmers' position in the value chain and also on food provisioning. To reach these goals, this measure was considered the most powerful, but also its impacts on livelihood security and biodiversity were perceived positively. Despite this, value chain contracts were less favoured (compared to the other contract types) and often disputed by the experts. The disputes were condensed around two focal points. First, some experts doubted that value chain contracts could effectively target ecological objectives and mentioned the risk of greenwashing. Second, several experts argued that market-based solutions should not be part of the CAP to avoid spending public money on private benefits. This argument appeared occasionally, although the phenomenon is already present in the CAP, not only through the payments for organic farming, but also in the case of area-based payments (i.e., public money is paid to support the realisation of private benefits). One possible way of dealing with this perplexity around public and private funds and interests in agriculture could be enhancing the role of private initiatives. Value-chain or land tenure approaches could complement and strengthen the intentions of agri-environmental policy without necessarily allocating more public money to private actors, but by re-allocating private money across the actors of the whole value chain. This would require, however, that legislation increasingly focuses on the whole agri-food system and initiates steps to reduce the system-level distortions caused by CAP subsidies.

Given that earlier literature showed the benefits of value chains contributing to a more resilient agri-food system and reducing the agri-food footprint (Manyise and Dentoni, 2021), we sought to frame the above-mentioned public-private controversies differently. Unlike other innovative contractual solutions, value chains and certification systems are market-based in several cases, as respondents also emphasised. Analysing the results from this perspective, we found a general reluctance toward market-based solutions. Participating experts expected the EU and the national governments to solve the problems deriving from budgetary constraints, knowledge gaps, or the risks related to achieving positive environmental impacts. Market-based solutions (e.g., consultancies or private insurance) to overcome these barriers were scored much lower. If we want to better understand whether market-based solutions can be integrated into the CAP architecture, the reasons behind the neglect of market-based solutions should be further investigated. Our results were not conclusive whether this neglect reflected a blind spot of surveyed decision-makers, farmers' representatives and researchers, or the path dependency of the agri-environmental subsidy system, or a general lack of trust toward market-based solutions.

6. Conclusions

This paper shared the key findings of a three-round online Policy Delphi study that identified and assessed policy options to renew the contractual design of agri-environmental schemes and to implement such novel contracts more widely. Our expert panel considered result-based and collective contract features promising solutions to amend currently widespread, mainstream AECM contracts. The CAP Pillar 2 measures, especially the agri-environmental-climate measures and other voluntary measures, were regarded as the key policy area where novel contracts can easily be implemented, but Pillar 1 eco-schemes, being launched in the post-2022 CAP, could also provide a suitable framework for testing and implementing contractual innovations (Germany is already implementing a result-based eco-scheme). Innovative contracts were envisaged to be adopted in small steps; not as substitutes for current payment schemes but rather as additional incentives and top-ups implemented by progressive administrations and targeting more advanced farmers. The strength of such an incremental approach is that innovative contracts can capitalise on existing best practices. However, the risk is that innovative contracts might remain marginal, and could not lead to a substantial change in farmers' attitudes and behaviour.

The challenges associated with innovative contracts (budgetary constraints, risks, transaction costs, knowledge gaps) were expected to

be solved by EU/state-level policy interventions. Among these challenges, the most crucial is the limited budget available in CAP Pillar 2. A possible solution to this is to mobilise diverse financial sources and implement novel contracts via various measures within and beyond the CAP. Such an approach would increase the complexity of the contract, i.e., more coordination would be needed to avoid double financing. Delphi experts also worried that combining public and private funds would go against the principle of using public funds to reward the provisioning of public goods. However, this blended approach is already in place, e.g., organic products are subsidised within the CAP but at the same time valorise higher prices on the market thanks to their certified high quality. Co-financing through private contracts, such as labelling schemes implemented throughout the value chain, could be beneficial to provide additional nudging to farmers, and could strengthen the alignment between the objectives of the Farm to Fork Strategy and the CAP Pillar 2 AECM measures. A further potential benefit of combining public and private contracts could be that the dependency on external inputs decreases (e.g., by replacing fertilisers and pesticides with the benefits of functional biodiversity), which is becoming more critical in the light of unexpected events of the world, like the energy crisis or the invasion against Ukraine.

Current market conditions, such as the high prices of chemical products or the limited availability of some raw materials could be seen not just as a threat, but also as a window of opportunity to boost agri-environmental payments and push more strongly towards sustainable and agro-ecological practices. Innovative contracts can have a role in such a transition by providing a more favourable and motivating environment for farmers. This role will, however, remain marginal if larger, systemic challenges associated with vested interests, land ownership concentration, and intensification are not addressed both at national and at the EU level.

CRediT authorship contribution statement

Yacamán-Ochoa Carolina: Conceptualization, Writing – review & editing. **Matzdorf Bettina:** Conceptualization, Funding acquisition, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Andersen Erling:** Conceptualization, Methodology, Writing – review & editing. **Prager Katrin:** Conceptualization, Writing – review & editing. **Kelemen Eszter:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Riccioli Francesco:** Conceptualization, Writing – review & editing. **Megyesi Boldizsár:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Dutilly Céline:** Conceptualization, Writing – review & editing. **García-Llorente Marina:** Conceptualization, Writing – review & editing. **van Bussel Lenny G.J.:** Conceptualization, Writing – review & editing. **Dumortier Myriam:** Conceptualization, Writing – review & editing. **LePage Annabelle:** Conceptualization, Writing – review & editing. **Moruzzo Roberta:** Conceptualization, Writing – review & editing. **Hamon Christine:** Conceptualization, Writing – review & editing.

Declaration of Competing Interest

The authors declare no conflict of interest regarding this manuscript.

Data availability

The authors do not have permission to share data.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.landusepol.2023.106706.

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