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SUSTAINABILITY OF AGRO-ECOLOGICAL
FARMING SYSTEMS IN THE EU

Deliverable Report D5.4

Innovative Market and Policy Instruments to Promote the Agro- ecological Transition Strategies

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ACRONYMS

AE	Agro-ecology/agro-ecological
AEP	Agro-ecological practice
AEFS	Agro-ecological Farming System
AEM	Agri-Environment Measures
AECM	Agri-Environment-Climate Measures
CAP	Common Agricultural Policy
CS	Case Study
GAEC	Good Agricultural and Environmental Conditions
MAP	Multi-Actor Platform
MCA	Multi Criteria Analysis
MPI	Market and Policy Instrument
UNISECO	Understanding and Improving the Sustainability of Agro-ecological Farming Systems in the EU
VAT	Value Added Tax



1. INTRODUCTION AND OBJECTIVE

This document represents the deliverable D5.4 within Work Package 5 “Governance and policy assessment” of the EU Horizon 2020 project UNISECO (Understanding and improving the sustainability of agro-ecological farming systems in the EU). The overarching objective of WP5 is to analyse market and policy incentives, with governance mechanisms, supporting Agro-ecological Farming Systems (AEFS). In particular, this report includes the results of task 5.4 “Multi-criteria assessment and co-construction of innovative market and policy incentives”.

The results achieved so far by the UNISECO project for the co-construction of AE transition strategies in the 15 CSs are the starting point of Task 5.4, especially:

- Task 5.2: the analysis of governance structures (Vanni et al. 2019, D5.2);
- Task 5.3: the identification of the relevant existing MPIS (Linares et al. 2020, D5.3);
- Task 3.4: the improvement in the environmental, economic and social impacts achievable by adopting key agro-ecological practices (AEPs), compared to the status quo assessment (Task 3.2) (Albanito et al. 2021, D3.5);
- Task 3.3: the co-construction of the AE transition strategy, by linking AEPs, the governance dimension of AEFS and the candidate list of MPIS and identifying the required changes to improve the effectiveness of the strategy to address the AE dilemma at the CS level (Schwarz et al. 2021, D3.4).

Previous UNISECO tasks focused on existing agro-ecological (AE) dilemmas in the 15 case studies (CSs) and identified the needed concrete changes to the current AE practices and the governance of Agro-ecological farming systems (AEFS) to address those dilemmas. This has translated into the identification of CS-specific AE transition strategies. A key item of each strategy is a mix of innovative and existing Market and Policy Instruments (MPIS) that should support the implementation of the envisaged changes by local stakeholders. Task 5.4 focuses on how to improve the design of the mix of MPIS to support envisaged changes and their implementation and on the opportunities that they offer within the identified transition strategies.

The overarching objective of Task 5.4 is to take stock of the lessons learned at CS level and to formulate policy and governance recommendations to promote the AE transition of European farming systems. To pursue that objective, **Task 5.4 uses a mixed methods approach, where a quantitative and qualitative analyses complement each other by gathering information about different aspects of the MPIS and their implications for the governance and future policies.** Given the complexity of the overarching objective, the empirical work in Task 5.4 is structured towards three more specific objectives, as follows:

1. To investigate the MPIS that need to be improved in order to ensure proper functioning.

This objective is achieved via a **multi-criteria analysis (MCA)** of selected MPIS, based on performance and relevance criteria;

2. **To identify changes in the design of the MPIS to increase their performances.** This objective is achieved via a **qualitative analysis**;
3. **To explore how future policies can facilitate governance adjustments and opportunities for the correct implementation of the mix of MPIS.** This objective is achieved via a **qualitative analysis**.

The outcomes of T5.4 have informed the case study summaries in Task 3.5 (Landert et al., 2021, D3.6) and the recommendations for practitioners and policy makers in Task 6.5 (Cazacu et al. 2021, D6.5).

The report is structured as follows: Section 2 includes an introduction to the topic with particular attention to the mechanisms of the key MPIS supporting AEFS in EU and on the linkages among EU future policy strategies and AEFS. Section 3 reports on the research method (mixed method MCA-qualitative analysis) used for the data collection in the context of the 15 UNISECO case studies. Section 4 presents a comparative analysis of the mix of MPIS identified to approach the different challenges in the case studies, highlighting the major changes suggested to make more effective existing instruments. Section 5 provides a discussion addressing lessons learnt and policy recommendations, also in light of the opportunities brought by the recent European policy initiatives in the field of agriculture and food chains. Conclusions are drawn in Section 6. The Annexes include a more detailed description of research results at the case study level.

2. MARKET AND POLICY INSTRUMENTS SUPPORTING THE AGRO-ECOLOGICAL TRANSITION

2.1. MPIs' Potential Role in Supporting Agro-ecology and Governance Challenges

In the following we provide an indicative, although not exhaustive, review of selected instruments addressing AE transition in Europe and related governance challenges based on the existing literature on the topic.

Among grants and financial instruments of relevance for AE transition, scholars paid particular attention to the support for EU Agri-Environmental Measures (AEMs), support for investments and support for advisory services. All of these payments are planned at the EU level through the CAP, but in fact are designed and co-financed by Member States according to national level priorities.

The AEMs and the organic farming support are often considered as low performance measures, mainly because of their lack of targeting and long-term effectiveness (Uthes and Matzdorf., 2013; Lastra-Bravo et al. 2015; Früh-Müller et al., 2019; Lindström et al., 2020). This last aspect is especially true for organic farming, where farmers can receive support without certifying their production. Namely, the certification of the organic method is disconnected from the marketing of organic products with the result that most of the European organic production is sold in the conventional market that does not recognize a premium price (Argyropoulos et al., 2013). That explains the cyclical effects of the organic payment on the adoption of the organic scheme and on the exit from the organic scheme. This is seen as a proof that support for organic farming is nothing more than an income support for most of the organic farmers.

About support for investments, there is a general agreement among scholars of lack of targeting on sustainability issues (Pe'er et al., 2020). Among sustainable investments, particular attention is paid to financing equipment for recycling organic waste and crop residues. This instrument is generally coupled with renewable energy credits (Renewable Energy Directive 2009/28/EC). However, harvesting, transport, storage and pre-treatment are crucial upstream problems that often discourage recycling initiatives by farmers. In addition, the establishment of supply chains for primary residues from agriculture and forestry is difficult and costly, limiting, in fact, investments by farmers (Meyer, 2017).

The potential of advisory services in supporting AE transition is broadly recognised as these services contribute to improving intangible assets such as, skills, knowledge and attitudes. Shared knowledge is, indeed, considered as having a prominent role in influencing farmers awareness, vision and perspectives as well as their willingness to change their agricultural systems and landscapes (Kallas et al., 2010). European advisory services are often not organised centrally by a government agency, but fragmented in a multitude of private / public actors (with different aims, specializations and missions) with the not desired side-effect of confusing rather than helping farmers (Prager et al.,

2017). In addition, roles in a mixed public-private advisory system are divided between different actors, with private advice provision on sustainable farm management being viewed as ‘suboptimal’ (Klerkx and Jansen 2010). A recent survey conducted in United Kingdom reveal that although advisory services are in theory accessible to anyone, cost or lack of engagement from the provider represent a barrier to access. Especially, young farmers, subsistence and part-time farmers where shown to be underserved (Prager et al., 2017)

Among regulatory instruments, particularly debated are the Bird (Directive 2009/147/EC) and Habitat Directives (Directive 92/43/EEC), the Nitrate Directive (Directive 91/676/EEC), the Pesticide Directive (Directive 2009/128/EC). These Directives require that Member States codify European protections in National laws and actively implement them within this network. The corresponding conservation actions focus on “Species of Community Interest”, “Habitats of Community Interest”, “Nitrate Vulnerable Zones” and other “Special Zones” defined by the means of local territorial planning initiatives (proximity to urban areas and water courses). These policies contribute influencing the CAP and the environmental requirements farmers have to coop with. Generally, Good Agricultural and Environmental Conditions (GAEC) conditions are stricter in Nitrate vulnerable zones and in Natura 2000 sites. It is sometimes questioned the way these policies are implemented by MS. Lack of data due to poor monitoring generates a knowledge gap that contribute failing to map vulnerable zones (Fenu et al. 2017; Jeanmougin et al., 2017; Musacchio et al., 2020) while , lack of transparency of pre-authorization procedures to introduce new pesticides in the market and post-authorization procedures to monitor impacts generates a knowledge gap that contribute failing to protect non-target organisms (Storck et al., 2017).

As a results, agriculture is still the main source of nitrate pollution in Europe (Musacchio et al., 2020), the ongoing process of agricultural intensification and abandonment of pastoral management practices is still contributing deteriorating biodiversity (Sokos et al., 2013), Europe is still the largest world pesticide consumer and around half of the European surface water systems are contaminated by pesticide residue levels that may pose a risk to non-target organisms (Storck et al., 2017).

This research focuses on environmental and agricultural policy. However, other policy might be necessary to foster the agroecological transition of European farming systems, which allows the design of action plans based on policy mixes that include waste management and tax policies, as well (Rogge and Reichardt, 2016). For instance, the European waste management directives (Directive 2008/98/EC) can help improving the management of food waste. However, the food sector is not well addressed by these directives (Wilts et al., 2016). No clear waste targets are defined for the food sector and the extended producer responsibility principle is not applied to farming. These aspects could contribute delaying the conversion process for the food sector and its potential for environmental sustainability and job creation. About tax policies, there is a general feeling that, as long as no high taxes on fossil resources or high charges on climate gas emissions will be introduced, many new material and energetic uses of biomass will not be competitive (Meyer, 2017) and as long as no VAT reductions for the purchase organic food will be implemented an high portion of the European population will be in fact excluded from the consumption of high

quality and healthy food (Galli et al., 2020) with the consequence that sustainable farming will continue to depend on political decisions about support and framework conditions. About food policies, particular emphasis is attributed to the need to promote the diffusion of food policies at the municipality level enhancing Green Public Procurement (GPP) initiatives, the consumption of organic and healthy food (fruit and legumes) in Schools, the reduction/zeroing of the fees for school meals to poor families, the introduction of food education in school programs (Galli et al., 2020).

With reference to GPP initiatives, it is of common opinion that public authorities can potentially shape consumption and production trends by the use of their purchasing power and, thereby, increase demand and alter the market structure in favour of more environmentally friendly products (Li and Geiser, 2005). In this respect, The European Commission is encouraging EU member states to implement GPP for organic food (EC, 2014). However, organic purchasing policies on national level are still relatively scarce (EC, 2020), although several local and/or regional GPP initiatives have been launched within the EU during the last decade. The low efficacy of GPP initiatives is attributed to the powerless structure of organic local supply chain, often not adapted to meet public procurement needs because of the high concentration of food and catering services directly linked to public canteens in one hand, which seeks for high quality and low prices, and the fragmentation and dispersion of local organic food production in the other hand, which does not guarantee standardized and constant supply (Lindström et al., 2020).

Recent evidences from Sweden on a panel data of 294 municipalities from 2003 to 2016 highlighted that national GPP initiatives played a very limited role in influencing the regional growth of organic farmland compared to practice-based payments and this is somewhat attributed to the fact that public authorities are unable to mandate food to be sourced locally (Lindström et al., 2020).

The relatively low efficacy of the Swedish GPP initiative compared to the practice-based is not really depending on the design of the policy itself but rather on the difficulties encountered by the primary sector in taking up the new market opportunities opened by the public sector.

The development and application of certification schemes represent another key contractual instrument. In recent years, a large number of sustainability standards and certification schemes have been introduced, including mandatory and mainly voluntary certifications developed by companies, organisations and multi-stakeholder initiatives. Such schemes include feedstock and supply chains for bioenergy, but also for food/feed and biomaterials (van Dam et al., 2010; Ting et al., 2016). Voluntary initiatives have gained a considerable market share. Nevertheless, sustainability certification schemes face challenges mainly due to difficulties in establishing efficient monitoring and auditing systems and because of their ambiguous impacts, i.e. the European biofuel schemes contributed to increasing the impacts of intensive agriculture in industrialised countries (Meyer, 2017).

Besides and prior to the need to redefine some important policy tools, even outside the agricultural and food policy sphere, there is often the need to change governance systems and, specifically, the process of interactions and decision making among the actors involved in a collective problem.

Specifically, lack of knowledge (Westerink et al., 2017) and lack of interests networks (Murdoch, 2000; Lurie and Anderson Brekken, 2019) in AE issues are considered the key governance issues that explains the limited diffusion of AE farming systems in Europe. The main barriers that contribute to maintaining lack of knowledge and of interest networks are, then: 1) Lack of coordination between central independent authorities and local agencies (Nielsen and Hunter, 2013); 2) Limited cross-agency collaboration in evaluation and performance measurement (Newcomer and Caudle, 2011); 3) Mismatch between short term political agenda and long term strategies needed to support required changes (Marra, 2018).

2.2. Future EU Policies for Agro-ecology

The European 'Farm to Fork Strategy' (COM 2020/381 final) and the 'Biodiversity Strategy' (COM 2020/380 final), conceived in the framework of the European Green Deal (COM 2019/640 final), are the two key strategies contributing to set the transition pathways of European food and farming systems towards more sustainable production, distribution and consumption models, coherently with the agroecological vision. Specifically, the Biodiversity Strategy aims to achieve the 30% of the protected areas according to the Habitat Directive (Directive 92/43/EEC), reduce by 50% the use of more hazardous pesticides by 2030, reduce the use of fertilizers by at least 20%, bring back at least 10% of the agricultural areas under high-diversity landscape features (i.e. buffer strips, rotational or non-rotational fallow land, hedges, non-productive trees, terrace walls, and ponds), achieve 25% of agricultural area under organic farming, mitigate climate and environmental risks by avoiding the use of certain sources of bioenergy according to the new Renewable Energy Directive (Directive 2018/2001/EU) (i.e. by promoting the shift to advanced biofuels based on residues and non-reusable and non-recyclable waste), restore fresh water ecosystems by the 2027 according to the Water Framework Directive (Directive 2000/60/EC). A key policy suggestion from the Biodiversity Strategy is to better targeting and to strengthening regulatory restrictions and to develop results-based payments schemes.

The Farm to Fork Strategy aims to ensure that the food chain (food production, transport, distribution and consumption) has a neutral or positive environmental impact, that everyone has access to safety food, that the supply of sustainable food is affordable. A key policy suggestion from the Farm to Fork Strategy is to further promote tax systems and pricing that reflect environmental costs (review of the national VAT systems), reinforce sustainability standards in the catering contract, review the EU school scheme / strengthen educational messages to enhance sustainable food consumption.

To support the long-term sustainability of both nature and farming, these strategies will work in tandem with new Common Agricultural Policy (CAP)¹. To help achieving the Biodiversity Strategy goals, the new CAP aims at further strengthening Good Agricultural and Environmental Conditions (GAEC) conditions and anchoring 20-30% of direct payments to eco-schemes, increasing the quota

¹ The Trilogue about the CAP reform 2023-2027 is still ongoing.

of RDP funds to AEMs up to 35%, binding 30% of RDP funds for advisory services to spread environmental/climate services. To help achieving the affordability issues addressed in the Farm to Fork Strategy, the new CAP aims to provide a more equitable distribution of payments among farmers by fixing a payment cap of 100.000 € per farm, by defining a progressive reduction of the direct payments with increasing farm size, by dedicating a minimum of 6% of direct payments to support small farms. In addition, Member States are called to set national action CAP plans, including relevant targets of the biodiversity and Farm to Fork Strategies. These plans have the potential to contribute to the redesigns of EU farming systems alongside the redesign of the EU food systems by further promoting the diffusion of sustainable agricultural practices.

In particular, the CAP post-2020 proposes a new “Green Architecture” comprising mandatory elements (enhanced conditionality), voluntary Agri-Environment-Climate Measures (AECM), and a new instrument called “Eco-schemes”. This new element allows to split the CAP Pillar I budget between Basic income support for sustainability and ‘Eco-schemes’. A menu-based Eco-scheme approach, including different types of sustainable farming practices², offers the advantage of gathering a wide variety of farms and farm types, while allowing the design of evidence-based measures. However, their biodiversity objectives need to become much more explicit and strengthened (Pe'er et al., 2021). Compared with CAP Pillar II payments (e.g. AEM for nature conservation), eco-schemes potentially can reach many more farmers and cover a greater agricultural area, however it is crucial to design voluntary eco-schemes in such a way that farmers perceive them as opportunities to improve their own farm management practices, possibly been rewarded from the market coupling eco-scheme with private labelling systems (Pope and Hannah, 2020).

However, the agroecological transition implies an organic and articulated action strategy involving different sectors and capable of integrating very different policies into common objectives. In light of these considerations, agro-ecology can only be promoted building new networks of interest, which imply strategies addressed to promote radical changes of the economic and social environment where farmers are embedded in and that contribute the most in conditioning the shape of the European farming systems (Lampkin et al., 2020; Peeters et al., 2021).

² The list of potential agricultural practices includes organic farming practices, Integrated Pest Management practices, agro-ecology, agro-forestry, carbon farming, precision farming and husbandry practices in favour of animal welfare and/or reducing the needs for antimicrobial substances.

3. RESEARCH METHOD AND DATA

This study adopts a mixed-methods approach under a wider comparative case study framework, using a convergent design, where a quantitative analysis (multi-criteria assessment, MCA) and a qualitative analysis are carried out in sequence, to achieve different research objectives. Data for both methodological steps are collected at the CS-level via workshops and/or interviews from the same set of stakeholders. An additional workshop with European level stakeholders is used to support the generation of external validity from the comparative case study, by asking feedback on preliminary research findings. The results from the MCA and qualitative analysis are integrated in the results section. Result interpretation relies on case-study comparison and on the construction of common narratives, based on the barriers that the MPIs can remove (Task 3.3).

This research design is based on ex-ante reasoning given the object of analysis (i.e. MPIs for inclusion in AE transition strategies) and allows to pursue the three specific objectives of the deliverable, each objective being associated with a methodological step. The logical flow of the methodological steps involves the gradual achievement of the subobjectives of the research, follows:

- Step 1: Selecting the policy instruments that can help overcoming key transition barriers in the different contexts characterizing each CS, identifying the key barriers that oppose to existing challenges. It was made through a workshop carried out in each CS;
- Step 2: Ranking policy instruments that are deemed necessary to face context specific barriers. This is achieved via Multi-Criteria Analysis that builds on multi-attribute theory methods to (i) prioritise the policies based on their perceived relevance by local actors; (ii) rank the policies based on performance criteria selected via the consultation of EU experts (EC, 2017; UK-DCLG, 2009). Data were collected via interviews and/or workshops in each CS;
- Step 3: Co-creating policy solutions to better address context specific challenges, especially around those instruments ranked as very relevant to face the challenges but of low performance in the first step. It was made through a workshop carried out in each CS;
- Step 4: Identifying common patterns and differences across the CSs. Policy instruments and related barriers are classified into common typologies, based on an inductive approach. This is achieved via the integration of findings from Steps 1, 2, 3 and the creation of common narratives to present the study findings.

The subject of evaluation is a list of MPIs that results from the co-construction of the AE transition strategy in Task 3.3 (Deliverable D3.4, Schwarz et al., 2021). CS AE transition strategies include existing MPIs in their current forms, revised MPIs with proposed changes to their current design, and newly proposed MPIs, grouped into 8 macro-categories derived for the past classification carried out in Task 5.3. The classification is driven by commonalities on the purpose of the instruments, except for the ones classified under 'Other measures', category which include all the less represented instruments. The description of the categories is shown in Table 3.1.

Table 3.1 – Macro-categories of Market and Policy Instruments

Categories of MPis	Definition
Income and market support	Income support to guarantee the maintenance of farming (e.g. direct payments, cross compliance and greening, payments for farming in marginal areas), including generation renewal. Other instruments included in this category are all the measures and rules to support and regulate agricultural markets, producer organisations, and international agri-food trade and competition
Agri-environment payments	Payments for sustainable farming practices (e.g. minimum tillage, organic farming), including non-productive investments (practice-based measures). This category also includes Result-based payments, adopted to reach a desired status of the environment (e.g. number of species in grassland, reduction of pollutants in water bodies, repopulation of pollinators)
Payments for investments	Subsidies and/or grants on loans for capital investments. Other instruments (including Payments) addressed to multi-functional activities and diversification on farm (e.g. agri-tourism, educational farm, social farming)
Knowledge promotion	Any instruments (including payments) addressed to trigger the creation and diffusion of knowledge among various actors from farmers to consumers
Certification schemes	Certification schemes developed by local actors or enforced by markets
Food policies	Policies addressed to food value chains and food systems and consumers, concerning how food is processed, distributed, and purchased
Networking/cooperation	Support for partnerships, networking and cooperation among private and/or NGOs and/or public organisations
Other measures	This macro-category includes a broad set of instruments, such as landscape management rules, wildlife laws and land use planning; limitations in the use of pesticides, fertilizers and livestock densities; measures to boost economic growth, for jobs creation and to improve quality of life in rural areas. Policies addressed to renewal/creation of local institutions (e.g. LEADER, rural district). Tax policies in order to create incentives promoting desirable behaviour and disincentives for unwanted behaviour.

The number of MPis included in AE transition strategies varied among CSs. To keep the focus on the key MPis and reduce the burden for the stakeholders during the participatory activities, a maximum of 10-15 MPis were subject to evaluation at the CS-level. When needed, CS partners shortlisted the

MPIs for evaluation from the candidate list of MPIs identified in Task 3.3, based on their experience and knowledge of contextual issues and giving priority to innovative MPIs.

The following sub-sections provides details about the methodology and its application in Task 5.4.

3.1. The Mixed Methods Approach

Mixed methods research uses the integration of qualitative and quantitative analyses to provide a more complete understanding of complex phenomena, than by applying either approach alone (Creswell, 2014). The logic behind that research approach is attempting to eliminate the know potential weaknesses of individual methods in relation to contextual aspects of the object of research, including their ability to generate all the required information to pursue the purpose of the study, to improve the viability of the study and the practical usefulness of findings (Johnson et al., 2007).

Two overarching rationales lie behind the selection of mixed methods as a research strategy: (i) the need for quantitative and qualitative research to answer specific and distinct research questions; (ii) the ability of diversified data collection and analysis to generate a wealth of information that researchers can investigate to discover inconsistencies between qualitative and quantitative results and generate findings that they had not anticipated (Bryman, 2006). More specifically, researchers can base their methodological choice on four criteria (Bryman, 2006; Greene et al., 1989): (i) triangulation, i.e. the results from different methods are expected to be mutually supportive; (ii) complementarity, i.e. the results from one method can be used to explain those from the other method, thereby enhancing the internal validity of the process; (iii) development, i.e. the results from one method inform the development of the other method; (iv) initiation, i.e. the results from one method are expected to pinpoint paradox, contradiction, or new perspectives; (v) expansion, i.e. different methods with different research aims can widen the breadth and range of inquiry of the study.

Mixed methods research relies on rigorously defined procedures for qualitative and quantitative data collection and analysis; however, its distinctive characteristic and value-added lies in the integration of methods and findings (hereinafter just integration) (Creswell and Plano Clark, 2011). The different approaches to integration are identified based on their level of implementation in the research workflow, i.e. the design, methods, and interpretation and reporting (Fetters et al., 2013):

- Integration at the design level: This is done during the conceptualization of a study and refers to the timing and relative importance of individual methods. The basic designs are exploratory sequential, explanatory sequential and convergent (or concurrent or parallel). In sequential designs, one method builds on the other, i.e. the findings from the first method informs the development of the other method. In convergent designs, the two methodological steps are developed and carried out independently, in parallel, and the analysis for integration begins after completing both of them. Those three basic designs can be incorporated into broader conceptual frameworks: (i) multistage, where multiple basic designs are associated to different research stages, generally in longitudinal

studies; (ii) intervention, where qualitative analysis supports the development of the intervention and result interpretation after its completion; (iii) case study, where both methods contribute to generate a comprehensive understanding of the object of research; (iv) participatory research, where the voices of the targeted population are the core of the study and there is a strong emphasis on the combination of basic designs.

- Integration at the methods level: This refers to the way how data collection and analysis are combined and is strictly linked to the type of integration at the design level. There are four approaches, not mutually exclusive: (i) connecting involves collecting data from the same sample or a subset of it; (ii) building is the process of identifying the data collection approach of a method based on the results of the other; (iii) merging occurs when two datasets originating, respectively, from the processing of qualitative and quantitative data are merged for analysis; (iv) embedding involves different combinations of connecting, building and merging at different stages of the research workflow, generally in complex intervention research.

- Integration at the interpretation and reporting level: This level of integration aims at generating meaningful and communicative results for publishing and may follow three approaches (or combinations of them): (i) integrating through narrative involves presenting quantitative and qualitative findings in separate sections of a paper (contiguous approach), together on a theme-by-theme or concept-by-concept basis (weaving approach), or stage-by-stage, in case of multistage designs (staged approach); (ii) integrating through data transformation relies on the transformation of quantitative into qualitative or vice versa and merging them in a single dataset of entirely qualitative or entirely quantitative information for analysis, respectively, via content analysis or quantitative techniques; (iii) integrating through joint displays uses visuals to help illustrate the findings of both methodological steps and explain the way how they link to each other.

3.2. Multicriteria Analysis of MPIs

MPIs are embedded in complex institutional settings, involving many parties with different perspectives and interests, and their ex-ante assessment should consider simultaneously multiple quantitative and/or qualitative criteria. Moreover, decisions in agricultural/environmental contexts need the involvement of a variety of stakeholders with different and conflicting viewpoints, which will enhance the complexity of the decision problem.

These arguments support the choice to use Multi-criteria analysis (MCA) to deepen on the analysis of the MPIs identified in Task 3.3, based on explicit objectives and a set of decision criteria. MCA is widely applied by national governments and international institutions and many officially released guidelines and ready-to-use tools exist. Here, the MCA builds on two key official documents, i.e. (EC, 2017) and (UK-DCLG, 2009).

Having set the objectives and the MPIs under study, key MCA stages involve identifying relevant criteria, weighting the criteria based on their importance with respect to the objectives, rating stakeholders' preferences for each MPI with respect to relevant criteria, and aggregating the scores

of each MPI, generally via the outranking approach or multi-attribute theory methods (or the single-criterion synthesis approach). A key difference between the two approaches is that the former does pair-wise comparisons, while the latter does comparisons based on trade-offs.

The outranking approach compares pairs of MPIs using preference relationships (i.e. outranking relations) to 'outrank' a MPI over another, i.e. MPI A outranks MPI B, when A scores better than B with respect to a given criterion. Then, the evaluator should be able to specify the preference of A against B as a function of the difference between the evaluations of A and B with respect to each criterion. The identified outranking relations are used to support the formulation of recommendations to solve the decision problem, which does not necessarily deliver a best solution choice. Popular outranking methods are, e.g., ELECTRE and PROMETHEE, among others.

Multi-attribute theory methods represent decision maker preferences on multiple criteria by aggregating the preferences per criterion into a unique aggregation function, which is then optimized to provide a single score for the overall performance of each MPI. The aggregation function is structured towards importance weights and the scores given to each criterion and can be expressed as an additive or multiplicative form. For example, the additive multi-attribute model has the form below:

$$\text{Single score} = \sum_{i=1}^n w_i S_{i,j}$$

where,

i= criterion

j = MPI

w = importance weight, s.t. $\sum_{i=1}^n w_i = 1$ and $w_i \geq 0$ for $i = 1, \dots, n$

S = sum of preferences

The single score can be interpreted as an index for the aggregate "performance" of the MPI (the greater the single score, the more preferred the MPI is). The strengths and weaknesses of each MPI under certain criteria can be evaluated as well. Key multi-attribute theory methods include, e.g., MAUT, SMART, and AHP, among others.

The present analysis uses a multi-attribute theory method because it delivers conceptually simple and easy to communicate results about the MPIs under evaluation. Major arguments against outranking methods are that they require the definition of thresholds, which are not available for the MPIs under study. Then, outranking methods inform on how much each MPI outranks the others, missing to present the differential performance of the MPIs under specific criteria, which hinders the direct identification and adequate discussion of the strengths and weaknesses of the MPIs.

Given the great variability in the design of MPIs with relevance for agricultural systems, the MCA study in UNISECO considers the self-reported level of confidence of the stakeholders involved in the evaluation exercise with the specific MPIs. The level of confidence is used to weight single responses to obtain a weighted average performance and relevance score by CS.

Then, three types of data are required for the MCA in UNISECO, as follows:

1. **Criteria weights** with respect to the MPI list, to understand the relative importance of the assessment criteria with respect to the MPI list. Weights own to the range [0-100] and they sum up to 100. In case a criterion is given a 0 weight, this means that it has no importance for the assessment of the MPI list. Instead, a criterion is given a weight of 100 when it is deemed to be the only important criterion for the assessment of the MPI list.
2. **Criteria scores** with respect to each MPI, to understand the extent to which each MPI of the list satisfies each assessment criterion. Scores are given on a 0-5 scale, as follows:
0 = Very weak – the MPI performs very bad compared to the assessment criterion
1 = Weak – the MPI performs bad compared to the assessment criterion
2 = Moderately weak – the MPI performs slightly bad compared to the assessment criterion
3 = Moderately strong – the MPI performs slightly well compared to the assessment criterion
4 = Strong – the MPI performs well compared to the assessment criterion
5 = Very strong – the MPI performs very well compared to the assessment criterion
3. **Level of confidence** with respect to each MPI list, to consider the relative background knowledge of respondents with respect to each MPI. The level of confidence is given on a 1-4 scale, as follows:
1 = I know very little about this MPI
2 = I know little about this MPI
3 = I am familiar with this MPI
4 = I am very familiar with this MPI

For each expert, the synthetic score of each MPI is obtained by summing up the product of criteria weights and performances/relevance scores for all the assessment criteria.

Assessment criteria

To pursue the specific objective of the MCA assessment in Task 5.4, two type of assessment criteria are considered, as follows:

- **Performance:** criteria that influence the performance of the MPI with respect to the barriers the instrument is supposed to help breaking down to tackle the key dilemma which largely depends on how the MPI is designed;

- **Relevance:** criteria that influence the relevance of the MPI in supporting the transition strategy, by evaluating the relative importance of the instrument and the urgency of its implementation.

Criteria selection relied on a participatory approach. A list of 11 candidate criteria was set up by the research team based on their ability to evaluate the performance and relevance of MPIs, drawing on (EC, 2017) and (UK-DCLG, 2009) (Table 3.2).

Table 3.2 – Candidate assessment criteria for the MCA

Types of criteria	Criteria
<i>Performance</i>	<i>Effectiveness</i>
	<i>Robustness to uncertainties</i>
	<i>Undesired side-effects</i>
	<i>Targeting</i>
	<i>Verifiability</i>
	<i>Efficiency</i>
	<i>Feasibility</i>
<i>Relevance</i>	<i>Flexibility</i>
	<i>Synergy</i>
	<i>Urgency and priority</i>
	<i>Policy consistency</i>

Criteria selection from the candidate list relied on the consultation (online survey) of the members of the EU-level MAP and PAG and CS partners. The respondents were asked to evaluate the suitability of the candidate criteria for assessing the performance and relevance of MPIs against four aspects, as follows:

- **Clarity** - Are the descriptions offered to explain the provisional set of criteria clear enough? If not, please specify which one is unclear and try to provide an alternative explanation.
- **Completeness** - Have all important criteria to assess MPIs performances been included? If not, please add to the list of criteria.
- **Redundancy** - Are there any unnecessary criteria? If yes, please indicate the unnecessary criteria.
- **Operationality** - Is there any criterion that is not suitable to assess the complete set of MPI under evaluation?

Additionally, the respondents were asked to highlight potential issues in criteria definitions and, when needed, to suggest adjustments.

The outcome of the consultation was a list of 6 criteria, and their definitions, for the MCA (Table 3.3).

Table 3.3 –Assessment criteria for the MCA

Criteria	Description
Performance	Effectiveness The extent to which the direct results of interventions (output) contribute to the removal of specific barriers that hinder the achievement of the envisaged changes. A MPI is considered effective if it allows to remove the barriers.
	Undesired side-effects The extent to which undesired side-effects of the MPI (tightening of barriers) balance the desired effects directly promoted by the instrument (removal of barriers). MPIs may fail to produce expected results, or worse, set off unintended consequences which further exacerbate the problems faced in practice.
	Targeting The extent to which the actors who can address the barriers are the target of the instrument.
	Efficiency The extent to which the instrument is considered less costly/more beneficial compared with alternative options on the removal of barriers. In other words, efficiency considers the relationship between the resources (inputs) used by an intervention and the changes generated by the intervention (outputs). Differences in the way an intervention is approached and conducted can have a significant influence on the effects, making it interesting to consider whether other options achieved the same benefits at less cost or greater benefits at the same cost.
	Feasibility Existence of the conditions (e.g. technical capacity, economic strength, socio-cultural acceptance and potential conflicts with current legal settings) required to implement and enforce the MPI by the Regulator (i.e. public body/private actor in charge).
Relevance	Urgency and priority The extent to which the MPI is considered important for the strategy. Specifically, Urgency refers to the timeliness (whether the instrument should be implemented first) and Priority to the relative importance of the instrument in supporting the strategy (whether the instrument is essential in supporting the strategy).

3.3. Qualitative Analysis

The qualitative analysis has three objectives, as follows:

- Receiving a general feedback by stakeholders on the MPIs under evaluation, also by identifying key strengths and weaknesses, as well as by identifying possible synergies and conflicts amongst MPIs;
- Identifying and understanding the policy innovations to support the AE transition and the key governance changes to support the adoption and diffusion of the most innovative MPIs;

- Providing recommendations for future policies, by discussing the opportunities offered by local and national policy framework, as well as by the CAP post 2020 and by other future EU strategies (EU Farm to Fork Strategy, New Green Deal, Biodiversity Strategy) to address the CS dilemma and foster the adoption of the most innovative MPIs.

To achieve those aims, a questionnaire was developed, with three sections:

Section 1: strengths and weaknesses of the list of MPIs, including possible synergies and conflicts among them;

Section 2: innovativeness of individual MPIs on the list, key governance changes, new processes, tools and practices in the design and implementation of innovative MPIs and economic needs to remove the barriers that prevent the adoption and diffusion of the AEPs included in the co-constructed AE transition strategy (Task 3.3);

Section 3: opportunities offered by the current and future policy frameworks (local, national and European) at the CS-level to address the dilemma and promote the AE transition strategy, with emphasis on the EU CAP post-2020, Farm-to-Fork Strategy and Biodiversity Strategy).

The table below (Table 3.4) displays the questions per each questionnaire section.

Table 3.4 – Questionnaire for the qualitative analysis

	Questions
Section 1	<p>Q1 – Can you briefly indicate what are the main strengths and weaknesses of the set of the MPIs that you have just assessed?</p> <p><i>This question aims at receiving a general feedback on the shortlisted MPIs assessed through the MCA, in order to allow the experts to identify the key aspects of the scoring exercise that he/she has just carried out (both positive and negative aspects).</i></p>
	<p>Q2 – Looking at the list of MPIs, can you identify possible synergies and conflicts amongst the assessed instruments in addressing the CS dilemma and the reasons they may occur?</p> <p><i>This question aims at receiving some feedbacks on the synergies and conflicts amongst MPIs and on the coherence of the shortlisted MPIs. Please, encourage participants to provide practical examples.</i></p>
Section 2	<p>Q3 - Looking at the list of shortlisted MPIs, can you briefly indicate what in your view are the most innovative MPIs and what are the key challenges for their implementation?</p> <p><i>This question aims at identifying the point of view of policy experts on the MPIs that show the greatest potential to address the CS dilemma as well as on new processes, tools and practices that should be adopted to better support the agroecological transition strategy</i></p>
	<p>Q4 - What are the key needs - in terms of knowledge, advice, financial resources, infrastructures, social capital, etc. - to effectively implement the most innovative MPIs? Would the most innovative MPIs require changes on the role, power, relations of some actors?</p> <p><i>This question aims at exploring key governance changes needed to effectively implement the most innovative MPIs, including the role of key actors (and missing actors)</i></p>

Questions	
Section 3	<p>Q5 - Are there any envisaged changes in the local or national policies context that could influence the adoption/diffusion of the shortlisted MPIs and more in general to address CS dilemma?</p> <p><i>This question aims at exploring if at the national and local we are witnessing a change of the policy and institutional framework (new regulations, emerging policy actors with new role and responsibility, new forms of cooperation) that could affect the adoption of the shortlisted MPIs and more in general that could influence the success of the transition strategies</i></p>
	<p>Q6 – Do you think that CAP post 2020 and the other future EU strategies (EU Farm to Fork Strategy, New Green Deal, Biodiversity strategy) will offer better opportunities in the adoption the most innovative MPIs?</p> <p><i>To formulate policy recommendations, this question aims at exploring if the new strategies, tools, regulations and measures discussed (or recently adopted) at the EU level are consistent with the objective, challenges and need required to implement by most innovative MPIs.</i></p>

3.4. Field Work

The field work relied on a participatory approach that involved the engagement of a variety of stakeholders, such as policy officials, managing authorities, researchers, farmers' unions, environmental NGOs and any other stakeholders from farming sector, services and agri-food chain sufficiently experienced on MPIs. Based on contextual issues, CS partners could collect data via workshops and or/interviews, to be carried out remotely or in person (with an average target of 10 stakeholders per CS).

CS partners made sure that the invited stakeholders had and understood all the background information about the CS challenge, the co-constructed AE transition strategy and the CS-specific evaluation problem. The workshops and interviews involved two consequential steps, i.e. the MCA exercise and the discussion about the qualitative questions.

During the MCA exercise, the stakeholders filled in a table, displaying all the MPIs under evaluation, with criteria weights, criteria scores and the level of confidence. CS partners assisted the stakeholders during the exercise, by answering their questions and providing further explanation.

The second part of the workshop/interview was organised towards the six questions of the questionnaire. CS partners recorded and verbatim transcribed the discussion.

The workshop/interviews were carried out in country languages. After completing the field work, CS partners reported the results of the MCA and qualitative analysis to the Task leader, in English.

Common guidelines were prepared and iteratively adjusted based on partner feedback. The guidelines included methodological explanations, data collection sheets and reporting templates. Remote meetings were organised with CS partners before the field work started, to provide further explanations and ensure shared understanding of the data collection and reporting processes. The field work occurred during the period October-December 2020.

3.5. Data Collection

Table 3.5 provides some information about the general characteristics of the Case Studies in which the described methodology was applied in order to identify instruments and governance mechanisms capable of coping with different agroecological challenges. The table shows some similarities and differences among the CSs.

Table 3.5. Overview of the 15 UNISECO case studies.

Country code	Case study	Geographical scope	Farming system	Transition stages
AT	MITIGATION OF CLIMATE CHANGE BY HUMUS FORMATION IN ARABLE FARMING	Local	Arable and livestock	Initiating
CH	INTENSIVE ANIMAL FARMING	Local	Livestock	Initiating
CZ	ARABLE LAND MANAGEMENT ON ORGANIC DAIRY FARMS	Subnational	Livestock	Enhancing
DE	DEVELOPING STRATEGIES FOR AGRO-ECOLOGICAL TRANSITION IN ARABLE FARMING SYSTEMS	Local	Arable	Initiating
ES	AGRO-ECOLOGICAL FARMING SYSTEMS	Subnational	Mixed	Enhancing
FI	PLANNING A DAIRY SECTOR DRIVEN BIO-PRODUCT PLANT	Local	Livestock	Initiating
FR	CONNECTING CUMAs TO FOSTER THE ADOPTION OF AE PRACTICES	Subnational	Permanent crops	Initiating
GR	COLLECTIVE IMPLEMENTATION OF ALTERNATIVE PLANT PROTECTION PRACTICES IN PEACH TREES	Subnational	Permanent crops	Initiating
HU	SOIL CONSERVATION FARMING	National	Arable	Initiating
IT	DIVERSIFYING SPECIALIZED WINEGROWING AREAS	Local	Permanent crops	Enhancing
LT	SMALL SCALE DAIRY FARMERS AND CHEESEMAKERS	National	Livestock	Enhancing
LV	ORGANIC DAIRY FARMING	National	Livestock	Enhancing
RO	HOTSPOT OF BIODIVERSITY AND HEALTHY FOOD	Subnational	Mixed	Enhancing
SE	DIVERSIFICATION OF RUMINANT PRODUCTION	National	Livestock	Initiating
UK	MIXED FARMING AND GENERAL CROPPING	Subnational	Mixed	Initiating

The CSs vary for the boundaries of the system under study (i.e. the SES boundaries set in Task 3.1) and on the type of challenge in place and the corresponding transition stage (i.e. the classification

based set in Task 3.3, D3.4). The transition levels defined by Wezel et al. (2020) and Gliessmann (2007) were adapted to better reflect the purpose of the co-construction process to initiative or to enhance transitions and broadly the differentiation of incremental and transformational change:

- **Initiating:** Case study focuses on how to initiate transition in a conventional system implementing mainly **incremental changes** in farming systems.
- **Enhancing:** Case study focuses on enhancing transitions in systems that already implement agro-ecological practices through **transformational change** redesigning the farming system and / or enhancing transitions to food systems level.

Interviews and workshops were the methods used to collect data and to perform the investigation in the different CS. The choice of the method was mainly driven by organizational issues (stakeholders' availability, connections problems for online workshops, etc.). In any cases, differences in data collections among CS did not cause any problems in data interpretation and information quality.

Table 3.6 provides a detail on the number and the typology of stakeholders involved in the analysis. In general, policy makers (including representatives of local administrations and authorities) and other actors are the types of actors mostly represented. Other actors include Food chain actors and Agricultural and Environmental association representatives. The predominance of policy makers (particularly represented in CH, CZ and DE) and other food chain actors (particularly represented in FI, LV, RO and IT) is justified by the fact that these are the ones mostly familiar with MPis and governance issues. However, great differences appear among CS. Advisors prevail in FR, Farmers in ES and UK, Researchers in HU and LT. Differences in stakeholders' typologies among CS can contribute explaining the relevance attributed to the evaluated MPis.



Table 3.6 – Number of respondents by typology for the 15 case studies.

Country code	Farmers	Agri-food value chains	NGOs	AKIS	Authorities	Total
AT	0	1	0	4	0	5
CH	0	0	0	1	3	4
CZ	3	0	0	3	4	10
DE	0	1	1	1	5	8
ES	3	0	2	1	2	8
FI	1	3	0	3	0	7
FR	0	0	0	9	1	10
GR	1	0	0	5	1	7
HU	0	2	1	4	3	10
IT	3	0	1	5	3	12
LT	2	0	0	5	3	10
LV	5	0	2	2	2	11
RO	2	0	2	3	0	7
SE	0	0	0	3	3	6
UK	8	0	1	2	1	12
Total	28	7	10	51	31	127

Table 3.7 shows the distribution of the collected information by CS' groups. From the table appears that the initiating transitions stage is more represented than the enhancing transitions stage when considering the number of CSs analysed, while we have a more balanced representation of the comparing transition stages when considering the number of responses.

Table 3.7 – CS representativeness and respondents typology by transition stages

	GROUP 1 (Initiating)	GROUP 2 (Enhancing)	Total
Case studies (n.)	9	6	15
Respondents (n.)	69	58	127
<i>Farmers</i>	10	18	28
<i>Agri-food value chains</i>	7	0	7
<i>NGOs</i>	3	7	10
<i>AKIS</i>	32	19	51
<i>Authorities</i>	17	14	31

With respect to the representativeness of the typologies of respondents contributing to the study, AKIS and Agri-food value chain actors prevail in the ‘initiating’ group while farmers in the ‘enhancing’ group. At a first glance, farmers appear to have major role in the co-construction of local transition strategies in the ‘enhancing’ group, while AKIS and food chain actors in the ‘initiating’ group, suggesting that perhaps different type of actors are called to activate transition strategies at different transition stages.

Table 3.8 shows few information on the characteristics of the CS by transition stage. GROUP 1 is gathering those CS with the narrowest geographical scope, representing the whole range of farming systems investigated in UNISECO and mainly focused in promoting changes in soil management. GROUP 2 gathers those CS characterized by a broader geographical scope and that are mainly focused on livestock and permanent crop farming and interested in promoting crop diversification, for permanent crops and extensive grazing for livestock. Thus, soil management issues appear to be dominant in GROUP 1 and extensive grazing and crop diversification in GROUP 2.

Table 3.8 – General information on case studies by transition stages.

	GROUP 1 (Initiating)	GROUP 2 (Enhancing)	Total
Geographical scope (%)			
<i>National</i>	2	2	4
<i>Sub-national</i>	3	3	6
<i>Local</i>	4	1	5
Farming systems (%)			
<i>Arable</i>	2		2
<i>Arable and livestock</i>	1		1
<i>Livestock</i>	3	3	6
<i>Permanent crops</i>	2	1	3
Main AEPs (%)			
<i>Crop diversification</i>	1	2	3
<i>Crop management</i>	1		1
<i>Extensive grazing</i>	2	3	5
<i>Manure management</i>	1		1
<i>Soil management</i>	4	1	5
Total	9	6	15

Schwarz et al. (2021) (D3.4) have identified three main themes of barriers to the AE transition across the different case studies: 1) lack of knowledge and social capital, 2) lack of added value, processing and market access, and 3) ineffective and bureaucratic policy support. Improving and Enhancing CSs also differ for the assessed ability of MPIs to address major barriers to the AE transition.

4. COMPARATIVE ANALYSIS OF CASE STUDIES

This section presents the key findings of the MCA and qualitative analysis. The following subsection (4.1) provides an overview of the MCA results per typology of MPIs (see Annex 1 for the ranking of MPIs and a summary of the key findings at the CS level) and link them with the barriers to AEP adoption (see Annex 2 for some insights on the process of MPI selection), during the co-construction of the strategy. Subsections 4.2 and 4.3 reports the findings of the qualitative analysis that are directly referred to MPI typologies; the former is about strength and weaknesses and potential for innovation, the latter concentrates of governance and implementation issues.

4.1 Multicriteria Assessment

The present section offers an overview of the main results obtained from the multicriteria assessment (MCA) of the relevance and performance of the MPIs selected to support the transition strategy in the 15 UNISECO Case Studies. MCA results - presented with aggregated scores for the 8 macro-categories of MPIs (see table 3.1 for a complete explanation) - allow: (i) to outline different policy mixes to face major transition challenges; and (ii) to identify key aspects in their design and implementation that might benefit from improvement. Results are presented as a series of tables and figures, also averaged by transition stages, and to pinpoint the differences between “Initiating” and “Enhancing” CSs (see subsection 3.5 for more information).

Each CS assessed a mix of MPIs ranging from 6 to 15 for a total of 148 instruments (table 4.1). Agri-environment payments is the largest type, with 24 MPIs. The remainder types include around 20 MPIs each, except for Income and market support and Certification schemes that include 15 and 8 MPIs, respectively. This diversity can be explained considering the substantially economic objective of Income and Market Support which makes these instruments less attractive for AE transition. In the case of Certification schemes, perhaps also the specificity of these instruments compared to the various instruments included in the other categories makes them relatively less frequently selected for the assessment. It is worth recalling that the selection of the MPIs results from a participatory process, where the case study MAP played a key role and UNISECO partners guided and facilitated the process.

Table 4.1 – Composition of the mix of MPIs by CSs' groups

	Initiating	Enhancing	Total	Initiating	Enhancing	Total
Income and market support	8	7	15	9%	11%	10%
Agri-Environment Payments	15	9	24	18%	14%	16%
Payments for investments	13	8	21	15%	13%	14%
Knowledge promotion	12	8	20	14%	13%	14%
Certification schemes	7	1	8	8%	2%	5%
Food policies	8	13	21	9%	21%	14%
Networking/Cooperation	8	11	19	9%	18%	13%
Other measures	15	5	20	18%	8%	14%
Total	86	62	148	100%	100%	100%

A more comprehensive analysis must also take into account the scores obtained for the relevance and performance criteria (see below). Initiating and Enhancing CSs show a difference in the selected MPIs for assessment. Initiating CSs have proposed typologies of MPIs more oriented towards incentives (Agri-Environment Payments and Payments for investments) or other less represented policies included in Other measures. Stakeholders involved in Enhancing CSs have shortlisted more instruments belonging to the macro-categories Networking/Cooperation and Food policies. This is also coherent with the wide knowledge challenge that they are facing, i.e. capacity building (Deliverable 3.4; Schwarz et al., 2021).

Figure 4.1 shows the overall relevance and performance of MPI macro-category. Scores are relatively close to each other, although there is a marked difference between the highest and lowest ranked MPI. Performance scores are usually slightly lower than relevance scores, depending on the different set of criteria used to calculate the average scores.

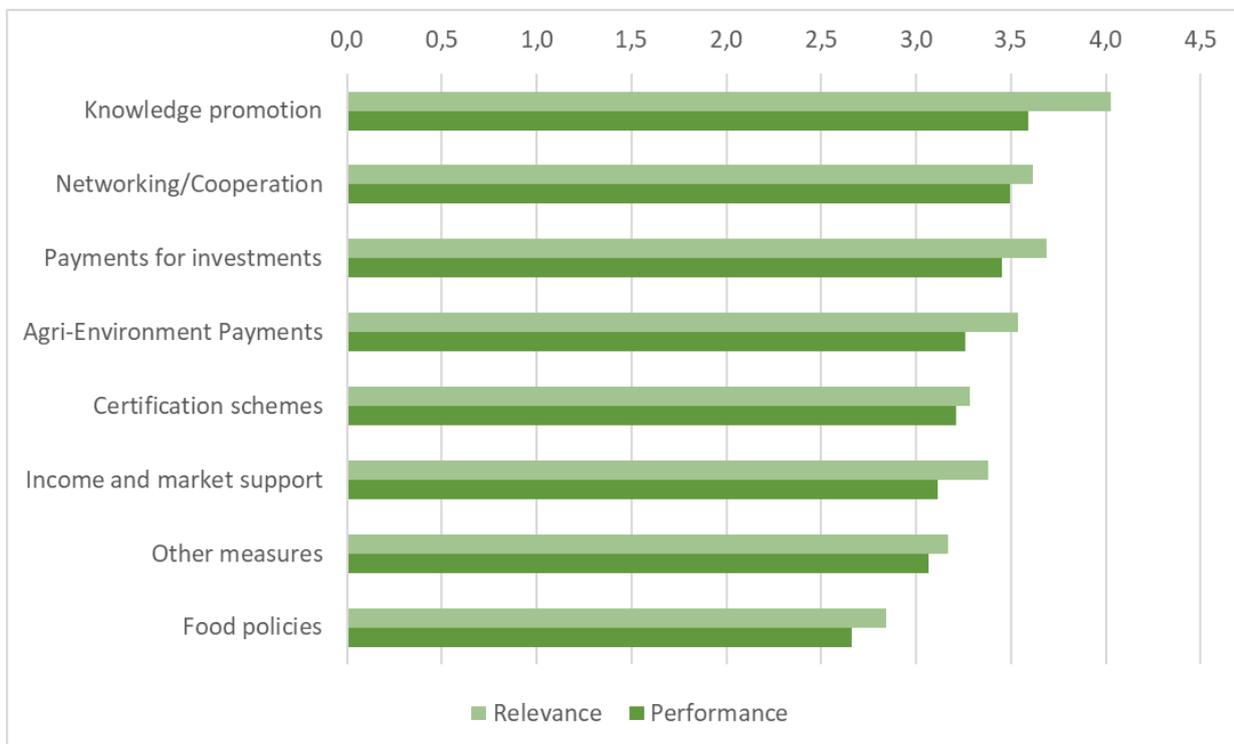


Figure 4.1 –Average performance and relevance scores of MPIs (Total CS)

A visual analysis of figure 4.1 highlights an agreement among the relevance and performance rankings. Both rankings share the top three MPIs, i.e. Knowledge promotion, Networking / Cooperation and Payments for investments, the middle three MPIs Agri-environment payments, Certification schemes and Income and market support, and the bottom two MPIs, i.e. Other measures and Food policies. This pattern suggests a high correlation between to two sets of criteria

(relevance and performance, which is confirmed statistically³. This finding probably underlies the existence of shared views among the local MAP members, irrespective of the CSs they belong to.

Though slightly, a difference in the relevance and performance ranking of MPIs exists, suggesting a divergence in the perception of MAP members in the evaluation of each MPI based on timing of implementation (relevance) and ability to reach the objective (performance).

Some results are consistent with previous research (Dessart et al., 2019; van Dijk et al., 2016; Riley, 2016). For example, supporting knowledge promotion has always been considered one of the keys to success in sustainable rural development. Other results differ a bit from what it could be expected and deserve more attention to understand why it is so. For example, Food policies show unexpected low ratings, provided that they are expected to be the backbone of the long-lasting development of agro-ecological farming systems in Europe. Probably, this is related to the CS selection process, especially aimed at representing CS at different stages in the AE transition pathway. So, the comparison of Initiating and Enhancing CSs) might support results interpretation.

It is quite clear that a common thread binds the two groups in promoting sustainable practices: knowledge promotion is considered the backbone of the MPIs mix for both groups. However, there are aspects for which the 2 groups differ markedly (figures 4.2 and 4.3). A consistent difference between the two groups regards the ranking of Networking/cooperation MPIs with Enhancing CSs displaying higher scores. A possible reason for this difference might be the greater need for aggregation, peer-to-peer discussion and integration of several different actors when the redesign of the farming system following the agroecological approach is the main target of the transition and then the knowledge challenge has shifted from knowledge creation and diffusion (Initiating) to capacity building (Enhancing). To some extent, this is supported by a higher frequency of knowledge-related key barriers in case studies initiating agro-ecological transitions. In addition, the socio-cultural and historical context of the Eastern European case studies and the commonly negative experiences of cooperative approaches and low level of social capital of farmers and other key actors increases the need for coordinated actions through policy support to increase cooperation (Schwarz et al., 2021).

The different transition stage might support the understanding of the better ranking of Knowledge promotion, Payments for investments, Agri-environment payments, and Certification schemes in the Initiating than in the Enhancing CSs. Those MPIs can trigger a transformation process of those farming systems that are still based on conventional, resource use efficiency or input-substitution production methods.

³ The Pearson correlation coefficient between Performance and Relevance scores is 0.794.

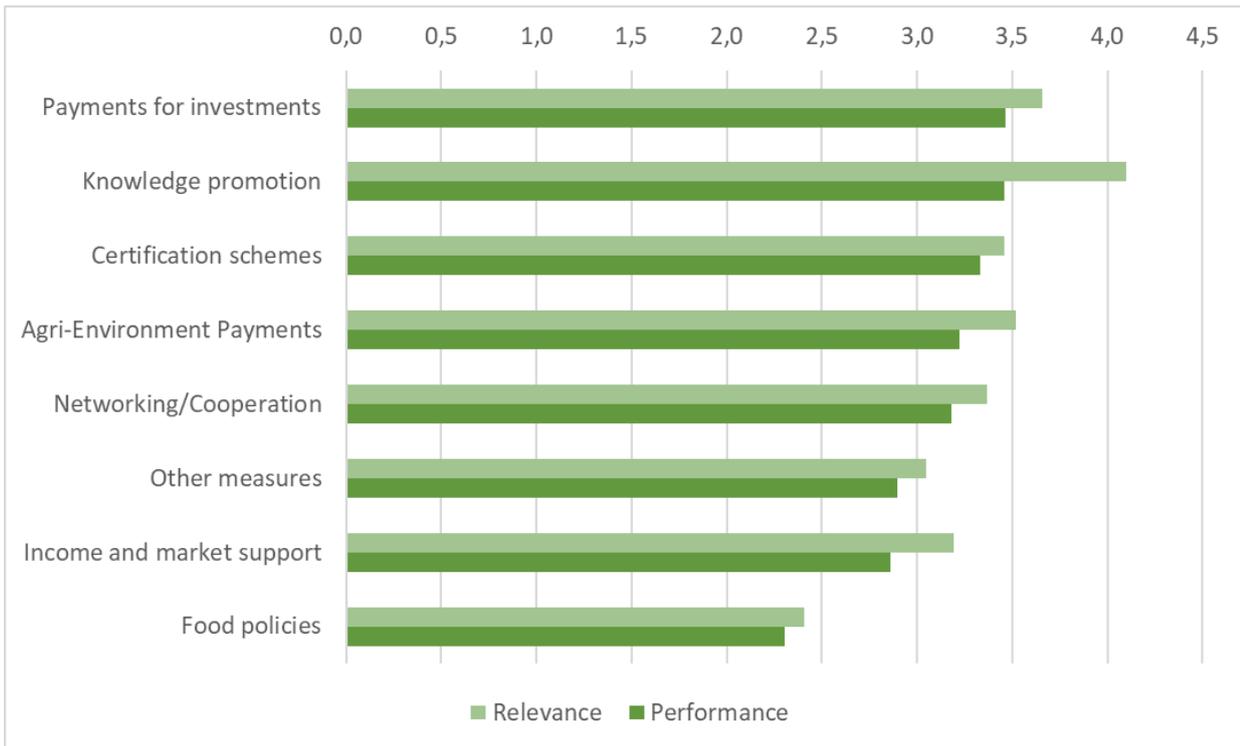


Figure 4.2 –Average performance and relevance scores of MPIs (Initiating Group)

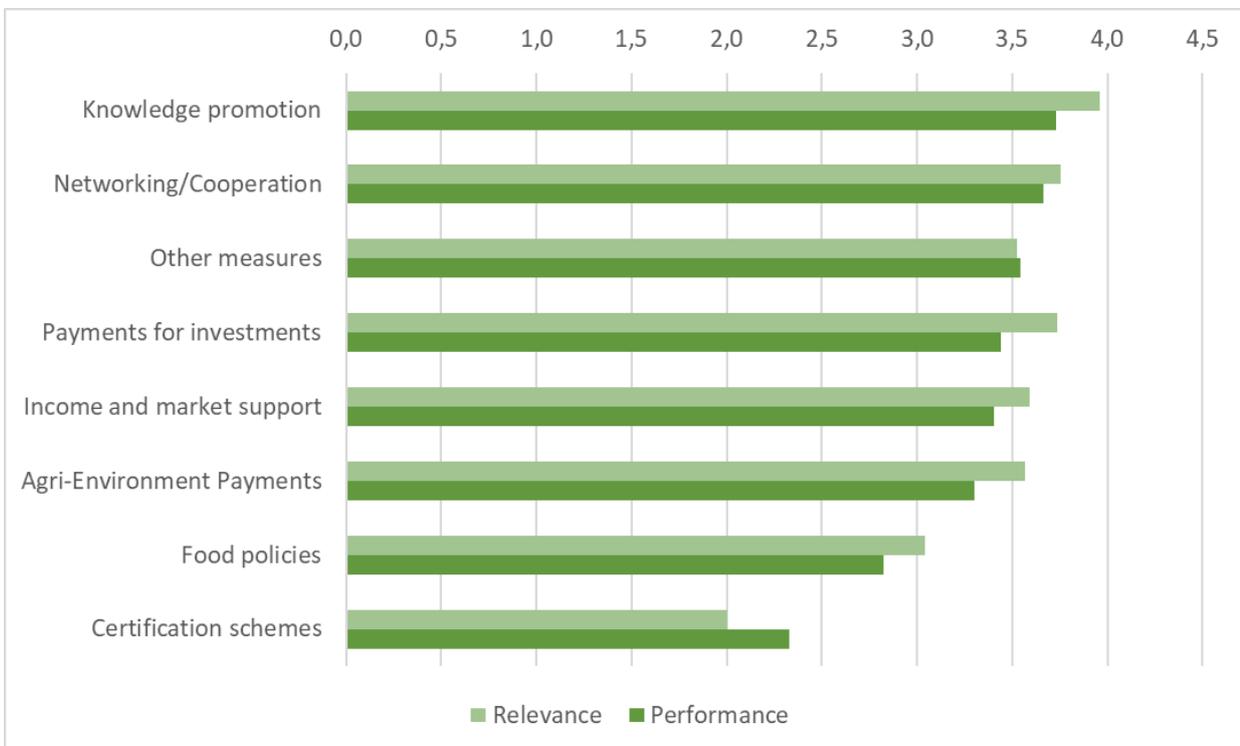


Figure 4.3 –Average performance and relevance scores of MPIs (Enhancing Group)

Regardless of the stage in the AE transition, Payment for investments is top-ranked and outperforms Agri-environment payments. This pattern highlights the need for structural adaptations in farms that go beyond mere financial compensation for the change of specific farming practices. In other words, to consolidate the transition process, farms require enabling conditions to adopt AE practices, to overcome the constraints related to insufficient farm endowment.

In Initiating CSs group Certification schemes rank high both in terms of relevance and performance. The availability of specific certification schemes can provide the right incentive to food chain actors, by increasing the value added of agro-ecological food. The change to organic farming in the first transition stage is more simplified, since certification requires the simple input substitution. Instead, Enhancing CS are more oriented towards systemic interventions, involving changes beyond the farm scale. Also, enhancing case studies struggle to increase the value added through cooperation across the value chain. This might explain the greater scepticism of these case studies towards Certification schemes, compared to Initiating case studies. This is especially true for relatively small farms, for which meeting certification standards is more challenging than for larger farms. This might explain different assessment of Certification schemes by the two CS groups. The farms in the most advanced stages of the AE transition have probably created a different system of relations between the actors of the farming system, where the trust associated with social capital prevails, rather than being based on official certifications which are more useful as a marketing tool in earlier transition stages.

Going back to Food policies⁴, on one hand it might be the case that the MPIs initially selected for assessment were not entirely appropriate to address the knowledge challenges related with the AE transition and the need to move from a farm-centred approach to a system re-design approach. On the other hand, the previous experience of MAP members on these issues, accustomed to thinking above all in terms of CAP tools, may have somewhat biased their scoring exercise with respect to these MPIs. This offers food-for-thought in view of what can be achieved via the Farm-to-Fork Strategy.

Interestingly, Income and market support MPIs are considered not essential or moderately essential to initiate or enhance the adoption of AEPs, respectively. This looks reasonable when considering substantially economic objective of these MPIs and the concern of farmers at the Enhancing stage not to jeopardize the survival of the farms due to lack of recognition by the market for the efforts made to transform their farming system. Then for farms at the Enhancing stage, Income and market support could become an effective payment for ecosystem services related to AE redesign.

Initiating and Enhancing CS comparative analysis of the two groups of CS Initiating and Enhancing in terms of policy mix - distinguished according to: a) key barriers that hinder agro-ecological transitions that need to be addressed by MPIs; b) setting on existing or innovative MPIs; c) degree

⁴ It should be added that the variability of the scores of Food policies is higher than for the other 7 instruments. Most likely, this is due to a relatively low consensus among stakeholders on an issue that is still little explored and debated. Additionally, even the confidentiality score shows a relatively less confidence with these instruments among the respondents.

of cooperation inherent in the MPIs - it helps to understand any differences and similarities in the choices made by the stakeholders.

Initiating and Enhancing CSs differ also for the assessed ability of MPIs to address major barriers to the AE transition (figure 4.4). Value added, processing and markets barriers activate the largest number of MPIs in both groups, confirming the need to consolidate economic and market performance through specific policy interventions. The MAPs in case studies enhancing agro-ecological transitions have placed more importance on external policy support to address barriers in relation to a lack of knowledge and social capital reflected in the greater number of MPIs compared to case studies initiating transitions. But more MPIs are connected to barriers in relation to Policy design in Initiating CSs. Compared to Initiating CSs, Enhancing CSs display a richer menu of instruments that can strengthen capacity building and social capital. This suggests the existence of a systemic vision in addressing the problem of knowledge promotion, ranging from changes on the design of dedicated instruments to promote knowledge diffusion to changes on the design of regulatory restrictions and incentives to raise awareness among final recipients (farmers). For Eastern European CSs, such as e.g. LV and RO, a richer menu of instruments might reflect a greater dependency on external support to strengthen cooperation and social capital.

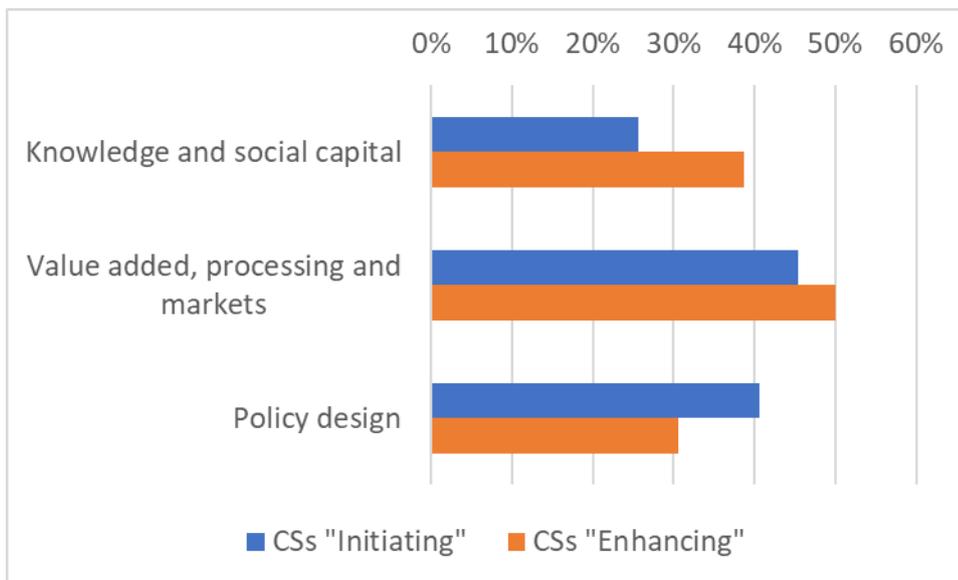


Figure 4. 4 - MPIs connected with key barriers by CSs' groups (number of MPIs addressed to overcome a specific barrier / total number of MPIs in percentage)

Figure 4.5 shows that the percentage of innovative MPIs is high for both CS groups, although this is higher for the Enhancing group. The visual CS comparison highlights that Initiating CSs are particularly keen on innovative MPIs to refine public and private incentive mechanisms. Instead, Enhancing CSs otherwise seem more prone to promote innovative MPIs to reshape the links with other food chain actors (horizontal and vertical cooperation) and to create networks of interest.

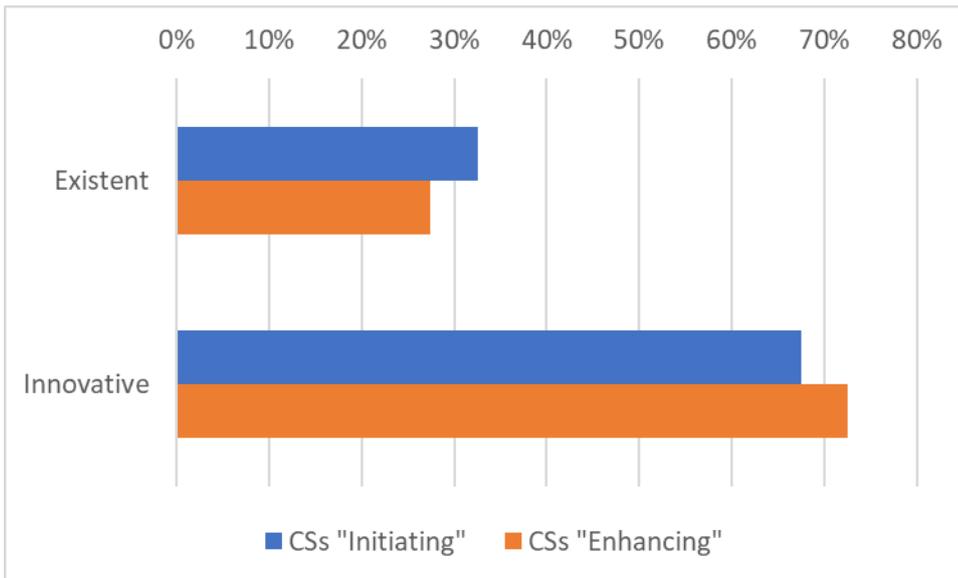


Figure 4.5 – Degree of innovativeness of the mix of MPIs by CS' groups

Figure 4.6 shows the percentage of cooperation initiatives. The two AE transition groups mainly differ for Payment for investments and Knowledge promotion, revealing a greater attention to innovate in collective action approaches by Enhancing CSs. Cooperation initiatives are in the form of collective actions for the implementation of sustainable practices, machinery rings and collective processing infrastructures for investments and private/public partnership in developing networks of knowledge.

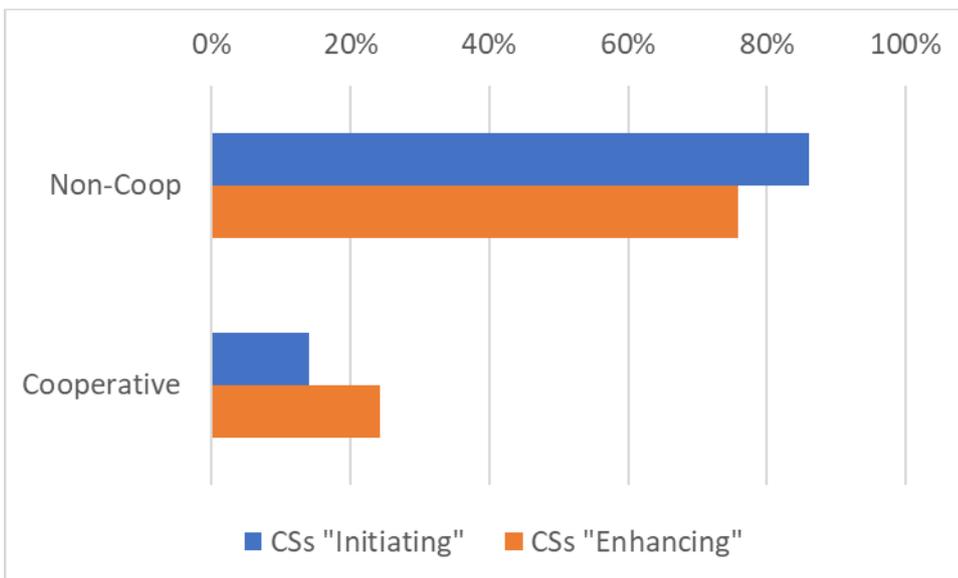


Figure 4.6 – Percentage of cooperation initiatives for each MPIs' category by CS' groups

4.2 Potential for Innovation

This subsection reports major results of the qualitative assessment by focusing on the strengths and weaknesses and potential for innovation of the existing and new MPIs. Here, the text considers MPI typologies as showed in tables 3.1. The reader may refer to Annex 1 for a summary of the most important issue reported at the CS level, and to Annex 2 for an overview of the reasoning behind MPI selection for assessment and the links with the process of co-construction of the AE transition strategy.

While the CS comparison highlight a general agreement towards the strengths and weaknesses of the entire set of evaluated MPIs, the potential for innovation greatly differ among new and existing MPIs. Of course, this might be related to the very nature of the new instruments, which are designed to remove the agroecological transition barriers. Then new instruments are characterised by their strengths, with their potential weaknesses involving their feasibility in the short term and the interactions with existing instruments. So, the strengths and weaknesses of the MPI are presented for existing MPIs only.

Existing Market and Policy Instruments

Income and market support – These instruments can increase the number of entrepreneurs who farm and build profitable, innovative businesses which respond to the industry’s changing economic environment. Key weaknesses are linked to the way in which funds are distributed, with generic eligibility criteria, not linked to agro-ecological practices, and non-grant contributions, which do not encourage the continuous improvement of the environmental performance of the beneficiaries.

The main improvements in the design of income aids and market measures were recommended for the type of payment and for the eligibility criteria. With respect to the type of payment, some stakeholders proposed to link direct payments to labour units rather than hectares as this is considered more consistent in terms of income support and, most importantly, it favours a more equitable distribution of subsidies among small and large farms. With respect to the eligibility criteria, some stakeholders proposed to strengthen cross-compliance rules and to promote as eco-schemes some agri-environment measures like extensive grazing, crop rotation and minimum tillage practices. However, some scepticism was noticed in the feasibility of such radical changes.

Agri-environment payments – A strength of these instruments is their stability over time (farmers know them and how to apply for funding), which supports the decision to adopt the funded practices. Relevant weaknesses include the lack of specificity to critical farming systems, low flexibility and lack of remuneration of farmers for the social value of the ecosystem services they provide.

The main improvements in the design of practice-based measures were recommended for the requirements to get the premium, the eligibility criteria, and the duration of the support. With respect to the premium for organic farming, some of the stakeholders from case studies enhancing

agro-ecological transitions highlighted the need to guarantee high premium also for the maintenance of organic farming (e.g., CZ), while some others highlighted the need to link the payments for the maintenance of organic farming to additional environmental improvements (e.g., LV, IT). With respect to the eligibility criteria, the main novelty is about the inclusion of agglomeration bonus for collective actions (e.g., LV, HU). Finally, the need to guarantee the maintenance of the support over time was also considered a key aspect that facilitates the adoption of the desired practices.

Payments for investments – These instruments offer farms (especially smaller farms) the possibility to respond to the demand of agro-ecological produce, by supporting the creation of the required facilities, including those aimed at the implementation of new farm activities. A weakness of the measure is related to the monitoring stage, particularly with respect to the actual ability of the investment to reach agroecological objectives. Then, the extent to which farmers are willing to innovate might depend on other factors, including the local tax system and political context, so, there is still the risk that farmers are not interested in new investments.

The main improvements in the design of payment for investments were recommended for the eligibility criteria which should prioritize investments aimed at improving the environmental sustainability of farming and food systems (e.g., productive re-conversions, composting, supply chain integration, etc.) and the definition of a progressive incentive system in favour of small farmers.

Knowledge promotion – The strength of these instruments lays in their ability to bridge agro-ecology-specific knowledge gaps of farmers and advisors, in the possibility to develop the entrepreneurial skills of farmers and in the diffusion of trusted information to farmers about the financial support opportunities offered by public and private institutions. A weakness is related to farmers' experience with AKIS; so negative perceptions about the service they receive often can affect farmers' willingness, e.g., to participate in agro-ecology training or to ask for innovative agroecological practices. Besides, the support for advisory services is not target to the diffusion of agro-ecology.

Priority, funding, and accessibility are the main issues around which stakeholders recommended improvements in knowledge promotion. Differently from other instruments (e.g., improvements on certification schemes, agri-environment measures), we observe a general agreement in the recommendations across CSs. By considering priority issues, many stakeholders across CSs report a delay in the financing of the measure. This is considered a critical aspect as it also compromises the performances of other instruments. A delay in the provision of advisory services hinders their supportive role in decision making. By considering funding issues, different stakeholders across CSs report the lack of advisory services in their CS area or the disappearance of public and locally founded advisory services with negative consequences especially for small farms. Thus, external and local funding resources can contribute together providing the necessary advisory services to spread sustainable practices. Funding issues contribute to partially solving accessibility issues as well.

Indeed, farmers have to pay to access advisory services, and this represents an important deterrent for small farmers. The proposal here is to guarantee the provision of advisory services and free access to advisory services addressed to agroecological issues for small farms.

Certification schemes – The strengths of certification schemes are the provision of comparable and trusted information to the consumer about the environmental performance of the farm and the adopted production method. The farmer gets a premium price of product sale and the “concerned” consumer has more information about the product. The weaknesses involve the required upgrade of farm management and/or farm facilities (the latter especially concerns smaller farms) to meet the certification standards, and the lack of a certification for agroecological products, which is a transition barrier especially for non-certified organic farms.

Premium prices and environmental requirements are the main issues around which stakeholders recommended improvements. About the relevance of these instruments very different opinions were recorded across CSs. These were considered particularly relevant for GR, SE, and FR, of intermediate relevance for DE, AT and CH, while very low relevant for CZ and RO and not considered at all for the other CS. The arguments in favour were that the market cannot be ignored and that its potential influence on farmers’ choices is even higher than the influence of policies. The argument against is that voluntary certification schemes, although potentially effective if well-conceived, are in fact a marketing tool used by big companies to protect existing business, not to solve contingent problems. These tools can be even harmful (e.g., by further promoting specialisation) in the absence of a solid system of property rights. That is why the DE CS proposed to introduce new voluntary certification schemes based on revised biodiversity standards for agricultural trade.

Food policies – These instruments can help to create a local demand for agroecological products, then their strength lies in the increase of farmer confidence in the decision to adopt agroecological practices, by reducing the uncertainty on product sale. Additionally, these instruments can create the basis for extended and improved cooperation among farms and other value chain actors. The weaknesses are related to the need for farmers to meet food standards (e.g., to access public procurement projects) and to ensure stable production, which is especially difficult right after the adoption of new agroecological practices on farm. Moreover, these instruments should include measures for both the supply and the demand side, to ensure that agroecological food is well received by consumers.

The main improvements addressed by stakeholders were about the reinforcement of sustainability standards in the catering contract for public schools (sustainable food production and reducing food waste), the creation of national/local label for organic local products, the empowerment of educational messages on the importance of healthy nutrition in schools to support shifts towards healthy diets. Some scepticism was recorded about the real capacity to promote local food chains through catering contracts for public schools due to the difficulties to guarantee size and continuity in supply locally.

Networking/Cooperation – The majority of these instruments aim at creating networks of food value chain actors, locally. This is a strength of the instruments, as the agroecological transition involves the creation or consolidation of local/short food chains, with increased social capital and capacity building. The weaknesses of the instruments include their reduced ability to change farmer aversion towards the cooperation with other actors. The problems are related with conflicts with other actors, e.g. “nature protection” actors, and the reduced involvement of farmers in the project design stage and the uneven distribution of funds; then, there is little turnover of farms among participants, which restricts the access to partnership project to a small group of farms.

The main improvements in the design of existing measures concerning networking and cooperation where recommended for the eligibility criteria which should prioritize actions aimed both at improving the environmental sustainability of farming and the economic viability of sustainable farming systems (e.g., pilot machinery rings projects, supply chain projects, ecosystem-services projects, epidemiological monitoring projects, etc.) by prioritising projects involving large number of small farms.

Other measures – This typology is very heterogeneous and includes a large share of new MPIs. Then there are existing instruments that address context specific issues, such as the access to abandoned land, the set-up of biodiversity strategies or energy policy, among others, each having strengths and weaknesses.

New Market and Policy Instruments

Agri-environment payments – Result-based payments are included in the mix of MPIs selected to support the challenge especially for DE, FR, HU, and LT. These payments are, in general considered more effective than the existing practice-based payments, and the incentive is directly linked to the result obtained and more freedom is left to the farmer on what practices is best to implement. This way proven limits in the performances of practice-based payments are overcome (e.g., deadweight loss associated with no real impacts due to imperfect information about the best practices to implement by the regulator, difficulties in monitoring the adoption of the desired practices, difficulties in targeting farmers that are responsible of a given pressure on the environment). At this regard, pilot projects are currently carried out in LT with successful results. Nevertheless, some expert was doubtful about the practicality of these type of instruments by putting into question monitoring costs and risk, the magnitude of which should drive the regulator in selecting the best instrument to use. Involving farmers in the monitoring of result-based payments is one suggested mechanisms to reduce the monitoring cost and efforts of administration.

Other measures – Among the various policies cited in this category, tax policies are included in the mix of MPIs selected to support the challenge for CH, DE, FI, LV, and UK. The implementation of tax policies is justified by the need to promote a fair tax and pricing system that reflect environmental costs. On the supply side tax policies are in the form of carbon taxes usually accompanied by carbon sequestration certification schemes and discount on excise duties for biofuels obtained from food

and farming waste or, rather on discount on property taxes linked to landscape and environmental improvement of the agricultural land (e.g., CH, DE, FI). On the demand side tax policies are addressed to encourage consumers to choose sustainable and healthy diets and these are in the form of adjustments on the on the VAT rates in favour of organic food (ref. SE, LV).

4.3 Governance and Implementation Challenges

The creation of new governance mechanisms involving research institutes, advisory services, small farms and other local value chain actors through networking instruments and regional policies helps re-shaping value chains and landscapes consistently with agro-ecological principles, especially by facilitating overcoming social and institutional barriers. This challenge can be pursued over an even longer time horizon, as it requires the creation of new networks of interests, the co-design of new value chains, alongside the promotion of educational campaigns and it is considered very stable once achieved as it involves the creation of social capital.

Major governance challenges across CSs are the improvement of advisory services and the increase in the coordination between government agencies, advisory services, and research and education to promote agro-ecology. Often, food chain actors are just moderately (if at all) interested in agro-ecology-related advisory services (e.g., SE, CH, UK). Small farms are expected to benefit most from the improvement of knowledge transfer around agro-ecological issues by public agencies (e.g., IT, HU).

The diffusion of innovative agro-ecological practices is subject to the availability of evidence about their tangible benefits for farmers (e.g., FR, AT). Of course, the continuous education of farmers is strictly related to that, then there is a need for improved farmer training and advisory services, to support local capacity building and promote the diffusion of knowledge and know-how on AEPs (e.g., GR, RO). In addition, advisors can take on the role of an intermediary between farmers and administrations and authorities to bridge and rebuild trust between those actors that was lost due to high bureaucracy and conflicts in the implementation and monitoring of policy measures (e.g. DE). The provision of advisory services should be connected with research and demonstration activities, including farm visits to pioneer farmers, as well as to secondary education, to ensure that the future generations have the necessary skills (e.g., LT).

Improving the delivery of formal and technical knowledge and supporting the farmers' access to agro-ecology-specific advisory services could markedly improve ability of farmers to take advantage of the existing and emerging opportunities offered by MPIs (e.g., RO, CZ, FR). The creation of AKIS networks is one such opportunities, by paving the way to new public-private partnerships in rural areas and to knowledge co-creation and exchange among AKIS actors that operate at different scales and geographical contexts (e.g., IT).

The agro-ecological redesign of the farming system involves the integration of supply and demand side actions and instruments. Food labelling is a key instrument to reduce information asymmetry

between food producers and consumers. Then, adequate voluntary certification schemes (private instrument) for agro-ecological practices might support the AE transition (e.g., DE). The creation of knowledge hubs is an additional key instrument to coordinate local supply chains and facilitate the set-up of local public procurements initiatives that require stable actor collaboration to meet the requirements of supply contracts (e.g., SE, CZ).

A key lesson across CS is that when agro-ecological initiatives are planned and supported collectively, efforts are better structured and effectively implemented (e.g., IT, ES, GR, FI). Thus, stimulate horizontal and vertical collaboration seem to be of crucial importance to remove the barriers to the diffusion of agro-ecology.

Improving the relationships within the governance system is key to design and plan suitable initiatives in each context, within the broader national and international policy framework (e.g., CZ, FI, FR). A more effective policy monitoring and a lighter bureaucratic burden for public and private actors are necessary to guarantee the correct implementation of the actions supported by the MPis included in the co-constructed AE transition strategies. Increasing coordination between national and regional public agencies and public agencies and training centres is seen as one of the most important governance issues to be addressed (ref. DE, CZ, LV, RO, LT).

A strategic plan for agro-ecology is required to ensure the stability over time of the proposed actions, while avoiding that the implementation of any change would be affected by the availability of public funding (e.g., LV, FI). Innovative MPis to promote agro-ecology require a long-term strategy as well as vision in planning initiatives (e.g., DE, LV, IT, ES, GR). Long-term strategies should be evidence-based and aimed at the creation of new knowledge and know-how; they should draw on clear and efficient rules (e.g., stricter biodiversity standards in DE) and favour the creation of new partnerships (e.g., land-use partnership, bio-districts, producer-consumer associations, knowledge hubs) across food chain, AKIS and other private (e.g., NGOs, civic society organisations) and public actors (e.g., UK, IT, SE).

4.4 Key Opportunities Brought by Future Policies

Within the EU's Green Deal, the Farm-to-Fork and Biodiversity strategies could boost the diffusion of agro-ecological practices and lay the foundations for the new CAP. The EU strategies set ambitious goals, which are positive signals sent to member states and stakeholders with respect to the need to foster agro-ecological transitions. The quantified targets set for the development of organic farming, the reduction of pesticides (and for antibiotics) use are important milestones. However, the concrete impacts that these strategies can have are still uncertain. The new European framework may serve as a turning point for the national strategies in Europe to protect natural resources, safeguard biodiversity and improve economic viability of farms. The environmental and climatic requirements are expected to increase in the next cycle of the CAP, therefore the topic of agro-ecology is justified to be a priority and requires getting prepared for the development of appropriate interventions in the national CAP Strategic Plan.

In this process, it is essential to raise environmental awareness among national stakeholders the environmental impact of CAP implementation programs is strongly dependent on current policy decisions throughout their implementation. These goals should be included in the national design for rural development, a strategic plan focusing on lifelong provision of education and training to farmers, effective coordination and operation of AKIS, opportunities for collaboration and support of joint actions. There is a general agreement towards the ability of the future CAP to offer opportunities to address the dilemmas at the CS level, by providing stricter regulations for food producers and reducing farmers' income uncertainties. For example, considering stricter biodiversity targets, national CAP plans should support sustainable farming (e.g. as precision agriculture, organic farming, agro-ecology, agro-forestry, low-intensive permanent grassland) and set stricter animal welfare standards. This might be followed by stricter sustainability standards for public procurement. Additionally, national fiscal systems might benefit from radical change, especially by shifting the tax burden from labour to pollution, under-priced resources, and other environmental externalities, consistently with the Farm to Fork strategy. Other opportunities are seen on the novelties of the CAP post-2020, such as support for collective actions, and the proposal for a single national strategic plan, with less fragmentation of funds. Sustaining the country's self-sufficiency in agricultural products and fostering local economic cooperation is a step forward. Already during the COVID-19 pandemic, local producer and trade collaborations have intensified, and producers are also becoming more open to direct contact with consumers for greater profit, avoiding intermediaries that increase consumer price for food. Greater harmonization of sustainability certification and labelling schemes across Europe would support growth of organic and agro-ecological farming practices and products.

The National Strategic Plan is regarded as an essential tool in the next budget period, to meet European objectives and the needs of each Member State. European targets need to be translated and adapted to the national context, depending on where each state currently stands on key indicators, such as the surface of protected areas, the surface of organic farmland, the level of usage of chemical inputs, among others. Still there is a need for more transparency in setting and monitoring targets in the process of transposing European strategies and objectives in national plans and programmes. However, across the CSs, results highlight the concern that no ambitious targets will be defined. This is mainly because of the great flexibility left to Member States in the design of their own CAP and because of the difficulties the EU will encounter when monitoring progress and improvements. The doubts are due to different factors. For example, Member States might still try to convert eco-schemes into "hidden" production support, but it would be up to the EU to catch these attempts. While the design of eco-schemes is still ongoing, a large-scale transition towards agro-ecology would require setting ambitious measures within the eco-scheme regime.

5. POLICY AND GOVERNANCE RECOMMENDATIONS

The UNISECO Case Studies developed around a common overarching dilemma: *'how to produce public goods whilst having viable production of private goods, securing economic and social sustainability at a farm level, which is not overly dependent on public fund'*. To offer a Europe wide perspective on the agro-ecological transition of key farming systems, the CSs are selected to include farming systems that are (Deliverable 3.4): (i) "initiating" the adoption of agroecological practices; or (ii) "enhancing" the way how the agroecological practices are operationalised by local actors.

The analysis of the co-constructed transition strategies, via the participatory activities of UNISECO case studies, resulted in the identification of three overarching themes of barriers to agro-ecology diffusion in Europe (Deliverable 3.4), i.e. knowledge and social capital, value added and market access, and policy design. This study suggests relevant MPIs to support the removal of those barriers and provides a series of recommendations for policy makers, provided that each barrier is linked to specific socio-economic and environmental conditions of each CS.

To support the removal of the **knowledge and social capital** barriers, future policy should sustain the access to advisory services by farmers, to raise awareness about agro-ecological practices. Improving the delivery of information and training, and the development of skills aimed at the agro-ecological redesign of farming system, including entrepreneurial skills (e.g., covering market and legal issues) would empower entrepreneurship. With agricultural diversification being a core theme in agro-ecology, the creation of partnerships and collective projects is a key step towards the increased availability of agro-ecological food on the local markets. Then, there is a need for targeted interventions for intermediate institutions (e.g., rural districts) and for AE-specific cooperation measures of the Rural Development Programme (e.g., pilot food chain projects).

To remove the **value added and market access** barriers, consumer markets should be more sustainable. Future policies can support sustainable market development through various instruments. For example, new voluntary "agro-ecology" certification and labelling schemes may be required in the short term. Of course, this is very much related to the challenge of creating awareness among consumers and citizens, which is subject to the promotion of educational and awareness campaigns in schools and local media. Public procurement initiatives are an additional way to drive the agro-ecological transition from the demand-side. These can build on already existing programmes (e.g. school programmes), but to improve public procurement initiatives, new and more ambitious standards are required in the call for tenders for public schools (e.g., local food, reducing food waste).

To remove the **policy design** barriers, there is a need for lighter bureaucracy and for a simplification in the requirements for policy support. Additionally, to offer farms greater opportunities in terms of access to advisory services, future policy might explicitly address these farm groups. To improve the efficiency of policy delivery and policy coordination, greater integration is needed for example in the support for investments, practices adoption and cooperation measures. To improve the targeting of policy support with respect to achievements in environmental protection, the design of

the policy that supports AEPs should be improved to ensure targeting to major practices and/or farm typologies. Further experimenting innovative MPis like result-based payments and eco-schemes targeted to AE practices might speed-up the AE transition process in Europe, as well.

Of course, removing those barriers is not straightforward and improving policy is not the only way to do that. In the end all the actors involved in the governance of farming-system will have to make an effort to allow the diffusion of agro-ecology in Europe in the short-mid-term to make noticeable progress in the transition towards sustainable farming systems.

Agro-ecology is a knowledge-intensive farming method. As expected, results show that different combinations of MPis are important to face the different knowledge-related challenges of the transition pathway, as follows:

- (i) **Knowledge creation:** this challenge refers to the need for developing research, demonstration fields and advisory services around agro-ecological issues, accompanied with incentives and information for value chain actors and consumers. Key MPis to face this challenge are **agri-environment payments** and **knowledge promotion**;
- (ii) **Knowledge diffusion:** this challenge refers to the need for facilitating the introduction of agroecological approaches and practices in value chains. Key MPis are **certification schemes** and **food policies**;
- (iii) **Capacity building:** this challenge refers to the promotion of collective action, peer-to-peer learning and networking to re-design the food system. Key MPis are **networking/cooperation**.

The knowledge challenges can be scaled at the CS level, thereby providing a lens to the interpretation of research findings. Though having different relevance for “Initiating” and “Enhancing” CSs, the three knowledge challenges are not alternative but generally coexist.

Policy support for knowledge creation and knowledge diffusion are probably more important when “initiating” the adoption of AEPs, by providing farmers and advisors with the technical and financial tools to modify farm management and by creating a demand for agro-ecological food and consumer awareness about the ecological and healthy attributes of it. In cases where the initiation of agro-ecological transitions is seen as relying on top-down initiatives, then MPis to support the introduction of sustainable agricultural practices, their recognition of the market, as well as farmer, advisor and consumer education can support the AE transition pathway. Compared to knowledge diffusion, knowledge creation can be pursued in a relatively short time horizon, but it is very unstable as it can easily regress in the absence of incentives. Knowledge diffusion requires more time to be achieved, as it implies the adaptation of the supply chain to new standards. Also, once knowledge diffusion has been achieved, it is unlikely that it regresses, e.g. once new standards are introduced.

Capacity building challenges are of particular importance when trying to “enhance” the AEPs. When AEPs are already widespread across the farming system, the purpose is to connect demand and

supply side actions into an integrated food system approach, locally. As seen in many of the “Enhancing” CS local actors are the key actors in the redesign of farming system. This can be done by allowing stable relationships across the food chain that might last in the future. MPIs can support the capacity building of local actors through the creation of agro-ecological networks to stimulate horizontal and vertical collaboration in the food chain. The capacity building challenge can be pursued over an even longer time horizon, compared to knowledge creation and knowledge diffusion. This is because it requires, at least, the creation of networks of interests, the co-design of new food chains, and the promotion of educational campaigns. Once achieved, capacity building objectives are stable, drawing on the creation of social capital.

An unsolved issue that emerges from this research relates to the way how public authorities engage food chain actors in policy decisions. For example, farmers often do not participate to relevant round tables on agricultural-related issues, so their interests and their contextual problems might be disregarded.

Economies of scope should be pursued to boost the agro-ecological transition across Europe, to increase diversification and to build stronger relations across the food chain and, eventually, sustain a more balanced and environmentally friendly rural development.

This research shows that the support to advisory services is the backbone of agro-ecological transitions, which involve shifting from an input-intensive to a knowledge-intensive production paradigm. Even where advisory services are financed, these are not easily accessible by all farmers, which are in fact excluded. Advisory services should be coupled and sustained by trusted research and dissemination centres, which provide evidence and support knowledge diffusion about new environmentally friendly solutions for farming.

Knowledge networks should co-develop with networks of interest, which benefit from the support for cooperation, supply chain projects, land management plans and regional laws on rural and organic districts. This, eventually, could lay the foundations for vertical and horizontal forms of cooperation, both of which are necessary for the agro-ecological farming system re-design. The related policy tools might benefit from greater budget shares, especially when aimed at solving rural-wide issues.

6. Concluding Remarks

The objective of Deliverable 5.4 is to analyse market and policy instruments (MPIs), with governance mechanisms, supporting Agro-ecological Farming Systems (AEFS) and to identify and understand how these MPIs can remove major agro-ecological (AE) transition barriers and address knowledge challenges. This Deliverable builds on the results achieved so far by the UNISECO project for the co-construction of AE transition strategies in 15 European case studies (CSs), especially: the analysis of governance structures (Vanni et al. 2019, D5.2); the inventory of the relevant existing MPIs (Linares et al. 2020, D5.3); the trade-offs in the environmental, economic, and social effects of the adoption of key agro-ecological practices (AEPs) (Albanito et al. 2021, D3.5); and the co-construction of the AE transition strategies (Schwarz et al. 2021, D3.4).

To that purpose, a stepwise mixed-methods research design has been developed, based on a participatory approach that involved the contribution of MAP stakeholders from data collection through to interpretation of the results. The research approach has improved the understanding of context-specific issues related to the dilemmas in individual case studies, by focusing on the ex-ante assessment of existing and new MPIs, with respect to their potential to foster the transition, and on their practical implications for governance arrangements and policy making. Here, the mixed methods approach was selected to deepen on the policy strategies that best suites to face existing AE challenges in Europe and to provide a wide understanding of the different aspects of this complex phenomenon. Specifically, the research design has involved the simultaneous use of participatory multi-criteria analysis and qualitative analysis to achieve different and complementary subobjectives. Multi-criteria analysis was used for ranking MPIs that are deemed necessary to face AE transition barriers. Qualitative analysis was used to support the delivery of recommendations about policy solutions that can remove the barriers and face the knowledge challenges.

The methodological approach allowed considering the different and conflicting viewpoints of different stakeholders and the complex institutional settings where MPIs are enforced, including the many parties, perspectives and interests that interact among each other. Carrying-out the research under a comparative case study framework that includes 15 CSs across Europe supports the generation of external validity, especially because CSs are explicitly selected to represent the geographical diversity of Europe, key farming systems, and different stages in the AE transition process (initiating, enhancing).

Research findings consolidate the outcome of Deliverable 5.3 (Linares Quero et al., 2020), by acknowledging the importance of CAP Pillar II instruments, especially knowledge promotion, cooperation and agri-environment payments, for encouraging the AE transition. This is especially relevant for farms that are initiating the adoption of AEPs and that need to face the challenge of knowledge creation. Improving farmer knowledge on the benefits of agro-ecological practices and economic opportunities is a key aspect of successful AE transition strategies. Food policies and certification schemes play a pivotal role by allowing the diffusion of AEPs - especially when the transition is initiating - and the related knowledge. Then, promoting horizontal and vertical

collaboration in the food chain is of crucial importance to address major AE transition barriers. Networking/cooperation instruments are crucial to create synergies within and amongst food chains and to support consumer responsibilities and involvement, which are needed to address the capacity building challenge and enhance AEPs towards system redesign. Tailored policy support is required to increase the capacity of local actors to create agro-ecological networks.

Future EU policies should support medium-long term strategic plans for agro-ecology, at the national level. National CAP plans should further promote sustainable practices, as well, besides stricter sustainability standards. There is a need for ambitious targets to avoid that the status quo will be maintained, given the great flexibility left to Member States in the design of their own CAP and the challenges related to monitoring policy impacts.

Despite the efforts to generate findings with Europe-wide generalizability, this study is affected by the methodological limitations of qualitative research and theoretical sampling. Research findings are based on the consultation of actors who have not a complete knowledge of the issues at stake for an ex-ante assessment and have inevitably different expertise and knowledge of present and future policies. To overcome these limitations, this study should inform further experimental studies intended to test cause-effect relationships associated with the diffusion of agroecological practices promoted by innovative policy.

Besides its limitations, this Deliverable offers a new perspective to the design of innovative MPis that can foster the AE transition of European farming systems, by offering interesting insights on the way how to implement tailored mixes of instruments to address major barriers and knowledge challenges, while considering trade-offs and synergies. While additional funding and entirely new measures are not the main priorities, the key challenge is improving the design and governance of existing MPis.

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ANNEX 1 - CASE STUDY SUMMARIES

