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Identifying institutional configurations for policy outcomes: A comparison of ecosystem services delivery

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Abstract

This paper employs the Institutional Analysis and Development framework across six ecosystem delivery measures in the European Union to develop a configurational explanation of (un)successful outcomes. By undertaking comparative institutional analysis, we systematically examine the effect of variation across rule types and generate insights on how different institutional configurations result in varying degrees of successful implementation of ecosystem delivery measures. We apply explanatory typology methods to identify the institutional features that best explain variation in implementation success across a number of cases. We argue that institutional rules shape outcomes in conjunction rather than in isolation. The findings show that differences in implementation success across cases can be explained by the interplay of differences in knowledge exchange, flexibility in implementation, and participation in the policy design process.

KEYWORDS

comparative methods, configurational explanation, ecosystem delivery measures, implementation success, institutional analysis

INTRODUCTION

Institutions matter in explaining policy processes and outcomes, and as the complexity of policy problems increases, new actors and dynamics intervene, with more institutional arrangements that guide and constrain behavior (Olivier & Schlager, 2021). Elinor Ostrom's Institutional Analysis and Development (IAD) framework (Ostrom, 1986, 2005, 2009, 2011) offers a common understanding of how actors' behavior is structured, shaped, and constrained by institutions in social settings (Bazzan, 2021; Schlager & Cox, 2017). One of the foundational assumptions of the IAD is the configurational nature of institutional arrangements (Olivier & Schlager, 2021; Ostrom, 2005, 2009, 2011). A configuration of institutions is an arrangement of rules linked in particular ways that, as a result, produce distinctive outcomes (Olivier & Schlager, 2021). Institutional arrangements do not work individually or in isolation, they work together in structuring sequences of actions and interactions (Bazzan, 2021; Kimmich & Tomas, 2019; Olivier & Schlager, 2021).

The trend of declining biodiversity and increasing water and soil pollution poses serious challenges to the governance of nature conservation in agricultural landscapes. In response to these challenges, diverse agri-environmental schemes have been initiated all across Europe, with the aim of fostering agricultural ecosystem service delivery (European Environment Agency, 2015, 2019). Agri-environmental schemes provide funding for farmers who undertake environmental commitments that go beyond legal requirements or the application of usual good farming practices. Ecosystem services delivery measures are designed at national, regional, or local level so that they can be adapted to the local farming systems and environmental conditions, which vary greatly across the EU (Bazzan et al., 2022). Examples of types of measures include those reducing environmental risks (such as reducing fertilizer or pesticide inputs), the protection of nature, and the preservation of traditional farming practices. There is a large variety in how these measures are designed, and they come in different forms: horizontal (i.e., between farmers) and vertical (i.e., between value chain levels), action-based and results-based, collective and individual arrangements.

Recently, many scholars have applied the analytical tools and theory of institutional analysis to study ecosystem services delivery (Corbera et al., 2009; Cumming et al., 2020; Fauzi & Anna, 2013; Huber-Stearns et al., 2015; Legrand et al., 2013; Lien et al., 2018; Matzdorf et al., 2013; Meyer et al., 2015; Muñoz Escobar et al., 2013). Institutional analysis has been mostly applied in environmental, climate, food, and water policy studies (Basurto et al., 2010; Bazzan, 2021; Hardy & Koontz, 2009; Schlager & Heikkila, 2009; Siddiki, 2014; Siddiki et al., 2011, 2015; Weible et al., 2017). Recent research has focused on the institutional dimensions of ecosystem services delivery and interactions with other policy instruments, in the attempt of understanding the impact of institutional arrangements on the structure and success of these schemes (Lien et al., 2018). However, previous studies have mostly focused on reviewing definitions and structures of ecosystem services, and conducted single case-study analyses of ecosystem delivery programs (Derissen & Latacz-Lohmann, 2013; Matzdorf et al., 2013; Muñoz Escobar et al., 2013). Despite the valuable insights they provide, such studies do not improve our understanding of how these governance arrangements function and what institutional factors are conducive to successful outcomes. With few exceptions (Lien et al., 2018; Mettepenningen et al., 2013; Meyer et al., 2015, 2018), most institutional studies published so far are typically limited to individual case studies of one ecosystem service, or one agri-environmental program, and are mostly descriptive. Specifically, *configurational* comparative institutional analysis is underdeveloped in the research on ecosystem services delivery with the result that we know relatively little about which configurations of institutional conditions can enable successful implementation of ecosystem services delivery. While the many single case studies demonstrate the relevance and utility of the IAD framework, only a configurational approach to comparative institutional analysis would be able to systematically test the institutional argument that rules matter (Baggio et al., 2016). As we draw upon the IAD assumption that institutional arrangements have a configurational nature (Ostrom, 2005, 2009, 2011), we would expect that different configurations of rules would result in different policy outcomes. Therefore, applying the IAD in configurational comparative analysis, this research contributes to further development of the framework by suggesting how the specific configuration of rules affect the extent to which successful policy implementation can

be achieved. To do so, this article adopts a configurational comparative approach to studying existing agri-environmental schemes (AES) that deliver different ecosystem services. We contribute to the development of institutional analysis by applying explanatory typologies as an innovative methodological approach. Configurational comparative methods aim at "contextualizing explanations by gathering in-depth within-case knowledge while capturing the complexity of cases and at the same time taking the need for parsimony into account" (Engeli et al., 2014, p. 85). By undertaking rigorous comparative analysis, we utilize the IAD framework to establish the relationship between particular institutional configurations and the degree of success with which ecosystem services delivery have been implemented.

We identify the institutional features that best explain variation in implementation success across a number of cases. We undertake a comparative analysis of existing voluntary AES across the European Union (EU) that deliver different agriculture ecosystem services: enhancing nature conservation and water quality in the Netherlands (Friesland), Hungary, Spain (Catalonia), Estonia, Germany (Bavaria), and Romania.

We first address the question of how to conceptualize successful implementation of agricultural ecosystem services delivery; then we apply the IAD to develop an explanation for (un)successful outcomes in light of existing literature. In the remainder of the article, we present the research design and test the explanatory typology by placing the empirical information of the cases under scrutiny in the relevant cells. We conclude with reflections on the implications of our analysis and suggestions for future research.

AGRICULTURAL ECOSYSTEM SERVICES DELIVERY

Considering the diversity of environmental needs it addresses, ecosystem services delivery is governed in very diverse ways. Here, we refer to a governance arrangement as "the ensemble of rules, processes, and instruments that structure the interactions between public and/or private entities to realize collective goals for a specific domain or issue" (Termeer et al., 2011, p. 161). Rules add an institutional component to governance arrangements. Building on this definition, we conceptualize institutions as enduring formal and informal rules, norms, and procedures. These form the context within which policies are designed and acted upon (Knill & Tosun, 2020; Mahoney & Thelen, 2009). Previous studies have provided insights on individual institutional design elements affecting farmers' participation and adoption of agri-environmental measures (Mettepenningen et al., 2013; Peerlings & Polman, 2009; Runhaar et al., 2017, 2018; Schomers et al., 2015; Schroeder et al., 2013; Smits et al., 2008; Westerink et al., 2015): assistance in implementation (i.e., the level of advice by government and the cooperation between farmers and other actors); flexibility in implementation (regarding the choice of land enrolled, the practices implemented, and the length of contract); participation in design (if the measure is designed by government only, or if participation of farmers and other actors is provided); the type of payment (i.e., result-based, or fixed rate), and the scope of the measure (individual or collective). Despite their acknowledged importance, we argue that what limits the explanatory power of existing studies is the lack of theorizing about the interplay between institutional conditions of agri-environmental governance arrangements in enabling (or constraining) implementation success (or failure) of the measures. Particularly, little research has examined how actions and interactions are structured, and how this influences outcomes (Howlett, 2014; Peters et al., 2018). This article will do so by establishing how the institutional architectures of these governance arrangements influence outcomes, focusing in particular on the degree of implementation success of ecosystem services delivery.

Defining AES outputs, outcomes, and impact

Addressing the question of successful implementation of AES first entails conceptualization of such success, which is in itself a contentious issue. Agri-environmental governance studies have distinguished

between agri-environmental outputs, outcomes, and impacts (Koontz et al., 2020; Newig et al., 2013, 2018). Outputs are the decisions typically set down in writing, in the form of a plan, a program, or a contract (Knill & Tosun, 2020). Outcomes are behavioral or procedural changes that directly result from an output, including the degree to which agri-environmental outputs are implemented and farmers change behavior in compliance with programs etc., e.g., through a change of farming practices. Finally, impacts are actual changes in the environment as an ultimate effect of the outcome (Koontz et al., 2020). Previous studies conceptualized successful agri-environmental outcomes in terms of whether and to what extent expected outputs are implemented, and successful agri-environmental impacts in terms of whether and to what extent the outcomes resulted into an actual positive change for the environment (i.e., improved biodiversity, enhanced water quality) (see Table 1). As implementation moves from outputs to impacts, it will be more difficult to establish a direct causal relationship as non-policy and non-governance factors have independent effects on impacts (Thomann, 2018). For that reason, policy scholars have suggested evaluating implementation success by establishing the extent to which policy outputs translate into changes in behavior and practices with the target group (outcomes) (Richardson & Mazey, 2015; Thomann, 2015, 2018).

A basic typology of AES institutional design features

Several scholars have assessed the strengths and weaknesses of action-based as well as result-based AES (Bartkowski et al., 2021; Bazzan et al., 2022; Börner et al., 2017; Burton & Schwarz, 2013; Engel, 2016; Engel et al., 2008). Action-based schemes offer a uniform payment to reward farmers for implementing specific environmentally friendly farming practices. In result-based schemes, the payment to farmers is conditional on the achievement of program goals, which is typically a quantified environmental target. The choice of means to achieve the target is left to the individual farmer (Bazzan et al., 2022). A growing body of literature suggests that action-based schemes often under-perform in relation to achieving the objectives (Bartkowski et al., 2021; Dicks et al., 2014; Pe'er et al., 2020). While the AES initiated at the EU level have been shown to slightly improve the state of European agroecosystems (Batáry et al., 2015), action-based schemes often lack sufficient sensitivity to local farming and contextual conditions, thus failing to provide the expected environmental benefits (Bartkowski et al., 2021; Bazzan et al., 2022; Burton & Schwarz, 2013; Dupraz & Guyomard, 2019; Kleijn et al., 2011). On the other hand, result-based schemes tend to perform better. First, they motivate farmers to enroll land that is most suitable for the purpose; second, information requirements are relatively low for the regulators; third, they are considered cost-effective and efficient, by providing incentives to innovate and lowering the costs of target achievement. Finally, they allow flexibility in relation to farm practices implemented to deliver the environmental service and promote collaboration which in turn tend to increase farmer engagement and, importantly, lead to an internalization of the scheme's targets by the farmer participants (Bartkowski et al., 2021; Bazzan et al., 2022; Burton & Schwarz, 2013). However, the monitoring costs of result-based schemes are higher than action-based schemes as they require ongoing monitoring and measurement of impact. Further, they tend to be less attractive to farmers because of the uncertainty of payment as natural conditions beyond the control of the farmer affect the opportunities to provide the expected environmental impact (Bazzan et al., 2022). Nevertheless, result-based schemes are extensively regarded as the way forward in the EU (Cullen et al., 2018; Mann, 2018).

TABLE 1 Conceptualizing successful implementation of ecosystem services delivery

Agri-environmental output	Agri-environmental outcome	Agri-environmental impact
Content of the contractual arrangement that mandates ecosystem services delivery	Behavioral or procedural change needed to address the environmental problem (e.g., farming practice)	Effects on the environmental problem: improved nature conservation (e.g., biodiversity or water quality)

In the last decade, the agri-environmental literature has explored cases in which there has been a shift from top-down toward bottom-up management of schemes and started advocating for a collective approach (Arnott et al., 2019; Groeneveld et al., 2019; Hardy et al., 2020). The effectiveness of a top-down approach to AES has been questioned, and it has been argued that more responsibility should be devolved to the local level (Böcher, 2008; de Krom, 2017; Kneafsey, 2010). The importance of farmer participation in AES design is widely acknowledged and many scholars advocate for designing governance arrangements that enhance stakeholder engagement and foster collaboration among participants (Ananda & Proctor, 2013; Bazzan et al., 2022; Hardy et al., 2020; Hardy & Koontz, 2009; Koontz et al., 2020; Westerink et al., 2017). Farmer participation is crucial for achieving the targets of the schemes and the 2014 EU Rural Development Regulation represented a first attempt of innovating in this direction, allowing collective applications for AES (maintaining the choice for individual farm applications as well). The collective approach is believed to result in a more effective and efficient achievement of nature conservation targets, with lower implementation and administration costs, and a higher uptake of farmers.

As a first step of our explanation building, we provide a basic typology of agri-environmental schemes, which combines these two prominent institutional design features—action-based/results-based, and individual/collective arrangements (see Table 2).

THE IAD FRAMEWORK

Agri-environmental schemes are governed within complex institutional arrangements that have an impact on the ultimate success or failure of implementation of the scheme (Lien et al., 2018). As this perspective is a more nuanced way of evaluating agri-environmental schemes than applied in most of the existing scholarship in the field, new analytical approaches are needed to understand how differences in institutional arrangements affect program outcomes, and particularly implementation success.

A promising approach to investigating the interplay of different institutional design conditions that shape the interactions within agri-environmental governance arrangements is the IAD (Ostrom, 1986, 2005, 2011). The framework offers an understanding of how actors' behavior is structured, shaped, and constrained by biophysical conditions, attributes of the community, and institutional rules (Bazzan, 2021; Ostrom, 2011; Schlager & Cox, 2017). Here, we focus our analytical attention on the role of institutional rules, acknowledging this can only provide partial explanation but nevertheless generates important insight on how governance arrangements impact on the implementation of eco-system services. In the IAD framework, social settings are called action-situations, in which participants act and interact to generate some outcomes. Institutions are rules that specify what actors can, must, or must not do under different spatial, temporal or procedural conditions (Kiser & Ostrom, 1982; Siddiki et al., 2015, p. 537). A common set of variables used to describe the internal structure of an action-situation encompasses: the set of participating actors, the specific positions occupied by participants, the set of allowable actions and their relation to outcomes, the potential outcomes that are linked to actions, the level of control each participant has over decision making, the information available to participants about the action-situation, and the costs and benefits assigned to actions and potential outcomes (Bazzan, 2021, pp. 34–35; Ostrom, 2011). The framework presents a typology for classifying rules according to the aspects of the action-situation they shape. Who is eligible to participate is identified in *boundary rules*. The positions that participants can hold in any given action-situation are specified in *position rules*. Sets of

TABLE 2 A basic typology of AES design features

	Action-based	Results-based
Individual	Type 1 (least successful ideal-type)	Type 2
Collective	Type 3	Type 4 (most successful ideal-type)

permitted, forbidden and required actions are described in *choice rules*. Potential outcomes are specified in *scope rules*. Decision-making processes are described in *aggregation rules*. Flows of information are regulated through *information rules*, and incentives and sanctions for certain types of behavior are indicated in *payoff rules* (Bazzan, 2021, p. 35; Ostrom, 2005; Siddiki et al., 2015). Consequently, outcomes of action-situations are the results of a set of actions and interactions shaped by the way in which rules combine into specific institutional configurations.

In our study, we understand the delivery of ecosystem services as the result of a set of actions and interactions within the agri-environmental governance arrangement (i.e., the action-situation) developed to design and implement the delivery measures and shaped by a complex combination of institutional conditions (i.e., the rules) (see Figure 1).

We apply the IAD framework to study how differences in agri-environmental outputs that mandate the delivery of ecosystem services influence variation in governance arrangements in relation to stakeholder participants, their actions and interactions, and costs and benefits assigned to potential outcomes, and how this rule diversity affects implementation success of the measures. Specifically, boundary rules establish whether the design of the agri-environmental scheme is open to participation of a plurality of stakeholders. Position rules indicate the roles each participant has in the arrangement. Scope rules emphasize targets and scope of the measures (individual or collective), and choice rules establish how targets are to be met (as in action-based schemes), or if there is flexibility (as in result-based schemes). Aggregation rules establish if decision making over the measures is top-down or bottom-up, and information rules provide for knowledge exchange among participants. Finally, payoff rules establish whether the scheme is action-based or result-based, and corresponding payments, monitoring/control, and sanctions (see Table 3).

AN EXPLANATORY TYPOLOGY FOR (UN)SUCCESSFUL AGRI-ENVIRONMENTAL GOVERNANCE ARRANGEMENTS

Based on the IAD assumption that institutional arrangements have a configurational nature (Ostrom, 2005, 2009, 2011), we expect that different configurations of rules will result in different

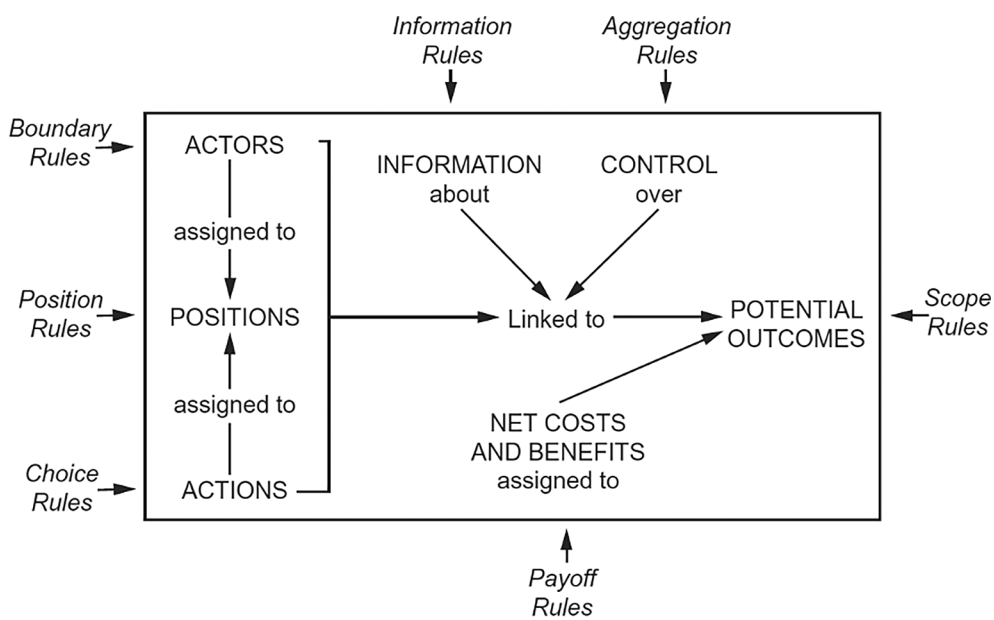

FIGURE 1 Ecosystem services delivery action-situation. *Source:* Adapted from Ostrom (2011, p. 20)

TABLE 3 Rules-in-use for ecosystem services delivery

	Boundary	Position	Choice	Scope	Aggregation	Information	Payoff
Definition in IAD framework	Eligibility to participate	Roles	Permitted/ forbidden/ required actions	Potential outcomes	Decision-making process	Flows of information	Incentives and sanctions
Application to ecosystem services delivery	Participatory design	Role definition	Flexibility in implementation	Collective or individual	Bottom-up or top-down decision making	Knowledge-exchange	Action-based or result-based

policy outcomes. Applying this typology in configurational comparative analysis enables us to further develop the IAD framework by suggesting how specific configurations of rules can affect the extent to which successful policy implementation can be achieved. In this section, we formulate typological expectations regarding the configurations of institutional rules that are conducive to (un)successful implementation of the schemes (see Table 4).

By (un)successful implementation we refer to the degree to which outputs are translated into outcomes in the sense of change needed to address the environmental problem. Two dimensions of change intertwine in operationalizing successful implementation of voluntary environmental schemes: that target group members actually sign-up for *uptake* in programs, and the participants' capacity to meet the requirements and overcome potential barriers to compliance.

Previous agri-environmental governance studies (Mettepenningen et al., 2013; Peerlings & Polman, 2009; Runhaar et al., 2017, 2018; Schomers et al., 2015; Schroeder et al., 2013; Smits et al., 2008; Westerink et al., 2015, 2020) examined institutional design elements affecting farmers' uptake of agri-environmental measures, including flexibility in implementation; participation in design; knowledge exchange; the type of payment, and the scope of the measure. However, these studies treat each condition individually rather than focusing on the interplay between them. Here, we build our expectations on the extant literature on agri-environmental governance arrangements, yet we retain Ostrom's focus on institutional rules, and particularly the assumption on the configurational nature of institutions (Ostrom, 1986, 2005, 2009, 2011). From a configurational perspective, Ostrom's framework indicates that, to unfold as expected, the actors have to be 'put under the right conjunction of rules' (Baggio et al., 2016; Barnett et al., 2016). Hence, we expect (un)successful implementation to be the result of a complex configuration of knowledge exchange (information), flexibility in implementation (choice), and inclusion in the design process (boundary rules) (as shown in Table 4). Specifically, we expect successful implementation to result from the interplay of high knowledge exchange (i.e., the level of advice and information provided by government or experts and the cooperation between farmers and other actors); high flexibility in implementation (regarding the choice of land enrolled, the farm practices implemented, and the length of contract); and participation in design (if the measure is designed by the nature protection sector in collaboration with the agricultural sector, or if participation of farmers and other stakeholders is provided). On the contrary, we expect limited implementation success to be the outcome of the interplay of low knowledge exchange among participants (level of advice and information provided), low flexibility in implementation, and no (or very limited) farmer and stakeholder participation in the design process (Mettepenningen et al., 2013; Meyer et al., 2015; Schomers et al., 2015).

RESEARCH DESIGN

Methods

This study poses the question of how the interplay of agri-environmental institutional design conditions affect successful implementation of ecosystem services delivery. To answer this research

TABLE 4 Typological expectations for (un)successful implementation of AES

	High flexibility in implementation		**Low flexibility in implementation**	
	High knowledge exchange	**Low knowledge exchange**	**High knowledge exchange**	**Low knowledge exchange**
Inclusive design-process	Type 1 (Most successful)	Type 2 (Intermediate success)	Type 3 (Intermediate success)	Type 4 (Mostly unsuccessful)
Non-inclusive design process	Type 5 (Intermediate success)	Type 6 (Mostly unsuccessful)	Type 7 (Mostly unsuccessful)	Type 8 (Least successful)

question, a comparison of governance arrangements that vary in relation to institutional settings, geographical locations, and instances of high and limited implementation success is performed. We apply the explanatory typologies method (Bennett & Elman, 2006; Elman, 2005). With explanatory typologies, "the dimensions of the property space associated with a typological theory are provided by the theory's explanatory variables, and the content of the cells comes from the logic of the theory. Given its posited causal relationships, what particular outcomes are associated with different combinations of values of the theory's variables?" (Bennett & Elman 2006, p. 465). Two characteristics make explanatory typologies methodology especially suitable to address the research question of this study. First, explanatory typologies specify conjunctions of variables, being especially suitable for comprehending configurative causation (Ragin, 2000). Second, they allow for equifinality, enabling to specify under which different conjunctural conditions the same outcome may occur (Barnett et al., 2016; George & Bennett, 2005). Similarly, explanatory typologies allow for multifinality, referring to multiple outcomes in different cases with the same value of an independent variable, depending on the values of other variables. Applying explanatory typologies, researchers first establish what they expect to find if their theory is correct, and then they place the empirical information in the relevant cells of the typology to verify if it conforms to their expectations (Elman, 2005, p. 309). Accordingly, we formulated our typological expectations in Table 4. We contend that the IAD framework can be applied to distinguish between ideal-types of successful and unsuccessful agri-environmental governance arrangements and to compare agri-environmental institutional design elements across cases.

Data collection methods and analysis

To obtain deep case knowledge, primary data were gathered from expert interviews. Evaluation and monitoring reports were used as complementary data sources. Reports were obtained from interviewees and through searching online archives of governments and public agencies. Complementary information was obtained through a case description protocol filled by academics and project partners from the Horizon 2020 EFFECT research project on environmental performance in the agricultural sector.[1] These data collection activities yielded measures of the seven IAD rule types (boundary, position, choice, information, aggregation, scope, and payoff), and of implementation success (measured as farmers uptake in the schemes and capacity to overcome barriers) for each agri-environmental scheme. Between June 2020 and July 2021, we conducted 37 expert and stakeholder interviews with actors engaged in the agri-environmental schemes under scrutiny. The interviewees worked for government agencies and ministries, farmer advisory services, cooperatives and farmer associations, research institutes and universities, or were farmers participating in the schemes. Interview questions (provided in the Annex) were derived from an operationalization of institutional concepts used in extant IAD applications and agri-environmental governance studies (Hardy & Koontz, 2009; Koontz et al., 2020; Siddiki et al., 2012, 2015). Respondents were also asked about their professional backgrounds, their role in the schemes, how they would define a successful scheme, and the institutional design elements they perceived most decisive for implementation success. Interviews lasted between 45 and 90 min.

To code the interview data, we used the program Nvivo. First, we developed a codebook (provided in Annex) drawing upon Ostrom's rule typology and the typological expectations drawn from the agri-environmental governance literature. In a second step, two authors independently coded data from each case highlighting the prevailing institutional design conditions for successful and unsuccessful outcomes. In case of disagreement, consensus was reached after discussion. In a final step, we summarized the coding results and assessed the ability of the explanatory typology to generate consistent empirical support for the expectations outlined in Table 4.

Case selection

Explanatory typologies have a strong case orientation and entail the comparison of a small number of selected cases that allow for generalization contingent to the cells or types (external validity). In comparative research, the cases must share sufficient background characteristics and the paramount consideration in selecting cases for small-N and intermediate-N comparative studies is the dependent variable. A second consideration concerns the extent of variance within the selected universe. In this regard, maximum diversity across a number of cases should be achieved (Berg-Schlosser et al., 2009).

We select cases to perform configurational comparative analysis following the types in the basic typology introduced in Table 2. What we are interested in is the relationship among the explanatory variables, and between these variables and the dependent variable. We select empirical instances of individual, action-based schemes (cases from Catalonia in Spain and Estonia), individual, result-based schemes (cases from Romania, Hungary, and Bavaria in Germany), and collective, action-based schemes (case from the Netherlands) (see Table 5). Our units of observation are instances of both successful and unsuccessful implementation of the schemes.

Unsuccessful individual action-based AES: Improving uptake of nutrient management technologies in Catalonia (Spain) and providing flower-fields for pollinators in Estonia

In Catalonia, an action-based scheme at individual level has been introduced as part of the Rural Development Program. It consists of a financial support to farmers to improve fertilization management in their farm units. The support does not provide a bonus, but it is a means to palliate extra costs that farmers could incur by doing soil analytics to improve fertilization. In addition, farmer participants get knowledge transfer and capacity building on what are the best practices to apply according to the results of the first soil analysis they get through the scheme. The implementation is mostly unsuccessful, as the uptake is very low and capacity to overcome barriers is low, with farmers experiencing difficulties in committing for a 5-year period and enrolling exclusively in the first year. Moreover, the scheme cannot cover the costs of mandatory requirements.

In Estonia, honeybee populations have seen a sharp decline in recent decades, due to habitat loss, intensified use of agrochemicals, crop selection and increased outbreaks of pathogens and parasites. The support-action of honeybee foraging crops is part of a wider measure about the "Restoring, preserving and enhancing ecosystems related to agriculture and forestry" within the Estonian Rural Development Program for the period 2014–2020. The objective of this support measure is to promote the expansion of environmentally friendly management practices in agriculture with emphasis to protect and improve the quality of soil and water, increase biodiversity and landscape diversity, and to raise the environmental awareness of agricultural producers. Specifically, the measure is action-based and assumes the joint action of farmers and the honey beekeepers. The objective of the measure is to provide foraging areas for honeybees, thus improving honey production and pollination services beyond the foraging fields. The measure is unsuccessful as the uptake is very low (ranging between 7 and 29 applications in the period 2015–2020) and capacity to overcome barriers is also low, with farmers experiencing difficulties in

TABLE 5 Case selection

	Action-based	Result-based
Individual	Catalan (case 1), Estonian (case 2)	Romanian (case 4), Bavarian (case 5), Hungarian (case 6)
Collective	Dutch (case 3)	No cases found but logically and practically possible

growing at least three melliferous plant species and in having foraging fields no further than 200 meters from the hives (as in the requirements).[2]

Unsuccessful individual result-based AES: Climate adaptation and water quality enhancement in Hungary

In Hungary, climate change, and particularly the increasing variability in rainfall, are increasing environmental risks in agriculture. Particularly, drought risk is increasing in the southeastern part of the country. Moreover, Hungary has a deficient irrigation system and only 2.4% of the agricultural landscape is irrigated. The Hungarian Rural Development Program for the period 2014–2020 is supporting the investments on improved climate change adaptation practices and water quality enhancement solutions. Specifically, the measure is result-based and has the objective to improve conservation facilities around the water reservoirs and surrounding areas; facilitating water retention and establishment of medium-sized reservoirs; implementing modern irrigation systems to reduce water and energy use; establishing natural filter fields, which reduce the exposure of surplus nutrients of the waste-water collection. The measure was unsuccessful as the uptake is very low (235 supported against 407 applicants) and capacity to overcome barriers is low, with farmers having trouble in implementing the requested practices.[3]

Successful individual result-based AES: Enhancing biodiversity conservation in Bavaria (Germany) and enhancing grassland biodiversity in Romania

A result-based grassland conservation scheme targeting plant species conservation has recently been initiated as part of the regional agri-environment program called KULAP (Kulturlandschaftsprogramm—Cultural Landscape Program) in the state of Bavaria, in Germany. While previously all schemes were designed as action-based, paying farmers for management action or non-action (e.g., limit to fertilization of cropland or cutting date restrictions for grasslands); the new Bavarian KULAP also includes a result-based measure. Farmers signing up are paid if a number of predefined plant species were found ex post on their land. The results-based scheme is being piloted during the programming period 2015–2020 and has been implemented quite successfully, with very high uptake (with 983 supported applications), but intermediate capacity to overcoming barriers, because of the short-term perspective and farmers having difficulties in understanding the requirements.[4]

In Romania, the dry grasslands of Transylvania present some of the widest floristic variety recorded anywhere in the world and support considerable populations of rare fauna. A pilot AES was running between 2015 and 2019, led and implemented by the non-governmental organization ADEPT Foundation, and financed by DG Environment and Deutsche Bundesstiftung Umwelt (DBU). Thirty species have been selected and tested in the pilot scheme regions as biodiversity indicators of high nature value meadows. Individual farmers enrolling the scheme are paid by results of measured species diversity on their farms and given the option of choosing management practices adjusted to local conditions. The scheme has been successfully implemented, as uptake has been high (with 72 successful applicants) and participants had high capacity to overcome barriers, as requirements were easy to understand.[5]

Successful collective action-based AES: Enhancing nature conservation in the Netherlands

The Dutch Rural Development Program finances a wide variety of measures, mainly concerning restoration, conservation, and enhancement of ecosystems related to agriculture. The program has a strong

ecological perspective and aims at promoting biodiversity and improving water and soil management. Within this framework, the Dutch agricultural landscape management scheme evolved under the 2014 EU Rural Development Regulation, which introduced the option of group applications for agri-environment-climate measures (Regulation EU 1305/2013, Art. 28). As a result, since 2016, only joint applications (through agrarian/nature collectives) became eligible for subsidies for agri-environmental management. The agrarian collective submits a territorial application that specifies which agri-environmental activities the collective (and its members) will perform in their territory, and how these will contribute to the realization of the goals of the provincial nature management plan. Collective subsidies will be granted only after the province has approved the territorial application. In this case, Noardlike Fryske Wâlden (NFW) is the agrarian collective that on behalf of its members submits a territorial application for agri-environmental subsidies to the province of Friesland and makes agreements with farmer-members on agri-environmental management practices and remuneration. The scheme is successful as uptake is high (ranging between 562 and 698 applicants between 2016 and 2021) and participants have high capacity to overcome barriers, as requirements are easy to understand.[6]

ANALYSIS

We analyze voluntary agri-environmental schemes across the EU that deliver different types of ecosystem services: enhancing nature conservation and water quality in the Netherlands (Friesland), Hungary, Spain (Catalonia), Estonia, Germany (Bavaria), and Romania.

Applying the IAD rule typology

In a first step, we applied the IAD rule typology to the AES under scrutiny (see Table 6).

In Catalonia (Spain), the measure is designed as a part of the Rural Development plan 2014–2020 by the Ministry of Climate Action, Food and Rural Agenda. The approval of the plan is negotiated directly with the European Commission. A wide participatory process was set to discuss all the measures with the relevant stakeholders. Furthermore, working groups were set to discuss particular measures in particular geographical areas that had to take into account the local context. The roles were clearly defined, and the communication was articulated through the Agrarian Board and stakeholders' representatives from cooperatives and farmers' unions. All the measures contained in the plan were discussed at once. This fact limits the attention to new measures that are not perceived as necessary by the sector. This particular fertilization management measure is action-based seeking individual farmers' commitment to post-ante soil analytics and to seek and follow technical advice based upon results. The limitations of the contract are: (i) Commitment for 5 years, (ii) enrollment during the first year, (iii) cannot cover costs of mandatory requirements. These limitations make this scheme particularly rigid, jeopardizing its uptake and sustainability for the next Rural Development periods.

In Estonia, the process of designing the measure is under the responsibility of the Ministry of the Rural Affairs and comprises working groups where different stakeholders are invited to join, including beekeeper associations, farmers, and researchers. Nevertheless, the number of participants is limited.[2] The roles are clearly defined: the managing authority is the Ministry of Rural Affairs who is coordinating the design process, and the paying agency is Agricultural Registers and Information Board who is managing the applications, performing controls, and paying the contribution.[2] Implementation of the scheme is rigid[7] and there is limited stakeholder engagement.[2] Decision making is top-down,[8] as the stakeholder participating in the working groups for designing the measures have merely an advisory capacity whereas the Ministry has full decisional capacity.[9] Mandatory training is provided to participants twice per period and full information is provided through an active advisory system.[9]

In Friesland (in the Netherlands), the NFW agricultural landscape management scheme is a collective action-based scheme, originating from a bottom-up approach, showing in the process of design

TABLE 6 An institutional analysis of ecosystem services delivery

	Boundary	Position	Choice	Scope	Aggregation	Information	Payoff
	Participatory design	**Role definition**	**Flexibility in implementation**	**Collective or individual**	**Bottom-up or top-down decision making**	**Knowledge exchange**	**Action-based or result-based**
CAT	Key stakeholder consulted during the design process	Roles are clearly defined; no overlapping of functions	Implementation of the scheme is rigid	Individual	Top-down decision making	Information provided through technical offices and stakeholders Limited information about this scheme within other AES	Action-based
EST	Limited stakeholder involvement in the design process (2012–2015) through working groups	Roles are clearly defined; no overlapping of functions	Implementation of the scheme is rigid	Individual (collaboration between farmers and beekeepers)	Top-down decision making	Full information and training provided; collaboration between farmers and beekeepers; limited stakeholder engagement in implementation	Action-based
NL	Regular multi-stakeholder meetings during the design process (2011–2012); key stakeholders actively participated in the design process	Roles are clearly defined; no overlapping of functions	Flexibility in implementation is quite high; flexibility is given to the collectives to design tailored measures for their farmer members	Collective	Bottom-up decision making	Full information exchange, training and assistance provided to farmers; collaboration among farmers; regular stakeholder engagement in implementation	Action-based
ROM	Key stakeholders consulted during the design process	Roles are clearly defined. No overlapping of functions	Flexibility in implementation is high	Individual	Bottom-up decision making	Information, training, and assistance provided to farmers; collaboration among stakeholders; regular stakeholder engagement in implementation	Result-based

(Continues)

TABLE 6 (Continued)

	Boundary	Position	Choice	Scope	Aggregation	Information	Payoff
	Participatory design	**Role definition**	**Flexibility in implementation**	**Collective or individual**	**Bottom-up or top-down decision making**	**Knowledge exchange**	**Action-based or result-based**
BAV	Regular multi-stakeholder meetings and consultation in design process (twice a year)	Roles are clearly defined. No overlapping of functions	Implementation of measures within the scheme is rigid	Individual	Top-down decision making	Full information but limited advice and assistance provided to farmers; no collaboration among farmers; regular stakeholder engagement in implementation	Result-based
HUN	From 2014 to 2020, regular multi-stakeholder working groups; information to key stakeholders. Since 2020, limited stakeholder involvement	Roles are clearly defined. No overlapping of functions	Implementation of the scheme is rigid	Individual and collective applications are accepted	Top-down decision making	No information provided to farmers; no collaboration among farmers; limited stakeholder engagement during implementation stage	

open to participation.[10] When designing the scheme, relevant stakeholders are regularly consulted and have advisory capacity as official members of the NFW board—ranging from municipality officials to local environmental NGOs, researchers, and university representatives.[11] Roles are clearly defined.[12] Implementation of the scheme is flexible[13] and decision making is bottom-up, as all relevant stakeholders are regularly consulted and have a say in the decision-making process.[14] NFW organizes regular information meetings with the farmer-members participating in the scheme and its field coordinators provide advice to farmers.[14]

In Romania, the process of designing the measure is open to participation of key stakeholders, including farmers, the paying agency, the ADEPT foundation, and other relevant NGOs.[15] Roles are clearly defined, and the implementation of the scheme is flexible.[5] Decision making is bottom-up, as there is a continuous process of consultation with key stakeholders, who are also informed of all relevant decisions.[16] Regular training and information meetings are organized for the farmer participants.[5]

In Bavaria, key stakeholders are consulted during the design process[17] through regular meetings happening twice a year.[18] Roles are clearly defined.[19] Implementation of the scheme is quite rigid,[20] as payments cannot be tailored[21] and the process is much formalized.[22] Decision making is top-down, as the decisions are taken solely by the Ministry.[23] During implementation, full information is provided to farmer participants,[24] through information meetings[25] and the relevant specialist press.[26] Farmers usually do not collaborate with each other[27] and receive limited advice and assistance in implementation.[28] Overall, relevant stakeholders are engaged during implementation, through the monitoring committee, including farmer associations and research groups.[29]

In Hungary, for the period 2014–2020, regular multi-stakeholder working groups were taking place[30] and key stakeholders were informed during the design process, including farmers and the Hungarian Chamber of Agriculture.[31] Since 2020, there is more limited stakeholder involvement by the Ministry.[30] Roles are clearly defined, and implementation of the scheme is rigid.[32] Decision making is top-down,[31] as the Ministry has full decisional power.[30] Farmer participants are informed and assisted in implementation to a limited extent.[33] Overall, farmers usually do not collaborate with each other.[31]

A configurational explanation

In a second step, using a configurational approach, we placed the empirical information in the cells of the explanatory typology to see whether it conforms to our expectations formulated in Table 4 (see Table 7).

To establish the extent to which the cases fall in the theoretically predicted configurations of the explanatory typology, we used the coefficient of reproducibility (CR). The CR indicates the proportion of cases classified according to what is expected theoretically (Thomann, 2018). The configurations that corroborate our theoretical expectations are Types 1, 3, 4, 7, 8, all aligning with our theoretical expectation. Hence, the CR of our explanation is 1.0. Drawing on the work of Møller and Skaaning (2017),

TABLE 7 An explanatory typology for (un)successful implementation of AES

	High flexibility in implementation		**Low flexibility in implementation**	
	High knowledge exchange	**Low knowledge exchange**	**High knowledge exchange**	**Low knowledge exchange**
Inclusive design-process	Dutch AES, Romanian AES (Type 1—most successful)	Type 2	Bavarian AES (Type 3—intermediate success)	Catalan AES (Type 4—Mostly unsuccessful)
Non-inclusive design process	Type 5	Type 6	Estonian AES (Type 7—mostly unsuccessful)	Hungarian AES, (Type 8—least successful)

we compare the actual CR of a given theoretical prediction with the equivalent CR of a random distribution. The random CR indicates the proportion of types predicted by the theory out of all types in the typology. The random CR of our explanation is 0.63 (5/8). These results lend support to the expectation that the interplay of high knowledge exchange, high flexibility in implementation, and participation in design is conducive to most successful outcomes. On the other hand, if knowledge exchange among participants is low, there is low flexibility in implementation, and no (or very limited) stakeholder participation in design, then implementation of the scheme is unsuccessful.

Our analysis reveals that the interplay of three design elements is affecting implementation success of the schemes, leading to six different configurations. On the one hand, the most successful type is the result of a configuration of participatory design, high flexibility in implementation, and high knowledge exchange. The most successful agri-environmental outcomes are obtained when there is collaboration at the landscape level. In the Dutch and the Romanian cases, this is achieved through the regular engagement of key stakeholders during the design and the implementation processes. The use of local and expert knowledge characterizes the knowledge of exchange in these arrangements, and flexibility is given to farmers to adjust the scheme so that they fit better to the local conditions. Agri-environmental schemes may allow flexibility in terms of choosing the enrolled land (Mettepenningen et al., 2013), or the farm practices to be applied (Ruto & Garrod, 2009). There may be a list of farming techniques to choose from (as in the Dutch action-based scheme) or a completely free choice can be given to the farmer (as in the Romanian result-based scheme). On the other hand, the least successful type is the result of a configuration of non-participatory design, low flexibility in implementation, and low knowledge exchange. In the Hungarian and the Catalan cases, implementation is rigid and there is limited stakeholder involvement both in the design and in the implementation processes. In addition to the two extremes, our explanatory typology accounts also for intermediate outcomes, which are the result of inclusive design and high knowledge exchange (but low flexibility in implementation) for intermediate success (as in the Bavarian case), and of low flexibility and non-inclusive design process (but high knowledge exchange) for limited success (as in the Estonian case). In these configurations, inclusiveness in relation to the design process is a positive condition, as its presence is decisive for intermediate success and its absence is decisive for limited success.

CONCLUSIONS

In this article, we adopted a comparative approach to study the complex institutional arrangements that govern agri-environmental schemes delivering different ecosystem services and we applied explanatory typology methods to investigate how differences in institutional arrangements affect program outcomes. The empirical observations of our study provide important insights to agri-environmental governance scholars interested in understanding the interplay between institutional design conditions in enabling (or hindering) successful implementation of these schemes. Further investigation may be needed to verify whether the explanatory configurations identified hold across different contexts, for instance extending the scope conditions to comparable arrangements in other regions.

Turning to the theoretical implications for research applying the IAD framework, this article demonstrates that the analytical framework can fruitfully be combined with comparative configurational analysis to identify the combinations of rules that enable successful implementation in which policy outputs are translated into the desired outcomes.

Our analysis also suggests that particular institutional configurations lead to more successful policy outcomes than others. By undertaking rigorous comparative analysis across cases, we have moved beyond insights generated on the basis of single case studies and systematically identified which institutional configurations lead to successful policy outcomes and which do not. Our analysis is the first combining the IAD rule typology with configurational comparative methods, and particularly explanatory typology methods. The IAD enables configurational comparative analysis to identify institutional rule patterns across cases. Our findings suggest that the interplay of three institutional rules provides

conditions for successful policy outcomes: high level of knowledge exchange, high degree of flexibility in implementation, and high level of participation in the policy design process. On the other hand, the interplay of low level of knowledge exchange, low degree of flexibility in implementation, and no (or very limited) stakeholder participation in the design process is likely to lead to unsuccessful policy outcomes. Other combinations of institutional rules would result in different degrees of implementation success. Further configurational comparative analysis could examine additional sets of cases and test whether the configurations of institutional rules identified as conditions for different degrees of successful policy outcomes also apply beyond the cases included in this study. Delivering eco-system services is a complex endeavor. While the institutional rules that this study selected for analysis provide important conditions for successful implementation, other institutional as well as non-institutional factors can also play a role. Therefore, in addition to testing our conclusions on additional cases, we encourage future configurational research to explore the impact of such factors.

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ENDNOTES

[1] https://project-effect.eu/.

[2] Respondent 1, Estonian case. 2020. Interviewed by the author. Online.

[3] Respondents 1 (2020) and 2 (2021), Hungarian case. Interviewed by the author. Online.

[4] Respondent 1, Bavarian case. 2021. Interviewed by a research assistant. Online.

[5] Respondents 1 and 2, Romanian case. 2020. Interviewed by the author. Online.

[6] Respondents 1, 3, 4, 5, 6. 2020. Interviewed by the author. Online and Friesland (the Netherlands).

[7] Respondent 2, Estonian case. 2020. Interviewed by the author. Online.

[8] Respondents 1 and 2, Estonian case. 2020. Interviewed by the author. Online.

[9] Respondent 2, Estonian case. 2020. Interviewed by the author. Online.

[10] Respondents 1, 2, and 4, Dutch case. 2020. Interviewed by the author. Online and Friesland (the Netherlands).

[11] Respondent 8, Dutch case. 2020. Interviewed by the author. Online.

[12] Respondents 1, 2, 3, and 4, Dutch case. 2020. Interviewed by the author. Online and Friesland (the Netherlands).

[13] Respondent 6, Dutch case. 2020. Interviewed by the author. Online.

[14] Respondents 3, 4, 5, 6, Dutch case. 2020. Interviewed by the author. Online and Friesland (the Netherlands).

[15] Respondent 1, Romanian case. 2020. Interviewed by the author. Online.

[16] Respondent 2, Romanian case. 2020. Interviewed by the author. Online.

[17] Respondents 2, 4, and 7, Bavarian case. 2021. Interviewed by a research assistant. Online.

[18] Respondent 2, Bavarian case. 2021. Interviewed by a research assistant. Online.

[19] Respondents 2, 3, 4, 5, Bavarian case. 2021. Interviewed by a research assistant. Online.

[20] Respondents 2, 7, 8, Bavarian case. 2021. Interviewed by a research assistant. Online.

[21] Respondent 7, Bavarian case. 2021. Interviewed by a research assistant. Online.

[22] Respondents 2 and 10, Bavarian case. 2021. Interviewed by a research assistant. Online.

[23] Respondents 3 and 11, Bavarian case. 2021. Interviewed by a research assistant. Online.

[24] Respondents 2, 3 and 11, Bavarian case. 2021. Interviewed by a research assistant. Online.

[25] Respondent 3, Bavarian case. 2021. Interviewed by a research assistant. Online.

[26] Respondent 4, Bavarian case. 2021. Interviewed by a research assistant. Online.

[27] Respondents 2, 3, 4, 5, Bavarian case. 2021. Interviewed by a research assistant. Online.

[28] Respondents 5 and 9, Bavarian case. 2021. Interviewed by a research assistant. Online.

[29] Respondents 2, 3, 5, Bavarian case. 2021. Interviewed by a research assistant. Online.

[30] Respondent 1, Hungarian case. 2020. Interviewed by the author. Online.

[31] Respondents 3, 4, and 5, Hungarian case. 2021. Interviewed by the author. Online.

[32] Respondents 1, 2, 3, 4, and 5, Hungarian case. 2020 and 2021. Interviewed by the author. Online.

[33] Respondents 1 and 2, Hungarian case. 2020 and 2021. Interviewed by the author. Online.

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ANNEX A

IDENTIFYING INSTITUTIONAL CONFIGURATIONS FOR POLICY OUTCOMES: A COMPARISON OF ECOSYSTEM SERVICES DELIVERY

A1 | INTERVIEW QUESTIONS

Measure	Question
Background questions	What is your function? In what role are you engaged with the scheme? How long have you been engaged with the scheme?
Successful implementation	
Problem solving/overcoming barriers capacities, easy for farmers to fulfill the requirements	In your opinion, how easy is for the farmers to fulfill the requirements of the measure? What aspects of the measure is easy or difficult to fulfill?
Farmers uptake	How many farmers participate in the scheme? How many applications have been received? Has uptake increased or decreased over the years? (if applicable)
Other success/failure dimensions	How would you define a successful scheme? Do you believe the scheme has been a success? Why (not)? In your opinion, what processes affected the success (or failure) of the scheme? Which interactions among the different actors involved do you think have been decisive for the success (or failure) of the scheme?
Participatory design (boundary rule)	
Representativeness of stakeholders involved in the design process *We aim at understanding if the process of design of the scheme is open to participation, who can participate, and under what conditions*	Is the process of design of the scheme open to participation? Who were the key actors involved in the design of the scheme?
Multi-stakeholder meetings	During the process of design/development of the scheme, have you been involved in any multi-stakeholder workshops, advisory forums, focus groups or any meetings with policy-makers? Do you know if any other stakeholder has been involved in such activities? Do you think such type of participatory activities had an impact on the success of the scheme? Do you think the scheme is sufficiently inclusive?
Role definition (position rule)	
We aim at understanding if the roles are clearly defined, and what roles different stakeholders play	Are roles clearly defined? Who are the key actors in the scheme and what role do they play? Are there overlapping functions?
Flexibility in implementation (choice rule)	
We aim at understanding if implementation of the scheme/contract is flexible, and whether flexibility affects the success (or failure) of the scheme	Do you think the implementation of the scheme is flexible? Why (not)? Do you think flexibility can have an impact on the success of the scheme?

Measure	Question
Knowledge exchange (information rule)	
Degree of information regarding the scheme/contract	Who is usually informed of the decisions regarding the scheme/contract?
Collaboration among farmers *We aim at understanding the degree of collaboration among farmers*	Is there any collaboration between farmers? What do you think could explain success or failure in such collaboration?
Collaboration among stakeholders	Do you collaborate with other stakeholders? (if applicable)
Assistance in implementation *We aim at understanding if and what kind of assistance is provided in implementing the scheme/contract* (i.e., *training, personal advice, collective advice*, etc.)	Which kind of assistance is provided to farmers in implementing the scheme/contract? (i.e., personal advice, trainings, etc.)
Stakeholder engagement during implementation of the scheme/contract	During the process of implementation of the scheme, have you been involved in any multi-stakeholder workshops, training activities, evaluation forums, focus groups or any meetings with other stakeholders? If so, how often these multi-stakeholder meetings took place?
Collective decision making (aggregation rule)	
Top-down or bottom-up decision making	How does decision making in relation to the scheme/contract work? Do you have any decision-making authority or any advisory capacity? Do you know if any of the other stakeholders do? Who is usually consulted during the decision-making process? To what extent and in what ways do you feel the farmers are involved in the decisions about the scheme/contract?
Further conditions	Are there any other factors that influence the functioning of the measure? Can you describe them?

A2 | CODEBOOK

Code	Definition	Example
Successful implementation		
Barriers	Overcoming barriers capacities	Low: There are multiple barriers and farmers have low capacity to overcome them High: There are few barriers and farmers are capable to overcome them
Easy/difficult	Easy/difficult for farmer participants to fulfill the requirements prescribed	Difficult: It is very difficult for farmers to fulfill the requirements prescribed Easy: It is very easy for farmers to fulfill the requirements
Farmers uptake	Farmer uptake of the scheme (over the years—if applicable)	Low: Uptake is low and/or decreased considerably over time High: Uptake is high and/or increased considerably over time
Participatory design (boundary rule)		
Stakeholder representativeness	Representativeness of stakeholders in the design process	No involvement of any stakeholder in the design process Full involvement of all relevant stakeholders in the design process
Multi-stakeholder meetings	Multi-stakeholder meetings organized during the design process	No multi-stakeholder meetings Regular stakeholder meetings
Role definition (position rule)		
Roles	Roles are clearly defined/not clearly defined. There are (no) overlapping functions	Roles are clearly defined and there are no overlapping functions Roles are not clearly defined and often there are overlapping functions between different stakeholders
Flexibility in implementation (choice rule)		
Flexibility	Implementation of the scheme is flexible/not flexible	No formal nor de facto flexibility in implementation of the scheme Full formal and de facto flexibility
Knowledge exchange (information rule)		
Information	Degree of information regarding the scheme/contract	Low: No information provided High: Full and regular interactive information flow
Collaboration between farmers	Degree of collaboration between farmers	Low: No collaboration between farmers High: Full collaboration between farmers
Collaboration between stakeholders	Degree of collaboration between different stakeholders (i.e., farmer advisors, collectives, ministries, agencies, etc.)	Low: No collaboration between stakeholders High: Full collaboration between stakeholders
Assistance in implementation	Assistance provided to farmers in implementing the scheme/contract (i.e., personal advice, trainings, etc.)	Low: No assistance provided High: Full assistance provided (training, administrative support, one-to-one advice)
Stakeholder engagement	Degree of stakeholder engagement during implementation of the scheme	Low: no stakeholder engagement during implementation High: Regular stakeholder engagement during implementation (i.e., through regular contacts, meetings, etc.)
Collective decision making (aggregation rule)		
Decision making	Top-down/bottom-up decision making	Decision making is fully top-down Decision making is fully bottom-up

A3 | LIST OF INTERVIEWEES

Case	Interviewee	When and where	Duration
CAT	Respondent 1—Head of the Fertilization Office for Livestock Manure Treatment	14 October 2020, online; interviewed by co-author	53 min
CAT	Respondent 2—Head of the Agricultural Sustainability Aid Service	10 March 2021; online; interviewed by co-author	51 min
CAT	Respondent 3—Farmer advisor (technical office)	25 February 2021, online; interviewed by co-author	96 min
CAT	Respondent 4—Agrarian school trainer	26 February 2021; online; interviewed by co-author	45 min
CAT	Respondent 5—Soil Service and Environmental Management of Agricultural Production Department of Agriculture, Livestock, Fisheries and Food officer	24 November 2020; online; interviewed by co-author	38 min
CAT	Respondent 6—Catalan Federation of Cooperatives	26 April 2021; online; interviewed by co-author	53 min
EST	Respondent 1—Agricultural Research Centre, chief specialist	22 April 2021, online; interviewed by author	45 min
EST	Respondent 2—Ministry of Rural Affairs officer	26 April 2021, online; interviewed by author	45 min
EST	Respondent 3—Ministry of Rural Affairs officer	26 April 2021; interviewed by author	45 min
NL	Respondent 1—Friesland Province officer	13 October 2020, online; interviewed by author	90 min
NL	Respondent 2—RVO Netherlands Enterprise Agency advisor	27 October 2020, online; interviewed by author	60 min
NL	Respondent 3—Farmer in the collective	29 October 2020, Kollumerpomp (Friesland, NL); interviewed by author and EFFECT project partner	2 h
NL	Respondent 4—NFW Noardlike Fryske Walden board member	29 October 2020, Buitenpost (Friesland, NL); interviewed by author and EFFECT project partner	2 h
NL	Respondent 5—Farmer in the collective	9 November 2020, phone interview; interviewed by EFFECT project partner	45 min
NL	Respondent 6—Volunteer in the farmer collective	10 December 2020, online; interviewed by author	60 min
NL	Respondent 7—RVO officer	25 March 2021, online; interviewed by author	60 min
NL	Respondent 8—Expert, advisor for the farmer collective	19 April 2021, online; interviewed by author	45 min
NL	Respondent 9—Expert on the collective approach	7 February 2020; Wageningen (NL)	60 min
ROM	Respondent 1—National Agency for Protected Areas officer; Association Filiala Asociatiei Microregionale "Pogani Havas" communication responsible	19 June 2020, online; interviewed by author	45 min
ROM	Respondent 2—ADEPT foundation representative	28 July 2020, online; interviewed by author	45 min

Case	Interviewee	When and where	Duration
ROM	Respondent 3—Farmer participant	14 September 2020, phone interview; interviewed by EFFECT project partner	30 min
ROM	Respondent 4—Farmer participant	14 September 2020, phone interview; interviewed by EFFECT project partner	30 min
BAV	Respondent 1—Expert, Emeritus professor for agricultural and resource economics	January 2021, online; interviewed by research assistant	45 min
BAV	Respondent 2—Project manager at the Bavarian section of the German Association for Landcare (DLV)	January 2021, online; interviewed by research assistant	45 min
BAV	Respondent 3—Head of the agricultural policy division at the Bavarian Farmer's Association (BBV)	January 2021, online; interviewed by research assistant	45 min
BAV	Respondent 4—Expert, Senior researcher at the Institute of Agricultural Ecology of the Bavarian State Research Center for Agriculture (LfL)	January 2021, online; interviewed by research assistant	45 min
BAV	Respondent 5—Expert, Project manager and consultant at research institute	January 2021, online; interviewed by research assistant	45 min
BAV	Respondent 6—Expert, senior researcher	February 2021, online; interviewed by research assistant	45 min
BAV	Respondent 7—Expert, Professor for agricultural policy, rural development and regional management	February 2021, online; interviewed by research assistant	45 min
BAV	Respondent 8—Expert, junior researcher	February 2021, online; interviewed by research assistant	45 min
BAV	Respondent 9—Expert, Emeritus professor for agricultural policy	February 2021, online; interviewed by research assistant	45 min
BAV	Respondent 10—Project manager/ policy advisor at a consultancy firm for sustainable development	February 2021, online; interviewed by research assistant	45 min
BAV	Respondent 11—Bavarian State Ministry of Agriculture, Food and Forestry officer	February 2021, online; interviewed by research assistant	45 min
HUN	Respondent 1—Hungarian association of young farmers member	22 December 2020, online; interviewed by author	60 min
HUN	Respondent 2—Expert, financing institute officer	8 January 2021, online; interviewed by author	60 min
HUN	Respondent 3—Ministry of agriculture officer	20 January 2021, online; interviewed by author	90 min
HUN	Respondent 4—Ministry of agriculture officer	20 January 2021, online; interviewed by author	90 min
HUN	Respondent 5—Ministry of agriculture officer	20 January 2021, online; interviewed by author	90 min

A4 | LIST OF DOCUMENTS COLLECTED

Case	Document	Source
CAT	Case background description	Author
CAT	Case presentation	EFFECT project partner
EST	Case background description	EFFECT project partner
EST	Case presentation	EFFECT project partner
NL	Case background description	EFFECT project partner
NL	Case presentation	EFFECT project partner
ROM	Case background description	EFFECT project partner
ROM	Results-based agri-environment schemes for support of broad biodiversity at landscape scale in Transylvanian High Nature Value farmland Romania 2015–2019 Final Report	EFFECT project partner
ROM	Results-Based Payments for Biodiversity: A New Pilot Agri-Environment Scheme for the Târnava Mare and Pogány-havas Regions 2015–2018	EFFECT project partner
BAV	Case background description	EFFECT project partner
BAV	Case presentation	EFFECT project partner
HUN	Case background description	EFFECT project partner
HUN	Case presentation	EFFECT project partner