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Exploring macro-environmental factors influencing adoption of result-based and collective agri-environmental measures: a PESTLE approach based on stakeholder statements

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Abstract. To promote more environmentally friendly and cost-effective agri-environmental-climate measures in the European Union, novel approaches such as result-based and collective schemes are advocated. This study explores macro-environmental factors facilitating or impeding the adoption of such schemes. By means of a PESTLE analysis and based on a survey of 85 stakeholders from Austria and Germany, we identify major adoption factors within the political, economic, social, technological, legal, and environmental domains. Our results indicate that economic, legal, and social factors are the most influential, with fair payment, clear contract design, and social relations being the most commonly mentioned. Moreover, the unpredictability of nature is a major impediment to the adoption of result-based schemes, while social dynamics and farmers' attitudes are key factors for a successful implementation of collective contracts. Overall, the study provides strategic and practical insights that can support the design and implementation of novel agri-environmental-climate measures under the Common Agricultural Policy.

Keywords: agri-environmental contracts, German and Austrian stakeholders, survey, acceptance.
JEL Codes: Q15, Q18.

1. INTRODUCTION

A more sustainable agricultural system in the European Union (EU) is not only a societal demand, but also an ecological necessity to tackle climate change, counteract biodiversity loss, and protect the EU's natural resources. By providing public funding, the legal framework of the European Common Agricultural Policy (CAP) has a prominent role in fostering agriculture's

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transition to sustainability. Contracts for Agri-Environment-Climate Measures (AECMs) under the second pillar of the CAP are pluriannual commitments, specifically designed to reduce the negative impacts of agriculture on the environment and to mitigate the effects of climate change (European Commission, 2017). The main challenge for AECMs is to ensure an efficient use of funds in addition to delivering the intended environmental effects. AECMs are facing multifaceted criticisms in this regard, such as the lack of empirical evidence supporting their effectiveness, imprecise targeting through insufficient consideration of the heterogeneity of farms and their local circumstances (European Court of Auditors, 2011), as well as missing (financial) incentives for farmers to produce the best environmental result through their entrepreneurial activity (WBAE, 2020).

New pathways within the design of AECMs are required: approaches such as result-based payments or collective implementation can contribute to a more effective and efficient design of AECMs. Result-based schemes aim at providing environmental improvement through paying for the achievement of specific environmental objectives instead of prescribing and compensating management practices to farmers. Consequently, farmers can flexibly decide how they want to achieve environmental improvement (Burton & Schwarz, 2013). Collective approaches have the objective to activate land managers to jointly provide agri-environmental-climate public goods (AECPGs), often accompanied by formalised cooperation (Runge et al., 2022). In fact, result-based and collective AECMs were eligible for receiving EU co-financing within the past CAP period (2014-2022), although they have been applied to a very limited extent in the Member States (WBAE, 2020). In the new CAP Strategic Plans Regulation ((EU) 2021/2115), Article 70(5), it is recommended that: "Member States may promote and support collective schemes and result-based payment schemes to encourage farmers or other beneficiaries to deliver a significant enhancement of the quality of the environment at a larger scale or in a measurable way." (European Parliament and the Council of the European Union, 2021). Moreover, Recital 71 of Regulation (EU) 2021/2115 states that "[s]upport under payments for management commitments may also be granted in the form of (…) result-based interventions". Result-based payment schemes are further specifically mentioned in the EU's biodiversity strategy 2030 (European Commission, 2020). With the new emphasis on environmental performance in the CAP, result-based schemes gain importance as a fast-evolving and distinctive approach. For illustration, at the time the survey was conducted, a result-based pilot project for nature conservation (biodiversity) was implemented in Austria, which, in the meantime, has been transferred into a fully eligible measure under the Austrian agri-environmental programme for the period 2023-2027 (AMA, 2023). Also in Germany, already in the previous CAP period some Federal States had programmed result-based measures for extensive permanent grassland which now led to the programming of a respective eco-scheme measure targeting flowering species (BLE, 2022). As regards collective approaches, they may operate as an extension of many other forms of contracts aiming at a more effective delivery of environmental goods and services, e.g. at a landscape scale. While in the last CAP period only the Netherlands made extensive use of collective implementation for its agri-environmental schemes, in the new programming period (2023-2027) there are also other countries offering collective measures with CAP funding, e.g. Ireland (DAFM, n.d.) and Germany in the Federal State of Brandenburg (MLUK, 2023).

Still, despite their potential positive impacts on the environmental effectiveness of AECMs, several factors can hinder the implementation and uptake of collective and result-based approaches. The implementation of result-based schemes may be impeded by (i) elevated administrative and transaction costs compared to action-based systems due to the requirement for result measurement, limited experience, and often small-scale experimental designs (Eichhorn et al., 2022; Schwarz et al., 2008), (ii) difficulties in determining accurate indicators for measuring environmental progress (Allen et al., 2014; Burton & Schwarz, 2013); and (iii) potential conflicts with WTO regulations (Matthews, 2019; Melèndez-Ortiz et al., 2009). Factors hampering farmers' willingness to participate are (i) the fear among farmers of lacking sufficient knowledge and skills to successfully perform result-based schemes (Massfeller et al., 2022), (ii) general scepticism towards novel approaches (Stolze et al., 2015), (iii) difficulties in understanding how these contracts work in practice (Wezel et al., 2018), (vi) perceived higher risk due to environmental uncertainty, and (vii) no secured remuneration (Derissen & Quaas, 2013). Also collective approaches face hurdles, such as lack of farmers' willingness to cooperate (Franks, 2011), insufficient coordination (Olivieri et al., 2021), and missing of pre-existing networks or lack of capacity (Prager, 2022).

Up to now, the state of knowledge on factors supporting or hindering the implementation of novel schemes is largely based either on case studies investigating mostly single or few contract solutions in a specific context (e.g. Birge et al., 2017; de Sainte Marie, 2014; Derissen & Latacz-Lohmann, 2013; Prager, 2022; Zabel, 2019), on farmers' surveys mainly addressing farmers'

intention to perform such novel schemes (e.g. Massfeller et al., 2022; van Dijk et al., 2015), or on studies concentrating on contract related factors, such as contract design features (contract length, payment mode etc.) (Bredemeier et al., 2022; Schulze & Matzdorf, 2023).

What is still missing, however, is a structured gathering of knowledge about macro-environmental factors influencing the adoption of result-based and collective agri-environmental measures. This is where this study comes in. Macro-environmental factors (such as technological, political, natural factors) refer to external forces and conditions that can have a significant impact on a business or organisation's operations and performance and are beyond the control of the business, but can influence its success or failure (Kotler et al., 2018). In our case, we looked at factors, which cannot be influenced by farmers directly, but have an impact on farm business decisions. A PESTLE analysis framework was used to identify these macro-environmental factors that promote or hinder the implementation of novel contract types in a holistic, structured and multidisciplinary way (Yüksel, 2012). Our analysis is based on an online survey of 85 stakeholders from Austria and Germany conducted in spring 2021. Within this survey, stakeholders identified a comprehensive set of factors based on six PESTLE categories (Political, Economic, Social, Technological, Legal, and Environmental). The survey targeted a wide range of stakeholders involved in the promotion, design, implementation and control of AECMs, with actors from government agencies, environmental organisations, agricultural associations, and private sector companies. By including policy makers/administrators/advisors from local up to national level, we were able to gather strategic, as well as practical (phenomenological) knowledge (Raymond et al., 2010).

The importance and originality of this study is that it (1) compares two novel contractual AECM approaches in one analysis, (2) strongly focuses on the opinion of stakeholders on external factors, which are much less examined within the agriculture policy literature and (3) provides a structured analysis of the external factors by applying the PESTLE approach, a strategic tool from business analysis, for the first time to study AECMs.

2. DATA AND METHOD

Our study aimed at identifying topics potentially affecting the adoption of result-based or collective contracts in their operational environment. For this purpose, the PESTLE approach was applied. This strategic planning tool is regularly used to analyse external macro-environmental factors that may impact an organisation or industry (Gupta, 2013). It is often used in marketing as well as for strategic business decisions (Theobald 2019), however, also in other fields the PESTLE tool (or its previous model PEST) is gaining importance (Achinas et al., 2019; Gupta, 2013; Rambaree et al., 2021). "PESTLE" represents the initial letters of the six factor categories considered, namely Political, Economic, Social, Technological, Legal, and Environmental factors. The main advantages of the PESTLE approach are, that it (1) enables a holistic, multidisciplinary analysis of the external factors inhibiting or promoting the feasibility of result-based or collective contract solutions before they are put into practice (precondition analysis) (Yüksel, 2012), (2) improves decision-making by systematically providing valuable information (in our case phenomenological and strategic stakeholder knowledge) and thereby encourages strategic thinking (Nitank & Treivdi, 2016) and (3) enhances risk assessment, by identifying potential risks that impact the feasibility and implementation of new types of contracts, thereby helping to take actions to avoid or minimise their effect (Nitank & Treivdi, 2016).

2.1 Questionnaire and data

Surveys were conducted in Austria and Germany between end of April and mid-May 2021[1] to assess stakeholders' knowledge of external factors impacting the implementation of novel AECMs. The surveys were administered online via LimeSurvey. Potential participants were contacted via email and provided with an online-link to access the survey. We aimed to reach key stakeholders and actors (e.g. involved in the promotion, design, implementation and control of AECMs), targeting respondents acting in different roles or having different areas of interest from both the public and private sector and with different backgrounds, at local, regional, and state levels. In Austria, 80 stakeholders were contacted and 34 questionnaires completed, in Germany, 142 persons were contacted and 51 completed surveys were received. This led to a total of 85 surveys considered in the analysis. Among the stakeholders, due

[1] Within the CONSOLE project, a stakeholder survey with PESTLE questions about the result-based contract was carried out in 12 countries. However, only Germany and Austria also conducted a PESTLE survey for collective contracts. In this contribution, we will, therefore, solely refer to the survey results from Germany and Austria. For more information on the PESTLE results for the 12 countries, see Hamunen et al. (2023): Deliverable 3.3 "Synthesis of opinions to implement suggested contract solutions and lessons learned" on the CONSOLE-website at www.console-project.eu.

to the still rather experimental nature of such schemes, an overall low level of familiarity with result-based and collective approaches was assumed. Connected to this, and for ensuring some common understanding amongst respondents, a short description of result-based as well as collective contract solutions was included in the survey (see appendix A). The questionnaire was structured into three parts: the first part contained questions on the respondent's backgrounds, such as affiliation, areas of interest, and responsibilities. The PESTLE approach was then implemented using two blocks of questions (one for result-based and one for collective approaches). The PESTLE block began with the overarching question of what external factors in the farm environment inhibit or promote the adoption of (a) result-based or (b) collective contracts? For a better understanding, participants were shown the six main PESTLE categories in a figure (see Fig. 1). Additionally, PESTLE categories were described by including short examples/descriptions: namely 1) environmental factors such as emissions and climate change, 2) political factors such as administration and regulations, 3) economic factors such as purchasing power and income, 4) socio-cultural factors such as demographic development and societal demands, 5) technological factors such as digitalization and innovations, 6) legal factors such as environmental and competition law.

The procedure of the survey was then as follows: Starting with result-based and in a second round continuing with collective contracts, participants were asked to (1) name 5 particularly important factors impacting on implementation/adoption, which can't be influenced by farmers directly, but have an impact on farm decisions. As participants were informed about the PESTLE categories beforehand, they certainly kept them in mind when answering, but they were not asked to name the factor nor to assign their responses to any category. (2) Using the symbols "+" or "-", participants were asked to indicate whether the mentioned factors promote or hinder implementation. (3) In a final ranking exercise, participants were then asked to select the most important factor out of the 5 answers they had given. This resulted in 5 responses for each contract type, of which one each was selected as most important for both result-based and collective contracts.

There was no word limit for the free answers but participants were asked to answer in short sentences, supplemented by the note: "the more concrete the information, the better". In addition, participants were forced to provide five responses, otherwise they were not able to continue the survey. The approach used is illustrated exemplarily in Table 1 in appendix A.

Figure 1. PESTLE categories; figure showed in the survey.

2.2 Data analysis

The analysis of the PESTLE results was carried out in excel and by using a three-step approach: First, the factors named by the stakeholders were assigned to the 6 PESTLE categories. This was done separately for the two contract types. (Thereby, statements which referred to the design of the contracts themselves, such as contract terms, duration etc. were assigned to the legal category.[2]) Second, factors representing a similar content were grouped, examined and subcategories were built. Thereby, a minimum of 3 associated responses were required to form a subcategory. To ensure quality and improve objectivity, the allocation of single factors to the subcategories was conducted via several rounds of exchanges between the Austrian and German researchers involved in the study. Third, codes and short summarising descriptions were assigned to the subcategories, whereas codes represent the PESTLE category and a consecutive number (e.g. "Ec" for Economic factor and "04" for the fourth subcategory). As several identical factors were mentioned by the stakeholders for both types of contracts, subcategories were summarised under identical descriptions where possible. Differences in subcategory descriptions between the two contract types are underlined in Table 1 for ease of identification and

[2] Several contract-related responses, in most cases targeting particular contract features, were given by the stakeholders, therefore the legal category was expanded to include them.

– whenever the descriptions differ partly or completely – abbreviations, CO for collective and RB for result-based, are added to the respective codes (e.g. Ec04RB)). Differences in subcategories are often closely related to the specificities of the two contract solutions under consideration.[3] When responses couldn't be assigned to one specific subcategory – either because they highlight interfaces or because they address aspects belonging to two different subcategories – a double-code was given (e.g. Ec01/L06), but they were only assigned (and counted) within the first code. For the case that stakeholders' answers directly repeated the pre-set PESTLE category, (e.g. stakeholders stated that economic factors influence adoption), such responses were counted into the respective PESTLE category, but were not assigned to any subcategory and marked "00". To reduce the complexity of the interpretation of the external factors we formulated descriptions of the subcategories neutrally or positively.

3. RESULTS

3.1 Descriptive statistics of stakeholder characteristics

Among the Austrian respondents, most participating stakeholders (64.7%) were active on a national level. In Germany mainly regionally (56.3%), and nationally active stakeholders (29.2%) participated in the survey. With regard to the field of activity, "agricultural activity" is in first place in both countries, followed by "environmental protection and nature conservation" and "forestry". In Germany 68.6% and in Austria 60.4% of the surveyed stakeholders are employed in these three fields of activity, whereby multiple answers were possible (Figure 2).

While in Austria many participating stakeholders (30%) were representatives of the private sector, a large share of German stakeholders were representing state organisations (22.9%). Furthermore, representatives of public companies, non-governmental organisations, scientific institutions, non-profit organisations, associations and civil society took part in the survey. In both countries, "advice or provision of information for farmers" was the most important task or field of interest for the participating stakeholders. Thus, 23.3% of the stakeholders in Austria and 21.2% in Germany were active in this area. For 21.6% and 14.7% of stakeholders in Austria and Germany, respectively, this task was also the most important field of activity. In Austria, "support in the design of contract solutions" (21.4%) and "provision of information to the public" (19.4%), were the second and third most important areas of activity, both of which were selected by 20.6% of the respondents. Also, in Germany, these tasks were named second and third most frequently, however in reverse order (for more details on stakeholder characteristics please see Appendix B).

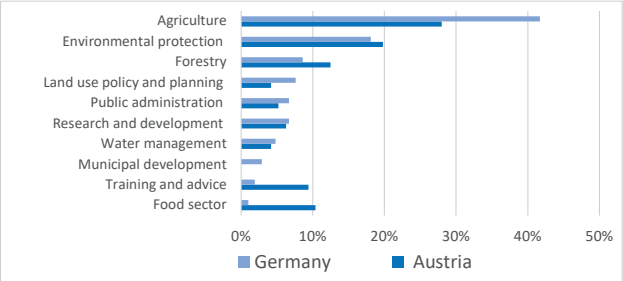

Figure 2. Stakeholders' fields of activity in Austria and Germany.

4.2 PESTLE Results

For result-based contracts, a total of 376 responses could be assigned to the six PESTLE categories, of which 147 came from Austrian and 229 from German stakeholders. For collective contracts, a total of 333[4] responses could be assigned to the six categories (131 from Austria, 202 from Germany). Table 1 summarises the main findings: The title of each section represents the PESTLE category. Subcategories (codes and descriptions) are assigned to each category, with differences between result-based and collective contract types being underlined. For each category, between four and six subcategories have been formed. Table 1 also serves as basis for the results presented in chapters 4.2.1 and 4.2.2. A more detailed description of the results is provided in Table 4 in Appendix C, which, in addition to the descriptions for all subcategories, also indicates the frequency of mentions and the factors selected in the ranking exercise as most important. In addition, it is indicated if the factor mentioned was marked as promoting or hindering.

Figure 3 shows how the factors identified for result-based and collective contracts are distributed across the six categories and among the two countries. The total number of responses per country and contract type is 100%, distributed across the six PESTLE categories.

[3] This is most evident for the social category, where the responses of stakeholders were assigned to different headings with one exception (see Table 1).

[4] The different amount of answers between collective and result-based schemes can be explained by the fact that only those factors which can't be influenced by farmers themselves while having an impact on farm decisions were included. Furthermore, within the collective part (the third part of the survey) a few participants decided to just write "no additional idea/answer" into the field.

Table 1. PESTLE categories and subcategories built based on the survey responses

POLITICAL		ECONOMICAL	
P01	Advice and support to farmers for implementation	Ec01	Payment calculation, appropriate remuneration for participation in the contracts
P02	Political will to support farmers in delivering environmental services	Ec02RB	Availability of sufficient funding for contract payments
		Ec02CO	Availability of sufficient funding for contract payments and for coordination / measure planning
P03	Low level of bureaucracy and administrative burden	Ec03	Income / revenue security and little financial risk for farmers
P04	Longer-term stable political framework	Ec04RB	Reliability of demand for and value chains to sell the agricultural products
		Ec04CO	Sharing of remuneration between farmers when participating in the contracts
P05	Assistance in contract implementation by qualified authorities and intermediaries	Ec05	New income opportunities for farmers by participating in contracts
		Ec06	Limited time and financial effort for implementation
SOCIAL		TECHNOLOGICAL	
S01	Social appreciation, recognition for the environmental services provided by farmers	T01RB	Existence of appropriate technologies for measuring the results achieved
		T01CO	Existence of appropriate technologies for measuring the achievements
S02RB	Attitudes of farmers, consideration of cultural norms and traditions	T02	Determination of appropriate indicators for monitoring
SO2CO	Attitudes of farmers and sensitivities of farmers		
S03RB	Societal and consumers' demand and interest for environmental services	T03	Easy to implement and no time-consuming monitoring / documentation
S03CO	Involvement of further stakeholders (interest groups, ...)		
S04RB	Willingness to work together (interest groups, neighbours, farmers' associations)	T04RB	Access to technology / machinery, technical practicability
		T04CO	Access to technology / machinery, distribution of work
S04CO	Content of cooperation		
S05RB	Farmers' awareness of environmental topics and knowledge	T05RB	Sufficient knowledge about the environmental effects of the farming practices
S05CO	Farmers' awareness of environmental topics and knowledge exchange		
S06CO	Group dynamics		
LEGAL		ENVIRONMENTAL	
L01RB	Contract characteristics: voluntariness, flexibility, clear goal(s), possibility of influencing	En01	Impacts of climate change and perceived need for action
L01CO	Contract characteristics: voluntariness, flexibility, clear goal(s), entry and exit conditions, responsibilities		
L02RB	Simplicity and comprehensibility of the contract	En02	Unpredictability of nature and the limited ability of farmers to have an influence on it
L02CO	Conditions of participation for farmers (number, setting)		
L03	Clarity and consistency of the legal framework of the contract	En03	Spatial and regional environmental conditions
L04	Compatibility of the contract with existing laws, programs and EU policies	En04	Interplay of action and impacts on nature and environment
L05	Practical achievability of the contract goals		
L06	Transparent and comprehensible controls and sanctions		

Note: PESTLE category = title; Subcategories including codes (category and a consecutive number e.g. Ec01, if different: CO= collective; RB= result-based, deviating wording is underlined).

In general, the figure reveals that stakeholders from both countries have given similar preferences to certain PESTLE categories per contract type, resulting in a similar distribution of the responses.

Results also show that general differences exist between the importance of specific PESTLE categories

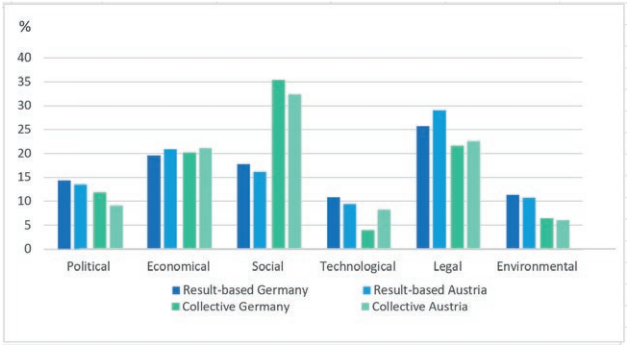

Figure 3. Breakdown of all stakeholder responses to the six PESTLE categories per contract type and country. Note: The six PESTLE categories for each contract type by country sum up to 100%.

with respect to specific contract types: For result-based contracts, most stakeholder responses belonging to this contract type fall into the legal category, with 25.8% for Germany, respectively 29.3% for Austria. The economic category with around 20% is placed second, social third and political fourth.

For collective contract solutions, stakeholder responses belonging to the social category take the biggest share with 35.5% of the responses from Germany, respectively 33.1% from Austria, followed by the legal category on the second, and economic on the third place.

Differences between both countries amongst categories become obvious only for the political category in respect to collective contracts, which is considered as more important by German than by Austrian stakeholders. Also, for collective contracts concerning the technological category some variance occurs: here German stakeholders evaluate technological aspects as less important than the Austrian respondents do.

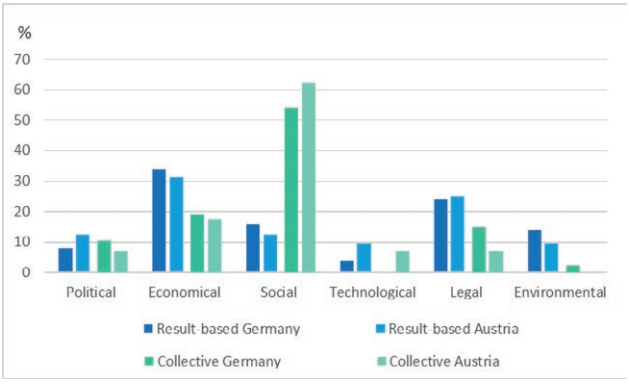

Figure 4. Breakdown of the responses ranked as most important by the stakeholders to the six PESTLE categories per contract type and country. Note: The six PESTLE categories for each contract type by country sum up to 100%.

When looking at the responses which were ranked as most important and their distribution amongst the six PESTLE categories, differences between the two contract types become even more explicit (see Figure 4). For result-based contracts, the economic category received the highest number of responses marked as "most important". 34% of the German and 31.3% of the Austrian stakeholders selected a response belonging to the economic category. For result-based contracts, the legal category follows on the second place with 24% of the German, respectively 25% of the Austrian responses ranked first. In sum, more than 50% of the responses ranked as most important for result-based contracts belong to those two categories. For the collective contract the dominance of the social category is outstanding, with 54.2% of the answers from Germany and 62.1% of the Austrian answers ranked as most important. At a great distance follows the economic category with less than 20% in both countries.

4.2.1 External factors in result-based contracts

In the following section, all six PESTLE categories impacting on **result-based contracts** are described, following the PESTLE order[5]. However, since economic, legal and social factors were mentioned most frequently for result-based contracts and since these are also the factors differing most when comparing the responses for result-based and collective contract solutions, more emphasis is put on these factors. An overview of the most mentioned subcategories in result-based contracts can be found in Table 2 at the end of this sub-chapter.

– *Political factors impacting result-based contracts*

In the political PESTLE category for result-based contracts, the subcategory **low level of bureaucracy and administrative burden** (P03) includes 11 individual stakeholder statements. Within these 11 statements, the factors "*administrative effort*"[6] *and* "*bureaucracy*" have been mentioned four times each. One stakeholder, for example, expressed concerns that result-based contracts would lead to an increase in bureaucracy due to the customization required for each contract to match the specific environment. Nine

[5] Due to the very similar response behaviour of the stakeholders, an evaluation in chapter 4.2.1 and 4.2.2 is carried out without differentiation between the two countries. However, where there are visible differences in response behaviour between Austria and Germany, this is addressed and highlighted in the result section.

[6] All translations of the responses from German to English by the authors.

statements were summarised under the subcategory of **political will to support farmers in delivering environmental services** (P02). One stakeholder stated that the "*contents of the contracts must have political consensus*". In the third place, with 8 statements, the subcategory of **advice and support to farmers for implementation** (P01) emerged. Advice, including technical guidance, and access to training are considered promoting factors. One stakeholder for example stated the need for "*support in understanding what is worth protecting and why*".

– *Economic factors impacting result-based contracts*

In the economic PESTLE category, the subcategory of **payment calculation, appropriate remuneration for participation in the contracts** (Ec01) was built on a sum of 28 statements, representing the subcategory based on most stakeholder responses within the whole PESTLE analysis for result-based contracts. Also, for the factors ranked as most important, this subcategory received the highest number (12 mentions). The payment level itself has been mentioned several times as an important factor for participation ("*It must pay off for the farmer*"). At the same time, it was critically noted that the payment calculation is "*demanding*". Also costs and time required for the payment calculation have been mentioned as economic factors. Listed as encouraging was that result-based contracts allow for a "*reward for higher environmental standards*" and also that the "*payments are positively dependent on management/commitment*". Specifically, a "*fair design of payment*" is called for, and this was made even more explicit in the response that "*fair compensation creates acceptance and reliability.*" In this sense, one stakeholder suggests a combination of "*basic remuneration plus performance payment (participation + success)*", while another participant advocates "*gradations in the achievement of intermediate targets*". In the economic category, 12 statements could be assigned to the subcategory of **new income opportunities for farmers by participating in contracts** (Ec05) placed second. On the third place, out of 10 statements, the subcategory **income / revenue security and little financial risk for farmers** (Ec03) emerged. While the former subcategory focuses on economic opportunities, the latter focuses on the risks associated with result-based contracts. Several times, economic profitability was mentioned in Ec05, with seven factors being ranked as most important under this subcategory. Thereby, the environmental performance to be provided was also considered. One statement explained that "*It must be possible to realize a financial and ecological profit that can be economically influenced on the basis of entrepreneurial decisions.*" Price fluctuations or the price level of the cultivated crops, but also production-related mistakes are mentioned as factors that can put at risk the income for participating farmers.

– *Social factors impacting result-based contracts*

In the social PESTLE category compiling factors with relevance for result-based contracts, the subcategory of **social appreciation, recognition for the environmental services provided by farmers** (S01) is based on 20 statements. Thus, it became clear that public perception or appreciation is classified as promoting. One statement in this respect exclaimed "*noticeable (!) social recognition*" as a factor, and another marked that "*the performance should be made visible to the people*". In addition, there were also a few sceptical voices about result-based contracts in the social context namely that "*The more differentiated the requirements are, the more difficult it is to argue 'externally' the funding level or to explain to the consumer what exactly is being done*". The importance of outreach to improve social recognition was highlighted in four responses. For example, one statement said that "*society needs to be made aware of this important work of the farmer through the media*". 15 further statements have been compiled under the subcategory of **farmers' awareness of environmental topics and knowledge** (S05RB). As promoting factors, farmers' own initiative and responsibility in result-based contracts have been mentioned: For example, one statement was that "*farmers are granted expertise/partners in nature conservation*". In the social category, the **attitudes of farmers, consideration of cultural norms and traditions** (SO2RB)**,** but also the **willingness to work together (interest groups, neighbours, farmers' associations)** (SO4RB) and the **societal and consumers' demand and interest for environmental services** (SO3RB) further emerged from the stakeholders' answers. Even if result-based contracts are implemented on the level of individual farms, peer pressure or social pressure from other farmers can have both positive and negative effects. An answer expressing positive impacts in this respect was for example that "*experience of other farmers with result-oriented contracts influences the acceptance and willingness to participate of interested parties*".

– *Technological factors impacting result-based contracts*

In the technological PESTLE category for result-based contracts, **existence of appropriate technologies for measuring the results achieved** (T01RB) has emerged as the only subcategory addressed more frequently, assembling 13 responses. Participants suggested new technologies, such as drones, remote sensing or aerial photography. One answer says for example that

Table 2. Result-based contracts – subcategories with at least ten mentions.

	Code	Subcategory	Sum	+	-	1.	P	Ec	S	T	L	En
1	Ec01	Payment calculation, appropriate remuneration for participation in the contracts	28	21	7	12						
2	En02	Unpredictability of nature and the limited ability of farmers to have an influence on it	27	3	24	8						
3	L01	Contract characteristics: voluntariness, flexibility, clear goal(s), possibility of influencing	22	21	1	4						
4	L06	Transparent and comprehensible controls and sanctions	20	8	12	3						
5	S01	Social appreciation, recognition for the environmental services provided by farmers	20	17	3	2						
6	L03	Clarity and consistency of the legal framework of the contract	18	12	6	4						
7	S05	Farmers' awareness of environmental topics and knowledge	15	14	1	4						
8	L04	Compatibility of the contract with existing laws, programmes and EU policies	14	5	9	3						
9	T01	Existence of appropriate technologies for measuring the results achieved	13	11	2	2						
10	Ec05	New income opportunities for farmers by participating in contracts	12	10	2	7						
11	L05	Practical achievability of the contract goals	12	10	2	4						
12	P03	Low level of bureaucracy and administrative burden	11	4	7	3						
13	Ec03	Income / revenue security and little financial risk for farmers	10	1	9	1						

Sum = number of responses in total assigned under this heading/factor; + = responses framed positively as well as assigned as promoting factor; – = responses framed negatively as well as assigned as hindering factor; 1. = number of responses, stated as most important factor for result-based contracts by stakeholders in the survey = ranking exercise; categories: P = Political ; Ec = Economical; S = Social; T = Technological; L = Legal; En = Environmental.

"*a possible documentation of results by the farmer could be facilitated by an app*", another recognizes that "*by all means use digitalization for knowledge creation and control, certainly motivates the majority*". In the technological category, reliability of outcome measurement, the choice of easily measurable indicators, and the availability of technology, both for monitoring and for measure implementation are further crucial factors. One suggestion in this respect was that "*easy-to-use tools should be available for documentation/monitoring*". Another answer going in the same direction by telling that, "*it is also important that technological means are promoted and made available to farmers through appropriate knowledge transfer on advantages and disadvantages*". Opportunities are further seen in digitalization and the use of special technology.

– *Legal factors impacting result-based contracts*

Within the legal PESTLE category**,** the subcategory of **contract characteristics** (L01) was highly important for the stakeholders, being represented by 22 statements. Here, voluntariness, flexibility and clear goals were named as promoting factors. The importance of achievable goals or a form of co-determination in the setting of goals becomes clear with these two answers: "*objective benefit of the goals should be evident to the contracting parties*" and "*if farmers can influence the selection of the desired ecological goals, this promotes acceptance*". Also, "*quantitative and qualitative specification of the results (criteria, indicators)*" is seen positively. This requirement is closely related to suitable technical feasibility and was coded twice accordingly (L01RB/T02). Another subcategory within the legal PESTLE category, which was built on 20 statements is **transparent and comprehensible controls and sanctions** (L06). While sanctioning is seen as a factor hindering the implementation of result-based contracts, controls and controllability were rated both positively and negatively. Annual fluctuations, especially with regard to biodiversity, insects, etc., are seen as critical for the assessment of results. In this regard, one question raised was "*What happens if, for example, no species settle/no results can be shown?*" As possible solutions, "*easy to control (simple success criteria)*" as well as "*conciliation in case of differing assessments of success*" were mentioned. The third important subcategory within the legal category, with 18 statements as basis, is **clarity and consistency of the legal framework of the contract** (L03). "*Legal certainty*" and "*planning security*" were mentioned particularly often with 6, respectively 4 responses. The 2 subcategories of **compatibility of the contract with existing laws, programmes and EU policies** (L04) and **practical achievability of the contract goals** (L05) were built on 14 and 12 statements, respectively. In connection with legal regulations, restrictions due to requirements from the fertilizer regulation and the prohibition of double funding were mentioned. Demands such as "*achieving the agreed results*

must not lead to sovereign protection!" or "*no obligation to continue after termination of the contract*" point to existing legal uncertainties in ecological successes.

– *Environmental factors impacting result-based contracts*

The environmental PESTLE category assembles the second most statements for result-based contracts under the subcategory of **unpredictability of nature and the limited ability of farmers to have an influence on it** (En02). This subcategory was built based on 27 statements in total, and 8 statements ranked as most important. Weather conditions and extreme weather events such as lack of precipitation have been mentioned, which can negatively influence the results and thus jeopardize the success of the measures implemented. Also addressed are uncertainties in natural processes, population trends, as well as already good ecological status as a baseline, which can make further environmental improvements difficult. From the point of view of the stakeholders, dealing with these uncertainties is crucial for a successful implementation of result-based contracts. This became clear e.g. in the demand that "*in case of extreme weather, the farmer must also be compensated*" (En02 / Ec01) or in the question on "*liability in case of non-achievement of goals (capricious weather, ...)*" (En02 / L06). The double coding indicates that regulations in this regard are highly relevant from an economic as well as a legal perspective. The subcategory of **impacts of climate change and perceived need for action** takes a special position within the environmental PESTLE category (En01). Climate change was explicitly mentioned as a factor relevant for result-based schemes, so one statement was for example that "*effects of climate change are felt by every farmer and increase the willingness to deal with the topic of soil*". One stakeholder commented that "*paid environmental or ecosystem services are farm diversification and increase resilience in climate change.*"

4.2.2 External factors in collective contracts

For collective contracts, we again structured the results along the six PESTLE categories. A clear dominance of social factors became obvious for collective contracts. Also, legal and economic factors were mentioned often, therefore we describe these three categories in more detail. Table 3 at the end of the chapter provides an overview of the twelve subcategories with most statements assigned to collective contracts.

– *Political factors impacting collective contracts*

As in the case of result-based contracts, within the political PESTLE category for collective contracts, the subcategory **low level of bureaucracy and administrative burden** (P03) was the only category to be built on the basis of more than 10 stakeholder statements. Hereby arguments concerning efficiency and effort have been raised: Stakeholders mention that in collective contract solutions "*control effort for [the] authority could be reduced*", and that "*public admin costs are reduced and increased within the group, but more efficient*". Also mentioned positively was that "*administration has fewer individual applications to deal with*". However, there are also a number of responses indicating the risk of even more bureaucracy for this contract type. This shows that the contractual arrangement will be decisive for the amount of bureaucracy. In the ranking process two responses within this category have been selected as most important, namely that "*good information in advance about the measure, its practical implementation and about ecological bases*" needs to be provided (within subcategory P01) and "*political will must be present*" (within subcategory P02).

– *Economic factors impacting collective contracts*

The most important subcategory within the economic PESTLE category impacting on the adoption of collective approaches is the **fair sharing of remuneration between farmers when participating in the contracts** (Ec04CO): Many statements take up the issue of fair payment distribution and how this can be organized. One stakeholder for example raised the question "*how is the compensation and the distribution within the group realised?*" and one respondent put his/her fears in a nutshell as follows: "*distribution of payment – when it comes to money, friendship ceases*". Other stakeholders suggested a "*distribution formula*" as well as the "*distribution of money via third parties*" or a "*pre-allocation of the remuneration*" in order to avoid disputes. But there were also comments regarding how to consider differences in cost structure amongst participating farms and how to distribute money fairly. Besides fair remuneration, two further economic aspects, summarised in the subcategories **payment calculation, appropriate remuneration for participation in the contracts (Ec01)** (13 statements) and **new income opportunities for farmers by participating in contracts (Ec05)** (11 statements) revealed to be of high importance for successful collective contracts. Of the 13 answers on payment calculation, 9 came from Austria, one of the rare situations with a clear country difference in the response behaviour. As in the case of the result-based contracts, statements on the payment amount and "*proper financial incentive*" dominate; there is also the demand for "*payment also for the additional organisational effort*" in the case of collective measures. In the ranking process,

for collective contracts 16 statements in the economic category were selected as most important, while for the result-based contracts 28 statements in the economic category were chosen. Amongst the most important factors were the requests for "*financing a coordination function*" and "*coordination must not be at the expense of remuneration*".

– *Social factors impacting collective contracts*

In the ranking of all PESTLE categories, for collective contracts social subcategories take the second to fourth place. This clearly demonstrates the outstanding relevance given to them by the stakeholders inquired (see Table 3). 30 statements have been assigned to the subcategory of **attitudes and sensitivities of farmers** (S02CO). Moreover, 13 stakeholders ranked statements in this subcategory as the most important, bringing it in the first position. For example, a good neighbourly relationship, "*past experiences of cooperation between farmers*" and the "*alliance of farmers with the same goal*" are mentioned as conducive. However, a number of inhibiting factors are also mentioned. For example, the willingness of farmers to cooperate and exchange is doubted, one answer in this respect was that a "*farmer is rather a loner*". But also, envy and jealousy between farmers or "*difficulty in finding a group"* have been mentioned. Trust between farmers, fairness, willingness to communicate and the ability to work in a team are mentioned as prerequisites for the successful implementation of collective contract solutions. The subcategory of **content of cooperation** (S04CO) follows in third place with 29 statements, of which the positive mentions slightly outweigh with 16 answers. 10 responses within this subcategory were ranked as most important by the stakeholders. Particularly the setting of common goals was mentioned several times as an important success factor, thereby e.g. two answers stated that "*the group focuses on a few or a common goal*" and "*farmers can achieve this effectively and on a large scale as a group with a common goal*". Coordination and communication efforts within the "collective" are seen as obstacles to be overcome, answers underlying this statement are e.g. that a "*common basis for discussion between all participants at equal level*" is needed, or, formulated differently, that there must be "*no dependencies / power imbalances within the group*". An "*equitable distribution of duties and benefits in the collective*" is seen as a success factor and it was suggested to offer "*mediation and conflict resolution training*". It was noted that "*if collective structures already exist, this simplifies the process*". The possibility of exchanging experiences among each other is seen positively, but also that in collective contracts synergies can arise. **Group dynamics** (S06CO) were considered as a separate subcategory, as 21 responses explicitly refer to it, 9 of which were ranked as most important. In total, this term was used six times by the respondents, of which it was negatively evaluated five times. For example, group dynamics are described as a "*stumbling block*" and there is a fear that solutions are endangered "*if individual participants crossfire*"; there are also questions about how to deal with social conflicts within the group as well as with "*difficult characters*". Specifically addressed is the concern that "*individual interests or political opinions of group members differ greatly or diverge*" and "*free-riding*" is mentioned as a further problem. Promoting factors are if the "*group [is] already sufficiently long established*", the presence of group members who have an "*exemplary character for other participants*" and the emergence of a "*we-feeling*". In the case of the subcategory of **social appreciation, recognition for the environmental services provided by farmers** (S01), with one exception, only promoting factors are mentioned. One statement explains that "*as a group it is easier to present interests to the outside world (public, politics)*", and also the "*example setting for third parties outside the group*" is mentioned. For the success of collective contracts, the **involvement of further stakeholders** (S03) besides farmers is important. Hereby, advisors and agricultural associations were explicitly mentioned, but also cooperation with environmental administrations/ authorities was suggested. With regard to the involvement of nature conservation associations, answers were more reserved with a "*distrust of environmentalists*" being mentioned and the potential for conflict that this may entail.

– *Technological factors impacting collective contracts*

Within the technological PESTLE category, even though none of its subcategories was amongst the top twelve, stakeholders raised a number of concrete suggestions: For example, "*technical devices that facilitate the application or the implementation of measures*" or technical solutions for the "*clear breakdown of services and rewards*" and for the "*verifiability of results and allocation to individual farmers*" are seen as beneficial. One stakeholder calls for "*suitable (digital) tools for the documentation of the measures implemented*". Also, the use of GPS "*can positively influence coordination within the collective*".

– *Legal factors impacting collective contracts*

For collective contracts, amongst the legal PESTLE category, the subcategory **contract characteristics: voluntariness, flexibility, clear goal(s), entry and exit**

Table 3. Collective contract solutions – subcategories with at least ten mentions.

	Code	Subcategory	Sum	+	-	1.	P	Ec	S	T	L	En
1	L01	Contract characteristics: voluntariness, flexibility, clear goal(s), entry and exit conditions, responsibilities	34	18	16	4					■	
2	S02	Attitudes and sensitivities of farmers	30	9	21	13			■			
3	S04	Content of cooperation	29	16	13	10			■			
4	S06	Group dynamics	21	8	13	9			■			
5	Ec04	Sharing of remuneration between farmers when participating in the contracts	18	3	15	4		■				
6	L03	Clarity and consistency of the legal framework of the contract	14	8	6	3					■	
7	Ec01	Payment calculation, appropriate remuneration for participation in the contracts	13	11	2	1		■				
8	Ec05	New income opportunities for farmers by participating in contracts	11	10	1	2		■				
9	S03	Involvement of further stakeholders (interest groups, ..)	10	8	2	2			■			
10	S01	Social appreciation, recognition for the environmental services provided by farmers	10	9	1	3			■			
11	P03	Low level of bureaucracy and administrative burden	10	4	6	3	■					
12	L06	Transparent and comprehensible controls and sanctions	10	5	5	0					■	

Sum = number of responses in total assigned under this subcategory/factor; + = responses framed positively as well as assigned as promoting factor; – = responses framed negatively as well as assigned as hindering factor; 1. = number of responses, stated as most important factor for collective contracts by stakeholders in the survey = ranking exercise; categories: P = Political ; Ec = Economical; S = Social; T = Technological; L = Legal; En = Environmental.

conditions, responsibilities (L01CO) was in first place with 34 stakeholder statements belonging to it. The contractual regulation of responsibilities and accountabilities, as well as clear rules and a clear distribution of tasks are named as promoting factors. Stakeholders ask questions such as "*how is the contract with the agency structured?", "who selects criteria for performance*", "who evaluates which achievements with distribution of funds?", "*how is the division of labour organized within the group*", or "*who is liable if an individual from the collective fails to perform*". Several answers in this subcategory refer to the legal protection in case of changes in the group composition or if one or more participants want to leave. The necessity of a clear formulation of goals is further stated, also that this is more difficult in the case of collective contracts as it requires "*contractual clarification between farmers*". The risk for disputes is mentioned as an inhibiting factor, either "*in the in the contract negotiations*", or because of "*unfulfilled requirements of individuals*" or regarding "*the payout*"; in this regard, there is a suggestion to establish an "*internal control system in the collective*". 14 stakeholder statements built the legal subcategory of **clarity and consistency of the legal framework of the contract** (L03). As with result-based contracts, also with collective solutions legal and planning certainty are addressed, and there is the concern about "legal dispute(s) when drafting the contract."

In addition, 10 statements were addressed to the subcategory of **transparent and comprehensible controls and sanctions** (L06), classified under legal aspects even though being relevant from economic perspective too. Central is thereby the question of "*how is the cooperation regulated, what happens if repayments would have to be made*". In the same direction goes the statement that the "*collective must be secured in terms of a control and sanction system*". There is also concern about the "*risk of sanctions or assumption of liability for mistakes made by other farms*". At the same time, another stakeholder points to an advantage of collective contracts with the answer "*no feeling as an individual to be at the mercy of the control system*".

– *Environmental factors impacting collective contract solutions*

In the environmental PESTLE category for collective contracts, in contrast to the result-based contracts, no subcategory made it into the top twelve. Beneficial factors addressed in this category are however the "*higher effectiveness of measures*" and that "*regional concerns can be better addressed*". Mentioned is moreover the possibility for implementing measures in a larger area through collective contracts and that the "*integration of structures such as wind belts etc. [is] more easily possible*". Qualifying, one response reads "*suitable only for measures that have a landscape effect and not just an area-specific effect.*" One comment is "*if it is clear what characterises a region and what is worth protecting, everyone is on board*".

5. DISCUSSION AND CONCLUSIONS

This work addresses macro-environmental factors impacting on the success of result-based contracts, and of contracts fostering collective implementation, both aiming for an improved provision of agri-environmental-climate public goods. So far, to the knowledge of the authors, only little literature can be found on hindering or facilitating external factors affecting the implementation of these novel AECMs. Therefore, this study aimed to investigate political, economic, social, technological, legal as well as environmental factors by using the PESTLE approach. The analysis was based on a stakeholder survey conducted in Germany and Austria.

The application of the PESTLE approach has demonstrated its efficacy as a valuable tool for structuring and classifying the varied responses elicited from a diverse set of stakeholders. It could be demonstrated that stakeholders possess the ability to provide input within the established categories/factors. Nevertheless, the practical application of the PESTLE approach within this particular context has encountered certain limitations. First, it is important to recognize that the quality of the results obtained is highly depending on which stakeholders finally participate in the survey. Despite successfully engaging a significant number of stakeholders in both countries, it is important to note that the sample is not representative in terms of their regional level (e.g., with a bias towards regional and national stakeholders), background organisation, and other stakeholder characteristics (see Appendix B). Second, our study specifically addressed factors that are beyond the direct control of farmers, yet exert influence on their business decisions. Under the CAP, AECM contracts are standardized and not subject to bilateral negotiations, thereby restricting individual contractors from negotiating specific elements of contract design within the legal framework. Consequently, various "internal" design elements arise within the "external" legal category (e.g. L01 contract characteristics), rendering the precise differentiation between "external" and "internal" factors somewhat challenging. Third, a lack of clear demarcation between external and internal factors was observed within the social category. While there are distinct external social factors such as social appreciation, this category also encompasses subgroups that can be regarded as internal, namely farmers' awareness and attitudes. Taking a broader perspective, it can be argued that the external social environment plays a pivotal role in shaping and influencing farmers' awareness and attitudes. Fourth, in the case of collective contracts, the introduction of a third social interaction in the form of the "group dynamics" of course represents a significant differentiation within the subcategories of collective and results-oriented contracts (e.g. S04CO "content of cooperation" and S06CO "Group dynamics" versus S04RB "willingness to work together (interest groups, neighbours, farmers' associations"). This has led to significant distinctions within the social category for result-based and collective contract solutions and to different subcategory headings, with one exception.

The results of this analysis shall now be discussed along the main external factors revealed for both contract types (see table 2 and 3). Starting with the factors/subcategories that exhibit congruence across both contract types, we will conclude with those factors that demonstrate the most significant variations in terms of statements and subcategories.

Navigating uncertainty in the new CAP period – political factors

During our PESTLE analysis, conducted in the midst of the new Common Agricultural Policy (CAP) strategic planning discussions, it became evident that the upcoming CAP period has resulted in considerable uncertainty among German and Austrian stakeholders. The respondents frequently highlighted the importance of having a clear and consistent legal framework for the contracts, as well as ensuring that the contracts are compatible with existing laws, programs, and EU policies. Specifically, legal certainty, planning security, ongoing legal changes, and the potential issue of double funding were identified as key concerns.

Fair payment structures and new income opportunities – economic factors

The economic category plays a crucial role in both result-based and collective schemes. The appropriate remuneration for participation and the potential for new income opportunities are perceived highly positive and important for farmers' engagement among stakeholders in both types of contracts. AECMs representing an additional income opportunity is a well-known motivational factor among famers in classical schemes, but was also already confirmed in novel schemes (e.g. Barghusen et al., 2021). The calculation of payments, however, is a concern for stakeholders in result-based contracts due to the challenge of compensating appropriately for the environmental improvements achieved. Literature recommends tailoring the payment structure to the environmental objective and the level of participation desired (Herzon et al., 2018). Stakeholders suggest

incorporating intermediate targets or offering graduated payments for various levels of success. The importance of fair economic incentives in introducing existing and novel contract types is widely acknowledged (Lastra-Bravo et al., 2015; Pavlis et al., 2016; Ruto & Garrod, 2009; Wilson & Hart, 2000), and should also cover risks in the introductory phase (Prager & Posthumus, 2010). In collective contracts the fair distribution of payments in line with the management efforts is particularly relevant for adoption. In addition, a "collective bonus" could serve as a reward for the additional effort of the farmers to integrate their business orientation into a specialised (collective) concept (DVL, 2021).

Beyond money: the power of social recognition in incentivizing environmental services by farmers – social factors

In addition to economic incentives, social appreciation and recognition for the environmental services provided by farmers are perceived as strong promoting factors in both result-based and collective schemes. Farmers react to societal demand when delivering AECPGs, but this usually goes along with higher / additional workload. Making farmers' work visible, for example through media or public relations work, helps improving the image of agriculture and is perceived as a strong promoting external factor. Result-based schemes, in addition, provide an opportunity to report clear environmental results to society. Furthermore, farmers themselves have also emphasized the importance of social recognition (Russi et al., 2016), which was mirrored by our stakeholder responses.

Stakeholders expressed concerns about specific contract design elements, with clearly differentiated requirements for result-based and collective contracts – legal factors

In line with the reticence and concerns expressed by stakeholders, there are recommendations pertaining to the legal aspects of contract design. While in result-based schemes, voluntariness, flexibility, and clear goals are key aspects, for collective schemes, entry and exit conditions as well as responsibility issues are particularly relevant. This finding is consistent with previous research suggesting that collective incentive schemes should have clearly defined participation criteria and organisational structures (Barghusen et al., 2021; Franks, 2011). Additionally, stakeholders emphasized the importance of fair distribution of remuneration among farmers participating in collective schemes, and a third-party distribution system or pre-allocation of the remuneration were suggested as means to increase trust and fairness. The legal category also revealed that stakeholders call for legal protection in case of changes in group composition. In literature, result-based schemes promote higher flexibility in farmers' management decisions (de Sainte Marie, 2014; Klimek et al., 2008; Matzdorf & Lorenz, 2010; Russi et al., 2016; Sabatier et al., 2012), and this was also deemed important by the stakeholders. In addition, result-based schemes require clear targeting, which involves a precise definition of the results that farmers can achieve and the ability to influence them, according to our stakeholders.

Nature's unpredictability poses a significant hindrance to result-based agri-environmental schemes – environmental factors

According to the results of our study, the unpredictability of nature and the limited influence of farmers on it emerged as a major hindering external factor for the adoption of result-based contracts. This issue is very specific to result-based schemes, where linking payments to measurable environmental improvements makes the influence of nature more salient, particularly in direct comparison to the dominating action-based payments. Also, for collective contract solutions it was seen as less relevant. Already existing literature has identified this issue as a potential risk factor for result-based payments (de Snoo et al., 2013; Derissen & Quaas, 2013; Olivieri et al., 2021; Wezel et al., 2018), our study provides evidence of its significance in stakeholders' perception: In the survey, stakeholders identified and mentioned various environmental factors that can influence the ecological outcome, including extreme weather events, seasonal/regional weather phenomena/conditions, shifts in animal and plant communities, climatic conditions, soil conditions, and the current ecological status. Thus, stakeholders acknowledge that the achievement of ecological results is not solely in the hands of farmers.

Social dynamics and farmer attitudes: Key factors in collective contracts – social factors

For collective contracts, social relationships between participating farmers and the related difficulties are dominating stakeholders' perceptions when thinking about hindering and facilitating external factors. This resulted in "attitudes and sensitivities of farmers" being the aspect with the most statements, and it also ranked first in the list of factors rated as most important. Farmer-to-farmer relationships and the social dimension of

such engagements were frequently mentioned. Promoting factors included past positive experiences of cooperation between farmers, good neighbourly relations, and an existing basis of trust. Hindering factors included a lack of willingness to cooperate, jealousy, traditions, and the perception of farmers as "loners". The stakeholders' predominantly pessimistic view of farmers' willingness to cooperate is also mirrored in a study by Rommel et al. (2022). Already Sutherland et al. (2012) concluded to take farmer co-ordination with caution, especially with regard to social characteristics and assumptions about trust between farmers. They also noted that it seems useful to build on existing structures. Franks (2011) stated that the success of collective contracts depends on clubs of like-minded members with similar views and beliefs who are willing to cooperate and have a low level of conflict between the members. Stakeholders in our study specifically addressed group dynamics as a crucial factor. They identified difficulties in bundling diverse interests and managing larger groups but saw positive aspects in knowledge exchange, developing a group feeling ("together we protect!"), and possible social control. Other studies have shown that farmers are motivated to join a group for knowledge exchange, learning from peers, and socializing with other farmers (Prager, 2022). Also Barghusen et al., (2021) confirmed social norms as an motivation factor.

6. CONCLUDING REMARKS AND OUTLOOK

To sum up, the objective of this study was to investigate the factors that are outside the sphere of influence of the individual farmer impacting the adoption of novel agri-environmental schemes, specifically result-based and collective schemes, using the PESTLE analysis framework. This approach was conducted to provide a systematic analysis of the macro-environmental factors affecting the implementation of such schemes and to offer in-depth insights. The study adopted a stakeholder survey approach and collected precise, multidisciplinary, and holistic insights into most important external factors. The findings of this study can support the decision-making of Austrian and German policymakers in the design and implementation of the two novel contract types by considering relevant promoting factors, including practical requirements for result-based and collective contract approaches from the outset. Furthermore, the study identified hindering factors that could be used as a basis for risk assessment, and scheme designers could act to minimize or avoid their impact. Overall, this study shows the suitability and practicality of the PESTLE approach for analysing the external factors influencing agri-environmental policy measures. This is becoming even more important under the current CAP with its new green architecture that gives greater flexibility at Member State level in the choice and design of measures targeting the environment and climate.

Further research opportunities are seen within the framework of the approach adopted in this study. One pathway to follow in future investigations could be the examination and comparative analysis of responses from further countries and assessing the differences amongst them. Moreover, it would be important to quantitatively analyse more in depth the differences between external factors for result-based compared to external factors for collective contracts. Another promising area for future research is to look more closely at the stakeholders and actors, their background and their activities at different levels and how this influences their response behaviour.

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APPENDIX A
DESCRIPTIONS OF RESULT-BASED AND COLLECTIVE CONTRACTS AS PROVIDED WITHIN THE PESTLE SURVEY

Result-based contract

In a result-based contract, land managers receive a **payment only for the delivery of environmental or climate results** (e.g. water protection, landscape improvement, increasing biodiversity of carbon sequestration). Land managers are free to decide about the management practices, with which they want to achieve these environmental or climate improvements. Selected indicators and scoring systems to monitor environmental or climate results are often used, and they will be exactly defined in the contract. Land managers have access to advice or training when they participate in this contract and they can voluntarily engage in the monitoring activity.

Contract with collective implementation

Land managers become members of **a group who applies jointly for compensation in order to implement environmental or climate activities**, e.g. water protection, carbon sequestration, biodiversity or landscape improvement. A minimum number of group members (e.g. 5) from the region is required to collaborate in order to get a payment. The group members decide about the implementation and locating the measures, and the distribution of the payment. Within the group, peer land managers and advisors share knowledge and support the achievement of the environmental objectives.

Table 1. Approach used within the PESTLE survey, exemplarily illustrate for RB schemes.

<table>
<tr><td colspan="4">(1) Short introduction into the PESTLE task</td></tr>
<tr><td colspan="4">(2) Overarching question of the PESTLE survey stated</td></tr>
<tr><td colspan="4">(3) Introduction of the six PESTLE factors including short descriptions and the PESTLE figure 1
 
</td></tr>
<tr><td colspan="4">(4) Short contract solution descriptions for result-based contract and contract with collective implementation provided</td></tr>
<tr><td colspan="4">(5) Participants are asked to name five 5 important aspects, influencing the implementability, in short concrete statements (example given)</td></tr>
<tr><td colspan="4">Please name 5 important aspects that, in your view, influence the implementability of RB/CO contracts , in short concrete statements.</td></tr>
<tr><td>A</td><td colspan="3">free text 1</td></tr>
<tr><td>B</td><td colspan="3">free text 2</td></tr>
<tr><td>C</td><td colspan="3">free text 3</td></tr>
<tr><td>D</td><td colspan="3">free text 4</td></tr>
<tr><td>E</td><td colspan="3">free text 5</td></tr>
<tr><td colspan="4">(6) Participants are asked to decide for each response given if it is promoting or hindering and to finally select the response considered as most important (example)</td></tr>
<tr><td rowspan="2">Your list of aspects (transferred from above A - E)</td><td colspan="2">Is the aspect promoting or hindering the adoption?</td><td>The most important (only one)</td></tr>
<tr><td>promoting
+</td><td>hindering
-</td><td>1.</td></tr>
<tr><td>A free text 1</td><td>☑</td><td>☐</td><td>☐</td></tr>
<tr><td>B free text 2</td><td>☐</td><td>☑</td><td>☐</td></tr>
<tr><td>C free text 3</td><td>☑</td><td>☐</td><td>☐</td></tr>
<tr><td>D free text 4</td><td>☐</td><td>☑</td><td>☐</td></tr>
<tr><td>E free text 5</td><td>☐</td><td>☑</td><td>☑</td></tr>
</table>

APPENDIX B – CHARACTERISTICS OF THE AUSTRIAN AND GERMAN STAKEHOLDERS

Table 2. Characteristics of the Austrian and German stakeholders.

Characteristics		Germany frequency (%)	Austria frequency (%)
Regional level of the respondent	National	29,2	64,7
	Regional	56,3	20,6
	Local	14,6	0
	International	0	14,7
Background organisation	Civil society / Private individual	4,2	0
	Public enterprise	8,3	17,6
	Non-governmental organisation	8.3	8,8
	Academic (e.g. university, research institute)	8,3	17,6
	Non-profit organisation (e.g. foundation, association)	14,6	11,8
	Private company	18,8	32,4
	Governmental organisation	22,9	8,8
	Other (e.g. professional associations)	14,6	2,9
Special area of responsibility (multiple answers allowed)	Agriculture	41,9	28,1
	Environmental protection / nature conservation	18,1	19,8
	Forestry	8,6	12,5
	Land use policy and planning	7,6	4,2
	Public administration	6,7	5,2
	Research and development	6,7	6,3
	Water management	4,8	4,2
	Community development	2,9	0
	Training and advice	1,9	9,4
	Food sector	1,0	10,4
Role or areas of interest (multiple answers allowed); in bracket selection of "most important"	Provider of information/advice to farmers	21,2 (21,6)	23,3 (14,7)
	Provider of information to the public	19,2 (13,7)	19,4 (20,6)
	Assistance for public funding of land management	1,9 (2,0)	4,9 (0)
	Support in the design of contract solutions	14,4 (17,6)	21,4 (20,6)
	Equipment and/or tool provision	7,7 (0)	2,9 (2,9)
	Providing/leasing land to land managers	2,9 (0)	4,9 (5,9)
	Providing finance to land managers/owners/workers	5,8 (2)	3,9 (0)
	Regulation and enforcement	6,7 (5,9)	2,9 (0)
	Lobbying, campaigning	13,5 (17,6)	6,9 (2,9)
	Community leader	1,9 (2)	1,9 (2,9)
	Supervisory authority	1,9 (2)	3,9 (0)
	Product certification body (e.g. organic, …)	0 (0)	0 (0)
	Processor of agricultural products	1 (2)	3,9 (2,9)
	Trade with agricultural products	1,9 (0)	0 (0)
	No selection "most important"	(15,7)	(26,5)

Table 3. Federal state from which the participants originate (in %).

Germany	Stakeholder	Austria	Stakeholder
Baden-Württemberg	5,9	Burgenland	6,06
Bavaria	13,7	Lower Austria	12,12
Berlin	5,9	Upper Austria	6,06
Brandenburg	2,0	Salzburg	0
Hamburg	3,9	Styria	3,03
Hesse	5,9	Tyrol	0
Mecklenburg-Western Pomerania	5,9	Vorarlberg	0
Lower Saxony	5,9	Vienna	30,30
North Rhine-Westphalia	21,6	Across the federal states	42,42
Rhineland-Palatinate	7,8		
Saarland	0		
Saxony	2,0		
Saxony-Anhalt	2,0		
Schleswig-Holstein	7,8		
Across the federal states	9,8		

APPENDIX C

Table 4. Detailed overview of subcategories mentioned within the PESTLE approach.

Code	Subcategory	CT	Sum	+	-	1.	P	E	S	T	L	E
P00	Political category – without specification	RB	5	2	3	1						
		CO	6	0	6	0						
P01	Advice and support to farmers for implementation	RB	8	7	1	1						
		CO	8	8	0	3						
P02	Political will to support farmers in delivering environmental services	RB	9	8	1	1						
		CO	3	3	0	1						
P03	Low level of bureaucracy and administrative burden	RB	11	4	7	3						
		CO	10	4	6	3						
P04	Longer-term stable political framework	RB	6	3	3	0						
		CO	4	2	2	0						
P05	Assistance in contract implementation by qualified authorities and intermediaries	RB	7	6	1	2						
		CO	5	4	1	0						
P06RB	Extensive communication of the measures to the public and to farmers	RB	7	7	0	0						
Ec00	Economical category – without specification	RB	8	5	3	4						
		CO	7	4	3	4						
Ec01	Payment calculation, appropriate remuneration for participation in the contracts	RB	28	21	7	12						
		CO	13	11	2	1						
Ec02RB	Availability of sufficient funding for contract payments	RB	4	3	1	2						
Ec02CO	... and for coordination / measure planning	CO	8	6	2	2						
Ec03	Income / revenue security and little financial risk for farmers	RB	10	1	9	1						
		CO	6	5	1	3						
Ec04RB	Reliability of demand for and value chains to sell the agricultural products	RB	6	4	2	1						

(Continued)

Table 4. (Continued).

Code	Subcategory	CT	Sum	+	-	1.	P	E	S	T	L	E
Ec04CO	Fair sharing of remuneration between farmers when participating in the contracts	CO	18	3	15	4						
Ec05	New income opportunities for farmers by participating in contracts	RB	12	10	2	7						
		CO	11	10	1	2						
Ec06	Limited time and financial effort for implementation	RB	8	2	6	1						
		CO	6	2	4	0						
S00	Social category – without specification	RB	7	6	1	0						
		CO	6	4	2	2						
S01	Social appreciation, recognition for the environmental services provided by farmers	RB	20	17	3	2						
		CO	10	9	1	3						
S02RB	Attitudes of farmers, consideration of cultural norms and traditions	RB	9	5	4	2						
S02CO	Attitudes of farmers and sensitivities of farmers	CO	30	9	21	13						
S03RB	Societal and consumers' demand and interest for environmental services	RB	8	5	3	2						
S03CO	Involvement of further stakeholders (interest groups, ...)	CO	10	8	2	5						
S04RB	Willingness to work together (interest groups, neighbours, farmers' associations)	RB	5	1	4	1						
S04CO	Content of cooperation	CO	29	16	13	10						
S05RB	Farmers' awareness of environmental topics and knowledge	RB	15	14	1	4						
S05CO	… and knowledge exchange	CO	8	7	1	2						
S06C	Group dynamics	CO	21	8	13	9						
T00	Technological category – without specification	RB	7	7	0	1						
		CO	3	3	0	0						
T01RB	Existence of appropriate technologies for measuring the results achieved	RB	13	11	2	2						
T01CO	Existence of appropriate technologies for measuring the achievements	CO	8	7	1	1						
T02	Determination of appropriate indicators for monitoring	RB	5	3	2	0						
		CO	1	1	0	0						
T03	Easy to implement and no time-consuming monitoring / documentation	RB	3	2	1	0						
		CO	1	1	0	0						
T04RB	Access to technology / machinery, technical practicability	RB	7	3	4	1						
T04CO	Access to technology / machinery, distribution of work	CO	6	4	2	1						
T05RB	Sufficient knowledge about the environmental effects of the farming practices	RB	4	2	2	1						
L00	Legal category – without specification	RB	7	1	6	2						
		CO	5	4	1	0						
L01RB	Contract characteristics: voluntariness, flexibility, clear goal(s), possibility of influencing	RB	22	21	1	4						
L01CO	… and entry and exit conditions, responsibilities	CO	34	18	16	4						
L02RB	Simplicity and comprehensibility of the contract	RB	9	5	4	0						
L02CO	Conditions of participation for farmers (number, setting, ...)	CO	6	1	5	1						
L03	Clarity and consistency of the legal framework of the contract	RB	18	12	6	4						
		CO	14	8	6	2						
L04	Compatibility of the contract with existing laws, programmes and EU policies	RB	14	5	9	3						
		CO	2	0	2	0						

(Continued)

Table 4. (Continued).

Code	Subcategory	CT	Sum	+	-	1.	P	E	S	T	L	E
L05	Practical achievability of the contract goals	RB	12	10	2	4						
		CO	3	3	0	2						
L06	Transparent and comprehensible controls and sanctions	RB	20	8	12	3						
		CO	10	5	5	0						
En00	Environmental category – without specification	RB	5	3	2	1						
		CO	4	3	1	0						
En01	Impacts of climate change and perceived need for action	RB	4	2	2	0						
		CO	2	2	0	0						
En02	Unpredictability of nature and the limited ability of farmers to have an influence on it	RB	27	3	24	8						
		CO	5	2	3	0						
En03	Spatial and regional environmental conditions	RB	3	0	3	0						
		CO	7	5	2	1						
En04	Interplay of action and impacts on nature and environment	RB	3	2	1	1						
		CO	3	2	1	0						

Note: Table 4 shows categories and subcategories including sum of all answers, indication of promoting or hindering assessed answers, weighting exercise answers with number of weighted as most important: Sum = number of responses in total assigned under this subcategory/factor; + = responses framed positively as well as assigned as promoting factor; – = responses framed negatively as well as assigned as hindering factor; 1. = number of responses, stated as most important factor for collective or result-based contracts by stakeholders in the survey = ranking exercise; categories: P = Political ; Ec = Economical; S = Social; T = Technological; L = Legal; En = Environmental.