A co-creation approach to learn about resilience: From regional to European scale

By Bárbara Soriano, Isabel Bardají, Yannick Buitenhuis, Daniele Bertolozzi-Caredio, Jeroen Candel, Peter Feindt, Miranda Meuwissen, Wim Paas, Pytrik Reidsma, Carolina San Martín, Thomas Slijper, Alisa Spiegel, Alberto Garrido

1. Introduction

The concept of resilience is gaining importance to address the ability of farming systems (FSs) to deal with the increasing and interconnected challenges. Assessing FSs' resilience is a complex issue that can benefit from the stakeholders involvement through a co-creation methodology(Prahalad, C.K. and Ramaswamy, 2004; Romero and Molina, 2009; Füller, Hutter and Faullant, 2011). Co-creation activities can be conducted in physical and virtual modes. Focus groups and workshops are traditional physical meetings. Digital platforms are rapidly gaining ground providing stakeholders a new space for interaction, information and opinion sharing.

The aim of this paper is to address how European FSs' resilience assessment can benefit from involving stakeholders using a multi-scale co-creation methodology. The co-creation activities were organized at two different spatial scales — regional and European scales — and combined physical and online stakeholder deliberations. Replication of participatory processes at multiple scales increases validity through comparison/triangulation and effectiveness as more relevant stakeholders can be involved.

2.Methodology

Two different co-creation modes were designed with the aim at conducting in parallel the same co-creation activities on the same resilience assessment topics at two different scales: the regional and European scale: 1) physical meetings across 11 case study regions to co-create with stakeholders, who are knowledgeable and experienced in the farming system they belong to (FS stakeholders); 2) and a digital co-creation platform to co-create with stakeholders, knowledgeable and experienced in the European FSs as a whole (European stakeholders).

A diverse set of physical meetings were organized through the whole project to involve the stakeholders in FS resilience assessment. Participatory sustainability and resilience assessment workshops (SURE-Farm FoPIA workshops) were held between November 2018 and March 2019 in 11 FSs[1] (Reidsma et al., 2019). Between April 2019 and September 2019, risk management focus groups were conducted in the 11 FS (Soriano et al., 2020). The focus groups built on results from a survey of 1,890 farmers on risk perception and risk management decision making (Spiegel et al., 2019). Finally, between November

[1] FS covered different sectors, farm types, products and challenges. They included large-scale arable farming in Northeast Bulgaria, intensive arable farming in Veenkoloniën, the Netherlands, arable farming in the East of England (United Kingdom), large-scale corporate arable farming with additional livestock activities in the Altmark in East Germany, small-scale mixed farming in Northeast Romania, intensive dairy farming in Flanders, extensive beef cattle systems in the Massif Central, extensive sheep farming in Northeast Spain, high-value egg and broiler systems in Southern Sweden, small-scale hazelnut production in Lazio, central Italy, and fruit and vegetable farming in the Mazovian region, Poland.

2019 and January 2020 co-design policy workshops were conducted in 6 FS[2]. In addition, a final workshop was organized in Brussels with fourteen Brussels-based experts from different backgrounds, to discuss and validate the national workshop and digital co-creation platform findings and share reflections on the proposed policy options (Buitenhuis et al. 2020; Candel et al., 2020).

The SURE-Farm digital co-creation platform operated from July 2018 to December 2019 aiming to assess and improve the resilience of FSs in Europe. A selection criteria were defined to invite the stakeholders: i) proven experience and background in the agricultural sector at national/European level; ii) having knowledge about or surrounding risk management, policy, farm demographics and/or agricultural production; iii) working on public or private organisations in any of the following activity areas: farmers organizations, policymakers, insurance companies, banks, research centres and universities, value chain actors, environmental NGOs, consumer associations; and iv) pertaining to one of the next staff category: experts, managers or directors.

FS and European stakeholders were participating in replicated co-creation activities in the physical meetings and digital cocreation platform. The activities addressed current resilience assessment and resilience in the future topics (in bold Table 1). To this end, the resilience variables, such as challenges, functions and resilience attributes (in bold), identified in the resilience framework proposed by Meuwissen et al. (2019) were analysed in the current resilience assessment. Perceptions on the improved strategies and resilience enabling policies (in bold in Table 1) were gathered to address resilience in the future.

Table 1. Co-creation activities replicated in the physical meetings an digital co-creation platform.

Activities performed by the stakeholders to assess current resilience	Activities performed by the stakeholders to assess current resilience
Identify the **challenges** threatening the European FSs. Classified according to the length of ther impact (shocks and long-term pressures) and nature (economic, environmental, institutional and social)	Co-create **improved strategies** to deal with challenges. Strategies are classified in risk-sharing strategies and on-farm strategies
Identify and assess the performance of European FSs **functions**. Functions of the FSs are classified into two groups: the provision of public goods and private goods	Co-design **resilience enabling policies**
Assess the presence of **resilience attributes** in the European FSs, defined as those characteristics which presence is supposed to increase the resilience of the FS (Paas et al., 2019).	

In total 360 stakeholders participated in the co-creation process: 233 FS stakeholders participated in physical meetings and 27 European stakeholders participated in the digital co-creation platform. The

[2] They included intensive arable farming in Veenkoloniën, the Netherlands, arable farming in the East of England, intensive dairy farming in Flanders, extensive sheep farming in Northeast Spain, small-scale hazelnut production in Lazio, central Italy, and fruit and vegetable farming in the Mazovian region, Poland.

stakeholders who participated in the physical meetings did not participate in the digital co-creation platform and vice versa.

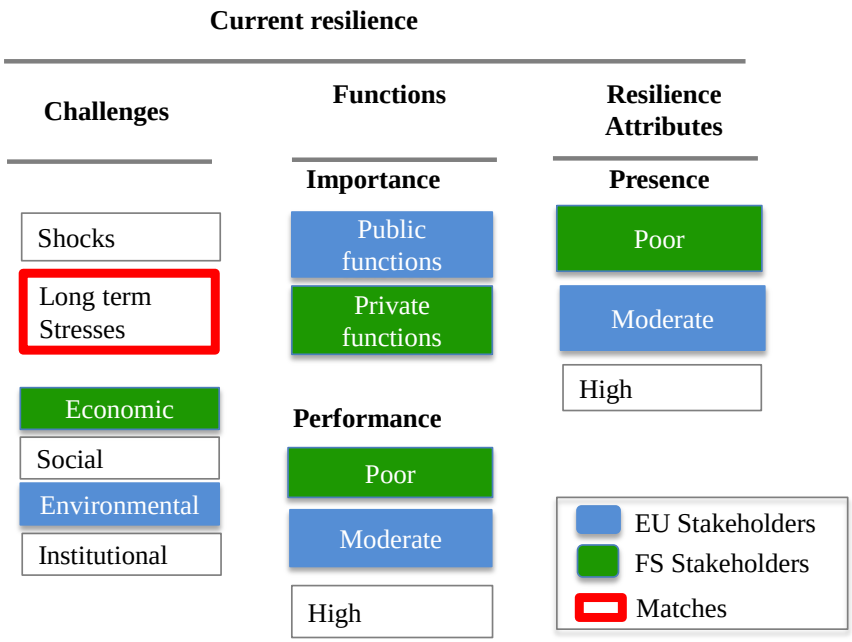
Co-creation activities provided quantitative and qualitative information regarding the stakeholders' perceptions on resilience topics at two different scales. Quantitative information was assessed by applying frequency analysis and analysing descriptive statistics. Qualitative information was assesses by following a qualitative analysis that entailed the elaboration and coding of collected information (Maxwell, 2005). As a result, convergent and divergent perceptions between FS and European stakeholders were identified across the resilience variables, i.e. challenges, functions and resilience attributes.

3. Results and discussion

3.1. Stakeholders' perceptions on current resilience

Figure 1 summarizes the principal stakeholders' perceptions on the resilience variables selected to analyse current resilience, i.e. challenges, functions and resilience attributes. The red squares highlight that the perceptions of the FS stakeholders are the same than that of European stakeholders. As indicated in Figure 1, both European and FS stakeholders were more concerned about long-term pressures than shocks. However, different perceptions between stakeholders are identified regarding the nature of the perceived long-term pressures. European stakeholders perceived environmental long-term challenges, such as global warming, water scarcity and pollution, change in precipitation patterns and decline of pollinators, to be the main challenges to deal with in the future. In contrast, FS stakeholders were mostly concerned by economic long-term challenges, such as decline in profitability forced by constantly increasing production costs and decreasing food prices. This is in line with Assefa et al. (2017), who found that farmers, wholesalers, processors, and retailers were more concerned about long-term price changes than with short-term price volatility.

Figure 1. Principal stakeholders' perceptions on current resilience.



Regarding the functions, greater importance is allocated to social and environmental functions by EU stakeholders, while FS stakeholders highlighted importance of economic functions (Figure 1). There was a consensus among European and FS stakeholders that the functions of the European FSs show a low-moderate performance. Finally, referred to the resilience attributes, both European and FS stakeholders agreed on the key resilience-enhancing attributes, namely: i) the "Reasonably profitable[3]"; ii) "Production being coupled with local and natural capital"[4]; iii) "Heterogeneity of farm types"[5]; iv) "Social self-organization"[6]; and v) "Infrastructure for innovation"[7] (Paas et al., 2019). Stakeholders also agreed on low presence of these attributes in the FS when explaining low performance of FS functions. Yet, European stakeholders were generally more positive about presence of these resilience attributes at the European level, than FS stakeholders at the FS level. More positive perception of presence of resilience attributes of the European stakeholders compared to the FS stakeholders might be related to several aspects: i) at EU level, the diversity in farming and the enabling environment is richer than the diversity within the FSs panel; ii) European stakeholders may be better informed than FS stakeholders regarding response diversity, infrastructure for innovation, legislation and policies, e.g. new ways of insurance or innovative environmental management practices, including supporting policies at EU level; and iii) at the same time, European stakeholders might be less informed on how the effects of resilience attributes can trickle down to specific FSs, taking into account local conditions.

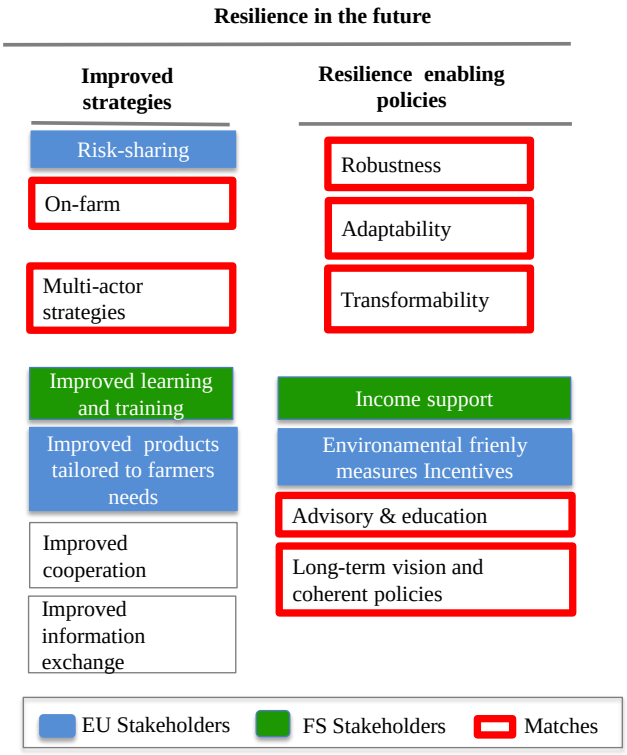
3.2. Stakeholders' perceptions on resilience in the future

As Figure 2 shows, both European and FS stakeholders mainly mentioned on-farm strategies. There are interesting differences between the stakeholder's perceptions with respect to on-farm strategies. The European stakeholders primarily mentioned strategies towards sustainable and efficient management of natural resources and adaptation/mitigation climate change, while FS stakeholders clearly prioritized the strategies targeting economic measures. Reidsma et al., (2000) also found diverge visions regarding the development of FSs focus technological versus ecological solutions requiring different strategies.

As for risk-sharing strategies, European stakeholders perceived insurance contracts to be the most interesting strategy to share risks with financial institutions. These results are in line with previous studies where insurance schemes are perceived as efficient tools to manage risk and uncertainty (Meuwissen et al., 2001; Heyder et al., 2010).

[3] Individuals involved in agriculture are able to make a livelihood from the work they do without relying too heavily on subsidies (Cabell and Oelofse, 2012).
[4] The systems function as much as possible within the means of the bioregionally available natural resource base and ecosystem services (Cabell and Oelofse, 2012).
[5] Patchiness across the landscape (Cabell and Oelofse, 2012).
[6] The social components of the system are able to form their own configuration based on their needs and desires (Cabell and Oelofse, 2012).
[7] Existing infrastructure facilitates knowledge and adoption of cutting-edge technologies (e.g. digital) (Reidsma et al., 2019).

Figure 2 Principal stakeholders' perceptions on resilience in the future.



Regarding how to improve strategies towards more resilient farming systems, there was a general consensus between FS and European stakeholders that improving risk management requires joint actions, i.e. every actor involved in the strategies' implementation has the opportunity to improve risk management in FS. Referring to concrete actions, while FS stakeholders highlighted fostering learning and training, European stakeholders prioritized adaptation or definition of new products better suited to farmers' needs. As the agriculture is constantly shifting and changing, farmers and other actors in the FSs were aware that they need to be up-to-date and participate in continuous learning and training programs on farm management, new technologies and financial planning. Although European stakeholders also perceived learning as a way to improve risk management, their ideas were mostly centred on the need of defining new income, contracts with suppliers and consumers, and insurance products. To this end, all four pathways are in line with the literature (Šūmane et al., 2018; Melander, 2018; Heyder et al., 2010; Dick and Wang, 2010; Meuwissen et al., 2001).

Finally, regarding the definition of the resilience enabling policies, the comparison of the policy recommendations proposed by FS and European stakeholders mainly revealed similarities in stakeholders' views on how policies can strengthen robustness, adaptability, and transformability of the European FSs. More specifically, increasing incentives for adopting agri-environmental and climate measures were clearly recommended by European and FS stakeholders, such as converting the basic payments into more result-based payments related to agri-environmental and climate outcomes (though differences can be depicted in the FS). A much-preferred policy intervention, at both FS and European level was to increasingly encourage social learning processes for exchanging knowledge and promoting cooperation, e.g., through advisory services, training services, education programs, and public-private collaborations. The CAP was regarded as having an important function of communicating about developmental directions for the future of European FSs. Such a long-term vision should be based on

norms and priorities and a clear sense of the vulnerabilities of European FSs. Moreover, the CAP could include clear and coherent policy objectives and instruments that reinforce rather than undermine each other. Feindt et al., (2019) found that the CAP and its national implementations support the robustness of different FSs to varying degrees, provide less support for adaptability, and often even constrain transformability by incentivizing the status quo. In addition, Buitenhuis et al., (2019, 2020) concluded that the ways in which multilevel policy configurations enable or constrain the resilience capacities are experienced very differently across European FSs depending on the systems' context (regional context, challenges, and national policy framework). These studies imply that developing policies for improving the resilience of FSs requires a comprehensive understanding of FSs' characteristics and contexts.

4. Conclusions

Three lessons are drawn from the application of the multi-scale co-creation approach on resilience assessment. First, co-creation is an advisable method to engage stakeholders in research projects, as allows the stakeholders to actively follow almost the whole lifetime of the project. Second, we learnt about the key shortcomings to overcome in future co-creation processes. One of the main challenges of digital platforms is to keep stakeholders engaged into the platform activities during the project lifetime. Learning from experience, digital co-creation platforms targeting complex issues requires a solid multidisciplinary team of i) researchers to set clear goals and formulate questions; ii) co-creation experts to translate the goals and questions into simple and attractive digital activities; iii) technical experts to develop the platform functionalities for performing designed activities; and iv) communication experts to keep stakeholders engaged. Third, the multi-scale approach is one of the major contributions of the co-creation process in the resilience assessment. Working in parallel with stakeholders knowledgeable at regional and European scales broaden the knowledge about resilience by identifying convergent and divergent perceptions on different resilience assessment topics. While we identified several matches in the perceptions, we observed some striking mismatches as well. On the one hand, European stakeholders prioritized environmental long-term stresses, public functions, and risk management strategies targeting environmental challenges. On the other hand, we observed that FS stakeholders perceive economic challenges, private functions, and economic risk management strategies as most important. European stakeholders seem to be more optimistic when assessing resilience at European FSs level.

The perceptions' divergence may have policy implications. Mismatches in the stakeholder's perceptions may explain the existing gap between the European policies, influenced and designed by European stakeholders', and the FSs' diverse needs illustrated by the FS stakeholders. The latter are mainly farmers and other mutual dependence actors who are close to business and remain primarily worried about the unsolved economic issues while European policies move forward to foster the greater balance between environmental and economic issues.

References

Assefa, T. T., Meuwissen, M. P. M. and Oude Lansink, A. G. J. M. (2017) 'Price risk perceptions and management strategies in selected European food supply chains: An exploratory approach', *NJAS - Wageningen Journal of Life Sciences*, 80, pp. 15–26. doi: 10.1016/j.njas.2016.11.002.

Buitenhuis, Y. *et al.* (2019) *D4.3 – Policy Bottom-up Analysis – All Case Study Report. SURE-Farm Deliverable (7527520).*

Buitenhuis, Y., Candel, J. J. L. and Termeer, C.J.A.M. P.H. Feindt, C. J. A. M. (2020) 'Improving the resilience-enabling capacity of the Common Agricultural Policy: policy recommendations for more resilient EU farming systems.', *Eurochoices. Forthcoming*.

Cabell, J. F. and Oelofse, M. (2012) 'An Indicator Framework for Assessing Agroecosystem Resilience', *Ecology and Society*, 17(1), p. art18. doi: 10.5751/ES-04666-170118.

Candel, J. *et al.* (2020) *D4.5: Policy recommendations for strengthening the Common Agricultural Policy's resilience impacts. SURE-Farm Deliverable (727520).*

Feindt, P. *et al.* (2019) *Assessing how policies enable or constrain the resilience of farming systems in the European Union: Case study results- SURE-Farm Deliverable (7527520)*. Available at: https://surefarmproject.eu/wordpress/wp-content/uploads/2019/05/SURE-Farm-D-4.2-Resilience-Assessment-Case-Studies-RP1.pdf.

Füller, J., Hutter, K. and Faullant, R. (2011) 'Why co-creation experience matters? Creative experience and its impact on the quantity and quality of creative contributions', *R and D Management*, 41(3), pp. 259–273. doi: 10.1111/j.1467-9310.2011.00640.x.

Heyder, M., Theuvsen, L. and Davier, Z. V. (2010) 'Strategies for coping with uncertainty: the adaptation of food chains to volatile markets.', *Journal on Chain and Network Science*, 10(1), pp. 17–25.

Maxwell, J. A. (2005) *Qualitative research design: An interactive approach*. Second. Newbury Park, CA: Sage.

Meuwissen, M. P. M. *et al.* (2019) 'A framework to assess the resilience of farming systems', *Agricultural Systems*, 176(June), p. 102656. doi: 10.1016/j.agsy.2019.102656.

Meuwissen, M. P. M., Huirne, R. B. M. and Hardaker, J. B. (2001) 'Risk and risk management: An empirical analysis of Dutch livestock farmers', *Livestock Production Science*, 69(1), pp. 43–53. doi: 10.1016/S0301-6226(00)00247-5.

Paas, W. *et al.* (2019) *D5.2 Participatory impact assessment of sustainability and resilience of EU farming systems*. Sustainable and resilient EU farming systems (SureFarm) project report, EU Horizon 2020 Grant Agreement No. 727520. doi: 10.13140/RG.2.2.25104.25601.

Prahalad, C.K. and Ramaswamy, V. (2004) 'Co-creating unique value with customers', *Strategy & leadership*, 32(3), pp. 4–9. doi: 10.1108/10878570410699249.

Reidsma, P. *et al.* (2000) 'A participatory assessment of the sustainability and resilience of EU farming systems', *Eurochoices. Forthcoming*.

Reidsma, P. *et al.* (2019) *Resilience assessment of current farming systems across the European Union. SURE-Farm Deliverable (727520)*. Available at: https://surefarmproject.eu/wordpress/wp-content/uploads/2019/12/D5.3-Resilience-assessment-of-current-farming-systems-across-the-European-Union.pdf.

Romero, D. and Molina, A. (2009) 'Value co-creation and co-innovation: Linking networked organisations and customer communities', *Working Conference on Virtual Enterprises*, 307, pp. 401–412. doi: 10.1007/978-3-642-04568-4_42.

Soriano, B. *et al.* (2020) *D 2.6 Report on state and outlook for risk management in EU agriculture. SURE-Farm Deliverable (727520).*

Spiegel, A. *et al.* (2019) *D2.1. Report on farmers' perceptions of risk and resilience capacities ─ a comparison across EU farmers (SURE-Farm Project)*.

Šūmane, S. *et al.* (2018) 'Local and farmers' knowledge matters! How integrating informal and formal knowledge enhances sustainable and resilient agriculture', *Journal of Rural Studies*, 59(December 2017), pp. 232–241. doi: 10.1016/j.jrurstud.2017.01.020.