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The role of stakeholder involvement in EU research and innovation policy: a case study of Technology Platform Organics

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Abstract This paper analyses the importance that participatory approaches may play in shaping the innovation policy in the context of the EU research framework programme. The paper reports case study research on the role of "TP Organics", a European Technology Platform (ETP) that supports research and innovation in organic farming in the EU. The case study is based on data concerning the relevance of resources pertaining to organic farming in the EU's most recent framework programmes for research and development (FP7 and Horizon 2020). We use process tracing to analyse the causal effects of the participatory approach used by TP Organics in defining policies and promoting funding for the organic sector. Data concerning textual content analysis on research calls and budget disaggregation for EU research funding are used to test the hypothesis that the engagement of stakeholders provides substantial effects in terms of the number of research projects explicitly oriented to organic farming and the amount of research funding made available. Results refer to the outcomes of a structured testing sequence for the key hypotheses supporting the causal model. They show that the impact of TP Organics relies on its successful multi-stakeholder participatory processes, which have improved the relevance of research themes related to organic farming and have ultimately yielded an increase in financed research projects and financial contributions to research on organic farming in the EU. Conclusions provide some theoretical generalisations on the importance of stakeholder engagement in successfully lobbying for research policy.

Keywords Policy analysis · Organic farming · Stakeholders · Case study · Process tracing · Qualitative analysis

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Introduction

Stakeholder involvement has become part of EU policy-making as an including approach that could improve policy legitimacy and research funding allocation, leading to a better understanding of the challenges in the broad area of knowledge building and knowledge transfer (Michelsen et al. 2009). The Framework Programme (FP) has been the EU's main instrument for funding research and development since 1984. The programmes have provided a framework that has facilitated collaboration across the EU, including partnerships between public and private actors, and now include research teams from non-EU countries.

This paper aims to analyse the effectiveness of stakeholder involvement in developing EU research and innovation policies. In particular, the study focuses on the case study of Europe's main representative organic organisation: the European Technology Platform for Organic Food and Farming Research and Innovation (aka TP Organics). So far, TP Organics has played a prominent part in directing and influencing the European FP agenda. Its strategy documents have directly informed the development of relevant EU research programmes. TP Organics has chosen a participatory approach to strengthen links between researchers and end-users and make research more relevant, thereby increasing the likelihood that this will result in more sustainable farming practices (Padel et al. 2011).

We consider if and how these practices consultations have influenced the content and funding of EU research and innovation programmes, particularly the 7th and 8th Framework Programmes (FP7 and H2020 in the remainder of this paper), in terms of support for organic farming. Over the last three decades, organic farming and food consumption has been growing year on year across Europe. In 2019, the total land area under organic management in the EU was 14.6 million hectares, and the number of organic producers in the EU has grown to 343,858 (Willer et al. 2021): between 2010 and 2019, the number of producers in the EU raised by 56%. Meanwhile, the value of the EU's organic market more than doubled between 2010 to 2019, increasing from 18 billion to 41.4 billion euros (Willer et al. 2021). A range of individuals and organisations, from producers and researchers to NGOs and public authorities, have played a part in this growth. Stakeholders' involvement has been crucial in bringing experience and practical knowledge to bear on developing a definition of common principles and rules for the organic food and farming sector. Already in 2006, the IFOAM EU Group[1] (2006: 2) described "a dynamic cooperation between farmers, processors, consumers, environmentalists and market actors long before there was a common EU legislation in force".

Policy-makers have shown a strong interest (European Parliament 2003) in having an inclusive approach to EU strategic decision-making processes to determine research and innovation priorities and funding. EU Directive 2003/35/EC (p.1) states that "effective public participation in the taking of decisions enables the public to express, and the decision-maker to take account of, opinions and concerns which may be relevant to those decisions, thereby increasing the accountability and transparency of the decision-making process and contributing to public awareness of environmental issues and support for the decisions taken".

We follow a process tracing approach to assess the influence of TP Organics through the participation of stakeholders from the organic food and farming sector on European research and innovation policy. Process tracing is a well-established method in the field of policy analysis and social sciences (Bennett 2010; Collier 2011; Mahoney 2012; Crasnow 2017) that looks for causal mechanisms in specific within-case studies aiming to reach a deeper understanding of a policy-related phenomenon. The aim of process tracing is to analyse whether a specific change (e.g. in policy outcomes) may be influenced by a specific cause. In this paper, we consider if the activities adopted by TP Organics (cause) based on the participatory approach of stakeholders have had concrete consequences (effects) in shaping research and innovation policies. Our empirical analysis is based on data available from FP7 and H2020 concerning the description of research project calls in EU Work Programmes (WPs) related to organic food and farming from 2007 to 2020. Content analysis for WPs, research project calls, signed grants for organic farming research, and disaggregated financial data from the EU research budget provide the empirical evidence for our analysis.

The structure of this paper is as follows: the next section ("Stakeholder involvement in policy-making for organic farming" section) provides a theoretical background on stakeholder involvement in policy-making and a short overview of the evolution of TP Organics; the "Research methodology and data" section describes the methodological approach of process tracing, the inference process and testing procedure and the data and information sources considered for the analysis; the "Results and discussion" section

[1] International Federation of Organic Agriculture Movements EU Group—the umbrella body for the organic sector in EU and EFTA countries.

contains a discussion on the main results arising from this analysis; the conclusions terminate the paper.

Stakeholder involvement in policy-making for organic farming

In this section, we discuss the role of stakeholders in the policy-making process and how stakeholders have been actively included in TP Organics, the European Technology Platform for organic farming.

The role of stakeholders in policy design

The growing popularity of stakeholder analysis reflects a greater recognition of the importance of stakeholders in decision-making processes (Brugha and Varvasovszky 2000). The Rome Declaration pointed out that "early and continuous engagement of stakeholders is essential for sustainable, desirable and acceptable innovation" (European Union 2014). Stakeholder engagement is also crucial in various documents issued by the European Union, such as the implementation strategy for Horizon Europe (European Commission 2020).

Different definitions of stakeholders can be found in the literature. In this study, we follow Hemmati (2002) and define stakeholders as "those who have an interest in a particular decision, either as individuals or representatives of a group. This includes people who influence a decision or can influence it, and those affected by it". In other words, those who can influence or may be influenced by a policy process can be considered stakeholders. Actually, there are various degrees of stakeholder involvement in decision-making (Helbig et al. 2015). According to Noland and Phillips (2010), a mere interaction with stakeholders alone is no longer sufficient, and to emphasise this concept, they refer to the use of the term "engagement" in stakeholder theory.

A multi-stakeholder process can be defined as a process "which aims to bring together all major stakeholders in a new form of communication, decision-finding (and possibly decision-making) on a particular issue" (Hemmati 2002).

In participatory approaches to multi-stakeholder processes, stakeholders are involved in a structured way to influence policy analysis and decision-making (Helbig et al. 2015). Furthermore, Bijlsma et al. (2011) describe participatory policy development as the "influence of stakeholder involvement on the development of substance in policy development, notably the framing of the policy problem, the policy analysis and design, and the creation and use of knowledge".

As far as the role of stakeholder involvement in organic food and farming is concerned, a recommendation report developed in the context of the EU-funded project ORGAP[2] concluded that to ensure the legitimacy of a European Organic Action Plan and its successful implementation, "the views advice and support of the different stakeholder groups are essential in all five relevant development stages of the plan: the design (agenda setting), policy formulation, decision, practical implementation and evaluation" (Schmid et al. 2008b). In the Organic Action Plan resource manual, Schmid et al. (2008a b) emphasise the importance of identifying relevant stakeholders in ascertaining the sector's development needs and policy objectives. However, effective stakeholder involvement in organic action plan development is not without its problems. Michelsen et al. (2009) conclude that in some situations, "involvement of a broad range of stakeholders in any part of the policy process does not appear to be an effective and pragmatic solution to the EU's problems of legitimacy and efficiency" and can introduce additional problems. Schmid et al. (2008a, b) argue that effective stakeholder involvement needs "good preparation, sufficient time and suitable methods". Based on the experience of developing an organic research agenda in Sweden, Wivstad et al. (2014) stated that an open and transparent process promotes the credibility of the agenda for policymakers and research funders as well as for agricultural stakeholders. "The including approach, engaging stakeholders in the food chain as well as the research parties, gives potential to bridging gaps between science and practice" (Wivstad et al. 2014).

Stakeholder involvement in the Technology Platform Organics

European Technology Platforms (ETPs) were introduced in 2003 as part of the European Commission's

[2] ORGAP: European Action Plan for organic food and farming—Development of criteria and evaluation procedures for the evaluation of the EU Action Plan for Organic Agriculture.

Innovation Union initiative and play a key role in highlighting where to place the focus of research and innovation funding. The rationale behind ETPs is to facilitate a coherent and less fragmented approach to setting the research and innovation agenda by bringing together multidisciplinary research expertise and knowledge skills in a specific technological field. There are currently around 40 ETPs covering a diverse spectrum of activity, from nanomedicine and robotics to biofuels and forestry.

TP Organics serves as the link between relevant stakeholders in the organic sector and the European Commission. Established in 2008, TP Organics is the ETP for organic food and farming, bringing together a broad cross-section of actors (i.e. large companies, small and medium enterprises, researchers, farmers, consumers and civil society organisations) in the organic value chain. TP Organics provides a formal channel through which stakeholders can feed into the policy-making process and acts as a focal point for a dialogue with the European Commission (the Directorate-General for Research and Innovation (DG RTD)), more specifically to contribute to policy decisions and determine research priorities and funding.

TP Organics represents a broad coalition of stakeholders in the field of organic, agroecological and low-input agriculture, research and environmental and consumer protection. It acts as a broker for stakeholders within the organic food and farming community to facilitate sharing information and discussion of innovative approaches to issues facing the sector. It has a central role in knowledge transfer and for the dissemination of research results, for example, through its online "Organic Innovation Area", which features innovative solutions already implemented by the organic food and farming sector.

The main activities of TPO, in particular, include cooperation and research coordination at the national or regional level in the member states.

The primary platform activities are based on preparing "input papers" dealing with high-priority topics for the organic sector. Main themes may refer, for example, to precision farming, the internet of things, organic seed development, etc., but may also tackle wider societal and environmental challenges, leading to active collaboration with ETPs operating in different fields. The "input papers" are then submitted to European Commission to be considered during the finalisation of the proposals of the research project calls in EU WPs.

TP Organics is a growing bottom-up initiative, and its members include the following:

- Umbrella organisations and international networks: transnational networks from organic farming, processing, trade, organic certification, etc.
- Enterprise members: especially small and medium enterprises (SMEs).
- National members: national organisations with a particular interest in research and innovation.
- National Technology Platforms (NTPs): mirror platforms of TP Organics at the national level. They help increase the participation of farmers and SMEs in TP Organics and allow TP Organics to reach practitioners and end users of the research better.

In July 2013, TP Organics was formally recognised by the European Commission as a European Technology Platform. Official recognition of its status as an ETP has allowed the platform to become a key player in discussions at the European level and to fulfil its role "as part of the external advice and societal engagement needed to implement Horizon 2020" (European Commission 2013).

The most relevant outcomes of TP Organics activity can be summarised as follows (Fig. 1):

- The first relevant document issued by TP Organics in 2008 is the Vision for Organic Food and Farming Research Agenda to 2025 (Niggli et al. 2008). As a first step, the "Vision for an Organic Food and Farming Research Agenda to 2025" was developed to form the basis of all TP Organics activities. It emerged from an extensive discussion and consultation process in 2007 led by ISOFAR and IFOAM EU and supported by 13 European NGOs, 5 Foundations and the German Federal Ministry of Food and Agriculture.[3]

[3] The development of the "vision" was informed by a participatory approach to research and knowledge transfer. It emphasises the value of both scientific and non-scientific knowledge and recognises that all stakeholders have expertise to contribute to the generation and dissemination of knowledge and know-how. The consultation process was designed to access a broad spectrum of contributors including producers, organic market actors and the scientific community as well as civil society. This resulted in a dynamic, iterative process that evolved in stages over a period of 14 months. The process began with the "Vision Camp", comprising key players in the organic sector which met in June 2007. The process culminated with the publication of the Vision document in July 2008.

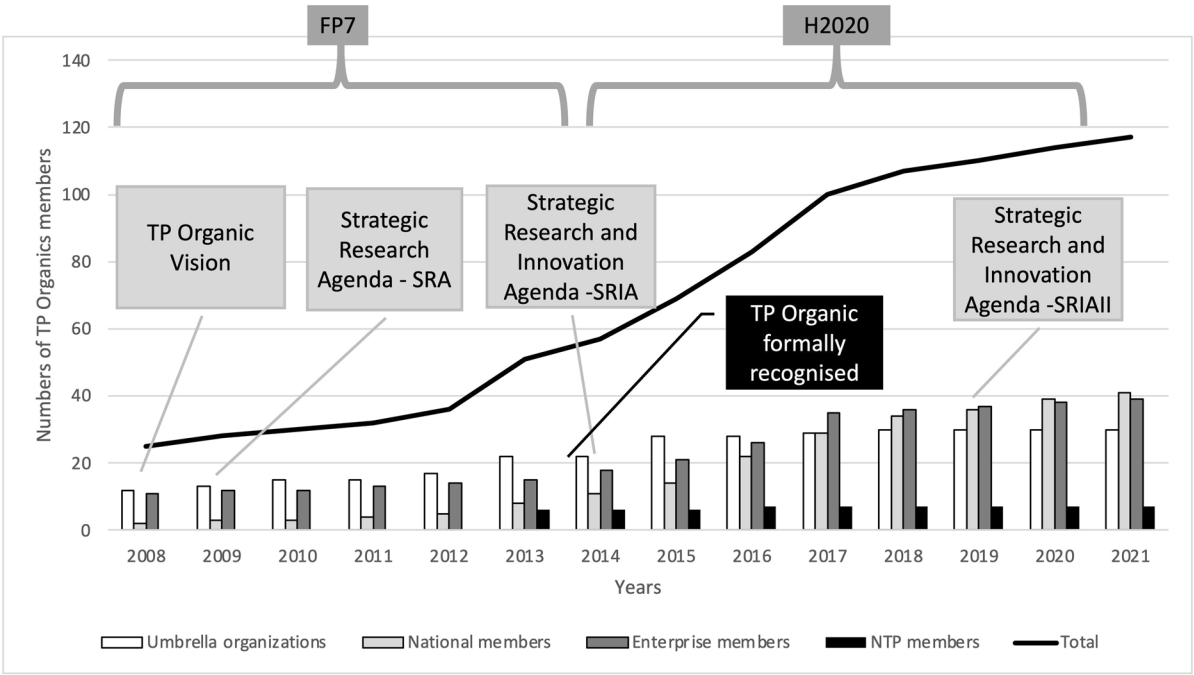

Fig. 1 TP Organics from 2008 to 2021: evolution through time and main milestones. Source: our elaboration

- The Strategic Research Agenda (SRA) (Schmid et al. 2009) was subsequently published in 2009 along with an Implementation Action Plan (Padel et al. 2010) in 2010, showcasing the research priorities of the organic sector for the EU's 7th Research and Development Framework Programme (FP7).
- The Strategic Research and Innovation Agenda (SRIA) for organic food and farming published in 2014 (Moeskops and Cuoco 2014) was produced in order to revise the SRA in accordance with the new EU framework for research and innovation, Horizon 2020 (FP8), the replacement for FP7.
- The new Strategic Research and Innovation Agenda for Organics and Agroecology (SRIAII) was published in 2019 (Barabanova Moeskops 2019) and considers new research priorities in the field of organics. The SRIA II shows concrete research areas and priorities that need proper support at the EU level, in particular through Horizon Europe.

Since its inception, TP Organics has been implementing systematic approaches to involve stakeholders in defining research and innovation strategies and taking action to influence EU Research and Innovation policies.

Advocacy is a core part of the role of TP Organics in the EU's organic agriculture movement. To fulfil this, TP Organics has developed professional lobbying strategies. According to internal documents, TP Organics defines lobbying as actions in which stakeholders are consulted, information is collected, alliances are established and proposals ("input papers") are developed to impact EU research and innovation policies. In summary, the advocacy campaign of TP Organics can be split into three parts: (i) gathering of accurate information; (ii) developing permanent and reliable relations with the authorities concerned; (iii) identifying who is drafting each specific item and analysing the system and how to enter to the decision-making process.

The most visible outcome of stakeholder involvement in TP Organics can be seen in their role in the definition of official documents containing the strategic agenda for the organic sector. More than 300 stakeholders are typically involved in TP Organics workshops for strategy definition, covering various interest groups.

The participation of stakeholders follows a rigorous procedure (Moeskops and Cuoco 2014; Schmid et al. 2009) that includes the following steps:

- Exploratory discussion
- Engagement and involvement of additional stakeholders (not already included in TP Organics)
- Drafting of primary goals and future challenges for research and innovation in organic farming
- Public consultation of primary draft outcomes
- Revising and publication of a final document on research strategies for organic farming

Stakeholder involvement usually requires subsequent consultations scheduled over different months: for example, the first SRIA (2014) was obtained over three consultations scheduled in a participatory process lasting 18 months, from June 2013 to December 2014.

Research methodology and data

To analyse TP Organics' contribution to European Research and Innovation Policies, we follow a case study approach focusing on the role of stakeholder involvement in strategic decision-making for research and innovation policies in organic farming. Case study analysis is a method for investigating a "contemporary phenomenon (the 'case') in depth and within its real-world context" (Yin 2018). Since phenomena and their contexts are often not easily distinguishable in real-world situations, case study research relies on "triangulating" multiple sources of evidence, often with more variables of interest than data points, to converge to an explanation (Yin 2018).

We use a single-case study approach, to describe how and why TP Organics has impacted the European Research and Innovation Policy. Our analysis follows a process tracing approach, a well-established research method for within-case qualitative analysis, commonly used in social science to define causal relationships (Beach and Pedersen 2019; Befani and Mayne 2014; Collier 2011). Process tracing allows for a causal testing procedure based on empirical evidence concerning the case under analysis.

Methodology: process tracing and testing procedures

Process tracing may be defined as a method to design and test hypotheses concerning explanations of events within specific case studies. It is one of the most important tools for testing a given hypothesis in qualitative and case study research (Mahoney 2012). Process tracing considers the definition of a causal chain among events, usually ordered in a temporal sequence, intending to find evidence that may confirm or confute the hypotheses of causal linkages. Different approaches may be considered for process tracing: theory testing and theory-building processes and case-specific processes (Beach and Pedersen 2019). Theory-based processes have a more ambitious scope of building or testing general theories and require more restrictive conditions for the causal definition of the process and demanding ontological assumptions. Case-centred approaches for process tracing aim to provide a sufficient explanation of empirically observed outcomes pertaining to a specific case study. Here, we follow Gerring (2006) and consider a case-centric approach to provide a minimally sufficient explanation of the increased support for research in the field of organic farming. In other words, we use case-specific process tracing to verify whether the TP Organics platform, through increased involvement of stakeholders in time, has actually been responsible for a higher number of research projects in the EU over the last two research programming periods (FP7 and H2020) and ultimately led to an increase in research funding for organic farming. The causal process is described as a flowchart in Fig. 2. Black boxes represent cause (X) and outcomes (Y1, Y2); an intermediary "preparatory" causal step (increased stakeholder involvement and TPO activities through time) is also considered in the hexagon. Grey parallelograms indicate data used for providing evidence during testing procedures. Testing procedures are described in the white boxes.

In the context of process tracing, the inference is based on the analysis of "evidence" that might explain if some occurrence can actually be related to a specific cause. In our case, we are looking for an answer to the following question: "Was research funding for organic farming in the EU actually conditioned by the activity of TP Organics?". Our pieces of evidence are twofold:

- Importance of the themes concerning organic farming in the FP7 and H2020 Framework Programmes. Data are measured in terms of the number of research project calls in the context of organic farming and in terms of the relevance of

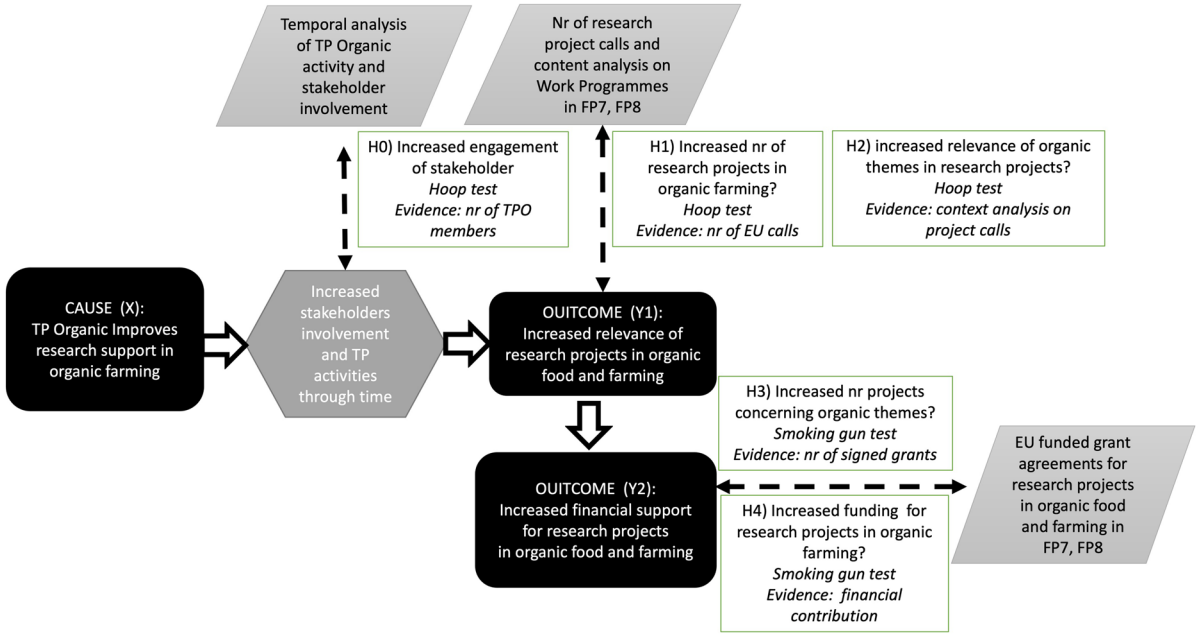

Fig. 2 Process tracing and testing scheme for the role of TP Organics in the development of research for organic farming. Source: our elaboration

the themes related to organic farming in the working programmes of FP7 and H2020.
- The number of signed grants and amount of financial contribution for research projects related to organic farming under FP7 and H2020.

Causal inference in process tracing requires the analysis of relevant events over time (Collier 2011). The relevance of observed events should be assessed in the context of the process of events considered in the analysis, taking into account various contextual factors, such as the temporal sequence of relevant events and previous knowledge of the issue considered (Befani and Mayne 2014). In our case, time continuity is assured by the availability of time-series information on what we consider as potential "causes" in the process of influencing research strategies for organic farming, i.e. TP Organics development, and supposed effects, i.e. resources for research in organic farming.

Our testing approach follows the well-established procedure originally developed by Van Evera (1997) and Bennett (2010) and recently rediscussed (Mahoney 2012; Befani and Mayne 2014; Mahoney and Vanderpoel 2015; Beach and Pedersen 2019). Four basic tests are available, all with a colourful denomination originally proposed by Van Evera (1997), that consider different combinations of necessary and/or sufficient evidence for affirming causal relationships:

- Straw-in-the-wind tests may increase the plausibility of a hypothesis but are not decisive: they provide neither a necessary nor a sufficient condition for accepting/rejecting the hypotheses. They represent the weakest type of test and are usually relevant in a preliminary analysis.
- Hoop tests require that the hypotheses pass through a "hoop", i.e. requires evidence that should be a necessary condition to support the hypothesis. Passing a hoop test does not confirm a hypothesis but provides support for it. Conversely, failing a hoop test eliminates the hypothesis. Hoop tests consider necessary but not sufficient conditions to support the hypothesis.
- Smoking gun (or confirmatory) tests consider if a specific causal linkage has produced the outcome or evidence. In other words, smoking gun tests look for confirmatory evidence that would be extremely unlikely to find under alternative causal

mechanisms (Befani and Mayne 2014). Passing a smoking gun test, therefore, confirms the hypotheses. Failing a smoking gun test does not reject the hypothesis but reduces its likelihood. Smoking gun tests consider sufficient but not necessary conditions to support the hypothesis.

- Double-decisive tests require both the necessary and sufficient conditions to support a causal mechanism. Passing this type of test confirms the hypothesis, while failing the test rejects the hypothesis. Given their demanding requirements, doubly decisive tests are not frequently encountered in a social sciences context (Bennett 2010; Collier 2011).

Following Collier (2011), we use a combination of the hoop and smoking gun tests in the process tracing sequence shown in Fig. 2. We aim to combine the advantages of the two approaches. Firstly, we test the primary hypothesis of increased participation of stakeholders in TP Organics activities through time (hoop test for H0). Secondly, we tested the hypothesis of increased relevance of organic themes in research funding (hoop tests for H1 and H2) once TP Organics was officially recognised as an ETP (i.e. starting from 2014). In this case, we improve the power of the hoop tests, providing what Mahoney (2012) considers a *difficult hoop test*, i.e. making the evidence for hypothesis of an increased relevance of organic farming in research projects more difficult to find. This is done by reducing the "hoop size", which in our case means imposing strict requirements in the content analysis we performed to provide evidence for our hypothesis. Passing a difficult hoop test provides stronger support for the hypothesis being tested.

Finally, we test the hypothesis of an increase in the number of signed grants and financial funding for organic research after the official recognition of TP Organics (smoking gun tests for H3 and H4).

Data

Relevant calls have been selected from the following sources[4]:

- FP7 project calls for the Work Programme Cooperation-Theme 2 "Food, Agriculture and Fisheries, and Biotechnology"
- FP8-Horizon 2020 project calls for the Work Programme-Societal Challenge "Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy"[5]

The selection of relevant calls was made using text analysis (Hodder 1994; Krippendorff 2004; Tipaldo 2014), specifically to establish if certain words or concepts are included within or sets of texts. From its formal recognition in 2013, a great effort has been made by TP Organics to facilitate the introduction of the word "organic" in the context of framework programmes. The aim was to create more opportunities for research projects in the organic field that could apply transversally in various research project calls. Therefore, the first step of our analysis was to verify this strategy's effectiveness in identifying and selecting the cells containing the word "organic": we label this group of research projects calls "organic generic" within the selected WPs. From the "organic generic" group of calls, we then selected only those where the word "organic" is paired with a set of words referring to topics specifically related to organic food and farming: we label this group of calls as "organic food and farming".[6] We used NVivo software to perform the text analysis, referring to a combination of words that we considered relevant for identifying research initiatives referring to organic food and farming. The list of word combinations considered for the selection is included in Appendix 1.

The information and data regarding the number of signed grants, content and financial data concerning the calls for the two categories, "organic generic" and "organic food and farming", were considered in the process tracing analysis described in Fig. 2. For Outcome Y1 (increased relevance of research in organic food and farming), we refer in particular to the number of relevant research project calls and textual data concerning the occurrences of words

[4] Available at https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/reference-documents. Accessed on April 2022.

[5] Included Core Organic project calls.

[6] Research projects approved under the specific calls related to organic food and farming research are not necessarily projects specific to this topic.

Table 1 Calls for research projects in organic-related themes: a comparison before and after the recognition of TP Organics in 2013

Type of research projects calls	Total number		Average number per year			Relative variation	
	2007–2013	2014–2020	2007–2013 (a)	2014–2020 (b)	2016–2020 (c)	(b) vs (a)	(c) vs (a)
Calls for "organic generic"	42	50	6.0	7.1	8.0	19.0%	33.3%
Calls for "organic food and farming"	29	34	4.1	4.9	5.6	17.2%	35.2%

Source: our elaborations

related to organic farming (see Appendix 1) in the Work Programmes under FP7 and H2020. Both the absolute and relative frequencies of references were measured for each WP. For Outcome Y2 (increased financial support for research projects in organic food and farming), we refer to the financial contribution and the number of signed grants for research projects concerning organic farming. Data from the European Commission website concerning evaluated proposals have been sourced, including detailed statistics and data on funded projects.[7] The number of contributions refers only to EU funding; co-funding from other sources is omitted. Financial data are analysed both in absolute and relative terms in order to evaluate the evolution of financial coverage in the context of a general increase in total EU contribution for research and innovation, a figure that has risen from 46.09 billion euros for FP7 (2007–2013) to 67.62 billion euros for H2020 (2014–2020).

Results and discussion

The results of the process tracing analysis and testing show a general confirmation of the hypothesis that the growing participation of stakeholders and the consequent improvement in lobbying activities have actually increased the number and the overall funding of EU-funded research projects concerning organic farming. Following the scheme in Fig. 2, all hypotheses have been confirmed.

Hypothesis H0 concerning the intermediate causal stage (increased stakeholders' involvement and TP activities through time) has been implicitly hoop-tested by the results summarised in Fig. 1, showing the sharp increase of the different types of TP Organic members, particularly from 2014 (see Appendix 2 for details). During the SRA, SRIA and SRIA II processes, specific actions were undertaken to tailor the consultation to different organic stakeholders (e.g. call for experts, SMEs consultation) and also to involve stakeholders that were not part of the organic food and farming sector. In all cases, the activity of TP Organics was heavily dependent on the intensive use of management resources: coordinating consultations and processing input took 13 months in the case of SRA, 18 months in the case of SRIA 2014 and around 1 year for SRIA II in 2019.

Hypothesis H1 concerning Outcome Y1 (increased relevance of research projects in organic food and farming) has been tested with two hoop tests. The first hoop test considers whether an increase in the number of calls for research projects concerning the theme "organic generic" and the specific aspect of "organic food and farming" occurred once TP Organics was formally recognised as an ETP in mid-2013. Failing this test would entirely invalidate the hypothesis of TP Organics' active role in promoting organic farming research in the EU. Of course, passing the hoop test provides support but does not confirm the hypothesis.

The results in Table 1 indicate an evident increase in the number and share of research project calls from 2014. While the distribution of research calls for the period 2007–2013 (i.e. under FP7) is relatively uniform, the number of calls during the period 2014–2020 (i.e. under H2020) shows a definite concentration in the last 5 years. The reason for this is that, initially, the activity of TP Organics was not as efficient as it has been in recent years. A comparison

[7] Available at: https://webgate.ec.europa.eu/dashboard/sense/app/93297a69-09fd-4ef5-889f-b83c4e21d33e/sheet/a879124b-bfc3-493f-93a9-34f0e7fba124/state/analysis
https://webgate.ec.europa.eu/dashboard/sense/app/eaf1621c-67ce-4972-a07b-dddba31815c1/sheet/076eedee-e14d-4554-a8a0-5545d89da416/state/analysis. Accessed April 2022.

Table 2 Financial contribution and number of research projects in organic-related themes: total value, relative share on the total contribution of framework projects (FP7, H2020) and number of signed grants

Period	Organic generic		Organic food and farming	
	Financial contribution	Number of signed grants	Financial contribution	Number of signed grants
2007–2013 (FP7)	175.3 Mio € (0.38%)	52	94.8 Mio € (0.21%)	32
2014–2020 (H2020)	686.6 Mio € (1.03%)	103	488.7 Mio € (0.73%)	78

Source: our elaborations

of the average number of calls per year for 2007–2013 with respect to 2016–2020 shows an even more considerable increase in calls referring both to general organic themes and to organic food and farming (33% and 35%, respectively).

The second hoop test considers whether an increase in the occurrence of the selective subsample of terms concerning organic food and farming themes (see Appendix 1) from the period 2007–2013 to the period 2014–2020 actually occurred. Failing this test would invalidate the hypothesis of an increased relevance of organic-related research themes after the formal recognition of TP Organics, while passing the test would support, though not fully confirm, this hypothesis.

Results show a considerable increase in the occurrence of relevant terms concerning organic food and farming in the working programmes for both periods, 2007–2013 and 2014–2020. The relative frequencies almost doubled from 0.05 to 0.1% between the two periods. The highest number of references found was 63 for the period running from 2016 to 2017 (relative frequency: 0.17%).

Hypotheses H3 and H4 were tested using two smoking gun tests, i.e. looking for confirmation that the improved relevance and attention paid to organic-related themes were actually concretely converted in terms of an increased number of signed grants (i.e. financed research projects) and amount of financial coverage.

Hypothesis H3 considers whether the number of signed grants for research projects related to organic farming actually increased after the formal recognition of TP Organics.

Hypothesis H4 considers whether the amount and relative share of financial contributions to research projects related to organic farming actually increased after the formal recognition of TP Organics. Passing these tests would confirm both hypotheses.

Results are shown in Table 2 and Fig. 3 and refer both to organic research themes in general (i.e. projects referring to "organic", although they might concern organic food and farming) and organic food and farming in particular. Since 2014, TP Organics has, in fact, explicitly supported the strategy of extending the reference to "organic" to provide a favourable context for specific research into organic farming. Results indicate a clear increase in the number of signed grants and the amount and relative share of financial coverage for research projects related to organic farming, both for the generic organic and the specific organic food and farming research projects, that almost doubled in the last 7 years of the research programming period. Of course, we should also acknowledge that a set of other factors might have contributed to these results, concurring with the activity of TPO.

Figure 3 shows the increase in time of financial contributions to research in themes related to the organic sector (see Appendix 3 for more details). For a correct interpretation of results, please note that while data from 2007 to 2013 (FP7) were available on a yearly basis, for the period 2014–2020 (H2020), data are only available in 2–3-year aggregates. Results confirm the effectiveness of the lobbying activity of TP Organics, which became particularly evident 2 years (2016 onwards) after its official recognition.

Our results contribute to the analysis concerning how a causal link between stakeholder engagement and impact measures can be discovered (Huzzard 2020). Following Hendricks (2017), the analysis of the effects of stakeholder involvement presents several challenges, such as determining the best

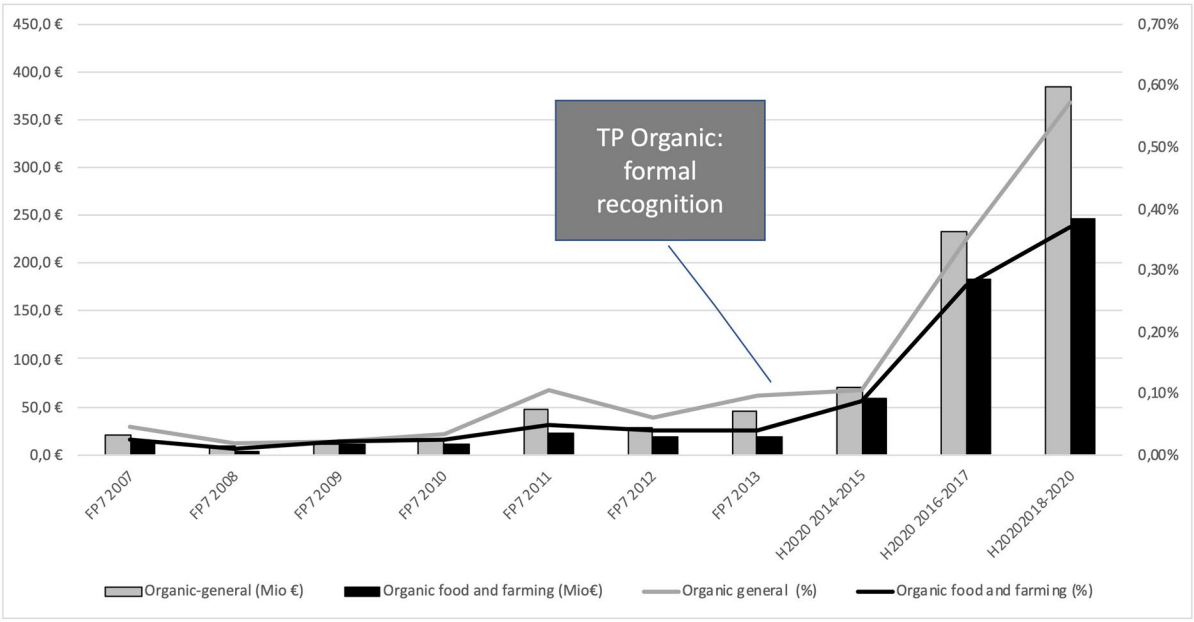

Fig. 3 EU financial contribution for research projects in organically related themes: total value (Mio€) and relative share of total contribution of framework projects (FP7, H2020). Source: our elaborations

measurement criteria as in "do good processes necessarily produce good outcomes?". According to TP Organics' Head of Secretariat, as a result of these advocacy activities, 70% of TP Organics amendments were taken fully or partially into account and supported by the members of the European Parliament and European Council (Schlüter 2015).

TP Organics has influenced the European Commission's approach to the research agenda through its advocacy for multi-stakeholder involvement in research. The EC now explicitly requires research proposals to adopt a "multi-actor approach" to "demonstrate how they will involve all relevant actors in the research process." (Levidow 2018: 11).

The first WP in H2020 was developed against the backdrop of the publication of a proposal for revised legislation on organic farming, as well as an accompanying Action Plan for organic production (European Commission 2021) Also, the Action Plan validated and reinforced the lobbying position of TP Organics with its direct reference to the role of the organisation: "the technology platform for organic food and farming research (TP Organics), would play its role by also providing input into a strategic research and innovation agenda".

The strategies of TP Organics have been twofold. On one side, TP Organics has supported the idea that the organic sector has specific research and innovation needs which are not necessarily shared by the rest of the food and farming sector, for example, safeguarding consumer confidence in organic products and ensuring fair competition between operators in the different EU Member States. This line of argument reflects, for instance, actions specific to the organic sector contained in the EC's Organic Action Plan.

On the other side, the intrinsic participatory nature of TP Organics promotes interaction with other Technological Platforms, such as the ETP "Food for Life". Cooperation has focused mainly on minimal and mild food processing strategies and increasing consumer understanding and engagement, particularly on sustainable consumption. Both topics were included in input papers of the two platforms and contributed to orienting the research themes for H2020.

Conclusions

European research is quite active, and many research outcomes are produced every year. However, only some

of these outcomes are implemented in specific innovations useful to end users (Georghiou 2008). This has been labelled "the European paradox" since "EU countries play a leading global role in terms of top-level scientific output, but lag behind in the ability to convert this strength into wealth-generating innovations." (Dosi et al. 2006). The growing involvement of stakeholders in the research process could help solve this paradox.

Generally, the democratic nature of policy processes is improved by providing opportunities for stakeholder involvement. Participation should not be simply a formal bureaucratic requirement but should highlight opportunities arising from interaction during decision-making processes. Policies implemented with the involvement of stakeholders are more comprehensive and do not overlook significant issues (Ulibarri et al. 2019).

The case study presented here has analysed the evolution of TP Organics from an interest group of like-minded individuals and organisations to a formal contributor to the EU's research and innovation policies as an official European Technology Platform.

TP Organics is a complex organisation where NGOs, businesses, scientists and other like-minded organic food and farming stakeholders meet to discuss its research and innovation needs. Only by systematically using stakeholder consultation tools can TP Organics facilitate the direct involvement of its diverse stakeholders in consultation processes. Tools such as workshops, expert meetings and events also provide opportunities to create new relationships among different stakeholders.

The process tracing analysis of TP Organics' role has provided interesting results on the overall influence that organic stakeholders have had on the current EU Research and Innovation Policy.

Indeed, some theoretical generalisations may be drawn, thanks to this case study. The multi-stakeholder participatory approach followed by TP Organics has proved to be a powerful engine for developing effective advocacy in many contexts, confirming the results from previous research in this field (Hemmati 2002; Häring et al. 2009; Fischer et al. 2015). The effectiveness of stakeholder engagement benefits by not limiting themselves to the boundaries of members or like-minded organisations. The case study showed that cooperation with other ETPs allowed TP Organics to engage in talks with other actors from the European food and farming system (e.g. TP Food for Life) and thus improving the chances of being heard by policy-makers.

The impact of TP Organics in shaping research policy was measured empirically in terms of financial coverage and relevance of research topics. The process tracing analysis focused on the causal mechanisms leading from active stakeholder involvement in TP Organics to increasing support for organic food and farming. The primary outcomes were as follows: more project calls for organic farming, particularly from 2015 onwards, increased relevance of the organic themes, considerably more signed grants, and financial coverage for research projects referring to organic food and farming.

Whilst the overall budget for organic farming research and innovation has increased, in the authors' opinion, TP Organics would benefit from identifying strategies to guarantee the effectiveness of an increased budget through mechanisms to monitor and measure access to this budget by its stakeholders. This could be obtained, for example, by favouring members' coordination so that they could be more engaged in bids competing for new project opportunities. Also, efforts should be dedicated to developing a mapping system to analyse the final beneficiaries of those calls where the platform had an impact.

Against a backdrop of a generally positive view of the outcomes and effectiveness of TP Organics, some issues can, however, be outlined. Firstly, the direct involvement of SMEs should be improved. So far, little consideration has been paid to the role that NTPs affiliated with TP Organics could play in improving the participation of SMEs.

Secondly, TP Organics would require a considerable amount of resources, both in terms of time and human resources, to maintain a systematic use of consultation tools.

Future research in this field could therefore aim to focus on a stakeholder analysis that may support the TP Organics (and other stakeholder based ETPs) in selecting stakeholders and analysing their degree of involvement. A more structured classification of involved stakeholders by categories, such as interest, competencies, field of activity and country, may provide a basis for monitoring the community involved and verifying the appropriate balance of the different areas involved in the European organic system. Also, this could provide the basis for in-depth analysis focusing on network building capacity and on the degree of interconnection among stakeholders. A follow-up of the future FP in accordance with a more detailed analysis of involved stakeholders might eventually lead to a better understanding of the paths leading from stakeholders' requirements and policy responses.

Multi-stakeholder participatory processes may suffer from unregulated and unstructured approaches (Hemmati 2002) and may be limited by aspects such as excessive specialisations of experts, uneven knowledge of stakeholders in any given area and conflicting interests that may distort the objective ranking of priorities (Fischler 2004). The case study presented here has shown how—by carefully tackling these issues—the impact on research policy might manifest in the number of calls devoted to organic food and farming. Based on the results of this study, TP Organics—among all the ETPs—appears one of the most successful, considering the relatively limited size of available resources.

Author contribution All authors contributed to the study's conception and design. Material preparation, data collection and analysis were performed by Daniela Vairo, Eduardo Cuoco and Danilo Gambelli. Danilo Gambelli and Daniela Vairo wrote the first draft of the manuscript, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript. Conceptualisation, Raffaele Zanoli; methodology, Danilo Gambelli; formal analysis and investigation, Danilo Gambelli, Daniela Vairo; data curation, Daniela Vairo, Eduardo Cuoco; writing, Daniela Vairo, Eduardo Cuoco, Danilo Gambelli; writing—review and editing, Danilo Gambelli, Daniela Vairo; resources, Eduardo Cuoco; supervision, Raffaele Zanoli.

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Data availability All data and material used in this study are publicly available.

Declarations

Competing interests Author Eduardo Cuoco is the Director of IFOAM Organics Europe.Danilo Gambelli, Daniela Vairo and Raffaele Zanoli have no competitive interests to declare that are relevant to the content of this article.

Informed consent and ethical aspects involving human participants Not applicable to this study.

Conflict of interest Author Eduardo Cuoco is the Director of IFOAM Organics Europe. Danilo Gambelli, Daniela Vairo and Raffaele Zanoli have no competing interests to declare relevant to this article's content.

Appendix 1 List of combination terms identified for this study that were applied to Work Programmes (WPs) FP7 (years 2007–2013) and Horizon 2020 (years 2014–2020)

- "Organic farming"
- "Organic system/s"
- "Organic sector/s"
- "Organic aquaculture"
- "Organic supply chains"
- "Organic food"
- "Organic products"
- "Organic breeding"
- "Organic inputs"
- "Organic agriculture"
- "Organic and conventional farming"
- "Organic seeds"
- "Organic producers"
- "Organic production"
- "Organic and low-input"
- "Organic crop production"
- "Organic regulation"
- "Conventional and Organic sectors"
- "Organic market"
- "Organic area"
- "CORE Organic"
- "Organic and other low chemical input systems"
- "Organic and low-input"
- "Organic certification"
- "Organic/low-input"
- "Organic principles"
- "Conventional and Organic sectors"
- "Low external input"
- "Organic livestock"
- "Organic juveniles"
- "Organic value chains"
- "Organic e-prints"
- "Organic plant"
- "Organic animal"

Appendix 2

Members of TP Organics from 2008 to 2021 by category

	Umbrella organisations	National members	Enterprise-members	NTP members	Total
2008	12	2	11	0	25
2009	13	3	12	0	28
2010	15	3	12	0	30
2011	15	4	13	0	32
2012	17	5	14	0	36
2013	22	8	15	6	51
2014	22	11	18	6	57
2015	28	14	21	6	69
2016	28	22	26	7	83
2017	29	29	35	7	100
2018	30	34	36	7	107
2019	30	36	37	7	110
2020	30	39	38	7	114
2021	30	41	39	7	117

Appendix 3

EU Financial contribution for research projects related to organic themes

	EU financial contribution (Mio €)		Share on total EU Financial contribution (FP7-H2020)	
	Organic general	Organic food and farming	Organic general	Organic food and farming
FP7 2007	20.5	11.7	0.04%	0.03%
FP7 2008	9.0	4.0	0.02%	0.01%
FP7 2009	10.0	10.0	0.02%	0.02%
FP7 2010	14.9	10.9	0.03%	0.02%
FP7 2011	48.0	22.4	0.10%	0.05%
FP7 2012	28.3	18.3	0.06%	0.04%
FP7 2013	44.6	17.5	0.10%	0.04%
H2020 2014–2015	69.8	59.0	0.10%	0.09%
H2020 2016–2017	233.4	182.9	0.35%	0.27%
H20202018–2020	383.4	246.7	0.57%	0.37%
Total FP7	175.3 €	94.8	0.38%	0.21%
Total H2020	686.6 €	488.7	1.03%	0.73%
Total Overall	861.9 €	583.5 €		

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