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Facilitating collaborative priority-setting for research and innovation: a case from the food sector

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ABSTRACT

Policy for science, technology, and innovation is increasingly supporting bottom-up approaches to setting strategic agendas for research and innovation (R&I). These processes are designed to bring industrial needs of R&I intensive sectors to the fore, while at the same time stimulating engagement of other relevant stakeholders, such as public and private research performers. This paper addresses the question of what conditions best facilitate the main activities of this type of ‘collaborative priority-setting’. It does so through a case study of the creation of a strategic R&I agenda in the Swedish food sector. The paper concludes that local conditions such as government resources and time availability, mixed bottom-up and top-down process steering, and complementary expertise, facilitated the priority-setting. They did so by facilitating the main activities of adjusting scope of prioritised research areas, and mapping out the R&I themes’ expected impacts, desired outcomes, and initial activities/investments. The paper suggests that insights into these ‘intermediate/micro-level relationships’ of priority-setting can assist policy-makers as well as managers aiming at creating sector consensus on R&I priorities.

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Introduction

This paper addresses the question of how the activities involved in research and innovation (R&I) priority-setting in an industrial sector may best be facilitated. It does this by focusing on how a bottom-up priority-setting process in the Swedish food sector evolved, and the conditions that facilitated the activities of what the participants ultimately considered a successful process.

Traditionally, governments shoulder the main responsibility of setting priorities for R&I of strategic importance to the nation. In a top-down fashion, governments typically coordinate and implement systematic approaches to prioritisation, such as national forecast and foresight exercises (e.g. Glod, Duprel, and Keenan 2009; Fisher and Maricle 2015). These approaches to priority-setting are by now well understood by policy-scholars and policy-makers (e.g. Linstone and Turoff 1975; Martin and Irvine 1989). However, national policies for science, technology, and innovation across Europe are converging on the notion that political goals related to e.g. societal challenges, economic growth, and competitiveness are best addressed when R&I needs are identified and implemented from the bottom-up (OECD 2016). This is one of several ways in which policy-makers are trying to enhance interaction between key actors in the innovation system. In particular,

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the approach aims at getting stakeholders from industry to develop a strong interest in implementing priorities (OECD 2015). The policy shift has caused a proliferation of strategic research and innovation agendas, in which priorities are negotiated, as well as implemented by various stakeholders. In many cases, the main responsibility for carrying out this type of ‘collaborative priority-setting’ is delegated to firm representatives and other stakeholders, and takes place within a time-bounded government initiative, often funded by public agencies. The process typically includes negotiations of converting political goals, such as increased competitiveness, sustainability, and cross-sectoral collaboration for certain industrial areas (e.g. mining), technologies (e.g. MedTech) or societal challenges (e.g. aging populations) into stakeholder consensus on relevant R&I investments.

It is clear that stakeholder choice in these priority processes have considerable impact on how political goals for R&I are operationalised and implemented. Yet, we know little about how these processes unfold and the local conditions that facilitate activities and choice. This paper explores this question through a case study of the creation of a strategic R&I agenda for the Swedish food sector. The priority process was initiated by the government and formed a part of a larger food policy initiative to strengthen the Swedish food sector. The priority process took place between 2017 and 2018 and was conducted by firms from the Swedish food sector’s domestic value chain (e.g. primary production, food processing industry, and retail industry). It resulted in a strategic R&I agenda for the Swedish food sector, made public in May 2018.

The paper proceeds by first outlining a number of insights from previous research relevant to the topic. Next, the method used is presented, followed by a case background. The results of the analysis are then presented. The paper ends with a conclusion and discussion.

Literature review

The literature review starts by briefly describing general activities associated with setting priorities. It then proceeds to outline facilitating conditions for priority-setting, identified by previous studies.

Priority-setting typically includes the general activity of creating lists of research themes and choosing between them (Salo and Liesjö 2006). In a priority process that does not rely on special selection techniques (e.g. foresight exercises) various stakeholders usually press their case, negotiate, and agree on lists (Georghiou and Harper 2011). This is generally followed by determining the relative importance of themes, ranking them accordingly, and subsequently formulating promising topics within the themes (Salo and Liesjö 2006; Georghiou and Harper 2011). Priority themes and/or topics are commonly understood as being thematic (e.g. pointing out fields of science and technology), or functional (e.g. aiming at conditions for effective knowledge production) (OECD 1991, 2009).

A range of process conditions pertaining to successful priority-setting can be identified in the literature. They can be divided into three categories, viz. organisational, procedural, and cognitive conditions.

Organisational conditions

Priority-setting can be described in terms of its directionality of influence (Gassler, Polt, and Rammer 2007; OECD 2009). When responsibility for R&I prioritising is delegated to the scientific community, firms, and/or civil society organization/community representatives, one may refer to a bottom-up approach of organising influence. Conversely, top-down priority-setting is associated with governments (and large industry) deciding which scientific or technological fields to allocate resources to (OECD 1991, 2009). From a critical point of view, bottom-up priority-setting may promote short-sightedness/status quo as opposed to novelty (e.g. Salo and Liesjö 2006). Novel R&I goals derived top-down, on the other hand, can cause tension with existing structures and capabilities of implementing agencies (Hellström, Jacob, and Sjöo 2017). Studies suggest that a combination of bottom-up and top-down may reduce the risk of biases in priority-setting activities because more

actors and interests are involved (Martin and Irvine 1989). In fact, several studies argue that stakeholder diversity/inclusivity is a fundamental organisational condition for successful priority-setting (e.g. Gibson, Martin, and Singer 2004; Salo and Liesiö 2006; Sibbald et al. 2009). For example, priorities may gain greater visibility from policy-makers when they are co-produced by practitioners and researchers (e.g. Hernandez-Morcillo et al. 2017; Ockendon et al. 2018; Rudd 2011). Additionally, diversity/inclusiveness tends to facilitate local relevance and ownership of priorities, minimisation of research duplication, and creation of shared responsibility for implementation (COHRED 2000, 2006). However, diversity/inclusiveness depend on several other conditions, such as a representative composition of stakeholders and opportunities for all participants to be heard, involvement of top managers as participants, and access to resources (Salo and Liesiö 2006; Driessen, Glasbergen, and Verdaas 2001; Singer et al. 2000). Resource conditions include equal access to information, access to expertise, meeting material, and neutral facilitators/mediators. It also concerns time to negotiate, create consensus, and commitment (e.g. Martin and Irvine 1989; Rowe and Frewer 2000; Salo, Könnölä, and Hjelt 2004; Prager and Freese 2009).

Procedural conditions

Several studies suggest that transparency throughout a priority process is a fundamental procedural condition for success. Being reflexive about whose voice, views, and interests are advanced is part of a transparent process (e.g. Montorzi, De Haan, and IJsselmuiden 2010; Oxman, Schünemann, and Fretheim 2006; Rowe and Frewer 2000). So is having clear task definitions (e.g. Rowe and Frewer 2000; Gibson, Martin, and Singer 2004; Singer et al. 2000). For instance, a transparent process depends on participants being informed about the nature and scope of the exercise, what it intends to achieve (outputs) and how it intends to achieve it (mechanisms of the procedure) (Rowe and Frewer 2000; Singer et al. 2000). Others stress that success depends on having process procedures that are adaptable to the problems and positions of the involved actors, as well as their capacities and demands (e.g. Driessen, Glasbergen, and Verdaas 2001; Prager and Freese 2009). Some note that in the absence of such flexibility, priority-setters may have to exercise significant amounts of discretion in order to circumvent rigid rules and regulations imposed from the top (e.g. Brattström and Hellström 2019).

In case the process runs over a longer period, participants should be offered opportunities to revisit past choices/decisions, through, for example, iterative decision-making (Gibson, Martin, and Singer 2004). Similarly, Sibbald et al. (2009) argue for the importance of inserting revision or appeal mechanisms into priority processes. There are at least two good reasons for this. First, in the light of new developments, priorities may need adjustment (Driessen, Glasbergen, and Verdaas 2001; Gibson, Martin, and Singer 2004). Second, priority-setting is fundamentally a learning process characterised by the exchange of knowledge and insights between participants. Learning may prompt participants to realise that original objectives and methodological choices were inappropriate (e.g. Georghiou and Keenan 2000; Havas 2003; van der Meulen, de Wilt, and Rutten 2003).

Cognitive conditions

Successful priority-setting is facilitated by a number of cognitive conditions, such as the participants' willingness and ability to enter into open dialogues, respect diverging interests, trust each other, and maintain a constructive approach to problem-solving (Driessen, Glasbergen, and Verdaas 2001; Sibbald et al. 2009). These conditions can be created and sustained through frequent and informal contacts between participants, where they can exchange knowledge and insights (see also Salo, Könnölä, and Hjelt 2004). One approach to keep parties at the negotiation table is to widen the scope of the problem that the exercise aims to solve (Driessen, Glasbergen, and Verdaas 2001). Under such circumstances, the participants' ability to handle uncertainties becomes a condition for prioritising.

Studies also relate successful outcomes with the participants' ability to actively participate and learn throughout priority-setting, adapt to new circumstances, and capabilities to build consensus. For instance, the willingness of participants to make trade-offs/negotiate is considered an important condition for successful prioritisation. However, trade-offs/negotiations may generate agendas that are too comprehensive/general (e.g. Coenen et al. 2017) and/or lacking in innovativeness (Luoma 2001).

Material and method

Data collection and analysis

The main source of data for this study was interviews with participants involved in the process of developing a strategic agenda for R&I in the Swedish food sector (see background section below). The interview material covers the process from the end of 2017 to May 2018. The material covers a majority of the research areas and R&I themes elaborated in the process. Interviews were conducted with participants holding leadership roles in the priority process. They participated closely in the priority process. From their position, these respondents had a good opportunity to oversee the emergence of themes and sub-themes. Respondents include members of the steering group, research area leaders, and theme coordinators. The selection of respondents covers actors from the main parts of the domestic value chain (e.g. primary production, industry, retail). In addition to these respondents, the agency coordinator as well as a process consultant were interviewed. In total, the material covers 18 interviewees. Semi-structured interviews were conducted over the phone or face-to-face in May and June 2018. Interviews lasted 25–45 min. Questions covered the main topic of the study, including background questions regarding position, role in the process, and the time involved in the process. Questions focused on how the process had unfolded and included what the respondent considered decisive moments during priority-setting (e.g. emerging obstacles, critical choices made by the respondent, and what facilitated action/choice). The interviews also focused on the results of the process (e.g. expected/unexpected results and how the respondent related them to activities and circumstances of the process). The respondents were free to steer the direction of the conversation as long as it kept within the topic. The interviews were recorded and transcribed verbatim.

The transcripts were analysed using template analysis (King 1998). This is a criteria-driven coding approach where segments are identified based on the researcher's interests. In this case, the researcher searched for segments that explicitly or implicitly denoted (i) priority-setting activities, and (ii) facilitating conditions as expressed by the participants. The researcher attached short analytical summaries (key words and phrases) to the segments. These statements were captured by assigning codes in the form of short descriptive labels. Subsequently, codes were clustered into broader themes based on commonalities identified by the researcher. In the result section/findings below, these are described and explained using illustrative quotes from the interviews.

The researcher also observed priority-setting activities from December 2017 to May 2018. In total, the researcher joined six steering group meetings and 11 meetings on the level of research and thematic areas. Participation was a mix of face-to-face and phone/Skype participation. This approach, typically referred to as participant observation, may enable the researcher to get in-depth knowledge about how the people under study behave in their 'natural' setting (Schensul, Schensul, and LeCompte 1999). The researcher did not engage with the participants other than presenting himself and the purpose of his participation. The activities were documented by taking notes. Insights from observing the activities later aided the researcher in assessing levels of representativeness of the respondents' interview accounts.

Case background

In June 2017, the Swedish parliament adopted a national food Bill (*the Food Strategy*). The overall objective of the strategy was to improve the competitiveness of the Swedish food sector while at

the same time achieving national environmental objectives (Food Strategy 2017). The strategy was divided into three strategic areas, viz. Rules and Regulations, Consumer and Market, and Knowledge and Innovation. The third area makes up the immediate context of this study. The aim of the strategic area of Knowledge and Innovation was to ‘support the knowledge and innovation system in order to contribute to increased productivity and innovation in the food chain as well as sustainable production and consumption of food’ (Food Strategy 2017, 24). The government identified one of the sub-objectives of the strategic area as improving research and innovation collaboration among firms in the domestic value chain.

By the end of the spring of 2017, food sector firms were invited by the government to sign a letter of intent (LoI) by which they committed to identify areas/topics for collaboration (Avsiktsförklaring 2017). In June 2017, the government selected the Swedish Agency for Economic and Regional Growth to facilitate the initial phase of developing the collaboration. The government set the deadline for the agency’s involvement to June 30, 2018.

During the fall of 2017, the signatories to the LoI elected a steering group. It consisted of actors from all the main parts of the value chain. The group proposed a number of general areas for future R&I collaboration and discussed them with the rest of the signatories. From the discussions, the following so-called *research areas* were formulated: Health and Taste, Circular Food, and Digitalization and Automation. At this point, the areas did not contain specified content. Three members of the steering group, referred to as *research area leaders* were assigned to each area. The rest of the signatories then joined the areas they found relevant. The responsibility of the three leaders was to coordinate prioritisation within each area. This study concerns that priority process. It started at the end of 2017. The process ended in May 2018 as the participants had come to an agreement on a set of priorities within each research area. The result, a strategic agenda for R&I, was made public on May 24, 2018.

Findings

This section is divided into two dimensions, viz. main activities and facilitating conditions. The first dimension includes the activities of (i) adjusting the scope of the research areas by making choices related to theme selection, and (ii) mapping out theme content components and their relation, i.e. to identify and connect a theme’s expected impact, desired outcomes/outputs, and starting condition such as initial activities/investments.

The second dimension deals with conditions that facilitated choice-making within the main activities. Conditions cover: (i) government resources and time availability, (ii) mixed top-down/bottom-up steering, and (iii) complementary expertise. In the discussion/conclusions, the relationship between the activities and conditions will be further analysed. The dimensions and categories of activities and conditions are exemplified by illustrative quotes from the participants.

Main activities

In the activity of *adjusting scope*, participants made choices related to the widening and reducing of scope of the research areas.

The steering group opened up for firm participation from the entire domestic value chain. Broad participation widened scope by generating a range of ideas and possible themes. It also laid the ground for building consensus, e.g.:

Firms from different parts of the value chain have their own ideas that needed to be aired and assessed in order for us to find common ground and proceed with a clear focus. **(Steering group member 1)**

To maintain a wide scope in the early phases of the priority process, the firms decided to exclude research performers (e.g. research institutes and academia) as formal members to the collaboration. A typical example of the rationale behind the decision:

I believe it would have been more complicated to include the research performers in the process. It would perhaps have been an impediment and [the priorities] would have become too specific. **(Research area leader 1)**

As illustrated above, regulating participation was a way of widening scope. In addition, research area leaders widened scope by using general selection criteria, e.g.:

I know my sector. If I mention the term 'R&I sophistication' [as criterion] to my colleagues, I would get as many definitions as participants. Hence, I have been very open and posed open questions such as: what are your needs? **(Research area leader 2)**

Subsequently, the participants began to reduce the scope of the research areas. This activity hinged on the participants' abilities to recognise overlaps between themes and collapse them, e.g.:

[When we reduced the number of themes from 70 to 13] it was all about re-grouping them by looking at what connected to what. We had no selection criteria. We relied on intuition. **(Research area leader 2)**

A challenge that faced the participants during scope reduction was to, on the one hand, maintain commitment across the value chain, and on the other, to de-prioritise themes. As a way of managing the tension between commitment and selectivity, the research area leaders chose to create two theme categories, one that included themes with higher R&I sophistication, and one with a lower level, e.g.:

When we had thirteen themes, we divided the themes into priority category one and two. They differed in how much they related to research and innovation. The distinction was not very strict but there was definitely a difference in that respect. **(Research area leader 2)**

The participants agreed that themes belonging to the first category should be included in the agenda and that the second category of themes should be put on hold.

The second activity, *mapping*, began once prioritised themes were identified. Eleven theme groups were created and distributed equally over the research areas. Each group was led by a participant, here referred to as *theme coordinator*. Together with 3–5 other participants, the coordinator mapped out each theme. The most crucial choice involved in this type of main activity concerned selecting starting conditions, here understood as areas of future investments/type of activity perceived to yield desired outcomes/impact. To make the choice, participants assessed the supply of relevant R&I and prioritised accordingly, e.g.:

We realized quite quickly that within certain fields, there are already high levels of research and innovation, and for that reason, we did not need to contribute with more resources. **(Theme coordinator 2)**

In some cases, the participants chose to focus on applied research as the appropriate starting condition to invest in (e.g. state of the art research in plant protein), e.g.:

[W]e have focused on what is topical right now, that is the more generic that needs to be researched deeper, rather than something considered greatly innovative **(Research area leader 1)**

Alternatively, the participants opted for investments in existing knowledge expected to yield commercial results in the shorter term. Here is how one respondent framed it:

For example, to develop a sugar free sugar is of course interesting to us but at the same time very specific. We must instead begin by identifying the low hanging fruit where we can reach success **(Theme coordinator 1)**

Facilitating conditions

This dimension concerns conditions that facilitated the activities/choice. It includes government resources and time availability, mixed bottom-up/top-down steering, and complementary expertise.

Government resources and time availability

Government resources, as a facilitating condition, can be divided into two categories: the national food strategy and funding. The firms saw the food strategy as a token of political support to

sector collaboration and increased public spending on food R&I. Throughout the process, the steering group used the perceived government message to maintain the participants' motivation. It also used the strategy to stress the importance of making timely choices in order to demonstrate to the government that the sector was able to collaborate. An illustrative quote:

The national food strategy was a precondition, a decisive factor. The politicians were willing to back us but only if we did our homework and mobilize and coordinate. This message played an important role. In the discussions, I could argue: if we don't seize the opportunity it might take a while before we get a new one (**Steering group member 2**)

In addition, participants sometimes used the national food strategy during internal discussions to defend their preferences, e.g.:

A dialogue emerged about where to place the priority focus – on plant-based or animal products. I clearly said that we should not prioritize one over the other. The national food strategy is about increased growth and competitiveness, even if it talks about ecological products. Others agreed with me. In the end, we proceeded with a broad focus (**Research area leader 1**)

In other cases, re-interpretations of the food strategy prompted participants to change theme focus. This typically occurred when participants found difficulties to align desired outcomes with the perceived aims/expected impacts of the strategy, e.g.:

We started with the entry point, how we can get Swedish consumers to eat healthier. But we gave it up since it doesn't fit the general aim of strengthening the competitiveness of the Swedish food sector. So, we made a turn and began looking at the competitive advantages the Swedish food sector and how we could market them in other countries (**Theme coordinator 1**)

In addition to the food strategy, government funding of the priority process was perceived as an important condition, e.g.:

So far, one precondition for engaging in the process has been the state funding, and that we have not been required to add any funds. (**Steering group member 3**)

The funds financed a coordinator from the host agency and meeting facilities. While the coordinator was appreciated in general, the participants particularly valued that she represented a public agency with no historical ties to any specific part of the domestic value chain or to academia, e.g.:

We have had a neutral actor, the Growth agency that has facilitated the process. That I think, was really important (**Steering group member 4**)

The funds also enabled the firms to procure various support services, e.g. an intelligence analysis, but more importantly for the process – an external process consultant from a food-oriented management consultancy. The consultant eased the participants' workload by, for example, providing organisational support, advising on how to integrate themes and map out content components and their relations, and facilitating internal communication, e.g.:

[The consultant] has been a crucial factor. They have moved the process forward and helped us cope (**Theme coordinator 2**)

Having time to prioritise was also an important condition. Successful choice-making within the main activities hinged on time availability in at least three respects. First, the participants did not enter the process with a clear idea of *how* they would set priorities. Time compensated for the lack of preparations, e.g.:

This was a process where the methodology developed over time. [...] It is really great that the whole sector now can sit down in working groups and write documents (**Research area leader 2**)

The methodology first emerged in one of the research areas, was diffused, and adopted by the two other research areas. Secondly, time allowed the participants to make an inventory of ideas. For example:

In an area such as this, where there are many different interests and perspectives, it would not have been possible to agree on something unless the process was allowed to take some time (**Steering group member 4**)

Third, it took time for the participants to learn from exchange and subsequently make informed choices e.g.:

Eventually we agreed on a few suggestions to possible initiatives that were feasible and good and something that we can continue to work with. [...] To my team, this was a learning process. (**Theme coordinator 4**)

Learning depended on the participants' willingness and ability to understand each other's perspectives on issues. The latter stimulated new understandings about how the sector was structured, e.g.

The discussions [in the group] opened up for insights into how complex the various interfaces of the value chain are. From the group dialogue one now has a better understanding of the different actors' opportunities and challenges (**Theme coordinator 5**)

Mixed bottom-up/top-down steering

This condition relates to how a mix of bottom-up and top-down decision-making facilitated the process. In general, bottom-up decision-making enabled the participants to regulate participation and develop priority-setting procedures without much external interference. An illustrative quote:

Having the mandate and freedom to work in a way that one prefers was important. It was a decisive factor to me. [...] The most important choice I made concerned how the research area would organize its process (**Research area leader 2**)

A second aspect of the bottom-up approach concerns choice of theme content. Firms enjoyed high levels of discretion in choosing starting conditions, e.g.:

We tried to avoid themes that were too technical or detailed. (**Theme coordinator 1**)

Although the priority process entailed significant levels of bottom-up discretion, it also included features of top-down steering. For example, top-down steering occurred when the steering group (the top) directed focus of the theme groups (the bottom), e.g.:

We were setting priorities that stretched the chain from primary production to consumption and recycling. The feedback from the steering group was that we should focus on the industry part of the value chain. So we had to re-think. In the end, it turned out well. (**Theme coordinator 4**)

The government was also at times the source of top-down interventions. For instance, political leadership (the top) could intervene with instruction to which the firms adapted (the bottom), e.g.:

[My research area] tried to include the start-up food-tech industry in the priority-process. But then we decided to postpone the collaboration. Now the government want us to include them, so we will have to reboot a bit. (**Research area leader 3**)

Complementary expertise

There are two aspects of this facilitating condition. The first refers to internal expertise and the second to external expertise. Internal, complementary expertise served to validate certain aspects of theme content, e.g.:

We held a meeting with all the thematic groups within our research area where we cross-fertilized the themes by swapping group members. There we got the input from the other experts. The cross-fertilization resulted in a validation of one of our ideas. (**Theme coordinator 6**)

Internal expertise also shaped theme content by increasing the participants' understanding of how to solve mutual problems. One example:

We discussed the topic of refrigerated and frozen foods products and needed a better understanding of how it worked regarding a certain process in the stores. I could look at it from a retail perspective while the producers

used their perspective. The information that we generated was holistic and something which we could work within in our theme. (**Theme coordinator 5**)

The second aspect of complementary expertise concerns expertise that resided outside of the firms. For example, choice related to selecting starting conditions hinged on the expertise of research performers and R&D staff from related business sectors in at least two regards. First, in case the participants had little or no knowledge of the state of the art in their R&I theme, external experts could inform them, e.g.:

None of us had any deeper knowledge about robotization. The input from [research performer S] increased our understanding of the research and development landscape, and what is feasible. Due to the contact it became clear to us what could be an initiative within our theme. (**Theme coordinator 4**)

Secondly, when participants had good knowledge of their R&I theme but wanted second opinions, external experts provided contrasting perspectives (in this case, on development of new materials from waste products):

We sent out our priorities to the reference group that consisted of research performers. In some cases, we challenged the researchers. When we received feedback, we asked ourselves what we could do to make them agree with us. It improved the content. (**Theme coordinator 5**)

The third and final way of how external expertise facilitated priority-setting, concerned how research performers coordinated an entire R&I theme. This only occurred in one of eleven themes. Yet, it had a significant impact since the theme supported several other themes. The reason behind the delegated responsibility was that the participants themselves lacked sufficient expertise, e.g.:

It was important to set the priorities without too much external influence. It was only within the theme [K] where we, due to needs, had to procure an external group leader from [research performer X]. (**Research area leader 2**)

This concludes the results section of this article. [Table 1](#) summarises the main results.

Table 1. Summary of main results.

Dimension	Category	Examples
Activity/choice	Adjust scope of the research area	<ul style="list-style-type: none"> • Open up for broad sector representation and exclude research performers as formal members (widen scope) • Avoid narrow definitions of what are relevant needs and problems (widen scope) • Collapse themes based on intuition (reduce scope) • Create priority categories/de-prioritise (reduce scope)
	Map out theme content components and their relation	<ul style="list-style-type: none"> • Assess the supply of relevant R&I (research/commercialisation) • Connect expected impact/desired outcomes to production of applied research (research) • Connect expected impact/desired outcomes to use of existing knowledge (commercialisation)
Facilitating conditions	Government resources and time availability	<ul style="list-style-type: none"> • Motivate, pressure, and create room for interpretations (food strategy) • Neutral coordinator and process support (funding) • Develop routines for priority-setting (time) • Inventory of ideas (time) • Learn/new insights (time)
	Mixed bottom-up/top-down steering	<ul style="list-style-type: none"> • Discretion to self-organise (bottom-up) • Discretion to decide themes and content (bottom-up) • Adjust scope on instruction from steering group (top-down)
	Complementary expertise	<ul style="list-style-type: none"> • Add collaborators on instructions from government (top-down) • Support selection among ideas (internal expertise) • Complement perspectives on mutual problems (internal expertise) • New knowledge about state-of-the-art (external expertise) • Critical but constructive critique (external expertise) • Coordination of novel R&I themes (external expertise)

Discussion and conclusion

Bottom-up priority-setting is a trend in science, technology, and innovation policy that often aims to achieve the dual goal of setting R&I priorities and forging new relationships between participants (OECD 2015, 2016). From this perspective, the studied priority process was a success. The participants reached consensus on an R&I agenda and laid the foundation for increased sector collaboration. A theme coordinator captured this well by stating: ‘The most important thing is that we together have formulated the priorities. [...] It is the collaborative and cross-border work that is needed in order to take the big steps forward’.

The main results of the study are the identification of (i) the main activities and choices in setting the priorities, categorised as adjusting scope and mapping out content components and their relations, and (ii) the local conditions perceived to facilitate activities/choice, that is, government resources and time availability, mixed bottom-up/top-down steering, and complementary expertise.

The findings resonate with previous research on *organisational conditions* perceived to facilitate successful bottom-up decision-making processes. These include the importance of government funding, a neutral process host, and a process coordinator (e.g. Singer et al. 2000; Driessen, Glasbergen, and Verdaas 2001; Salo, Könnölä, and Hjelt 2004) as well as a combination of a bottom-up and top-down decision-making structure (e.g. Martin and Irvine 1989). Additionally, food sector firms from any part of the domestic value chain were invited to participate as formal members in the collaboration/process. This openness generated a diversity of participants (e.g. Gibson, Martin, and Singer 2004; Salo and Liesjö 2006; Sibbald et al. 2009). However, the firms also excluded related industries, research performers, and other stakeholders such as consumer interest groups as formal members. The exclusion seemed to have had positive effects on the activities but may have come at the cost of reduced R&I quality and external relevance of the priorities (e.g. Coenen et al. 2017). In terms of *procedural conditions*, methodologies for prioritisation emerged during the process (e.g. Prager and Freese 2009). Themes, content, and links between starting conditions and desired outcomes/expected impact were discussed during several rounds of negotiations/workshops in which participants sometimes engaged in revisions of earlier results (e.g. Gibson, Martin, and Singer 2004; Daniels and Sabin 2000; Sibbald et al. 2009). In terms of *cognitive conditions* highlighted in the literature review, the participants engaged actively, worked constructively with addressing emerging obstacles, and made clear efforts to understand each other’s perspectives (e.g. Driessen, Glasbergen, and Verdaas 2001; Sibbald et al. 2009). The present study also demonstrates how the participants assessed the stock of R&I supply, interpreted policy texts, and hypothesised relations between starting conditions and desired outcomes/expected impacts. These activities resonate with what Brattström and Hellström (2019) refer to as cognitive aspects of discretion, i.e. those activities/choices of priority-setters that directly shape the content of priorities. However, the findings also imply that the participants felt pressure from the government to create consensus on content and seemed to assume that failure would result in a lost opportunity. Forced efforts to create consensus may have a negative effect on the innovativeness of R&I agendas (e.g. Luoma 2001). For example, several of the firms were already working within the prioritised themes. This may indicate that the firms resorted to finding overlaps between existing priorities as opposed to identify potentially novel ones.

The next sections illustrate how the main results of the study (see Table 1.) relate. It elaborates how the three identified conditions facilitated choice throughout the activities.

Government resources/time availability. The national food strategy, as a resource, enabled the participants to advocate for including certain themes (adjust scope) and to later assess and adjust starting conditions (mapping). The process consultant initially advised participants on how to merge themes (adjust scope), and subsequently supported theme coordinators to map out theme content and hypothesising causal links (mapping). Time, initially facilitated an inventory of ideas (adjust scope) and later a methodology for prioritising and learning between participants (mapping).

Bottom-up/top-down-steering. At the start of the process, bottom-up steering enabled the participants to regulate the intake of ideas and merge/rank themes (adjust scope). Top-down steering enabled the government to add collaborators to the process (adjust scope). As the process entered the phase of mapping out themes' expected impact, desired outcomes, and linking them to starting conditions, the mix of bottom-up/top-down steering continued to facilitate choice. From its position, the steering group had a good overview of the progress of all the research areas and could on that basis justify interventions in specific theme groups to correct perceived imbalances. Bottom-up steering, on the other hand, enabled participants of the theme groups to decide whether to focus starting conditions on research or on commercialisation/innovation, how to divide labour, and how to organise interactions (e.g. cross-fertilizing activities).

Complementary expertise. Complementary expertise facilitated the coordination of entire R&I themes (adjust scope). It also supported theme groups in validating interesting ideas/content, identifying solutions by addressing mutual problems, and facilitating new insights among the participants about the state of art within the themes (mapping).

To conclude, industrial sectors have their own history, culture, and challenges related to R&I collaboration. They may also differ in terms of R&I intensity/maturity. Hence, their susceptibility to steering by the interests of external actors such as research performers may vary. Factors such as these are embedded in the case context and affect the generalizability of the findings of the study. However, a qualitative case study like this can offer some insight into the basic variables, and their relation, that shape process outcomes of collaborative priority-setting for R&I. By taking a process perspective on prioritisation, this study has offered a view into the black box of collaborative priority-setting. It has unpacked some of the components, here understood as the activities and facilitating conditions, that mediate between inputs (e.g. the policy decision to fund the process) and outcomes (e.g. a strategic R&I agenda/sector consensus). The study has demonstrated what part of the collaborative priority process conditions support. The results should therefore be of interest to policy-makers and industrial actors who seek to create sector consensus on strategic agendas for R&I. What remains to be seen is how sector specific processes transfer across sectors. Future research in this area could profitably focus on the relation between activities and facilitating conditions of collaborative priority-setting from other sectors. Additional cases may provide a fertile ground for comparative studies and policy-learning.

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