Forging forms of authority through the sociomateriality of food in partial organizations

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Abstract

This study theorizes on the sociomateriality of food in authority-building processes of partial organizations by exploring Alternative Food Networks (AFNs). Through the construction of arenas for food provisioning, AFNs represent grassroots collectives that deliberately juxtapose their practices from mainstream forms of food provisioning. Based on a sequential mixed method analysis of 24 AFNs, where an inductive chronological analysis is followed by a Qualitative Comparative Analysis (QCA), we found that the entanglements between participants' food provisioning practices and food itself shape how authority emerges in AFNs. Food generates biological, physiological and social struggles for AFN participants who, in turn, respond by embracing or avoiding them. As an outcome, most AFNs tend to bureaucratize over time according to four identified patterns while a few idiosyncratically build a more shared basis of authority. We conclude that the sociomateriality of food plays an important yet indirect role in understanding why and how food provisioning arenas re-organise and forge their forms of authority over time.

Keywords: Alternative food networks, Authority-building processes, Partial organization, Sociomateriality, Grassroots collectives

Introduction

An important stream of research in organization studies explains how grassroots collectives and social movement organizations construct arenas as space for organizing and developing forms of leadership, hierarchy and control over time – what we define as authority-building processes. Bicycle commuting routes (Wilhoit and Kisselburgh, 2015), bars, parks and parts of towns (Haunss and Leach, 2007; Reedy et al., 2016), Occupy Wall Street (Reinecke, 2018), and open source platforms (Puranam, at al., 2014; Massa, 2017) represent examples of arenas

where grassroots collectives organize to shape and enact forms of protest and contestation (Haug, 2013). Arenas constitute "partial organizations" (Haug, 2013: 713) since their social order is partially 'decided' and partially based on interpersonal networks and institutions (Ahrne & Brunsson, 2011). While grassroots collectives and social movement organizations appear boundaryless and leaderless from the outside (Wilhoit and Kisselburgh 2015; Dobusch and Schoeneborn, 2015), a closer examination of how they organize their arenas reveals the presence of processes for maintaining order and social control. Haug (2013: 723) has suggested that using arenas as a unit of analysis helps us to understand these processes, by focusing "on specific *events* and […] looking at what people actually do and analysing this activity as situated in *time* and *space*". Specifically, in food provisioning arenas this means looking at the interplay between participants and food provisioning practices, suggesting a sociomaterial perspective to investigate organizing in these arenas (Forssell and Lankoski 2017; Sarmiento 2017).

However, we know relatively little about organizing with the sociomateriality of things – for example, food in alternative provisioning arenas – and particularly in partial organizations. Sociomateriality involves the enactment of activities that meld bodies, artefacts and technologies with institutions, norms, discourses, and other social phenomena (Leonardi, 2012). In other words, multiple forms of human and material agency become constitutively entangled (Orlikowski, 2010) in organizational practices. Only recently, scholars have approached how some facets of materiality entangle with social practices in the evolution of partial organizations (Barinaga, 2017; Cnossen and Bencherki, 2019). This is a remarkable gap, as the functioning and evolution of grassroots collectives plausibly depends on the entanglement between members, spaces, technologies, artefacts and bodies.

This study aims to explore the role of sociomateriality in authority-building processes of partial organizations by focusing on the sociomateriality of food that shapes provisioning

arenas in Alternative Food Networks (AFNs). AFNs are grassroots collectives deliberately attempting to differentiate their practices from mainstream forms of food provisioning (Mount, 2012; Duncan and Pascucci, 2017). AFNs may emerge from farmers boycotting supermarkets and co-producing food directly with consumers, from citizens occupying abandoned plots in urban peripheries, from gardeners collectively experimenting agro-ecology, or from anarchists promoting a food sovereignty agenda (Goodman et al., 2012; Laforge, 2017). Food provisioning arenas in AFNs represent an example of *partial organizations*: through food provisioning, participants "strategize, quarrel, negotiate, create master frames, devise campaigns, or make decisions collectively" (Haug, 2013: 723). Furthermore, food provisioning arenas in AFNs represent ideal organizations for studying the *sociomateriality of food* because in these arenas, participants' practices constitute *entanglements* with food, as an agent, itself. That is, food is not only grown, but it grows; it is not only harvested, assembled and processed, but it matures, transforms and perishes along the way; it is not only served and consumed, but it exalts its flavors or rots, depending on the interplay with other social and material agents (Cherrier, 2017; Sarmiento, 2017). While much of the rural sociology literature has romanticized the material role of food in AFNs (Murdoch and Miele, 2004), our study shows how AFN participants struggle with the sociomateriality of food and shape their organizations accordingly. More specifically, we investigate *how the sociomateriality of food enacts authority-building processes of food provisioning arenas in AFNs*. Contributing to the recent stream of studies on the role of sociomateriality in the evolution of partial organizations, our analysis identifies and compares temporal processes through which, over time, authority is forged in food provisioning arenas. We develop a sequential mixed method approach, where an inductive chronological analysis is followed by a Qualitative Comparative Analysis (QCA) using a fuzzy set approach and Boolean logic. The analytical properties of QCA were used to

unveil relationships between the case (organizational) attributes and the emergence of different forms of authority.

Our findings confirm that the human agency enacted by participants in food provisioning arenas entangles with the sociomateriality of food in forging authority-building processes in partial organizations like AFNs. Two mechanisms play a role sequentially: first, food takes an agentic role by generating struggles due to its biology, physiology and sociality; second, AFN participants' human agency neutralizes (by avoiding) or reinforces (by embracing) these struggles. We found that, through these entanglements between material and human agency, food plays an indirect role in how authority emerges over time. Concerning our cases, most arenas became progressively bureaucratized, presenting four distinct patterns of organizational responses to food related struggles, thus suggesting the presence of regularities in how sociomaterial entanglements forge bureaucratic authority in these arenas. Instead, only few arenas developed a shared basis of authority, suggesting the presence of an idiosyncratic authority-building process. Generalizing from our findings, we suggest that food represents an agent playing a critical yet indirect role – by generating struggles through its sociomateriality and, in turn, related participants' responses – in why and how partial organizations forge their forms of authority.

Theory

Authority-building processes and partial organizing in grassroots collectives

Organizing in social collectives has been of interest to scholars for a long time, since these forms of organizing challenge classic assumptions of what an organization is (Dobusch and Schoeneborn, 2015). Traditionally, organizations are seen as having workable boundaries and identities (March and Simon, 1958) and the use of a bureaucratic basis of authority (Etzioni, 1959; Coleman, 1980; Adler and Borys, 1996). Instead, social collectives are fluid (Schreyögg

and Sydow, 2010; Dobusch and Schoeneborn, 2015) and 'boundaryless' (Ashkenas et al., 2002). They use 'anti-hierarchical' and 'non-bureaucratic forms' of authority (Sutherland et al., 2014; Reedy et al., 2016), due to their ideological and political aspirations as an alternative to mainstream organizations (de Bakker et al., 2013; Parker et al., 2014). Yet, a closer examination reveals the presence of mechanisms for maintaining order and social control (den Hond et al., 2015), intertwined with diverse forms of leadership and authority (Sutherland et al., 2014; Reedy et al., 2016). In these "non-hierarchical, leaderless groups (…) social order is not only decided, but also emergent as it is grounded in relationships, shared behavioural patterns and beliefs among participants" (de Bakker et al., 2017: 29-32).

This blending of social orders has been referred to as *partial organizing*: forms of organizing that are incomplete, heterogeneous, without all formal organizational properties such as hierarchy or memberships, while demonstrating a combination of decided, networked and institutionalized orders (Ahrne and Brunsson, 2011). In complete organizations, authority is the legitimate right of an individual or group of individuals to use and allocate resources efficiently, to take decisions and to give orders to achieve organizational objectives (Coleman, 1980). Decisions entail membership, hierarchy, written or socialized norms for controlling members' behaviours (and compliance), and rewarding/penalizing accordingly (Ahrne and Brusson, 2011). In partial organizations, authority reflects the partiality of the forms of social orders through undefined, porous membership and rules (Schreyögg and Sydow, 2010; Ahrne and Brunsson, 2011). Accordingly, authority emerges from processes of collective evaluation, control and reward of individual contributions to group tasks, by means of norms of cooperation and trust (Bowles and Gintis, 2002), personal ties or expertise (Porter et al., 2018); self-determination (Parker et al., 2014) and participatory decision-making (O'Mahony and Ferraro, 2007; Sutherland et al., 2014).

Given the nature of partial organizing, forms of social order and authority in grassroots collectives inherently intertwine with each other, specifically in organizing arenas (Haug (2013). In particular, *bureaucratic authority* may relate to more 'decided forms of order' on the basis of formal rules, hierarchy, membership, decision-making, monitoring and sanctions. Instead, 'networked or institutionalized forms of order' (Ahrne and Brunsson, 2011), mediated through social interactions, ties and personal networks, may facilitate the emergence of *forms of a shared basis of authority* (Haug, 2013). In our theorizing process, we found this interplay between forms of social order and authority in grassroots collectives to be critical to make sense of how participants in AFNs organize responses to sociomaterial struggles in food provisioning arenas.

Sociomateriality and food provisioning arenas

The study of sociomateriality in organizations focuses on the entanglement of human and material agency (Leonardi, 2012). Particularly, the study of sociomateriality in organizations stems from the realization that organizational dynamics can be explained through explicit reference to the role of materiality (Orlikowski and Scott, 2008; Leonardi, 2012). Broadly speaking, materiality refers to bodies, artefacts and technologies that may act in the physical space of an organization (Boxembaum et al., 2018; de Vaujany et al., 2019). Therefore, scholars taking a sociomateriality approach focus on how, for example, technology and work become constitutively entangled in, and shape organizational life (Orlikowski, 2010). Material and human agents do not play the same role in organizations. While materials have agency on their own, human practices interplay with both materials and the broader social structure in which organizations are embedded (Leonardi, 2013). This means that bodies, artefacts and technologies are shaped by institutions and at the same time, through these materials, human agents enact institutional work (de Vaujany et al., 2019).

While the study of sociomateriality in organizations is fully established, only a few studies have used a sociomateriality lens to understand processes of partial organizing (Vásquez et al. 2016; Akemu et al. 2016; Barinaga 2017; Cnossen and Bencherki 2019). For example, Vásquez and colleagues (2016) found that written texts play an important role as artefacts in creating, at the same time, order and disorder in nascent organizations. A visual artefact of not-yet-existing products, such as the picture of a smartphone built with all its materials certified as slavery-free, serves as a boundary object transforming activism into the organized commitment of multiple actors (Akemu et al. 2016). Mural paintings in depressed neighborhoods "turn a public (disorganized) outdoor space into the constitutive order for a nascent social venture" (Barinaga 2017: 944). Or, finally, the physical space of a public street and the agents populating it interplay in constituting new organizational order in protest movements; and it is "precisely their reflexive relation that contributes to the emergence of new organizations" (Cnossen and Bencherki (2019: 1057).

Relative to this literature stream, food represents an overlooked agent to consider in partial organizing. Due to the uniqueness of its materiality if compared to other objects, food triggers novel entanglements between human and material agencies. A stream of studies in rural sociology has revealed that food and the space where it is grown, harvested, assembled, processed, served and consumed interplays continuously with social agents in a balance between organizational order and disorder (Murdoch and Miele, 2004; Cherrier, 2017; Sarmiento, 2017). For example, the spaces where food provisioning in AFNs takes place (e.g., the gardens, the warehouses, the food stands, the kitchens) shape the collective experience that connects participants with the multi-sensorial qualities of food and food production (Murdoch and Miele, 2004). Along with the narratives of AFNs as spaces for energizing and reconnecting with nature (Forssell and Lankoski, 2017), the sociomateriality of food in AFNs have recently been studied as sites of intense organizational struggle (Cherrier, 2017; Sarmiento, 2017).

Struggles related to the sociomaterial nature of food (or, more simply, 'food-related struggles') refer to differences in experiencing and embodying food due to its vitality (Cherrier, 2017). Hence, the 'visceral nature' of food organizing cannot be disentangled from personal and collective struggles around food, from "the body that eats, enjoys health or suffers disease" (Sarmiento, 2017: 486). Thus, to understand the interplay between partial organizing and merging forms of authority in the context of food provisioning arenas, we need to pay "attention to the agentic roles of non-humans in food systems" (Sarmiento, 2017: 486).

Methodology

To investigate how the sociomateriality of food enacts authority-building processes of food provisioning arenas in AFNs, we followed a sequential mixed methods design approach, where results from an inductive/explorative chronological analysis (step 1) were used as input for a fuzzy-set Qualitative Comparative Analysis (QCA) (step 2). In the next two sections, we present our data collection approach, and then we further specify our analytical strategy.

Data collection

From 2012 to 2014, two of the researchers, supported by research assistants, progressively engaged with twenty-four AFNs (Table 1). The selection process was designed to maximize variability in our sample, in terms of a typology of AFNs and a diversity of food provisioning practices, thus allowing for richer data on the collective organizing and sociomateriality of food. We only included AFNs explicitly critiquing mainstream practices of food provisioning. Within this group, we sought to include an AFN based on i) type of food provisioning activities (e.g. consumption/distribution or production/growing orientated), (ii) type of geographical and historical context (e.g. originating from friends/neighbors, anarchist or social justice movements, or supported by municipalities); and iii) level of 'maturity'. According to these

criteria, we excluded organizations at the boundaries of the AFN universe (e.g., organic shops, farmers' markets, cooperatives). Eventually, our data collection involved seven AFNs from the Netherlands (labelled as Community Supported Agriculture; Table 1), two from Southern Italy (labelled as Solidarity Purchasing Groups; Cembalo et al., 2013; Pascucci et al., 2016) and fifteen from Southern Spain (referred to as Community Gardens and Consumer Groups; Miralles et al., 2017).

During our fieldwork, we had direct access to rich primary and secondary data. In-depth semi-structured interviews with initiators and members required typically one or two days of engagement to gauge the AFN structure, activities, and retrospectively reflect on changes over time. We had the option of follow-up discussions when needed to co-produce accounts of key events. Along with the primary interview data, we had access to inventories, archival data, documents and information related to meetings, statutes, membership and activities, as well as their website and/or social media pages. This secondary material was critical for reconstructing the origins of the AFNs and identifying 'key events' in triangulation with the interviews. All the material collected from primary and secondary data was transcribed, summarized, and coded in readiness for our two steps iterative analysis.

INSERT TABLE 1 HERE

Step 1 – Inductive chronological analysis

In the inductive analysis, we identified 32 first-order codes and 9 second-order themes, including how AFNs set up forms of authority, struggles related to the sociomateriality of food, type of responses to struggles, and how AFNs forge forms of authority. In our coding approach we moved from an informant-oriented to a concept-oriented process (Gioia et., 2013; Gehman et al., 2018). The literature on AFNs (Murdoch and Miele, 2004; Goodman et al., 2012) and sociomateriality of food (Cherrier, 2017; Sarmiento, 2017) was crucial in helping the research

team conceptualize and categorize the types of struggles and responses. Similarly, the literature on partial organizing (Ahrne and Brunsson, 2011; Haug, 2013) and grassroots collectives (de Bakker et al., 2017), was crucial for identifying and conceptualizing how struggles in food provisioning arenas relate to forms of authority and social order (Haug, 2013). Particularly, during the coding process the research team noted the presence of a distinct set of quotes narrating the relation between responses and changes in the organizing of the food provisioning arenas, suggesting a temporal sequence. Based on this observation, we organized all the first and second-order codes in chronological order, taking into account key events and changes in each case study (see Figure 1).

While these patterns of authority-building had a rather clear chronological sequence, the specific patterns characterizing the different food provisioning arenas in terms of food-related struggles, AFN participants' responses and authority-building outcomes remained unclear. Did different struggles, with either the biology, physiology and/or sociality of food, induce specific organizing responses in the food provisioning arenas? Were there regularities between the types of struggles and the types of responses? Ultimately, did new forms of authority follow any specific 'struggle-response' pattern? These questions led the research team to investigate differences and similarities in struggles and responses in each arena (case study), and to control for any spurious relations, leading to the use of the inductive/explorative qualitative analysis as a necessary precursor for a QCA.

Step 2 – Qualitative Comparative Analysis

The QCA approach used Boolean logic and set theory to produce solution patterns for a given outcome set (Table 2). In line with our inductive approach, all variables used in the inductive analysis have been coded into quantitative variables using a categorical approach (see details in Table A7 in Appendix A). We ran the QCA using, as an outcome set, the presence of

enhanced bureaucratic forms of authority, and then, again, having as an outcome set, the presence of enhanced forms of shared basis of authority. Our analysis is based on a conservative solution due to our inductive approach, which favours the discovery of unexpected set relations in the empirical data set. In fact, there were two models (suggesting little model ambiguity, Baumgartner and Thiem, 2017) for the conservative solution, with the only difference in formulation occurring in the final path, and so the model with the higher consistency and coverage for the path that differed (as overall consistency and coverage for the solution remained the same) is presented here (see Table 7 and 8). The other model is reported in Appendix A for transparency's sake (please see Table A5 and Figure A2 in Appendix A).

The QCA approach consistently revealed patterns explaining enhanced bureaucratic forms of authority, while no meaningful patterns of enhanced shared basis of authority were identified. Therefore our approach involves minimising a truth table from which can be derived solution paths for membership in the outcome set of Bureaucratic Authority at the time of study ('Out' in table 2 below).

INSERT TABLE 2 HERE

This indicates that, in our study, only bureaucratic forms of authority can be associated with identifiable patterns of entanglements between material and human agency, while authority-building processes towards more shared forms of authority have a more idiosyncratic nature. It also shows the presence of equifinality, in that many processes can lead to the formation of a bureaucratic form of authority in food provisioning arenas. We reflect on these differences in the discussion section. Finally, we also checked for spurious relations with conditions that could have played a role outside of the key constructs identified. We checked for type of initiator, location, type of key activity, maturity, and size. As reported in Table 7 and 8 only maturity and size have a role in some of the paths.

Findings

Organizing responses to food-related struggles in food provisioning arenas

Our analysis maps out a chronological narrative (Figure 1), which involves the following four distinct stages of organizing responses to food-related struggles in food provisioning arenas. The first stage relates to the initial setting up of forms of authority in food provisioning arenas. The second stage entails the emergence of struggles related to the sociomateriality of food. In the third stage, a new configuration emerges in response to these food-related struggles. Finally, in the fourth stage, a re-definition of forms of authority emerges in these food provisioning arenas.

INSERT FIGURE 1 HERE

Stage 1: Setting up forms of authority in food provisioning arenas. In their initial stage of formation, all AFNs engaged in a process of co-construction of forms of authority in order to organize their food provisioning arenas. Our findings indicate the co-existence of forms of bureaucratic authority based on membership, formalized task-allocation, planning and scheduling, with forms of shared basis of authority, based on fostering members' participation, activism, collective learning and task sharing (Table 3).

INSERT TABLE 3 HERE

In food provisioning arenas where bureaucratic forms of authority prevailed, members negotiated rules and tasks, and formalised membership ('*This project works with a membership and a subscription. You pay at the beginning of the season and can come weekly to harvest the fruit when it suits you*'; NED4). Other food provisioning arenas started with a more political agenda, avoiding too formalized and hierarchical membership rules, while seeking networked and

interpersonal participation rules ('*We started with a group of about 20 unemployed people. The project did not work out and a friend decided to restart with young people, that did not know each other, gathered and returned again to the project*; ESP5).

Stage 2: Emerging struggles related to the sociomateriality of food. After this initial stage of formation, AFNs experienced a period of tensions, mostly due to three different types of sociomaterial struggles (Table 4). *Struggles related to the biology of food* entail cyclical activities of food production, including how to prepare the soil before seeding, finding the right time to seed, scheduling harvest in between members' busy daily and weekly schedules ('*when it's hot and warm in summer we have to harvest everything before the afternoon*'; NED3). Hence, the biology of food intertwines and morphs interpersonal relationships both within (e.g., trust that members do not pick up too much food; feelings that other members do not put sufficient time into growing food) and outside the AFN's boundaries (e.g. problems with outsiders leaving their dogs' faeces in the crop field, or outsiders damaging plants).

Second, *struggles related to the physiology of food* concern challenges in coordinating how to store, transport or distribute food after harvest, how to prepare and cook it, and how to assess its quality and safety. Sometimes, yet not always, these coordination issues concern the use or limitation of space ('*A dedicated area available all week to diversify food distribution over several days,* […] *a refrigerated area to keep products fresh';* ITA2). In this process of entanglement with food provisioning practices, participants need to cope suddenly with food as an object and a 'living entity' that changes over time, and that sometimes deteriorates rapidly. In this struggle participants are confronted with the need to differentiate these practices from similar ones present in mainstream food provisioning systems, while keeping collective participation and a certain degree of efficiency (e.g. what gets rotten in a fridge in a social collective gets rotten in a supermarket, because food deteriorates).

Third, *struggles related to the sociality of food* involve how to combine time for food provisioning, as well as when and how to engage daily/weekly activities, and energize each other to volunteer in the fields, and how often and where to have meals together. In these struggles, food itself - and the spaces where it grows and matures - plays a triggering role. Sometimes these struggles are manifest in challenging or seeking to understand each other to align individual and collective needs or, vice versa, adapting the functioning of the AFN – to the extent that the food matter allows – to the members' needs ('*There are many members who work full-time and have small children. So, they don't have much time to work on the garden*'; NED7).

INSERT TABLE 4 HERE

Stage 3: Re-organizing food provisioning arenas. In line with our sociomaterial lens of analysis, different entanglements between participant and food generated a range of struggles and responses, e.g., from enjoyment and fun, to anxiety and even anger. We found two different patterns of responses to food-related struggles leading to re-organizing the food provisioning arenas (Table 5).

On the one hand, in some arenas, *participants avoided dealing with struggles*, for example due to lack of participation and engagement, lack of time, poor planning and task division, or contextual challenges (Table 5),('*It costs us a lot effort to build trust between members […] We invest so much time in the field activity and to maintain a good internal organization that we have no time left'*; ESP4).

On the other hand, in other arenas, *participants seemed keen to embrace struggles*, and show a more experimental approach to embed food in their organizing arenas. For example, collectively enjoying agricultural practices, or food preparation in events, festivals and rituals

('*Over time the tools have deteriorated so we are considering making a dinner or a cafeta (event) to raise some money to allow us to buy new tools;* ESP1).

INSERT TABLE 5 HERE

Stage 4: Forging forms of authority in food provisioning arenas. Finally, different patterns of food-related struggles coupled with participants' responses had led AFNs to re-configure forms of authority in their food provisioning arenas, thereby either enhancing forms of bureaucratic authority or shared basis of authority (Table 6). For instance, in arenas where bureaucratic forms have been enhanced, participants had engaged in *setting new rules to plan, coordinate and participate*. Accordingly, a core group of participants had emerged to become responsible for taking care of planning and monitoring (long-term) activities and specific operations ('*We have formed a board, to which I belong, which is open to any gardener who wants to participate. Of course, we are not many because there is not a big desire to participate. From the board, we take various responsibilities'*; ESP5). This progressive division of roles and tasks, initially informal and then routinized over time, enacted a shift towards both a more organized form of social order and bureaucratic forms of authority in these arenas.

In arenas where a shared basis of authority was enhanced, participants had engaged in *distributing tasks and responsibilities, developing committees and working groups, leveraging members' trust and interpersonal relations*, and *enhancing members' activism, competence and enthusiasm* (*'[new members] have to belong to a committee, this is a participatory group and that is not a supermarket*'; ESP12). Participants had further developed committees, working teams, shared procedures, and a plethora of voluntary projects based on interactions among members ('*As the collective needs to emerge, we react on them by gathering in groups'*; ESP1). The distribution of activities takes place on a strictly voluntary basis, depending on

members' competencies, interests and aspirations: '*The assembly of the house is the initiator and organizer, and then there are various groups that have emerged'* (ESP1).

INSERT TABLE 6 HERE

Distilling patterns of authority-building processes in food provisioning arenas

Findings from the chronological qualitative analysis formed the initial step for running a QCA to compare and contrast data from the different cases. This analytical step provided a more fine-grained understanding of the specific patterns characterizing the authority-building processes, which were still puzzling after the inductive analysis. The retained conservative solution is presented in Table 7.

INSERT TABLE 7 HERE

From these results, we have identified four distinct patterns, all related to enhancing forms of bureaucratic authority (Table 8). While interpreting the QCA outcomes and the related clustering of the cases, the research team identified two sociomaterial mechanisms (among those identified in Figure 1) emerging as critical to discern between the four patterns of bureaucratic authority-building processes. The first mechanism involves the sociomaterial agency of food that generates struggles in the food provisioning arena. The second concerns the human agency of participants that collectively react to these sociomaterial struggles, neutralizing (by avoiding) or reinforcing (by embracing) them, in relation to their initial forms of authority. We label each of the four emerging patterns of bureaucratization of food provisioning arenas on the basis of these two distinctive mechanisms.

INSERT TABLE 8 HERE

Pattern 1: Embracing responses to multiple food-related struggles. The first pattern refers to food provisioning arenas where participants embracing food-related struggles that led them to the re-enforcement of bureaucratic forms of authority. In these arenas, collectives of food producers and families started by organizing food provisioning through routinized activities and working groups. These arenas were initiated with the aim of re-localising food provisioning and revitalising activities in the neighbourhood. When faced with food related struggles, these arenas responded by experimenting collectively, and then further structured task allocation processes, membership and participation rules ('*We established various committees to organize ourselves. Here we run with commissions that handle different things. In addition, once every month or every two months we gather to have an assembly all together*'; ESP13). This mechanism identified novel forms of bureaucratic authority allocated by participants to working groups or committees within the collectives, in the attempt to engage purposively with emerging struggles. Food plays an indirect role in shaping the authority-building process, which is instead characterized by participants hands-on activism, for example, by organizing meetings where farmers go to show products or explain the origin of the ingredients used by members to prepare meals and for cooking purposes. Participants are often organized in committees in charge of looking for different products. Membership is used proactively to invite outsiders to share experiences and to perform activities to amplify the impact of the community. ('*Also there have been people who are not from the neighborhood that wanted to buy food in our group so they are accepted… There is only one requirement, which is to become a partner of the neighborhood association*'; ESP10). The result of all these activities and group experimentation has been the creation of committees and the definition of new rules.

Pattern 2: Avoiding responses to struggles generated by food biology. The second pattern relates to food provisioning arenas where avoiding struggles associated with the biology

of food led to further re-enforcement of bureaucratic forms of authority. While initially the farmer took responsibility for specific operations in the fields, eventually he struggled to let participants join in and contribute. Farming and harvesting were often organized as part of routinized gatherings, such as periodic meetings for the participants. But their involvement in growing food, taking care of the harvesting, making sure to plan farming activities ahead had often been limited and volunteering for these tasks was not a common practice ('*Participants are supporting our business by paying in advance and sharing the risk […] if the harvest goes wrong, then they share the risk with us. But the supporting in terms of physical work is not generally present. I also don't think people will be interested in helping in the field'* NED4). As a result, tasks were allocated more formally to a leading group or to the farmer directly.

Pattern 3: Avoiding responses to multiple food-related struggles. The third pattern characterises arenas where avoiding various food-related struggles has led to shift from a shared basis of authority to the enforcement of bureaucratic forms of authority. Starting up as social collectives founded by activists with rather networked relations, these arenas progressively defined their food provisioning introducing control on access, membership and more formalised task allocation. These arenas engaged in connecting with other actors in the local context, including other AFNs, regional universities and groups of activists in order to promote local and sustainable development ('*one day, experts from the university came here to explain about other gardens. The idea was appreciated, and it became a proposal to use the land for growing vegetables, and to share it between different associations and with some other people who wanted to work the land*; ESP7). Through these activities, participants defined procedures, assigned roles and responsibilities, for example to engage with farmers, food providers or consumer ethical associations. Activism in these arenas shifted from spontaneous collective action or communication, to well-established and planned activities in dedicated places (e.g. a shop, a warehouse, a kitchen), including transactional relations with other

collectives to source products (‘*The store is also a space that serves them to recruit volunteers, people who want to learn and comes to the farm to help out. In addition, the shop works as a good teaching point, in which the consumer has to understand that the price of vegetables is due to certain things’*; ESP14). Often these relationships are managed through personal networks and informal interactions, but rules are always codified.

Pattern 4: Embracing and avoiding responses to struggles generated by food physiology. Finally, the fourth pattern refers to arenas that, either moving from more shared basis or an already bureaucratic form of authority, have reacted to struggles related to the physiology of food by combining experimentation and rule-setting, leading to a more bureaucratized form of authority. Participants have often sought to learn how to switch/adapt collective activities to share goals and needs that are then reflected in common plans and task-division processes (‘*we moved a lot and contacted different people through email, phone, contacts who were already from the unemployed platform. We also attended meetings of the Valencian country, the meeting for the earth, where we took many directions and little by little we're getting head’*; ESP5). Participation is often spontaneous and the organization of creative space is based on the group or participants’ initiative (‘*Usually someone who comes here is friend of someone. Then you get here and there's a welcoming committee that is in charge to explain how everything works*’; ESP11).

Discussion

Contribution to theories of sociomateriality in organizations

Our findings indicate that food, itself, plays a role in how authority emerges through the biological, physiological and social struggles that it triggers, in entanglement with responses of participants in food provisioning arenas. Zooming into this entanglement, the agentic role of food is always indirect, meaning that food provokes a variety of sociomaterial struggles that generate either embracing or avoiding responses, which, in turn, shape the bureaucratization of

all these arenas. In patterns 2 and 4, however, the agentic role of food is more specific, for example, due to its biology (pattern 2), or physiology (pattern 4).

On the basis of these findings, we suggest that food does not provide just another empirical context for sociomaterial agency that shapes organizations, just as spaces, artefacts or technology do (Orlikowski and Scott, 2008; Leonardi, 2012; de Vaujany et al., 2019). Rather, we argue that food, as a living organism and as an element of congregation, has distinctive forms of agency and effects on organizations in entanglement with human agency. From our cases, we identify three distinctive sociomaterial dimensions that give agency to food as a living organism interplaying with human bodies. The first distinctive material element of food is in its *biology*. Food grows, through plants (and animals, but not in these cases where participants are predominantly vegetarian!), as an agentic combination of land, water, sunlight, air and a number of chemical elements combined in them. Human agency in any organization – not only participants of grassroots collectives as partial organizations, but also (for example) of established farms or companies partnering with farmers (van Hille et al., 2019) – needs to deal with the biology of food. The second key material element of food involves its *physiology*. Different from other objects and bodies, food matures, mutates and perishes remarkably fast; moreover, each specific food changes its nature over time differently in interplay with the environment (e.g. level of humidity, temperature, presence of pathogens). Furthermore, food transforms itself – in interplay with other material agents – through cooking. Humans, not only in grassroots collectives, but in any organization along the supply chain from transport and storage companies to chefs and haute-cuisine critics (Slavich and Castellucci, 2016), interplay with the rapidly changing chemical and organoleptic elements of food. We argue that a third key material dimension of food is its *sociality*. Food brings people together and, at the same time, requires people to gather around it – either as a material necessity or as a ritual – for example during harvest and consumption. This dimension of food plays sociomaterial agency

not only in AFNs but also, for example, in families (Moisio et al., 2004) and social justice organizations (Keevers and Sykes, 2016). These organizations, for example, may either thrive, struggle or even collapse depending on whether and how participants congregate around food. Along with these three dimensions of food agency, our findings suggest that the sociomateriality of food involves a human response. In our empirical cases, for example, we found that participants respond either by avoiding or embracing food-related struggles. This entanglement between multiple food agency dimensions and the responses to their related struggles plays a key role in shaping the organizing in food provisioning arenas.

Generalizing from our empirical cases, we suggest that the sociomateriality of food plays a distinctive yet indirect role – i.e., mediated by organizational responses to food-related struggles – in shaping authority-building processes in partial organizations relative to other types of materiality. It is exactly in theorizing the role of the sociomateriality of food to authority-building in partial organizations that builds upon, and adds to, the rural sociology literature that describes the agentic role of food in AFNs (Murdoch and Miele, 2004; Cherrier, 2017; Sermiento, 2017). Reflecting more broadly on the theoretical boundaries of the sociomateriality of food, we suggest future research to investigate if and how other forms of organizing – beyond partial organizations – are shaped through this food-human agentic entanglement.

Contribution to the literature on authority-building processes in partial organizations

Our findings indicate that the sociomateriality of food, as we theorized above, led to changes in partial organizing in food provisioning arenas. Participants are confronted with, and respond to, the sociomaterial struggles inherent to the nature of food by forming and consolidating what Haug (2013) describes as ‘decided orders’. This implied an increased bureaucratization of a partial organization, for example, through increased planning, formalised membership, and

task divisions among members. For example, this is what happened in our empirical cases in patterns 2 and 3. This shift in the form of organizing is intertwined with the emergence or consolidation of bureaucratic forms of authority. Interestingly, we also found that the emergence or consolidation of shared basis of authority follows more idiosyncratic processes, thus lacking regular patterns of entanglements. Consistently with the idea of a multi-faceted entanglement between social and material agencies, we found that the sociomateriality of food shaped moments of realisation, enjoyment and experimentation (e.g. in patterns 1 and 4), but leading to forms of authority based on hierarchy, membership rules, formalized norms and routines, rather than social interactions, informal ties and personal networks.

Generalizing from food provisioning arenas in AFNs as our context of study, we argue that these findings enrich our understanding of how authority is forged in grassroots collectives, enlarging the spectrum of forms of authority presented in previous studies (Sutherland et al., 2014; Reedy et al., 2016). Our findings support the idea that sociomateriality – and specifically the food-human agentic entanglement – plays an important role for understanding how grassroots collectives and other partial organizations identify their practices as 'alternative', how they organize themselves, and ultimately how they forge authority. In other words, while bolstering the notion that partially organized collectives identify 'anti-hierarchical' forms of authority (den Hond et al., 2015; de Bakker et al. 2017), in our patterns these forms of authority tend to be socially embedded in processes of formalisation and bureaucratization, either through shared 'procedures and rules' or through collective rule-making.

Our research suggests that looking at sociomateriality adds to our understanding of how authority-building processes stem from the 'internal' entanglement of *social and material agencies*, rather than only through engagement with ideology, politics and wider social struggles outside the collective (Soule, 2013; de Bakker et al., 2013). This further informs our theorizing on forms of authority and their intertwined relation with forms of partial organizing

in grassroots collectives. For instance, while Haug (2013: 720-721) suggests that *bureaucratic authority* relates to and emerge with the decided order of the collective, and *shared basis of authority* relates to and emerge with the networked order of the collective, in his theorizing there is still limited understanding of when and how these different forms of authority may emerge. In our study, we extend this perspective by developing an approach based on sociomateriality to depict *when and how* these processes may unfold.

Future research and limitations

Our study helps to refine theory on partial organizations by explaining how the sociomateriality of food shape their authority-building processes over time. Specifically, our findings show that analyzing the temporal sequence of the entanglement of material and human agencies may help predict how partial organizations will forge authority over time. Future research may seek to tackle the limitations of our study, for example by extending its focus on authority-building processes related to shared basis of authority to further clarify whether other sociomaterial entanglements and patterns may explain their emergence and consolidation. Also future research may seek to focus on other types of arenas in grassroots collectives, to enlarge the sample to new geographical areas, and to further consider cultural differences between countries and cases. Generalizing further, it may be relevant to understand how the sociomateriality of food plays a remarkable role in other forms of partial organizations beyond grassroots collectives.

Interpretations and meanings of authority are likely to vary, and such cultural and contextual factors could usefully be explored. For instance, our study is not conclusive on what leads to more shared forms of authority over time in food provisioning arenas in AFNs. Future research may investigate, on a larger sample or more in depth, when and how the entanglement between food and human agency lead to more shared forms of authority. We suggest extending this

approach to other forms of social collectives, where the sociomateriality of things can help to understand the prefigurative meanings of forging authority. This may follow the plea to extend our understanding of how prefigurative practices inform the emergence and unfolding of 'alternative organizational principles' (de Bakker et al. 2017: 27) in social collectives attempting to combine 'protest and contestation' with 'experimentation'. For example, the different ways of engaging with the sociomaterial 'nature of food' in AFNs seems connected with multiple visions about futures, at times utopian or dystopian. Prefigurative meanings associated with the sociomateriality of food are seemingly unfolding from these different realisations and interpretations of food provisioning. Similarly, in our approach we have noticed intriguing echoes between the way AFNs engage with the 'nature of food' and the way other social collectives engage with the 'nature of protest or contestation'. Both are understood as socially constructed, contested, ambiguous, contentious, and multidimensional. Both are connected to forms of order and authority-building processes. We believe these parallels merit further exploration.

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Tables and figures

Table 1: Description of the selected Alternative Food Networks cases

Case #	Case code	Number members at t=1	Type of AFN	Organization and historical context	Year of foundation	Year of inquiry (t = 1)	Country	Primary data # field survey or interview with community members	Secondary data # documents consulted
1	NED 1	240	Community Supported Agriculture (CSA)	Bioakker: Farmer-initiated agricultural self-harvest scheme with local consumers	2003	2014	The Netherlands	10	13
2	NED 2	160		In Het Volle Leven: Farmer-initiated agricultural self-harvest scheme with local consumers	2006	2014	The Netherlands	19	5
3	NED 3	97		De Volle Grond: Farmer-initiated vegetable box scheme with local consumers	2010	2014	The Netherlands	34	8
4	NED 4	40		Us Hof: Farmer-initiated agricultural self-harvest scheme with local consumers	2014	2014	The Netherlands	4	3
5	NED 5	275		Nieuwe Ronde: Farmer-initiated agricultural self-harvest scheme with local consumers	2005	2014	The Netherlands	43	15
6	NED 6	95		Asum te Technum: Farmer-initiated agricultural self-harvest scheme with local consumers	2013	2014	The Netherlands	13	2
7	NED 7	200		Niuewe Akker (Haarlem): Farmer-initiated agricultural self-harvest scheme with local consumers	2009	2014	The Netherlands	110	19
8	ITA1	25		Gasualmente: Consumer-	2010	2012	Italy	5	18

				founded group procuring food from several farmers					
9	ITA2	30	Solidary Purchasing Groups	BibiGAS: Consumer-founded group procuring food from several farmers	2008	2012	Italy	8	1
10	ESP1	300	Community Gardens	Benimaclet: Community garden self-managed by group of activists for self-sufficiency	2011	2014	Spain	2	7
11	ESP2	100		Bicihuertos: Community gardens privately owned by agricultural expert but self-managed by users	2012	2014	Spain	2	7
12	ESP3	300		Burjassot: Community gardens owned by the municipality but self-managed by activists and local families	2012	2014	Spain	2	5
13	ESP4	15		Aixada com Eixida: Community garden initiated by the owner based on solidarity and social cohesion principles	2012	2014	Spain	5	2
14	ESP5	15		Terra i Canya: Self-organized community garden initiated by activists driven by food sovereignty principles	2013	2014	Spain	2	3
15	ESP6	90		Huertos del Turia: Community gardens privately owned by agricultural expert but self-managed by users	2012	2014	Spain	2	5
16	ESP7	300		La Coscollosa: Community gardens owned by the municipality but self-managed by activists	2011	2014	Spain	3	6
17	ESP8	15		Ca Favara: Community garden initiated by activists for recovering	2013	2014	Spain	1	3

				degraded land and creating social cohesion					
18	ESP9	100	Consumer groups	Huerto City: Self-organized community garden initiated by experts and driven by food sovereignty principles	2012	2014	Spain	85	6
19	ESP10	250		CSOA L'Horta: Community garden initiated by group of consumers recovering degraded land and creating social cohesion	2012	2014	Spain	85	15
20	ESP11	19		Patraix: Self-organized consumer group of volunteers driven by food sovereignty principles	2011	2014	Spain	3	8
21	ESP12	20		Cabasset D'Arrancapins: Self-organized group of families ordering food from farmers and distributors	2013	2014	Spain	3	14
22	ESP13	18		Algiros: Self-organized group of families ordering food from farmers and distributors	2012	2014	Spain	2	13
23	ESP14	15	Community gardens and consumer groups	l'Hort del Carmen: Self-organized community garden initiated by activists driven by food sovereignty principles	1999	2014	Spain	3	5
24	ESP15	15	Community gardens	Mateta de Fenoll: Self-organized group initiated and managed by families ordering food from farmers and distributors	2008/2009	2014	Spain	3	2

Table 2: QCA - Truth Table

BUR	EMBR	BIO	MAT	SOC	AGE	SIZE	Out	incl	PRI	CASES
0	0	0	0	0	0	0	1	0.949	0.783	NED6
0	0	0	0	1	0	0	1	0.971	0.880	ITA1, ESP4
0	0	0	0	1	0	1	1	1.000	1.000	ESP7
0	0	0	1	0	0	0	1	1.000	1.000	ITA2, ESP5
0	0	0	1	0	1	0	1	1.000	1.000	ESP14
0	1	0	0	1	0	0	0	0.875	0.429	ESP8, ESP9, ESP15
0	1	0	1	0	0	0	1	1.000	1.000	ESP11
0	1	1	0	0	0	0	0	0.828	0.577	ESP2, ESP6
0	1	1	0	0	0	1	0	0.683	0.227	ESP1, ESP3
1	0	0	1	0	1	1	1	1.000	1.000	NED1
1	0	1	0	0	0	0	1	0.970	0.923	NED3, NED4
1	1	0	0	0	0	1	1	1.000	1.000	ESP10
1	1	0	0	1	0	0	1	0.946	0.722	ESP12, ESP13
1	1	0	0	1	0	1	1	1.000	1.000	NED7
1	1	0	1	0	1	1	1	0.950	0.688	NED5
1	1	1	0	0	1	1	1	1.000	1.000	NED2

Note: BUR (initial bureaucratic authority), EMBR (embracing response to struggle), BIO (biological struggles), MAT (material struggles), SOC (social struggles), AGE (age of group), SIZE (size of group).

Table 3: Representative quotes underlying first-order concepts and second-order themes related to setting up forms of authority

Theme: Co-constructing forms of bureaucratic authority	
First-order concepts	**Exemplary quotes**
Definition and control of membership rules	"One evening I was talking during a dinner with people for the neighborhood interested in our project, who decided to sign a contract and become member." (**NED2**) "There are three groups of people, CSA members- who pay for and consume the vegetables, volunteers and clients" (**NED3**)
Formalised task-allocation	"To allow the producers to sell directly to us, we officially registered as an association." (**ESP10**) "We established various committees to organize ourselves. Here we run with commissions that handle different things. One of the most important things that was settled was a commission to scout the producers." (**ESP13**)
Planning and scheduling	"At first, we did not ask for things in bulk, but we asked for boxes that we just had to share and thus the organization was very basic. We met here, and distributed the vegetables. We have always met here since then." (**ESP13**) "We first started as a project with vegetable box scheme with regular schedules and harvesting periods. All was scheduled." (**NED5**)
Theme: Co-constructing forms of shared basis of authority	
Supporting collective participation and activism	"[…] even if we were not producers, we were involved in agro-ecology networks, thus we contacts a lot of different people through email, phone, all from the unemployed platform." (**ESP5**) "We set a date that coincided with the anniversary to start cleaning, and then leveraging that day we did activities, made meals, built a wooden geodesic dome whose bars had been previously built in the art school." (**ESP8**)
Organizing workshops, meetings, events to share practices	"The gardens have been created for leisure activities, for growing your own food and green vegetables of Km 0. We gave numerous talks and workshops to inform on how to crop in each season, soil health, use of fertilizer, and synergies between crops" (**ESP2**) "To facilitate people to get empowered we conducted workshops as well as theoretical and practical training in various fields, and for transforming this balcony in an urban garden" (**ESP9**)

Table 4: Representative quotes underlying first-order concepts and second-order themes related to struggles in food provisioning arenas

Theme: Emergence of struggles related to the biology of food	
First-order concepts	**Exemplary quotes**
Harvesting	"Maybe someone is taking too much food when harvesting, but I'm not sure. Because it is quite difficult to figure out. Maybe they cheat. So, it's difficult to reach them." (**NED2**) "Especially when it's hot and warm in summer we have to harvest everything before the afternoon." (**NED3**). "It's hard to get people for harvesting." (**NED4**)
Composting and managing manure	"The hardest thing to get across to the public (i.e. members) is to make them understand that the soil has to be manured to keep it fertile and productive. They do not understand that nutrients are depleted." (**ESP6**). "Each compost bin belongs to two or three plots, which is not too many to make it work if they coordinate a bit. So, like everything, there are composts working better and other being used as warehouse, and are full of plastic bottles and so on." (**ESP3**).
Watering, irrigating and dealing with drought	"To improve the space between the roads path. It is not big enough. Certain vegetables don't grow well because we have a very dry July." (**NED4**). "A negative factor this year has been the little rain in the last 6 months, the driest seasons since there are records in the area, and a lot of hot air that contributes to a drier ground." (**ESP2**). "It is very hard to have a garden without water infrastructure as any flower garden around Valencia has. After Roberto brought pipes to make drip irrigation and with that we have been running this summer and now this winter." (**ESP8**)
Managing weeds	"[…] most people just have too much to do. But this year there are strawberries, and I'll send mail if you don't have anything to do you can come and weed for the strawberry plants on the weekend. It's also not practical about the time as well because I'm there on weekdays but they are at work and when they are available on Sunday I'm not there." (**NED6**)
Protecting plots	"Once some plots close to the road were damaged, we made an event to raise funds and install a fence, pylons, etc. together." (**ESP1**) "We have some problems with the dog walkers, and we have suffered some robberies from outsiders this summer." (**ESP8**)
Theme: Emergence of struggles related to the physiology of food	
Dealing with costs of food	"It is also costly to adjust to the closed-box model because it is a big change from what we were used to in the supermarket: e.g. I want this and not the other; I want one and not seven." (**ESP11**). "The prices seem very expensive to the people compared to the prices of the cooperative. […] People do not understand the concept of organic and all the work behind it." (**ESP5**). "Although there are many people participating, in practice we consume like no more than five families. And this bring us to the situation that there is not enough strength to demand all products we would like." (**ESP11**).
Managing food quality and quantity	"Food product quality control in this context is a challenge." (**ITA2**). "Because they are all on the holiday and there are many vegetables left." (**NED1**) "The tasks that costs them more work is to give commercial exit to the products. They have to be constantly working on it, and do not have much time to do it." (**ESP14**)
Handling food distribution	"During their first year we face some problems, mainly internal conflicts. [For example] when we used a vegetable box system it didn't work and we preferred a self-harvest system." (**NED5**). "There are also problems concerning logistics […]. A need for a dedicated area available all week to diversify the food distribution over several days, and to develop a refrigerated area for keep products fresh. […] A warehousing area

	for certain products such as pasta, olive oil, wine […] A small operational office and work area is also needed." (**ITA1**). "We also have legumes and oil, but the new order of oil has not yet happened since we have not reached the minimum required" (**ESP10**) "Xuso bring us the products, only through telephone, and that's not the same as going to the farm to smell the soil and shit of the horse, which opens all the pores of the skin." (**ESP10**) "This committee has a big job because after doing the product listing, collects orders from each member, and then puts together the collective order for the producers." (**ESP13**)
Theme: Emergence of struggles related to the sociality of food	
Timing and enthusiasm	"We invest so much time in the field activity and to maintain a good internal organization. We have no time left to also be sellers, distributors and commercial managers." (**ESP4**). "If the group stays like this, I see it stagnant. An evolution is needed. People with motivation and time that bring new energy." (**ESP10**). "Now we are less than 25 because, when bigger responsibilities came, some people quit as it is normal. It happens in all kind of different groups." (**ESP13**). "We are currently in a transition period, as some people who had participated in the initiative from the beginning chose to go." (**ESP9**) "Look, I hate to say it, but really so far, we meet once a month. Thus there is only time to get organized for the purchase, not to get into deep topics and debates." (**ESP10**)
Dealing with group size and diversity	"The high number of diverse members with the group, including students and young unemployed graduates […] poses problems." (**ITA1**). "To coordinate so many people, which is very different from each other, is not an easy task." (**ESP7**) "There have been times we did not have all products but mainly because we needed people to find them. Also there have been products we could not order as for getting them we needed to be a larger number of people" (**ESP13**)
Family ties and duties	"There are many members who work full-time and have small children. So, they don't have much time to work on the garden." (**NED7**). "Since the beginning, the social activities did not work out. The projects were very interesting but all participants had families and many different projects at a time so we couldn't find the time to push them." (**ESP15**).
Social conditions	"The conditions are being hard, and the results are not what they should be socially speaking. The circumstances are tremendous […] in the sense that there are squatters […] with all the consequences." (**ESP8**).

Table 5: Representative quotes underlying first-order categories and second-order themes related to organizing responses

First-order concepts	Exemplary quotes
Theme: Struggle-avoiding organizing responses	
We have no time for struggles	"There are lots of suggestions. Mostly I reply that you can do it by yourself. Because I don't have time." (**NED1**) "Most [members] just have too much to do. […] It's also not practical about the time: […] I am there on weekdays but they are at work and when they are available on Sunday I am not there." (**NED6**) "We have to be constantly working on it, and do not have much time to do it." (**ESP14**)
We do not seek for struggles	"Pedro complains about the lack of involvement of some of the gardeners, as he has to guide them like little children." (**ESP2**) "If the rest of the gardeners do not respect the board and they do not see you as an authority because you are just another gardener. You are nobody and as the board has no power either, this is sometimes become a cumbersome task." (**ESP7**) "I […] wonder what will happen to the farmers if this movement of having a field at home for your own consumption continues growing. Farmers are the ones who really know about growing food, about keeping a good growing circle." (**ESP10**)
We have/had too much struggle	"For organizational reasons, the orders cannot be delivered the same day from the Solidarity Purchase Group or from other seven Solidarity Purchase Groups in the city. […] The complexity of managing purchases and deliveries, poses problems of finding adequate solutions to keep the non-profit association running efficiently." (**ITA1**) "We are often under pressure, we need to differentiate products and to reach out to more producers locally, which is not so easy." (**ITA2**) "Maintaining ongoing relationship with members is the most difficult issue in my opinion. […] They stop asking during holidays or summer, and that's a big disadvantage" (**ESP4**)
Theme: Struggle-embracing organizing responses	
We consider the struggle as an individual member's choice	"We do not oblige members to work in a farm but there are some times [when] people who want to do [it]." (**NED2)** "Because it's enough for everyone to organize their own things […] Here everyone organizes himself as [s]he can, and this has to be respected. In fact, that's the requirement to participate, that the different situations of everyone are respected. We adapt to our possibilities and the time we have." (**ESP15**)
We enjoy and learn from struggles	"There are vegetarians and who is not. When non-vegetarians proposed to buy meat directly to a slaughterhouse […] they went to visit and decided to get it. […] Things are not prohibited, we are inclusive." (**ESP13**) "We believe that social interaction is important. By self-harvesting, members know the land and know the community. It develops 'natural ties'" (**NED5**) "It is all very slow, but the pathways are emerging! Even if we go slower than anyone in the world, [we are] going (**ESP8**). We want it to be a learning space in which different values [about food practices] are transmitted." (**ESP9**) "What is interesting [to us] is learning. For now, the consumer group is in its learning phase." (**ESP11**) "There are people who also like the closed-box model because it enhances their imagination and turns it over into a more creative cooking." (**ESP11**)
We expected to struggle	"I already knew that if you put together students from architecture and a vacant lot in southern Valencia, and more precisely in this neighbourhood, things would have been hard…" (**ESP8**). "You can go to an organic store, grab the box and take it with you, pay and leave. But then you have to consider, do we want to just distribute or to participate? That's the dilemma. And here, in this group, we decided to participate more than just distribute." (**ESP11**). "The idea was not to focus on the gardens as an end, but […] as means for the people to approach not only the gardens but also other activities." (**ESP1**).

We struggle together	"If the water does not reach the fields, we all lose or, if we water wrongly, it is also bad for everyone, etc. […] Here everything belongs to everybody, problems with water affect everyone." (**ESP1**) "Then there are always some who have never contributed to common tasks […] This is not about gardening but of human organization. It also assumes that everyone who said yes is involved in common tasks." (**ESP1**) "There are extraordinary assemblies because now the group is in crisis. It will not disappear but it is having a change." (**ESP11**)
We adapt to the struggles	"We realized that the problem was due to too any assemblies that were held weekly […]. Thus, we realised that we were failing with too many assembles" (**ESP1**) "I support the closed box, that is, to consume whatever the farmer has. […] otherwise it is like reaching supermarket models, where farmers would have to plant only what is requested […] Obviously you have to adapt to what the farmer is growing and her/his way of doing things." (**ESP10**) "Well, you realize that in the end all the ingredients together require more than you know and we do not yet know how to let everything come together." (**ESP8**)

Table 6: Representative quotes underlying first-order concepts and second-order themes related to emerging forms of authority

Theme: Forging forms of bureaucratic authority	
First-order concepts	**Exemplary quotes**
Setting new rules to plan, coordinate and participate	"… to coordinate so different people is not an easy tasks. You're nobody and the board has no power either. So yes, it is important that the council [municipality] played a role to support the board to set rules …" (**ESP7**) "Last summer, I needed help. There was an upcoming music festival and I made a deal such that each participant working in the garden could get a free ticket. So [now] every year there is a festival organized for the opening of the season, and at the end of the season" (**NED6**). "I also plan to get members more involve in the project. Because they are all on the holiday and there are many vegetables left." (**NED1**)
Formalising task-allocation	"We have tried to set up a field planning in the garden, we have our own page where we try to mark the crops and the different plants. [..] we try to plan everything and have it updated and well-defined targets" (**ESP5**). "We developing a 'Community-Supported Agriculture scheme'. We link the idea of [member] interference: people want to be involved in this process. So, we are still developing this scheme. We doadministration within the family." (**NED4**).
Allocating tasks to leading members	"All the work is done by leading farmers […] The other community members hardly come to the farm. […] In the morning, we [farmers] sit together to have a coffee and then distribute the task. We distribute [boxes with food products] twice a week, on Wednesday and on Friday." (**NED3**)
Theme: Enhancing forms of shared basis of authority	
First-order concepts	**Exemplary quotes**
Distributing tasks in committees and working groups	"[…] Everything is decided in assemblies, previously every two weeks, now once a month. […]." (**ESP11**) "When joining someone explains we function like a participatory group not a supermarket. Each participant has to join a committee." (**ESP13**). "The assembly is the initiator and organizer, and then various groups have emerged: the old orchards, the new orchards, the parents groups, and educational projects, and others. […] There are parents running workshops for children, workshops to make soaps, workshops to make bread, etc." (**ESP1**)
Leveraging members' trust and interpersonal relations	"This system works only with trust. […] people pay for the right to harvest, but I don't look when they come. I trust that they take only what they need. […]." (**NED2**) "Members have also organized some workshops themselves like seed exchanges and training activities. The council has assigned an agronomist to coach members. After that we believe members can continue on their own**."** (**ESP3**)
Enhancing members' activism, competence and enthusiasm	"The general attitude of this group is to not use vetoes**;** we try to do to increase of responsible consumption." (**ESP13**) "Our organization is based on four levels: awareness, engagement, training and enthusiasm. Each participant belongs to different levels, and accordingly different teams are formed. We believe that in this way a hierarchy is reached naturally." (**ESP9**) "Each member moves to another house to pick up the ordered food products. It is like going to visit a friend**.** If you have more relationship with that member you drink a beer with him, otherwise you pick your product, pay and leave." (**ESP15**)

Table 7: The retained Conservative solution.

Conservative solution paths	Consistency	Coverage	Cases covered
Path 1: bur*embr*bio*mat*SOC*age	0.973	0.397	ITA1,ESP4; ESP7
Path 2: bur*embr*bio*MAT*soc*size	1.000	0.347	ITA2,ESP5; ESP14
Path 3: BUR*EMBR*bio*mat*SOC*age	0.954	0.406	ESP12,ESP13; NED7
Path 4: BUR*EMBR*bio*mat*age*SIZE	1.000	0.330	ESP10; NED7
Path 5: BUR*bio*MAT*soc*AGE*SIZE	0.958	0.249	NED1; NED5
Path 6: bur*bio*MAT*soc*age*size	0.979	0.336	ITA2,ESP5; ESP11
Path 7: BUR*embr*BIO*mat*soc*age*size	0.970	0.231	NED3,NED4
Path 8: BUR*EMBR*BIO*mat*soc*AGE*SIZE	1.000	0.123	NED2
Path 9: bur*embr*bio*soc*age*size	0.958	0.408	NED6; ITA2,ESP5

Note: overall conservative solution consistency is 0.946 and coverage is 0.840

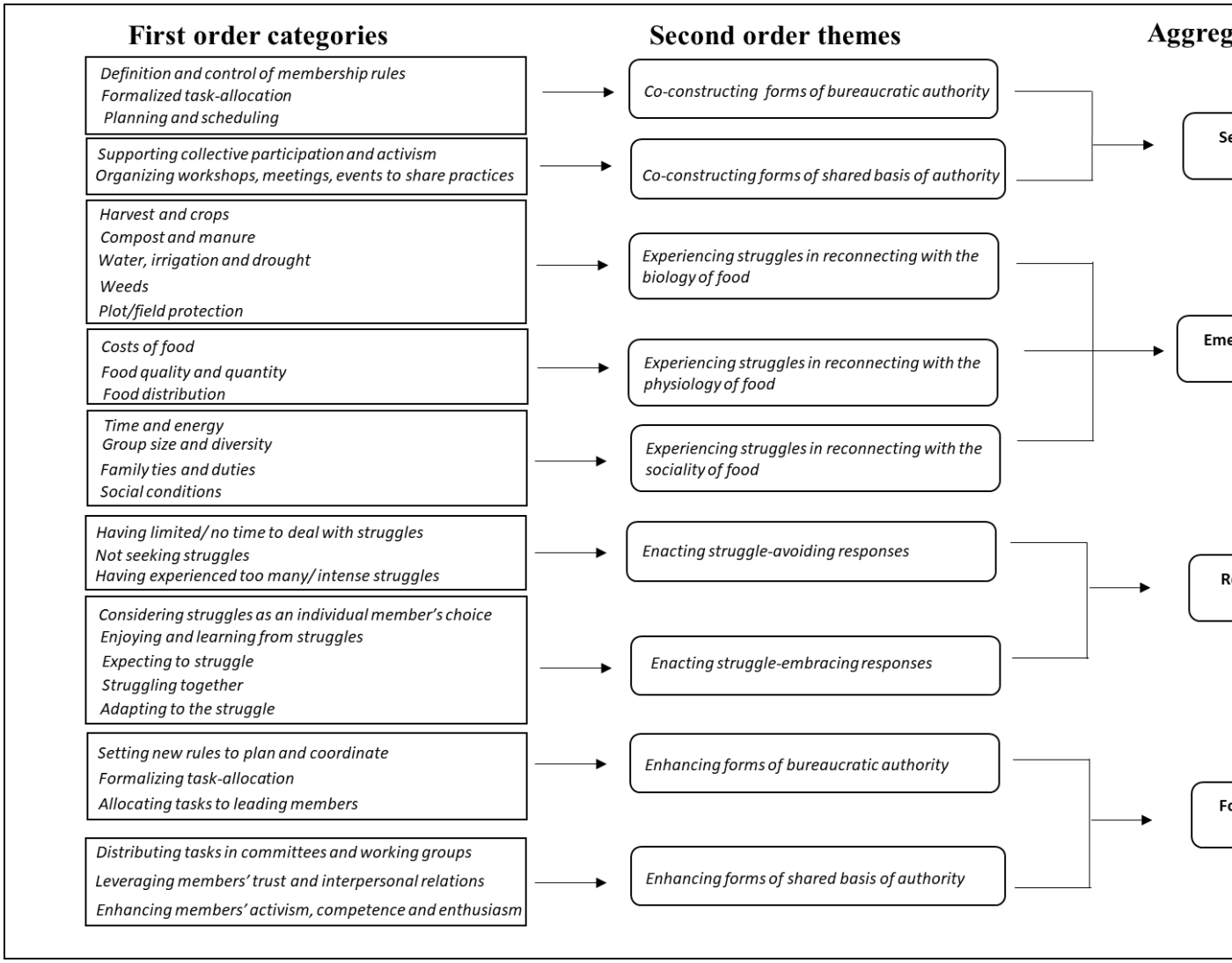
Table 8: Patterns of authority building processes in food provisioning arenas[2]

Type of pattern	Chronological dimensions					QCA Path	Cases covered
	Prevailing form of authority in the initial stage	*Type of prevailing food-triggered struggle*	*Type of organizational responses*	*Emerging form of authority*	*Control Variables*		
Pattern 1: **Food organizing in hardworking arenas**	Bureaucratic	Biology of food	Embracing	Re-enforcement of bureaucratic forms of authority through struggle-embracing responses	Old, large	8	NED2
		Sociality of food			Young	3	ESP12; ESP13; NED7
		Mix of struggles			Large	4	ESP10; NED7
Pattern 2: **Food organizing in routinized arenas**	Bureaucratic	Biology of food	Avoiding	Re-enforcement of bureaucratic forms of authority through struggle-avoiding responses	Young and small	7	NED3; NED4
Pattern 3: **Food organizing in hands-off activism arenas**	Shared basis	Sociality of food	Avoiding	Emergence of bureaucratic forms of authority through struggle-avoiding responses	Young	1	ITA1; ESP4; ESP7
		Physiology of food			Small	2	ITA2; ESP5; ESP14
		Mix of struggles			Small, Young	9	NED6; ITA2; ESP5
Pattern 4: **Food organizing in learning-by-doing arenas**	Bureaucratic	Physiology of food	Mix of avoiding and embracing	Enforcement of bureaucratic forms of authority through mixed struggle-avoiding and embracing responses	Old, Large	5	NED1; NED5
	Shared basis				Young, Small	6	ITA2; ESP5; ESP11

Source: our analysis – further details of the QCA results in Appendix 1

Figure 1: Analytical code process

[2] QCA presents equifinal patterns towards the outcome of interest, allowing for cases to be present in multiple paths as they can be explained by different combinations of sets. Additionally, while the coverage of our overall solution (0.840) is high enough to support the claims of sufficiency that we make, along with consistency (0.946), because coverage is not total, two cases are not explained by the solution and so do not appear in the patterns.



Appendix A

Qualitative Comparative Analysis (QCA) was introduced to support our inductive and theory-building approach, by adding an iterative and systematic methodology that compares cases for the consistency and necessity of conditions in relation to an outcome, in our case an enhanced form of bureaucratic authority, although our original aim was also to account for a shared basis of authority. To this end, we ran several combinations of conditions, including with different approaches to coding (such as fuzzy vs. crisp, coding the two types of authority as mutually exclusive or as congruent), however we were unable to derive a solution for shared authority that had sufficient coverage and consistency and minimal deviant cases. This inability to find a pattern for shared authority suggests that it may not be the inverse of bureaucratic authority, and so different factors may determine this outcome that were not the focus of this study. This is a novel contribution in and of itself and highlights the benefits of a QCA approach

to authority, as it is a methodology that embraces principles of causal complexity such as equifinality. With this in mind, it was decided to focus on the patterns that were emerging from our analysis of bureaucratic authority.

In order to derive a solution pathway for bureaucratic authority that met criteria for empirical relevance, consistency (akin to significance) and coverage (akin to explained variance) we explored several coding approaches (see table A7) and several combinations of conditions. In the field of QCA it is important to keep the number of conditions low due to the problem of limited diversity, which is evident when numerous combinations of conditions and outcome are not empirically supported – termed logical remainders (Schneider and Wagemann, 2010, p. 6). This is why extensive knowledge of the cases and theory is vital to QCA. Analysis was done in R 3.5.1 (R Core Team, 2018), using the QCA (Dusa 2019) and SetMethods (Ioana-Elena & Schneider 2018) packages, and involved tests for skewness, necessity and sufficiency (Thiem, 2016) prior to the determining of solution pathways.

The cases were coded (see Table A7) according to their membership in the condition and outcome sets, using fuzzy (allowing for degrees of set membership) rather than crisp (binary) sets. Then the conditions were tested for skewness – the threshold was set at 20%, which was met by all conditions apart from age. It was decided to include age regardless as its high relevance of necessity (RoN) suggested this condition was empirically relevant. The outcome set was skewed towards the presence of bureaucratic authority, which explains the limited contribution to discussions on shared authority.

The conditions were then tested for necessity, with several conditions having relevance of necessity (RoN) over 0.8. However no conditions had such values for the consistency and coverage of necessity, suggesting that while the conditions were empirically relevant, they were not necessary, and so the focus of the analysis was on relations of sufficiency. The low sufficiency of individual conditions led us to use a high raw consistency threshold of 0.9 in creating the truth table (Table A1). Combinations of conditions met this criteria, which can be seen in the solution pathway (depicted with an asterisk), and which we have termed and discussed as paths, as in, for example, Table A2.

Our Qualitative Comparative Analysis (QCA) approach involves minimising a truth table using set theory and Boolean logic, from which can be derived solution pathways for membership in the outcome set of Bureaucratic Authority at the time of study ('out' in table A1).

Table A1 - Truth Table

BUR	EMBR	BIO	MAT	SOC	AGE	SIZE	out	Incl.	PRI	CASES
0	0	0	0	0	0	0	1	0.949	0.783	NED6
0	0	0	0	1	0	0	1	0.971	0.880	ITA1, ESP4
0	0	0	0	1	0	1	1	1.000	1.000	ESP7
0	0	0	1	0	0	0	1	1.000	1.000	ITA2, ESP5
0	0	0	1	0	1	0	1	1.000	1.000	ESP14
0	1	0	0	1	0	0	0	0.875	0.429	ESP8, ESP9, ESP15
0	1	0	1	0	0	0	1	1.000	1.000	ESP11
0	1	1	0	0	0	0	0	0.828	0.577	ESP2, ESP6
0	1	1	0	0	0	1	0	0.683	0.227	ESP1, ESP3
1	0	0	1	0	1	1	1	1.000	1.000	NED1
1	0	1	0	0	0	0	1	0.970	0.923	NED3, NED4
1	1	0	0	0	0	1	1	1.000	1.000	ESP10
1	1	0	0	1	0	0	1	0.946	0.722	ESP12, ESP13
1	1	0	0	1	0	1	1	1.000	1.000	NED7
1	1	0	1	0	1	1	1	0.950	0.688	NED5
1	1	1	0	0	1	1	1	1.000	1.000	NED2

The number of logical remainders (combinations of conditions not empirically supported) was high enough to prevent us from using the most parsimonious solution, especially given our epistemological positioning as QCA 'realists' rather than 'idealists', in that we avoid excluding explanatory relations by using the broader conservative solution (Schneider, 2018). Using theory and case analysis, we formulated directional expectations as falsifiable hypotheses (Table A3) for each condition (Berg-Schlosser and De Meur, 2009), which allowed us to determine an intermediate solution (Table A4) along with the initial conservative solution (Table A2) (Maggetti and Levi-Faur, 2013; Schneider and Wagemann, 2013) . The intermediate solution had good coverage and consistency and the same number of deviant cases in kind as the conservative solution. However, it was decided to treat the conservative solution in detail in the analysis due to our inductive approach, which favours the discovery of unexpected set relations in the empirical data set. There were two models for the conservative solution, with the only difference in formulation occurring in the final path, and so the model with the higher

consistency and coverage for the path that differed (as overall consistency and coverage for the solution remained the same) is presented in the main text, although Model 2 is reported in Table A5 in the interest of transparency. Multiple models for the same solution pathway is a sign of possible model ambiguity and it is good practice within the field of QCA to report such occurrences (Baumgartner and Thiem, 2017). Additionally, the pathway for the negative outcome, useful for accounting for causal complexity, had low coverage and a large number of deviant cases in kind, which is to be expected given the skew in the cases towards bureaucratic authority rather than the absence of bureaucratic authority (i.e. a negative outcome).

The accepted conservative solution included some deviant cases in kind of consistency (and thus were not explained by the proposed pathways, see lower right quadrant on figure A1). In this vein, deviant cases of consistency and coverage were paired with similar typical cases for case analysis. Finally, the truth tables and all solution models are reported here in the interest of transparency (Baumgartner and Thiem, 2017; de Block and Vis, 2018).

The full database can be found at the end of the document, and the conditions in the tables and figures below are referred to using abbreviations: BUR (initial bureaucratic authority), EMBR (embracing response to struggle), BIO (biological struggles), MAT (material struggles), SOC (social struggles), AGE (age of group), SIZE (size of group).

The conservative solution shows the set relations between the seven conditions (initial bureaucratic authority, embracing response, age, size and biological, material and social struggles) and the outcome of bureaucratic authority, using only the combinations of conditions or paths that are evidenced by cases. The overall coverage and consistency of the conservative solution is good (0.946 and 0.840 respectively) and there are only two deviant cases of consistency in kind (NED5 and NED6, discussed above). Table A2 splits the pathway into combinations of conditions, which has structured our discussion of the solution in the paper. Each path shows set relations that were sufficient for the outcome of bureaucratic authority and all the paths have a consistency of over 0.950. As such, these paths

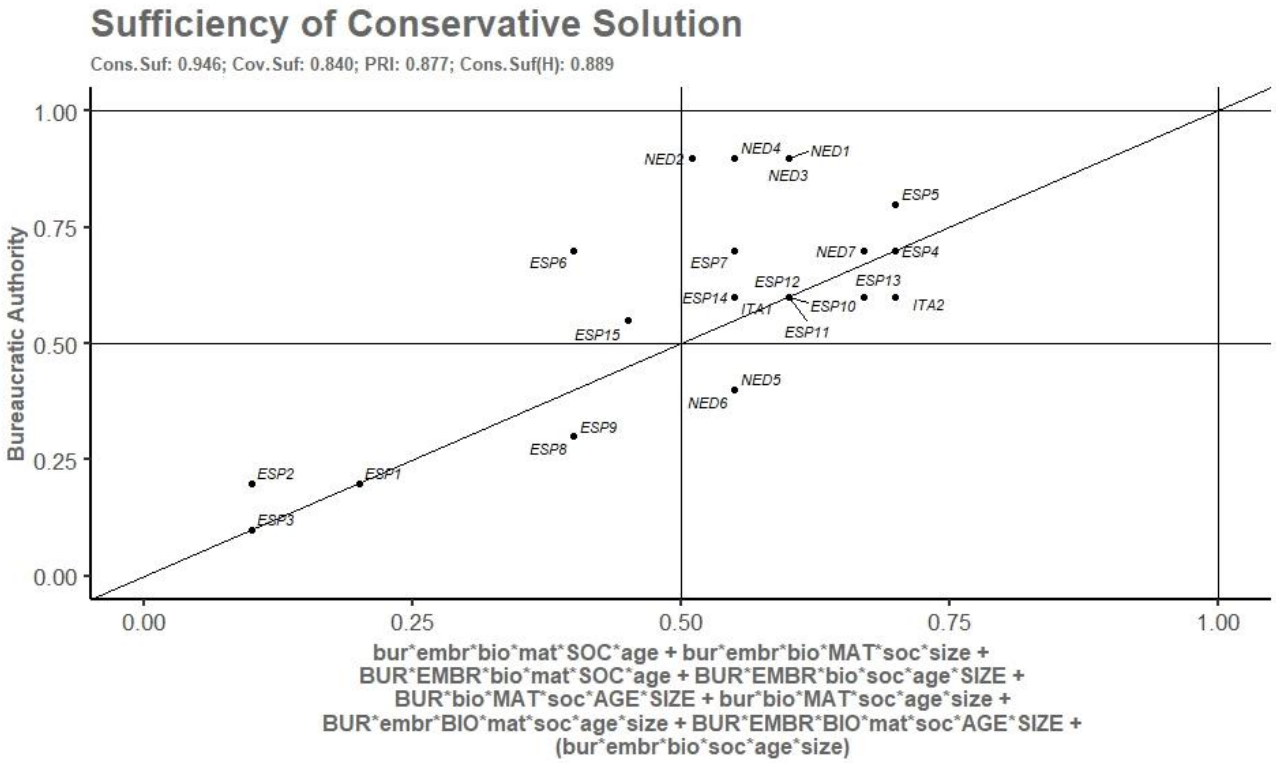
represent the different processes that can lead to bureaucratic authority, and so embrace the concept of equifinality, which is a core strength of QCA as a methodology. In addition, the focus on combinations of conditions better represents the holistic and complex social reality, not least through the active inclusion of 'spurious' or contextual conditions.

Table A2: The retained Conservative solution.

The overall conservative solution consistency is 0.946 and coverage is 0.840

Conservative solution paths	**Consistency**	**Coverage**	**Cases covered**
Path 1: bur*embr*bio*mat*SOC*age	0.973	0.397	ITA1,ESP4; ESP7
Path 2: bur*embr*bio*MAT*soc*size	1.000	0.347	ITA2,ESP5; ESP14
Path 3: BUR*EMBR*bio*mat*SOC*age	0.954	0.406	ESP12,ESP13; NED7
Path 4: BUR*EMBR*bio*mat*age*SIZE	1.000	0.330	ESP10; NED7
Path 5: BUR*bio*MAT*soc*AGE*SIZE	0.958	0.249	NED1; NED5
Path 6: bur*bio*MAT*soc*age*size	0.979	0.336	ITA2,ESP5; ESP11
Path 7: BUR*embr*BIO*mat*soc*age*size	0.970	0.231	NED3,NED4
Path 8: BUR*EMBR*BIO*mat*soc*AGE*SIZE	1.000	0.123	NED2
Path 9: bur*embr*bio*soc*age*size	0.958	0.408	NED6; ITA2,ESP5

Figure A1: Plot showing the sufficiency of the Conservative Solution.



Legend: Axis X indicating 'the conservative solution'. Axis Y 'presence in the outcome set of bureaucratic authority'. Cases clustered around the indicated diagonal axis are those best explained by the solution.

Table A3 - Directional expectations of the conditions when Bureaucratic Authority is present

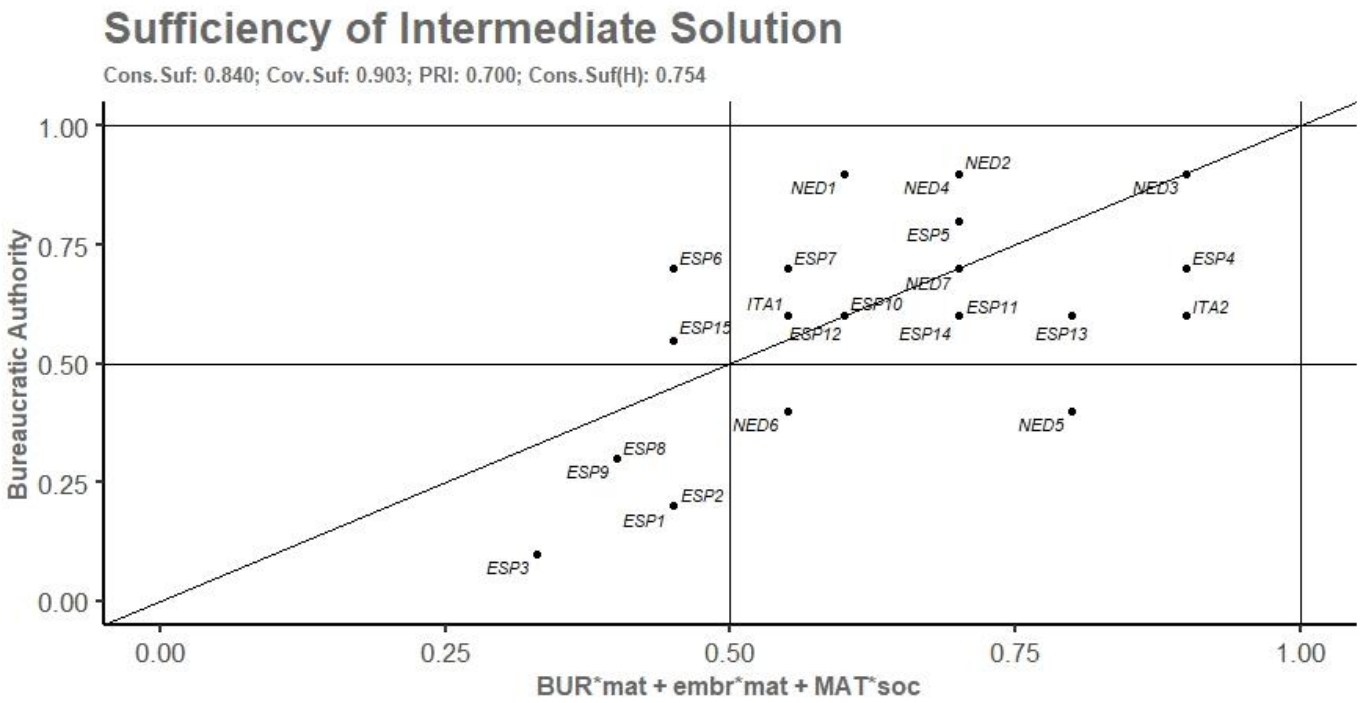
Conditions	**Expectation**
Initial Bureaucratic Authority	Present
Biological Struggles	Present
Material Struggles	No expectation
Social Struggles	Absent
Embracing Response	Absent
Size	Present
Age	Present

Table A4 - Sufficiency of Intermediate Solution

Intermediate solution consistency is 0.840 and coverage is 0.903.

Intermediate Solution Paths	Consistency	Coverage	Cases covered
Path 1: BUR*mat	0.929	0.661	NED3,NED4; ESP10; ESP12,ESP13; NED7; NED2
Path 2: embr*mat	0.876	0.601	NED6; ITA1,ESP4; ESP7; NED3,NED4
Path 3: MAT*soc	0.884	0.495	ITA2,ESP5; ESP14; ESP11; NED1; NED5

Figure A2: Plot showing the sufficiency of the Intermediate Solution.



Legend: Axis X indicating 'the intermediate solution'. Axis Y 'presence in the outcome set of bureaucratic authority'. Cases clustered around the indicated diagonal axis are those best explained by the solution.

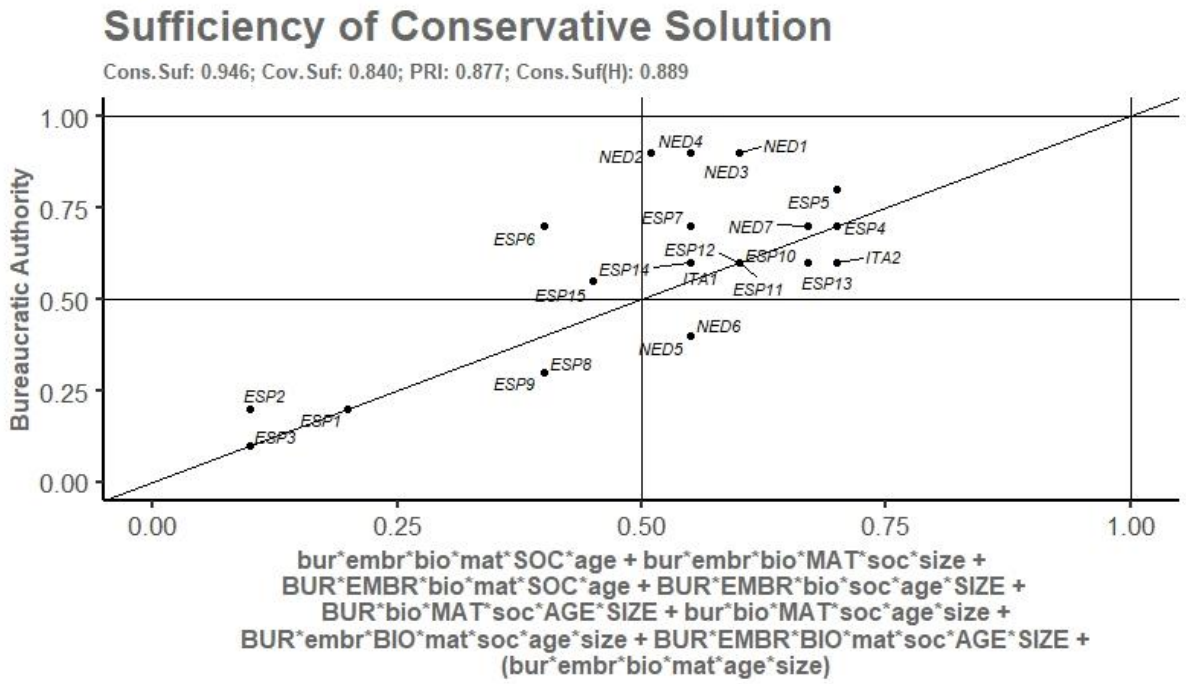
Table A5 - Sufficiency of Conservative Solution Model 2

Conservative solution Model 2 consistency is 0.946 and coverage is 0.840.

Conservative Solution Model 2 Paths	Consistency	Coverage	Cases covered
Path 1: bur*embr*bio*mat*SOC*age	0.973	0.397	ITA1,ESP4; ESP7
Path 2: bur*embr*bio*MAT*soc*size	1.000	0.347	ITA2,ESP5; ESP14
Path 3: BUR*EMBR*bio*mat*SOC*age	0.954	0.406	ESP12,ESP13; NED7
Path 4: BUR*EMBR*bio*mat*age*SIZE	1.000	0.330	ESP10; NED7
Path 5: BUR*bio*MAT*soc*AGE*SIZE	0.958	0.249	NED1; NED5
Cluster 6: bur*bio*MAT*soc*age*size	0.979	0.336	ITA2,ESP5; ESP11

Cluster 7: BUR*embr*BIO*mat*soc*age*size	0.970	0.231	NED3,NED4
Cluster 8: BUR*EMBR*BIO*mat*soc*AGE*SIZE	1.000	0.123	NED2
Cluster 9: (bur*embr*bio*mat*age*size)	0.957	0.231	NED6; ITA1,ESP4

Figure A2: Plot showing the sufficiency of the Conservative Solution Model 2



Legend: Axis X indicating 'the second model for the conservative solution'. Axis Y 'presence in the outcome set of bureaucratic authority'. Cases clustered around the indicated diagonal are those that are best explained by the solution.

Table A6 - Database – QCA

CASE	Farmer initiated*	Consumer initiated*	Activist initiated*	Self-harvest scheme*	Grow yourself*	Box scheme*	Location	Year of foundation (t=0)	Year of interview (t=1)	Maturity (years)	Size (# participants)	Forms of bureaucratic authority at t=0 #	Forms of shared basis of authority at t=0 #	Struggle with biology±	Struggle with materiality±	Struggles with sociality±	Embracing struggles⌂	Forms of bureaucratic authority at t=1 #	Forms of shared basis of authority at t=1 #
NED1	1	0	0	1	0	0	NL	2003	2014	11	240	0.7	0.3	0.20	0.60	0.20	0.33	0.9	0.1
NED2	1	0	0	1	0	0	NL	2006	2014	8	160	0.7	0.3	0.60	0.20	0.20	0.75	0.8	0.4
NED3	1	0	0	0	0	1	NL	2010	2014	4	97	0.6	0.4	0.65	0.10	0.25	0.00	0.9	0.1
NED4	1	0	0	1	0	0	NL	2014	2014	0	40	0.7	0.3	0.60	0.20	0.20	0.45	0.9	0.2
NED5	1	0	0	1	0	0	NL	2005	2014	9	275	0.55	0.45	0.10	0.80	0.10	0.67	0.4	0.7
NED6	1	0	0	1	0	0	NL	2013	2014	1	95	0.4	0.6	0.45	0.10	0.45	0.45	0.4	0.6
NED7	1	0	0	1	0	0	NL	2009	2014	5	200	0.7	0.3	0.00	0.25	0.75	0.67	0.7	0.3
ITA1	0	1	0	0	0	1	IT	2010	2012	2	25	0.4	0.7	0.00	0.40	0.60	0.45	0.6	0.5
ITA2	0	1	0	0	0	1	IT	2008	2012	4	30	0.4	0.7	0.00	0.90	0.10	0.45	0.6	0.5
ESP1	0	0	1	0	1	0	ESP	2011	2014	3	300	0.3	0.7	0.80	0.20	0.00	0.55	0.2	0.8
ESP2	0	0	1	0	1	0	ESP	2012	2014	2	100	0.1	0.9	0.90	0.10	0.00	0.55	0.2	0.8
ESP3	0	0	1	0	1	0	ESP	2012	2014	2	300	0.3	0.7	0.90	0.10	0.00	0.67	0.1	0.9
ESP4	0	0	0	0	1	0	ESP	2012	2014	2	15	0.3	0.7	0.10	0.10	0.80	0.00	0.7	0.4
ESP5	0	0	1	0	1	0	ESP	2013	2014	1	15	0.3	0.7	0.00	0.70	0.30	0.00	0.8	0.3
ESP6	0	0	0	0	1	0	ESP	2012	2014	2	90	0.3	0.7	0.60	0.10	0.30	0.55	0.65	0.4
ESP7	0	0	1	0	1	0	ESP	2011	2014	3	300	0.4	0.7	0.00	0.20	0.80	0.45	0.6	0.5
ESP8	0	0	1	0	1	0	ESP	2013	2014	1	15	0.4	0.6	0.45	0.00	0.55	0.60	0.4	0.7
ESP9	0	0	0	0	0	0	ESP	2012	2014	2	100	0.4	0.6	0.00	0.20	0.80	1.00	0.3	0.7
ESP10	0	1	0	0	0	1	ESP	2012	2014	2	250	0.7	0.4	0.20	0.40	0.40	0.67	0.6	0.55
ESP11	0	1	0	0	0	1	ESP	2011	2014	3	19	0.4	0.6	0.10	0.70	0.20	0.55	0.55	0.7
ESP12	0	1	0	0	0	1	ESP	2013	2014	1	20	0.8	0.2	0.00	0.40	0.60	0.67	0.6	0.55
ESP13	0	1	0	0	0	1	ESP	2012	2014	2	18	0.8	0.2	0.00	0.20	0.80	0.67	0.6	0.55
ESP14	0	0	1	0	1	1	ESP	1999	2014	15	15	0.55	0.6	0.00	0.70	0.30	0.45	0.65	0.55
ESP15	0	1	0	0	0	1	ESP	2008	2014	6	15	0.55	0.55	0.00	0.10	0.90	0.75	0.7	0.65

Legend: all detailed coding rules are reported in Table A7 below

* Control variables coded as dummy (0 = absence / 1 = presence). Variables are not mutual exclusive (e.g. presence of one variable does not preclude the presence of another variable)

Variables measuring forms of authority at both t=0 and t=1 coded as fuzzy. Variables are orthogonal but not mutual exclusive (e.g. high level of one variable does not preclude a high level of another variable – their sum is not bounded to 1)

± Variables measuring types of struggles coded as fuzzy. Variables are not mutual exclusive however their sum is bounded to 1.

⌂ Variables measuring response to struggles coded as fuzzy. Variables are mutual exclusive (e.g. high level of embracing struggles implies low level of struggle avoiding).

Table A7 - Coding process to quantify QCA variables

In the following tables, we present the decision rules used in the coding process to quantify the variables.

Inquiry dimension	QCA – variable (Crispy)_	Key construct	Decision rule	Values

Geographical and historical context - type of AFN initiation process	Farmer initiated	The AFN was initiated by a farmer or group of farmers	Presence of statements/quotes or evidence form documents indicating a (group of) farmer(s) as initiator	If present = 1 Otherwise = 0
	Consumer initiated	The AFN was initiated by a consumer or group of consumers	Presence of statements/quotes or evidence form documents indicating a (group of) consumer(s) as initiator	If present = 1 Otherwise = 0
	Activist initiated	The AFN was initiated by an activist or group of activists	Presence of statements/quotes or evidence form documents indicating a (group of) activist(s) as initiator	If present = 1 Otherwise = 0
Type of activities at the core of the food provisioning	Self-harvest scheme	The AFN promotes participation of consumers in managing and harvesting crops/agricultural products	Presence of statements/quotes or evidence form documents indicating a self-harvest scheme	If present = 1 Otherwise = 0
	Grow yourself	The AFN promotes allotments of land in which participants manage food provisioning activities	Presence of statements/quotes or evidence form documents indicating a grow yourself scheme	If present = 1 Otherwise = 0
	Box scheme	The AFN promotes distribution to participants of products managed in the community	Presence of statements/quotes or evidence form documents indicating a box scheme	If present = 1 Otherwise = 0
Geographical and historical context - location of AFN	Location	Control for the role country of geographical location as proxy of cultural differences in the process of forging authority in the community	Indication of country of location in documents and statements	NED = Netherlands ITA = Italy ESP = Spain
Level of 'maturity' of the AFN	Maturity (years)	Control for the role of maturity in the process of forging authority in the community	Difference between the year when the interview took place (t=1) and year of foundation (t=0)	Index of maturity set between 1 and 0 Year interview – year of foundation / Max year of maturity in the sample
Geographical and historical context - Size of the AFN	Size (# participants)	Control for size of the community in the process of forging authority in the community	Comparison of size between communities	Index of size set between 1 and 0 Size of the community / Largest community in the sample

Continue Table A7 – Categorical variables

Inquiry dimension	**QCA – variable (Fuzzy)**	**Decision rules**	**Categorical values (from 0 to 1)**			
			Low intensity (0 – 0.20)	**Medium Low (0.21 – 0.49)**	**Medium High (0.51 – 80)**	**High (0.81 – 1.00)**
Forms of authority	**Forms of bureaucratic authority at t=0**	Evidence of the definition and control of membership rules	Statements and documents show little to no evidence of procedures, codes and processes for defining and controlling membership	Statements and documents show some evidence of procedures, codes and processes for defining and controlling membership	Statements and documents show clear evidence of procedures, codes and processes for defining and controlling membership	Statements and documents show abundant evidence of procedures, codes and processes for defining and controlling membership

		Presence of formalised task-allocation	There are no or limited statements or documentation related to formalised tasks	A few statements or consulted documents report presence of forms of formalised task-formalisation	Statements and/or consulted documents are clearly reporting presence of formalised tasks	Several statements and/or consulted documents are consistently reporting presence of formalised tasks
		Evidence of use of planning and scheduling	There are no/limited statements or documentation related to use of planning and scheduling	A few statements or consulted documents report presence of use of planning and scheduling	Statements and/or consulted documents are clearly reporting use of planning and scheduling	Several statements and/or consulted documents are consistently reporting use of planning and scheduling
	Forms of shared basis of authority at t=0	Presence of actions supporting collective participation and activism	Statements or consulted documents report only limited collective participation or activism	Statements or consulted documents report some presence of collective participation or activism	Statements and/or consulted documents are clearly reporting collective participation or activism	Several statements and/or consulted documents are consistently reporting collective participation or activism
		Evidence of organization of workshops, meetings, events to share practices	There is only limited evidence of workshops, meetings, events to share practices	There is clear evidence that some workshops, meetings or events have been organized	There is clear evidence that several workshops, meetings or events have been organized	There is abundant evidence that several workshops, meetings or events have been organized
		Leveraging members' trust and interpersonal relations	Statements or other evidence of interpersonal relations and trust between members are scarce or not offering clarity on the subject	Statements or other evidence of interpersonal relations and trust between members are present and offering some clarity on the subject	Statements or other evidence of interpersonal relations and trust between members are clearly mentioned and clarify the subject	Several statements and other evidence of interpersonal relations and trust between members are present and offering a clear-cut view on the subject
	Forms of bureaucratic authority at t=1	Evidence of new rules to plan, coordinate and participate	Statements and documents are not relevant or clearly supporting evidence on the subject.	Some statements and documents are relevant or supporting evidence on the subject.	Several statements and documents are relevant and supporting evidence on the subject.	There is abundant evidence in both statements and documents relevant to the subject.
		Presence of formalising task-allocation	Statements or consulted documents report only limited presence of formalised task-allocation	Statements or consulted documents report some presence of formalised task-allocation	Statements and/or consulted documents are clearly reporting presence of formalised task-allocation	Several statements and/or consulted documents are consistently reporting presence of formalised task-allocation
		Evidence of allocation of tasks to leading members	There is only limited evidence of allocation of tasks to leading members	There is some evidence of allocation of tasks to leading members	There is clear and consistent evidence of allocation of tasks to leading members	There is abundant evidence of diffused allocation of tasks to leading members
	Forms of shared basis of authority at t=1	Evidence of distributing tasks in committees and working groups	Statements or consulted documents report only limited evidence of distributing tasks	Statements or consulted documents report some evidence of distributing tasks	Statements and/or consulted documents are clearly reporting evidence of distributing tasks	Several statements and/or consulted documents are consistently reporting evidence of distributing tasks
		Evidence of leveraging members' trust and interpersonal relations	Statements or consulted documents report only limited evidence of leveraging members' trust and interpersonal relations	Statements or consulted documents report some evidence of leveraging members' trust and interpersonal relations	Statements and/or consulted documents are clearly reporting evidence of leveraging members' trust and interpersonal relations	Several statements and/or consulted documents are consistently reporting evidence of leveraging members' trust and interpersonal relations
		Presence of enhancing members' activism, competence and enthusiasm	Statements or consulted documents report only limited presence of enhancing members' activism, competence and enthusiasm	Statements or consulted documents report some presence of enhancing members' activism, competence and enthusiasm	Statements and/or consulted documents are clearly reporting presence of enhancing members' activism, competence and enthusiasm	Several statements and/or consulted documents are consistently reporting presence of enhancing members' activism, competence and enthusiasm
Type of struggle with socio-	**Struggle with biology**	Presence of the following activities:	There is only limited presence of listed activities	There is some presence of listed activities	There is clear and consistent presence of listed activities	There is abundant presence of listed activities

materiality of food		• Harvesting • Composting and managing manure • Watering, irrigating and dealing with drought Managing weeds • Protecting plots				
	Struggle with physiology	Presence of the following activities: • Dealing with costs of food • Managing food quality and quantity • Handling food distribution	There is only limited presence of listed activities	There is some presence of listed activities	There is clear and consistent presence of listed activities	There is abundant presence of listed activities
	Struggles with sociality	Presence of the following activities: • Timing and enthusiasm Dealing with group size and diversity • Family ties and duties • Social conditions	There is only limited presence of listed activities	There is some presence of listed activities	There is clear and consistent presence of listed activities	There is abundant presence of listed activities
Response to struggles	**Embracing struggles**	Presence of the following activities: • We consider the struggle as an individual member's choice • We enjoy and learn from struggles • We expected to struggle • We struggle together We adapt to the struggles	There is only limited presence of listed activities	There is some presence of listed activities	There is clear and consistent presence of listed activities	There is abundant presence of listed activities

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