# What makes a farm resilient? A processual and relational approach

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## Abstract

The Covid-19 pandemic shook the planet in 2020 and raised new questions and debates about food systems, highlighting the need for a deeper understanding of resilience within agricultural contexts. This article revisits the recent literature on farm resilience and proposes a conceptual and methodological framework to enrich the processual and relational approach. We review 72 of the most recent publications on farm resilience, generated primarily by the Covid-19 crisis. We highlight the common foundations of these articles, referring to the notion of resilience developed in ecology and sometimes directly applied to socio-ecological systems. We then group the works into two main approaches: the first is based on the search for determinants at the farm or farmer level, mostly developed in economics and agronomy and often based on statistical analysis; the second, mostly based on the social sciences and qualitative methods, focuses on analysing contexts favourable to farm resilience and opens up a processual and relational approach. Following this second line of research, we propose to enrich it with the contribution of economic and network sociology, using mixed methods to qualify and quantify the resources mobilised through relational chains to deal with disturbances. We discuss our framework in relation to other relational approaches in sociology applied to the resilience of socio-ecological systems, while emphasising the importance of also considering non-relationships in order to understand how the process of resilience reveals and potentially modifies power structures.

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**Biographical notes**

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## Introduction

The Covid-19 crisis shook the planet in 2020 and raised new questions and debates about food systems (Sanderson Bellamy et al., 2021). Defined as the way in which people organise themselves in time and space to obtain their food (Malassis, 1996), these systems have proved to be fragile. The notion of resilience, which can initially be approached as the ability to withstand and recover from a crisis, quickly found its way into media and political discourse. Within food systems, attention tended to focus more on the resilience of supply chains than on that of the basic units essential to maintaining food security, namely farms. It has nevertheless been pointed out that farms linked to the agro-industrial model may have suffered from their dependence on fertilisers and foreign labour, whereas those linked to local food systems, which are generally smaller, have adapted quickly (Meuwissen et al., 2021). These findings have given new impetus to research into the resilience of farms.

The article pursues two objectives. The first is to present the two main approaches to farm resilience in the academic literature: one focuses on structural determinants, and the other on the role of context. Our second objective is to propose a conceptual and methodological framework that extends the contextualised approach and enriches it with insights from the first approach through the quantification of resilience-promoting resources. More specifically, we explore farm resilience as a process-based capacity, focusing on how this capacity is built through social relationships which provide resources for resilience that can be quantified. From this perspective, the analysis of farm resilience offers a new opportunity to highlight the value of relational approaches in sociology, as an alternative to under- and over-socialised visions of actors (Granovetter, 1985) in the analysis of contemporary economic phenomena.

This article is based on a critically constructive review of the works identified in a non-exhaustive review of the literature on farm resilience. We searched the Web of Science (WOS) database for article titles using the keyword 'farm resilience' to identify the most visible and relevant work on this subject, which yielded 81 results. The aim of this review was to highlight the main approaches to farm resilience within this set of articles, taking into account the recent studies undertaken in response to the Covid-19 crisis. After excluding nine irrelevant articles, our analysis is based on 72 documents (see Annex 1).

In Section 2, which revisits the literature review, we briefly outline the conceptual foundations referring to ecological resilience that are common to most articles on farm resilience, and then present the different approaches to this subject that have been highlighted in recent reviews. We then classify the body of 72 articles into two main approaches. In Section 3, drawing on dimensions of these two approaches, we develop our conceptual and methodological framework on farm resilience, which we position in relation to other frameworks and discuss in Section 4.

## Revisiting the state of the art

*From common foundations to specific angles*

Noting the growing application of the notion of resilience to farming systems over the past decade, Van der Lee et al. (2022) conducted a systematic literature review on this theme, in which they analysed 123 articles from the WOS database published in English between 2010 and 2019. They show that a significant proportion of these articles is based on Holling's foundational approach to ecological resilience. About one third directly applies this approach to socio-ecological systems, a concept developed within the Resilience Alliance.

Observing the responses of Canadian forests to various disturbances, Holling defined ecological resilience as the ability of a system to absorb changes while maintaining its core functions, relationships, and identity (Holling, 1973). This diverged from the traditional notion of engineering resilience, which emphasises the efficiency and speed with which a system returns to equilibrium. Instead, ecological resilience highlights the

capacity to adapt and evolve rather than simply revert to a pre-disturbance state. Holling's theory of adaptive cycles (Gunderson and Holling, 2003) expanded this framework by recognising that disturbances can have cascading, long-term impacts. These impacts create hierarchies and spillover effects across temporal and spatial scales (Bodin and Wiman, 2004).

Building on Holling's work, the Resilience Alliance collective extended the concept of ecological resilience to the social sciences in the 1990s. This extension integrated the interdependence of human and ecological systems through the notion of socio-ecological systems (SES). SES resilience, as summarised by Walker et al. (2004), reflects the capacity to persist, adapt, and innovate in response to uncertainty and disruption. It focuses on preserving identity and core functions while enabling deliberate system evolution (Folke et al., 2010). Resilience is thus defined as the capacity of a system to maintain its identity by preserving core functions, even when the processes achieving those functions change (Walker et al., 2004). From this perspective, crises are viewed as opportunities for change, innovation, and improvement (Folke et al., 2010). Three key capacities characterise resilient systems: robustness, adaptability, and transformability. Robustness ensures performance during disruptions, adaptability allows systems to adjust while preserving their essential functions (Walker et al., 2004), and transformability enables the creation of new systems when existing conditions become unsustainable (Anderies et al., 2004; Walker et al., 2004).

In their literature review, Van der Lee et al. (2022) classify articles applying this analytical framework to farming systems as developing the "traditional lens" of resilience. Works approached through this lens primarily view resilience as an inherent capacity of the system, enabling it to maintain its functions in response to disturbances. Although these studies generally also refer to Holling's work, according to Van der Lee et al. the other articles included in their review represent three additional angles for approaching the resilience of farming systems. The 'capacity lens' emphasises absorptive capacity, that is, a system's ability to absorb immediate shocks, while focusing on subjective perspectives of resilience. This angle examines how individuals and communities interpret and respond to disruption, stressing the importance of learning and organisation. The 'vulnerability lens' focuses on the impacts of disturbances on farming systems. It aims to reduce system vulnerability by building adaptive capacity to mitigate shocks and adopts a quantitative approach, using measurable indicators such as sensitivity to shocks and the ability to withstand disturbances. Finally, the 'agroecology lens' emphasises the importance of preserving resources through interactions between plants, animals, and people to mitigate disturbances affecting farming systems. Resilience is then assessed through the extent to which these practices promote beneficial interactions. Van der Lee et al. conclude their review by proposing a roadmap for the complementary use of multiple resilience lenses. Above all, they call for clarifying and consolidating the link between the theoretical dimension of resilience and the operationalisation of its analysis.

Also covering a large body of work on farm resilience, Darnhofer (2021) confirms the major influence of Holling's framework as developed by the Resilience Alliance. She notes, however, that most studies focus primarily on the absorption of shocks by farms and, subsequently, on robustness and adaptability rather than on transformation. She shows that this conventional approach is articulated through three main frameworks: a positivist framework examining objective variables correlated with farm persistence; an interpretive framework based on analyses of farmers' perceptions of crises; and a critical framework that conceptualises resilience as a social construct framing individual actions.

Darnhofer nevertheless calls for the development of alternative approaches that better account for the challenge of transforming systems through resilience. More fundamentally, her review highlights the importance of understanding how disciplinary perspectives and theoretical frameworks shape research on farm resilience. We adopt this perspective and, in turn, revisit the literature review on this subject by taking into account recent work triggered by the Covid-19 crisis. This approach allows us to highlight and extend the path laid out by Darnhofer toward a process-relational approach to farm resilience. We do so by proposing a conceptual framework and the methodological foundations necessary for its operational implementation.

Including the most recent and visible work on farm resilience, we identify two main approaches beyond the general reference to Holling and/or the Resilience Alliance. Each approach is driven by specific disciplines and methodologies. The first seeks to identify structural farm or farmer characteristics as key determinants of resilience. The second emphasises the broader context and explores how this context influences the development of resilience capacities. Revisiting the literature review in this way leads us to enrich the second approach while adopting the quantification objective of the first, drawing on contributions from economic and network sociology.

*Resilience as a determinants-based capacity*

The first set of articles (47/71), mainly rooted in economics or agronomy and to a lesser extent in the social sciences, aims to assess resilience through various indicators, which are often composite. The assessment of resilience varies across disciplines. In economics, resilience is often linked to the ability to sustain commercial activities. In agronomy, it generally refers to maintaining production despite disruptions, such as climate change. In both cases, indicators are used to quantify levels of resilience. Researchers then identify variables and examine correlations between these variables and resilience levels, primarily through statistical analysis. Two main types of structural determinants emerge from these studies: determinants at the farm level and those at the individual level.

Focus on farm characteristics

At farm level, farm size is one of the most frequently emphasised determinants in the economic literature on farm resilience. Curtiss et al. (2018) find that moderately sized farms are better equipped to handle economic crises. In contrast, Motaghed et al. (2024) suggest that smaller farms in Iran are more resilient to climatic disturbances. Kurlavicius et al. (2024), however, report that larger farms in Eastern Europe and Lithuania demonstrate greater resilience, particularly when resilience is measured in terms of economic profitability.
Another group of studies in economics and agronomy also searches for determinants but focuses more specifically on practices implemented at farm level. A range of practices aimed at preserving natural resources is highlighted as contributing to farm resilience. These include organic farming (Jacobi et al., 2015), agroforestry (Jacobi et al., 2017; Mayorga et al., 2022), soil conservation (Kik et al., 2021), intercropping (Gayathiri et al., 2024), and efficient irrigation (Lozzi et al., 2024). The scope of these practices sometimes extends to work organisation. For example, farms with lower workloads are identified as more resilient (Perrin et al., 2024).
Rather than focusing on specific practices, Yoshida (2024) proposes a sustainability index that combines various sustainable practices as a more appropriate way to assess farm resilience. Similarly, other authors emphasise diversification strategies, including diversification of crops (Kahiluoto and Kaseva, 2016), animal feed (Bilotto et al., 2021), market outlets (Duran et al., 2023), or on-farm activities (Dabkien, 2020), as ways to withstand shocks. Ultimately, however, resilience remains linked to the number of crops, feed sources, or activities.

Taken together, these studies do not explain what leads farmers to implement these resilience-building practices.

Focus on individual characteristics

Alongside studies focusing on farm-level determinants, another group of articles (14/71), also primarily rooted in agronomy or economics and sometimes adopting a multidisciplinary perspective, focuses on variables characterising farmers themselves. These studies particularly consider psychological and socio-demographic traits and examine how these influence farmers' abilities to manage disruptions.

Studies in agronomy tend to focus on farmers' perceptions of risk. Becot and Inwood (2022) note that farmers' perceptions of vulnerability hinder their ability to plan for the future, a finding also emphasised by Linder and Campbell-Arvai (2021). Ladyka et al. (2022) analyse how producers' perceptions shaped their

responses to the Covid-19 crisis. Bernzen et al. (2023) and Tamminen et al. (2024) highlight how awareness of environmental shocks and climate impacts drives farmers to adopt diversified practices to improve resilience. Hussein et al. (2024) argue that inadequate risk perception results in ineffective strategies in the face of disruptions.

Economic studies, by contrast, focus more on how farmers' attitudes and traits influence their ability to manage disruptions. Kangogo et al. (2020) show that a farmer's personal capacity to engage in farming is a key factor in resilience. This perspective is further developed by Hartono et al. (2024), who emphasise that maintaining income and resilience depends on a farmer's strategic entrepreneurial orientation. Lavoie et al. (2021) argue that a farmer's ability to recognise the benefits of practices conducive to resilience encourages their adoption. Similarly, McKenzie et al. (2024) assert that resilience is fostered by farmers' capacity to innovate and anticipate future disruptions, allowing them to adapt their production systems accordingly. Together, these studies underscore the importance of entrepreneurial skills and innovation in building farm resilience. In this body of work, quantitative evaluations of individual traits, for example based on Likert scales, are correlated with resilience assessments using various indicators.

Other studies, also focused on farmers' entrepreneurial attitudes but from a different perspective, examine how farmers engage with their social networks and how this engagement influences resilience. Although these studies incorporate a relational dimension, they often remain within a deterministic framework, viewing the presence or absence of specific factors as decisive for resilience. For example, Slijper et al. (2020) investigate the resilience of Dutch farms and identify two key determinants: farmers' perceptions of their ability to overcome obstacles and membership in networks of fellow farmers, the latter being considered a form of social capital. The authors argue that social capital enhances resilience by promoting learning processes and supporting psychological factors that enable farmers to respond to disruptions (Slijper et al., 2022).

Finally, while these studies highlight the importance of measuring structural variables to gain clear insights into the factors influencing farm resilience, they do not examine how these characteristics are acquired. Statistical analysis identifies determinants but does not explain how these factors are implemented or why certain factors are chosen over others. These limitations have contributed to the emergence of a second, contextualised approach. This approach focuses on the specific contexts in which particular strategies are effective, and examines how these strategies are decided upon and implemented by farmers.

*Resilience as a contextualised process*

In contrast to the deterministic approach, which fundamentally supports a static view of resilience capacities, the second set of articles (24/71) adopts a contextual and evolutionary perspective on resilience, drawing on geography, institutional economics, and sociology. Rather than attempting to identify universal factors that enable or hinder resilience, studies developing this approach focus on understanding the conditions under which farmers are more likely to respond effectively to disruptions. They also examine the strategies farmers implement in such situations. These articles emphasise how the ability to cope with challenges can be developed and sustained over time, thus viewing resilience as a dynamic and evolving process.

From policies to social interactions

At the broadest scale, some studies examine the effects of policies and general contexts as generators of socio-economic environments that are favourable to farm resilience to a greater or lesser degree. For instance, Le Goff et al. (2022) show that policies tailored to specific local challenges, such as poverty in Uganda, are key to enabling adaptation strategies. Wendt (2022) also addresses the impact of policies on farm resilience but highlights differences depending on how resilience is assessed, whether through profitability, crop diversification, or other criteria. This study calls for a rethinking of subsidy redistribution to better support farm resilience across diverse contexts. Similarly, Brune et al. (2023) show that the Covid-19 pandemic revealed new needs among producers, to which public policies must adapt more adequately.

At European level, research on the Common Agricultural Policy (CAP) highlights that it could better promote resilience by further encouraging sustainable practices (Polakova, 2018). From this perspective, Wieliczko (2019) explores the potential effects of the 2021-2027 CAP on farm resilience, stressing the need for policy subsidies to be tailored to different types of farms. More generally, Marsden et al. (2023) emphasise the need for public policy to account for the diversity of farm types and to avoid adopting a one-size-fits-all approach to encouraging diversification.

Within this contextualised approach, another group of studies focuses on understanding the choices and actions that promote resilience by examining how farmers' social environments influence their decisions and behaviours. Some studies analyse the role of family interactions. For example, Koloszycz et al. (2024) highlight the importance of maintaining a balance between work and personal life, and argue that family interactions must be considered when assessing resilience. Dudek and Spiewak (2022) also demonstrate the influence of family on farm resilience by supporting farmers in developing 'micro-strategies' of adaptation that ultimately enable them to cope with disruptions.

Other studies focus on interactions among producers. Yoshida and Yagi (2021) emphasise that farms that managed to cope and reorganise during the Covid-19 pandemic benefited from exchanges among peers, which provided access to advice. Similarly, Bulla and Steelman (2016) show that organising working groups among farmers based on shared observations of disruptions helps improve resilience. In a study of mountain farms, Daugstad (2019) emphasises the importance of agricultural and community identity built through interactions between farmers in implementing more resilient practices, particularly regarding land use. Aguilar-Støen et al. (2009) further demonstrate that exchanges among farmers, especially involving seeds and equipment, allow small-scale operations to maintain diversity and enhance farm and farmer resilience, particularly in the face of climate change. McWherter et al. (2025) stress the importance of knowledge sharing among producers to encourage innovation in farming practices in response to disruptions. Additionally, Bardsley et al. (2018) argue that cooperation among farmers facilitates the development of regional adaptation clusters that support resilience.

A final set of studies shows how relationships between farmers and other types of actors contribute to the absorption and reorganisation of farm activities. Rosman et al. (2024) show that relationships between producers and consumers within Community Supported Agriculture systems encourage independence from mainstream markets, giving producers greater room to manoeuvre. Their study also demonstrates that relationships with consumers support the reorganisation of agricultural practices. Similarly, Darnhofer (2020) highlights how new relationships created between farms and consumers enabled the development of new forms of adaptation during the Covid-19 crisis.

Other studies examine interactions between farmers and additional categories of actors, such as non-profit associations, NGOs, and researchers. These works highlight how such interactions encourage farmers to adopt new knowledge and practices that foster resilience. Farnworth et al. (2018) explain how interactions with non-profits contribute to a more equitable gender distribution of tasks, helping to sustain disrupted maize production in Malawi. Knook et al. (2024) demonstrate that participation in research programmes enhances farmer resilience by encouraging openness to new ideas and increasing farmers' willingness to modify their practices in response to challenges. Similarly, Ruggia et al. (2021) show that co-innovation between farmers and researchers promotes resilience in agricultural operations, while Kovar et al. (2024) argue that such interactions facilitate the adoption of adaptable practices. Montalba et al. (2017) discuss the role of NGOs in promoting agroecological practices, noting that their interactions with farms support the implementation of adaptive, resilience-enhancing operations.

Overall, these studies not only demonstrate the value of considering context in understanding farm resilience but also point toward a processual approach shaped by social interactions, which has since been further conceptualised.

A process linked to relational dynamics

In 2016, Darnhofer et al. emphasised the changes and opportunities offered by a relational approach to farm resilience. Their approach draws on Elias's metaphor of the 'game'. It is not merely a question of understanding the outcomes of farm resilience but of deciphering the processes that lead to its emergence. The relational approach calls for transcending traditional frameworks by discarding the notion of predefined and stable entities, actions, or relations. In this sense, the relational approach to farm resilience goes beyond viewing farms as predefined and stable units. Instead, it reintegrates them into networks of interactions in order to better understand how they are interconnected and how these interconnections contribute to their evolution. This approach supports a theoretical perspective that focuses on dynamic and evolving relationships and network nodes rather than fixed categories.

Whereas conventional approaches often focus on determining whether farms are resilient or not, Darnhofer et al.'s relational approach emphasises that resilience is a process-based capacity in constant construction and transformation. This perspective aligns more closely with Holling's foundational ecological understanding of the concept. It incorporates a dynamic dimension inspired by ecological theories to show how resilience is built through the evolution of relationships. Rather than focusing solely on the maintenance of activities, this approach sheds light on transformative dynamics.
To conclude this section, in reviewing the literature on farm resilience, we classify it along two main lines of focus: (i) a focus on structural variables versus a focus on context, and (ii) a focus on individual versus collective entities, such as families, peer groups, and networks. Following Van der Lee et al. (2022), and while underlining the limitations of both deterministic and contextualised approaches, we develop a conceptual and methodological framework to analyse farm resilience with the contribution of economic and network sociology. This framework aims to integrate different dimensions of analysis and to continue along the lines opened by Darnhofer et al.

## Enriching the contextualised approach with economic and network sociology

*A critical and constructive review of the literature*

Irrespective of the approach – deterministic or contextualised – the limitations of most studies lie in their tendency to consider stability as the primary goal. However, the agri-food sector is characterised not only by constant change and growing uncertainty, such as climatic hazards and price volatility, but also by the multiplication and acceleration of crises (West, 2016). The agricultural sector itself largely contributes to these crises (IPBES, 2024). Therefore, the main challenge is less about maintaining existing states and modes of functioning on farms than about transforming them. A dynamic dimension is required to understand how agricultural systems can evolve while preserving their essential functions in a context where disruptions are multiplying and intertwining (Richards et al., 2024).

This perspective is consistent with studies on 'desirable states' (Carpenter et al., 2001), defined as the achievement of an equilibrium that guarantees the maintenance of key functions while limiting damage. Applied to agriculture, Bennett et al. (2014), in conceptualising resilient agriculture, describe a desirable state in which agricultural efficiency is improved without harming the environment and is therefore combined with sustainable practices. From this perspective, the objective is not merely to maintain functions but to ensure their persistence through evolving modes of farming (Walker, 2020).

As Darnhofer (2021) emphasises, farming resilience – rather than 'farm resilience', to account for a dynamic and non-stable entity – depends on the ability to balance efficiency within a given context, with the capacity to reorganise and adapt to unforeseen changes. To navigate uncertainty, adaptive practices such as bricolage and experimentation enable the reconfiguration of available resources and their innovative use. These processes, grounded in learning, collaboration, and networking, pave the way for the proactive recognition and shaping of emerging opportunities. Resilience is therefore not about preserving a stable state but about engaging in continuous adjustment and transformation.

Beyond identifying the limitations of the approaches previously presented, revisiting the literature also highlights the value of combining analytical dimensions and methods developed within the two main approaches. On the

one hand, structural and quantitative studies do not explain how outcomes are achieved, but they do highlight the relative effectiveness of certain factors – considered as existing 'resources' – in fostering resilience. On the other hand, the contextualised approach allows researchers to open the 'black box' of determinants and to explore the mechanisms involved in maintaining core farming functions, including through changes in practices within an economic entity. In doing so, authors adopting a contextualised approach also stress the importance of specific resources available in the farm environment, not only for responding to perturbations but also for transforming activities by leveraging the opportunities created by these perturbations (Darnhofer, 2021).

Economic and network sociology offers both a theoretical framework and mixed methods that are particularly well suited to addressing these challenges. It focuses on how resources are accessed through networks over time to support economic processes confronted with perturbations.

*Deepening farm resilience studies through economic and network sociology*

To address the challenges outlined above, we analyse farm resilience through the lens of economic and network sociology, particularly as applied to entrepreneurship. Economic and network sociology, as theorised notably by Granovetter (1985), offers an alternative to both under-socialised and over-socialised views of the economic actor. The actor does not act freely in a social vacuum, nor is he or she fully determined by social structures. Instead, action is embedded in social relationships, which influence actions and shape their performance (Granovetter, 1985). This conception of economic action aligns more broadly with the relational sociology developed by Harrison White, which breaks with both standard economics and functionalist sociology (White, 1992).

Applied to entrepreneurship, economic and network sociology challenges the idea of the entrepreneur as a solitary actor and calls for a shift from the entrepreneur as an individual to entrepreneurship as an activity (Comet, 2011). This perspective emphasises the dynamic social processes that shape entrepreneurial practices. It moves beyond individualistic analyses to consider the broader contexts in which activities unfold and in which resources are mobilised for development.

We therefore approach farm resilience from this perspective, viewing it as an entrepreneurial activity embedded in a broader context, particularly within networks of relationships. Economic and network sociology provides a theoretical and methodological framework to further develop the process-relational approach to farm resilience. More specifically, it makes it possible to identify and measure the resources gained through relationships and mobilised to absorb, adapt to, and transform in response to disturbances, notably through the mixed-method approach based on relational chains.

*Analysing processual farm resilience through relational chains*

In relational sociology, relational chains refer to the processes through which resources are transferred between individuals via interpersonal relationships. These processes were first highlighted in pioneering studies in the 1960s, notably in Nancy Howell Lee's *The Search for an Abortionist* (1969), which analysed the networks mobilised to access abortion providers in a context where the practice was illegal. This research demonstrates how social interactions can overcome obstacles by facilitating access to rare information or services.

In the 1970s, Granovetter expanded on these insights by demonstrating the role that weak ties play in accessing employment opportunities. He highlighted the benefits of relational chains in providing access to information about job vacancies (Granovetter, 1973), even though the term 'relational chain' was not yet used in economic and network sociology. In France, Grossetti et al. built on these approaches to analyse the effects of relational embeddedness on entrepreneurial development. They focused on relational chains

– now conceptualised as a distinct analytical concept – as providers of resources for enterprise creation (Grossetti et al., 2011). As Chauvac and Comet (2014) have shown, this approach emphasises the pathways through which resources – material, informational, or financial – are transmitted within social and economic networks and support entrepreneurial activity. Unlike simplified models of resource exchange, relational chains reflect the concrete pathways followed by resources, involving multiple intermediaries and complex relational dynamics (Akermann, 2015).

From this perspective, the analysis of entrepreneurship through relational chains relies on a mixed-method approach formalised by Grossetti, known as 'quantified narratives' (Grossetti, 2011). This method involves identifying and counting the different types of resources required at each stage of enterprise development and specifying the types of relationships involved in accessing these resources, alongside alternative non-relational arrangements. It combines qualitative data collection through biographical-style interviews with systematic questioning about each situation of resource access, followed by the coding of these situations. The coding process relies on the categorisation of variables such as resources, relationships, and other arrangements providing access to resources (e.g., public tenders, websites). A chronological narrative is then constructed to retrace the entrepreneurial trajectory. This narrative draws on interview data as well as secondary sources, which help contextualise the mobilisation of specific relationships or resources and assess their effects (Grossetti, 2011).

While the categorisation of relationship and resource variables may vary across studies, once narratives are coded, statistical analyses can be conducted to test correlations between variables. These analyses make it possible to identify links – particularly between types of resources and types of relationships –or to assess the frequency of specific categories across different periods. As a mixed method, quantified narratives allow researchers to objectify the effects of relationships and institutional arrangements – among other non-relational arrangements – on economic processes while also capturing the meanings these trajectories hold for actors.

The relational chain approach, equipped with the quantified narratives method, has recently been applied to agriculture. For example, Polge and Pagès (2022) use this approach to identify the resources required for transitions to organic farming, and to analyse the role of social relationships in this process. Their study highlights the decisive role of peers in the early stages of transition, as they provide essential resources such as advice and information for adopting new practices. These authors also emphasise the importance of farmers' collectives, which facilitate access to mediating resources, such as facilitators, that are crucial during the period of consolidation of new practices. Results are obtained by dividing the transition into different stages – before, during, and after the transition – and identifying the resources mobilised at each stage, along with their modes of access. This process-based division, combined with the creation of quantified variables for each period, allows for an objective assessment of the role played by relationships throughout the transition. We extend the relational chain approach from farm trajectories to the analysis of farm resilience. For economic entities such as farms, crises like the Covid-19 pandemic can be understood as periods in which key resources are lost or challenged, for example access to markets. This situation requires the acquisition of similar or compensatory resources, such as new markets and information enabling access to new customers. Social relationships that facilitate the acquisition and replenishment of resources therefore play a pivotal role in shaping how farms navigate and recover from crises. The use of quantified narratives makes it possible to identify which resources are acquired and mobilised to maintain economic activity and at which stages of disruption this occurs. In doing so, it helps to operationalise the conceptualisation of farm resilience as a relational and processual capacity unfolding over time.

As with other types of business, but here applied specifically to farm resilience during and after crises, data collection would involve identifying: (i) all the resources mobilised over time by farmers to maintain economic activity, whether in production and/or in marketing, and (ii) how these resources are accessed,

considering both relational and non-relational arrangements. Compared with studies on enterprise creation, the characterisation of resources takes on a new dimension, as it begins with the joint identification, together with farmers, of the resources lost or challenged by the crisis. The typology proposed by Grossetti et al. (2011), which distinguishes between material resources (financial and material support) and immaterial resources (logistical, moral, and informational support), typically serves as a foundation for studies using quantified narratives. In the context of farm resilience, however, as hybrid resources such as commercial opportunities – both material and immaterial – play a central role in coping with disruptions, an adaptation of this typology is required.

Building on the identification of lost and acquired resources, the evolution of mobilised relationships, and the impacts of these resources and relationships on farm activity, different empirical phases in farm trajectories can be distinguished and linked to resilience capacities: absorption, adaptation, and transformation. For example, during the COVID-19 crisis, some commercial relationships between farmers and consumers evolved into more supportive relationships, which proved to encourage agroecological transitions on farms during the period of return to normal (Nemes et al., 2021). From the conceptual perspective proposed here, this shift can be interpreted as an evolution in relationships that provide financial support to other relationships offering moral support, thus contributing to a new phase characterised by the development of the farm's capacity for transformation.

Finally, by integrating insights from economic and network sociology, resilience can be conceptualised as an embedded, process-based capacity built through distinct stages, in which relationships play varying roles according to the resources they provide. Equipped with the mixed method of quantified narratives, this approach enriches the process-relational perspective by characterising and quantifying the relationships involved in resilience processes. It demonstrates the value of combining a process-relational perspective with quantitative analysis, while maintaining a non-deterministic view of resilience and providing tools to measure what matters in resilience dynamics.

## Discussion

*Confronting our framework with other relational approaches applied to resilience*

The resilience of socio-ecological systems has also been studied using other relational approaches in sociology. Applying Actor-Network Theory (ANT) to the Chang-shan Archipelago fishing system in China, Yao and Liu (2022) highlight how a 'heterogeneous network' involving fishermen, government officers, technical professionals, marine organisms, and fishing technologies helps fishermen cope with extreme weather events. Using assemblage thinking as developed by DeLanda (2016), Lendvay's work (2021) on the resilience of a watermelon-farming community in Hungary follows a similar line of reasoning. In this case, the community is conceived as an assemblage of human and non-human components that perform both material and expressive roles, and its resilience is shown to rely on human-non-human relationships.

ANT and economic and network sociology do not share the same epistemological foundations. ANT considers non-humans in the same way as humans, that is, as entities endowed with agency. However, as in ANT, what matters in our approach to resilience is not so much the existence of relationships as the networking process between entities and what this process contributes to resilience.

Our conceptual framework of resilience also intersects with Shove et al. (2012)'s theory of social practices. This theory shifts the analytical focus from individuals to practices, understood as dynamic configurations articulating material, competences, and meanings. From this perspective, resilience is less an individual capacity than the ability of certain practices to persist, adapt, or transform in the face of disruption. Social practice theory addresses relationships between actions and values rather than explicitly focusing on relationships between individuals. Nevertheless, human-to-human relationships play a role in enabling the articulation of

the three dimensions that allow a practice to emerge and spread. Combining this framework with ours opens up a promising perspective for understanding the relational conditions under which farms implement transformative practices during or after a crisis. This involves considering both interpersonal relations and relations between the dimensions of practices.

However, relational approaches to resilience, which encompass various types of relationship, may underestimate power relations and asymmetries within networks. This observation calls for a more explicit engagement with these issues.

*Addressing power relations and asymmetries*

Relational sociology may tend to dilute power relations within systems of relationships. In particular, the economic and network sociology developed by Granovetter has been criticised for depoliticising the economy by insufficiently accounting for power relations, especially those between actors and institutions (Krippner, 2001). At first glance, our conceptual framework for farm resilience also does not explicitly address power issues.

However, highlighting the relationships mobilised to access resources during crises also reveals other relationships that are not mobilised. These may include relationships with institutions, possibly because farmers are not well regarded or are excluded from certain networks. Moreover, the nature of the resources accessed also indicates those that could not be acquired. In times of crisis, information is a key resource for coping with disruptions, but such information may not be accessible to some farmers, even though it is accessible and useful to others. Analysing activated relationships and acquired resources therefore provides insights into a farm's position within power structures and its exposure to information asymmetries.

This discussion calls for a broader examination of the economic and political dimensions that shape or constrain the relational processes underlying resilience. It also serves as a reminder that equal attention should be paid to both ties and the dynamics of their interdependencies in social network analysis, in order to fully understand social structures and dynamics (Kitts, 2014).

## Conclusion

The resilience of food systems, and particularly of farms as their most basic components, has gained strategic importance since the Covid-19 crisis. In this article, building on previous reviews, we shed new light on the literature on farm resilience and cross-reference the two main approaches identified in order to enrich the processual and relational approach developed by Darnhofer (2021).

By conceptualising crises as moments of resource loss, economic and network sociology applied to entrepreneurship enables us to frame the resilience of economic entities such as farms as a relational process through which resources are mobilised to cope with disruptions. This perspective also makes it possible to identify and quantify the types of resources involved in building resilience capacities. In doing so, this article contributes to structuring and differentiating research on food system resilience at a time when a growing number of studies are being produced by consulting organisations, activist networks, and digital or technology-oriented agricultural companies.

Given the many environmental, economic, and social disruptions currently affecting food systems, the challenge is not to promote ready-made solutions but to document, on a sound analytical basis, evolving and transformative relational processes of resilience (HLPE, 2025). This requires further strengthening the research agenda on food system resilience, particularly by examining how, and under what conditions, relational processes triggered by disruptions – or aiming to anticipate or mitigate them – can transform power structures and reduce information asymmetries within food systems.

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