frontiers | Frontiers in Sustainable Food Systems

ORIGINAL RESEARCH
published: 16 June 2022
doi: 10.3389/fsufs.2022.866004

Changing Conditions for Local Food Actors to Operate Towards Agroecology During the COVID-19 Pandemic

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Specialty section:
This article was submitted to Social Movements, Institutions and Governance, a section of the journal Frontiers in Sustainable Food Systems

Received: *30 January 2022*
Accepted: *17 May 2022*
Published: *16 June 2022*

Citation:
Frank M, Kaufmann B, Ejarque M, Lamaison MG, Nessi MV and Amoroso MM (2022) Changing Conditions for Local Food Actors to Operate Towards Agroecology During the COVID-19 Pandemic. Front. Sustain. Food Syst. 6:866004. doi: 10.3389/fsufs.2022.866004

Given the novel character of disturbances caused by the pandemic in food systems, initial studies have been conducted to stress the reinforced urgent need for food systems' transformation toward sustainability. First assessments, conducted in the early months of the pandemic, found that local food actors responded to changing production and marketing conditions by implementing alternative practices under the umbrella of agroecology. However, given the unprecedented and dynamic character of the pandemic in regional situations, and related context-specific changes caused in food system actors' operations, case studies are needed to assess in more detail under which changing conditions food actors implemented alternative practices. Moreover, the maintenance of practices as conditions normalize, and food actors' transformative potential in relation to the principles of agroecology, need further assessment. In response to these emerging issues, we provide insights into our case study research conducted during 2021 in a local food system in Argentina. The aim of this research was to study how changing conditions triggered local food actors to (re-)frame their objectives and activities regarding marketing, and to assess the relevance of agroecological principles as a means of responding to changing conditions and to unfold longer-term transitions. We identified local producer shops ($n = 5$) and markets ($n = 4$) that were established or consolidated by self-organized producer groups (SOPGs) during the first months of the pandemic. Using semi-structured interviews with SOPG members ($n = 12$) and qualitative content analysis, we found that alternative practices were adopted in response to different changing conditions, and new needs and opportunities for producers and consumers brought about by the pandemic. Objectives pursued, and activities undertaken by the groups revealed reactive short-term mitigation strategies, and proactive longer-term transformative objectives. The relational analysis between practices and agroecological principles showed that the principles became important

means of responding to changing conditions and to unfold longer-term transitions. The cases illustrate how local food actors operationalized agroecological principles, and in turn how principles can be used to investigate the nature and potentials of food actors' alternative practices, highlighting the relevance of agroecology to co-design sustainability transitions in local food systems and to mitigate possible future crisis.

Keywords: agroecological principles, agroecological transitions, shock-mitigation responses, transformative potential of local food actors, Argentina

INTRODUCTION

The COVID-19 pandemic and measures implemented by governments at the global level to manage the pandemic have caused a systemic crisis, affecting food systems' performance, and processes along global and local agri-food supply chains. Negative consequences for established global chains highlight weaknesses of prevalent food production, distribution and consumption practices, and threaten sustainable human development (van der Ploeg, 2020; Rivera-Ferre et al., 2021). Impacts caused by the pandemic unfold in multiple areas, and through complex interrelations between social, economic, ecological, and human health factors. A distinction is made between direct impacts (the virus on human health) and indirect impacts, as a consequence of measures implemented to control the pandemic or through the effect of fear in the population (UNICEF, 2020; Rivera-Ferre et al., 2021). In response to these impacts, actions have been taken by groups or individuals in society or governments to prevent, compensate for, or adapt to emerging changes. There are hints that local food actors have responded to the consequences and impacts by developing immediate decentralized collective strategies, and by implementing alternative practices under the umbrella of agroecology (Tittonell et al., 2021; Zollet et al., 2021). However, the particular changing conditions under which such practices have been implemented and what potentials they unfold within local food systems' sustainability transitions in time and in relation to the principles of agroecology (Wezel et al., 2020) remain to be further explored.

Given the novel character of the pandemic and induced disruptions in prevalent global food systems, studies have been conducted and expert opinions published to understand the new situations, to reveal impacts, and to stress the hitherto known and, through the pandemic, reinforced urgent need for a transformation of food systems toward sustainability (IAASTD, 2009; IPES Food, 2016; HLPE, 2019). The studies have focused on a wide range of phenomena associated with the diverse food system actors impacted, including farmers, processors, retailers, consumers, as well as regulatory and policy-making entities and wage workers involved in agri-food sectors. For instance, disruptions in supply chains were assessed with regard to decreasing food security (e.g., Savary et al., 2020; Workie et al., 2020), to impacts on different food supply chain components and commodity groups in developing countries (Vyas et al., 2021), to labor availability, food systems' connectivity and international trade (Stephens et al., 2020; van der Ploeg, 2020), and to increasing inequality experienced by small scale food producers (Paganini et al., 2020). A review by Béné (2020) shows that by June 2020, indirect impacts caused by lockdowns and mobility restrictions led to loss of income, purchase power, and in consequence to a decrease of food security for poorer segments of populations in low and middle income countries.

These suddenly arising and challenging impacts have pushed local food system actors to immediately respond to the changing conditions within their specific context of operation (Zollet et al., 2021; Frank and Amoroso, in press). Studies looking into such local responses were mainly conducted during the initial phase of the pandemic (March-June 2020), providing 'snapshots' of responses in the context of early lockdowns. For instance, studies on local and regional food systems in different countries around the globe, characterized by short supply chains and producer-consumer proximity, indicate high flexibility and adaptability of local actors to operate under changing conditions, by building on strong local relationships (Thilmany et al., 2020; Prosser et al., 2021), by taking advantage of (temporal) changes in consumption patterns (Lal, 2020; Bisoffi et al., 2021; Zollet et al., 2021), and by showing their growth potential (Nemes et al., 2021). In a cross-national study in the Latin American region, Tittonell et al. (2021) characterized initial responses of family farming and agroecology movements in the early months of the pandemic regarding their potential to mitigate threats toward food security. The study provides first indications of high resilience and potential for reconstruction of local actors in developing and implementing immediate strategies under lockdowns, based on producer-consumer links, short value chains, local and solidary economy, collective capacity, and cooperation within networks. Mostly, answers from development projects/initiatives were analyzed, hence direct farmer perceptions were not considered (Tittonell et al., 2021).

These first findings, based mostly on large online surveys, from the initial phase of the pandemic, support the general narrative by advocates for agroecology. The narrative uses the argumentation that reinforced and evidenced weaknesses of prevalent food systems and observed "agroecological" responses of local food actors confirm that agroecology is the appropriate pathway for sustainability transitions in food systems (Altieri and Nicholls, 2020; Gliessman, 2020; Bisoffi et al., 2021; Gras and Hernández, 2021). However, given the unprecedented and dynamic character of the current pandemic, its varying implications in different regional situations, and related context-specific changes caused in food system actors operations, the above argumentation for agroecological food practices as

appropriate responses to systemic shocks requires further, case study based, empirical evidence. Moreover, the maintenance and evolution of responses as conditions normalize, and the longer-term transformative potentials of practices implemented in relation to sustainability issues, such as consolidated in the principles of agroecology, need further assessment (Nemes et al., 2021).

Longer-term food system transitions might be explainable by the consolidated principles of agroecology, proposed as a general framework to guide and monitor transitions at the plot, farm, and food system level (Wezel et al., 2020). Using the generically formulated principles for in-depth analysis of local responses by food actors under changing conditions may lead to better understanding of how suddenly changing conditions for producing, marketing and consuming food may trigger actors to develop and implement agroecological practices. By studying how actors (re-)frame their objectives under changing conditions and how the statements of agroecological principles are translated into concrete local action, the potential of agroecology for local transitions in the context of a systemic crisis and beyond can be approached. In turn, this knowledge can help to define the relevance of specific principles for actors to operate under changing conditions, and to better inform policy interventions to support local food actors. Appropriate support measures can help actors to potentialize their capacity to mitigate shocks through increased resilience and to use this crisis as an opportunity to unfold their longer-term transformative potential (Folke et al., 2010), by contributing to food security, sovereignty and reduction of vulnerability of smallholder food actors (Tittonell, 2019).

Conceptually, such analysis responds to the dynamic and unpredictable character of agroecological transitions, and the need for more inductive and constructivist research (Ollivier et al., 2018). It can be approached through the understanding of agri-food systems as purposeful human activity systems (Kaufmann and Hülsebusch, 2015), where actors operate within their frame of reference (knowledge, objectives, values, attitudes etc.) toward their specific objectives, influenced by constraining or enhancing context conditions (Mezirow, 2000). For instance, at the farm decision-making level, Sutherland (2011) conceptualized that major change processes toward sustainable management are often initiated in response to major trigger events. From this perspective, studying the diverse changing conditions caused by the pandemic that frame the individual and collective room to maneuver of local food actors for (re-)framing their objectives and actions is promising to understand what pushes actors to change from the usual.

Against this background, this study emphasized the Argentinean case, where in recent years agroecology is gaining momentum, and where the pandemic and the prevention measures have had severe impacts. The worldwide calculated COVID-19 Stringency Index shows that in a global comparison, Argentina was one of the countries with the strictest and longest lock-down and prevention measures implemented (Hale et al., 2021). National lockdown measures included strict local mobility restrictions, mandatory social isolation, distancing and closure of local markets and shops (put into force by the national decree N° 260 in March 2020). Although agricultural production and marketing activities where officially exempt from lockdown, difficulties in obtaining circulation permits for local food actors where widely reported all over the country (Urcola and Nogueira, 2020).

Within our ongoing case study research on agroecological transition pathways in a local food system in Argentina, in April 2020 we responded to the sudden lockdown and its impacts on the local food system by starting a stepwise study. In a first step, we conducted an online-survey to assess how local farmers and processors in a local food system in Northern Patagonia perceived disruptions and impacts in the early stage of the pandemic (March-June 2020) to carry out activities for producing and marketing food, and what immediate strategies they proposed and implemented to cope with the restrictions and perceived impacts (Frank and Amoroso, in press). We found that ninety percent of the respondents were affected in their farming and/or processing activities. In relation to specific impacts, among others, sale of products appeared as the most affected process and farmers and food processors stated their interests in establishing agroecological practices within civic food networks (c.f. Renting et al., 2012).

Based on these findings, in the second step of our study, we identified local producer shops and markets that were established or reinforced during the pandemic, for an in-depth case study. The overall aim was to study changing conditions, how they triggered actors to (re-)frame their objectives and activities regarding local marketing, and to assess the relevance of agroecological principles as a means of responding to changing conditions and to unfold longer-term transitions. The specific objectives were to (i) reveal marketing conditions that changed during the pandemic for local food actors to operate; (ii) identify objectives of, and activities conducted by, local producer groups to establish producer shops and markets; and to (iii) understand how the objectives and activities carried out reflect agroecological principles as articulated by Wezel et al. (2020).

This study reports on an exemplary case 'in the making', providing insights into particular changing conditions under which alternative practices are implemented, and into how agroecological principles can be used as a lens to investigate characteristics and potentials of these practices regarding immediate shock mitigation aspects, and longer-term agroecological transitions. Thereby this study contributes with case study-based knowledge to better situate general narratives for agroecology as sustainability pathway in response to food systems' crisis.

In the following, we first present materials and methods used to approach the above objectives. In the results we give a brief characterization of the assessed producer shops and markets and present our analysis of changing conditions for market actors, objectives and activities conducted by the self-organized producer groups (SOPGs) who implemented the producer shops and markets, and the linkages of their objectives and activities with the agroecological principles. Finally, we discuss our findings in the light of learning opportunities from disruptions caused by the pandemic and from the responses by food actors regarding potentials of agroecology approaches

to build alternative local food systems in context of crisis and beyond.

MATERIALS AND METHODS

Study Location

The case study was conducted in the Andean valley region *Comarca Andina del Paralelo 42*, comprising territories between parallels 41°30′ and 44°55′ South, and 71°20′ and 71°42′ West of the provinces of Río Negro and Chubut, Argentina (**Figure 1**). The region is characterized by a cold temperate mountain climate (average precipitation 750 mm/a, average annual temp. 9,8°C) (Madariaga, 2009). The human population has been growing rapidly in the region over the last decades, due to high national and international migration fluxes.[1] The territory counts several dispersed and rapidly growing urban and peri-urban centers, connected by a strong flow of labor, goods and capital across the province border that divides the region. In socio-economic terms, tourism, the public sector, agricultural and forestry production, and a diversity of handcrafts are the main sources of income for the local population.

Surrounded by mountainous forest landscapes, diversified agricultural production takes place in the productive valleys and on terraces (fruits, vegetables, hops, cereals, and small to medium scale animal production with varying intensities). The main growing season is from November to March. Local food provision relies to a large amount on imports from other regions of the country, although parts of the population choose local products and thereby engage in sustainable consumption practices. To our knowledge, there is no data available that quantifies the amounts and types of food imports or the share of local production necessary to cover local food demands.

According to data estimated by the National Institute for Agricultural Technology (Cardozo et al., 2022), there are 2619 farmers in the study region, out of which 96% work on a small scale for family consumption and/or selling of small volumes. Vegetable production is estimated to take place on 101 ha in greenhouses and outdoors. Farms are characterized by mixed small and medium scale production systems, under conventional management and a growing number under agroecological-based management approaches, such as organic farming, market gardening, community supported agriculture, community gardening and small farms for self-consumption (Frank et al., 2020). Local products are usually sold *via* direct marketing (on-farm, social media, home delivery and farmer markets), local retailers and informal bartering.

Data Collection and Analysis

Based on our findings on emerging local marketing strategies in response to indirect impacts perceived by local farmers and processors (Frank and Amoroso, in press), in March 2021 we mapped local producer shops (locally used term in Spanish: *mercados*) and markets (locally used term in Spanish: *ferias*) in the study region. In consultation with local experts (extension service, advisors, researchers, farmers, and consumers) we identified all the shops and markets ($n = 14$) that fulfilled our defined criteria (farmer/processor-led; food or mixed food/no-food; focus on direct marketing). Subsequently, we selected those cases ($n = 9$) that were functioning during lockdown/restrictions between March and December 2020, or at least during some months in this period, in order to be able to observe effects of changing conditions for the market actors. Out of the selected cases, 6 (5 shops and 1 on-farm market) were established after March 2020 (i.e., during the pandemic), and 3 (markets) existed before that date. The distinguishing characteristics of producer shops and markets is detailed in the results (Section Characteristics of Producer Shops and Markets). The identified shops and markets were visited to familiarize with the organizing groups (hereinafter referred to as *self-organized producer groups*: SOPGs), to learn from informal interactions how the shops/markets function, what motivates participating producers,[2] their objectives, and the challenges they face. The visits were conducted by the authors in collaboration with the local state extension service. Finally, during the visits we

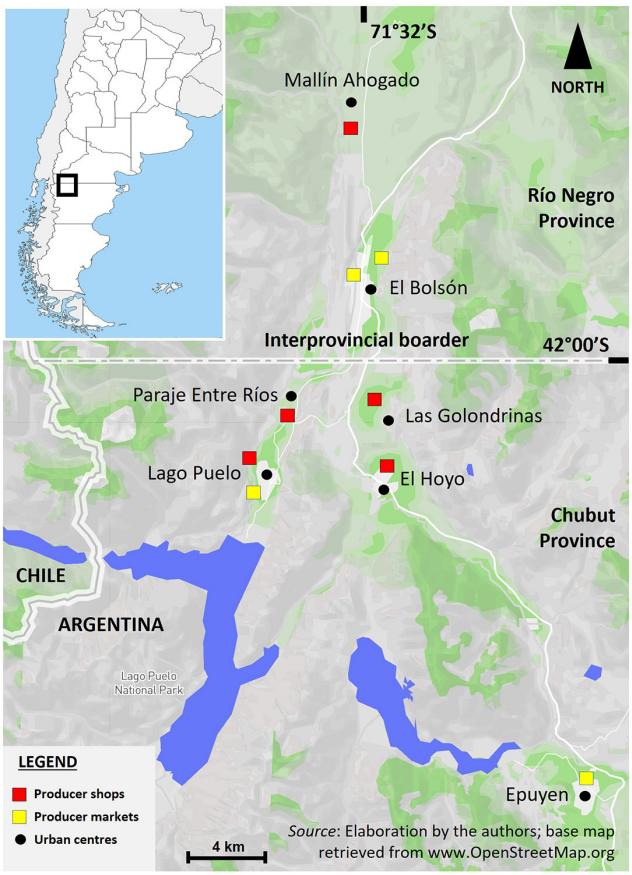

FIGURE 1 | Map of the study region and assessed cases.

[1]The last official census in 2010 reported a total of 23392 inhabitants (INDEC, 2010).

[2]In this article we adopt the term *producer* to refer to *farmers* (primary production) and *processors* (elaboration).

determined with the SOPGs their interest in participating in the consultative research through individual and group interviews.

Given the exploratory character of the study, a semi-structured interview method was chosen to capture and understand the interviewees' perceptions within the scope of the research objectives (Kvale, 2012), such as the history of the producer shops and markets, effects of the pandemic, objectives, activities, experiences, and future expectations of interviewees. Further, an open interview flow was used to provide space for the interview partners to also bring forward those relevant aspects that were not previously thought of by the researchers, and therefore to enrich the data and to reduce possible bias of the results. Where possible, group interviews were conducted with various members of the respective SOPG, to capture perceptions and knowledge of different individuals. This approach facilitated gaining insights into the representations, motivations, and interpretations of the participants in a situation of interaction not only with the interviewers, but also with other SOPG members. The dynamic interaction among group members recreates the social representations of the group on the issues under study, based on the discursive confrontation among participants. It is from this group interaction that the answers to the questions were further discussed, enhancing the richness of obtained data (Merton, 1987). Further, it provided the participants with greater cohesion and confidence at the time of answering in the dialogical mode proposed by the researchers (Kamberelis and Dimitriadis, 2011). For this study, the selection of interview partners was carried out by the consulted SOPGs themselves, respecting their organizational dynamics (Beitin, 2002).

Based on insights from the first interactions with the SOPGs and the defined research objectives, a first guide for the semi-structured interviews was drafted. The draft guide was used for the first three interviews (February 2021) and adjusted based on a preliminary revision of transcripts. Then, the remaining interviews were conducted by the authors (see Section Author Contributions) between August and October 2021. In total, 12 interviews were conducted, 8 with participants of the 6 producer shops that were established after March 2020, and 4 with participants of identified producer markets that were established before the pandemic started. In total, 5 group interviews and 8 individual interviews were conducted, with an average duration of 70 mins (range from 30 to 90 mins).

All interview material (Spanish language) was transcribed using a basic transcription mode to completely transcribe the literal content. Transcripts were then introduced into a qualitative data analysis software (ATLAS.ti) for qualitative content analysis. Qualitative content analysis is a flexible but structured method for qualitative-interpretative analysis of (text) material. It is the systematic analysis of documented communication, based on certain rules and led by theory (Mayring and Fenzl, 2014). The structured analytical-interpretative process was guided by the development of concepts and categories (codes) that were applied to the text in order to sort the material with regard to content (coding), and to increase information density by reducing text volume. **Figure 2** gives an overview of the qualitative data analysis framework, as employed in this study. The (sub-)categories and coding themes were developed by using a hybrid approach. The main analytical categories (1–5) were derived from the research objectives (deductive). Then, the sub-categories within the main categories 1–4 were developed based on the transcripts (inductive). For the analysis of linkages of objectives and activities with agroecological principles (category 5), the principles of agroecology that apply to the (local) food system level (as defined by Wezel et al., 2020) were taken as sub-categories and their definition (coding themes) were then used to reveal connections to objectives and activities conducted. Direct quotes of interview partners presented in the results are coded by the interview ID, differentiating between group or individual interview (gr/ind).

RESULTS

Characteristics of Producer Shops and Markets

Among the studied cases, two operational types of physical marketplaces were identified, where self-organized producer groups (SOPGs) and consumers, residents of the region or tourists, come together. The first type were the *producer markets* ($n = 3$), which preexisted the pandemic and were characterized by open-air spaces where producers offered their products at individual stalls. Producers participating in the markets organized to perform common tasks, such as communication, maintenance, or improvement of the markets' infrastructure. The second type were the *producer shops* ($n = 6$) that were closed spaces, implementing a rotational shift-work scheme for selling products of all the participating producers.

In both operational types, responding to the principle of self-organization, most SOPGs established assembly structures and decisions were made by consensus. The type of products offered were similar in all assessed SOPGs. A variety of local food products, such as vegetables, fruits, marmalade, honey, sweets, juices and bakery goods, seeds and seedlings, as well as handmade cosmetics, clothing, and other handicrafts were offered. In some cases, the product range was supplemented with products from other regions (community-based purchase), as availability of local fresh produce is seasonal.

Shops and markets were composed on average by 35 members (min = 5/max = 88), with seasonal fluctuation. Participant profiles were heterogeneous in terms of age and socioeconomic level, including a high number of producers with an urban-rural migration background and a predominance of female participants in the SOPGs. Most of the producers had other sources of "off-farm income," and only a few relied solely on the economic revenue from the shops and markets. Participating producers were farmers, some of them integrating processing of their crop and livestock products, and processors who bought raw materials mostly from within the SOPGs or from other local producers. Only in one case, pure re-sellers (traders) were represented within the SOPG.

Changing Conditions for Market Actors to Operate

Locally implemented lockdown measures in the study region came into force by 17th of March 2020, and were extended

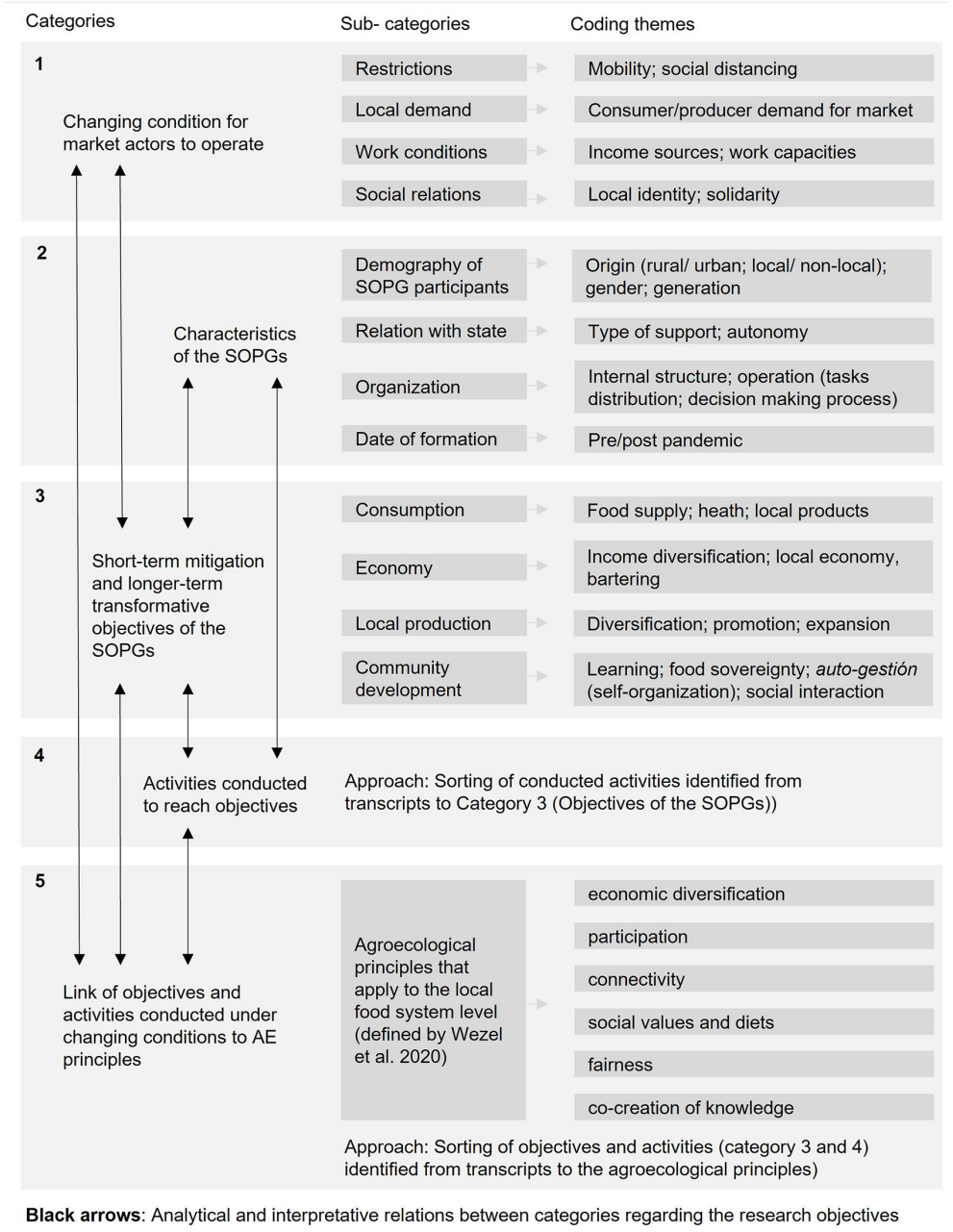

FIGURE 2 | Qualitative content analysis framework.

and modified in the subsequent months, legally justified by a high number of frequently changing national and provincial decrees.[3] Most restrictions were implemented by law nearly until the end of 2020, such as the closure of the province borders between the Provinces of Rio Negro and Chubut (dividing the highly connected urban centers within the study region), strict curfews and later on, social distancing measures for the general population. Formally, agricultural activities were exempt from restrictions, while some established mixed farmer and handicraft markets were closed. Small-scale producers, including the participants of the SOPGs, were restricted in their mobility to cross provincial borders. The beginning of lockdowns coincided with the ending of the main agricultural production season in the region, affecting marketing of the local production.

[3]National decrees: https://www.boletinoficial.gob.ar/busquedaAvanzada/busquedaEspecial; Chubut Province: https://boletin.chubut.gov.ar/; Rio Negro Province https://defensoriarionegro.gov.ar/drn/normativas-provinciales/.

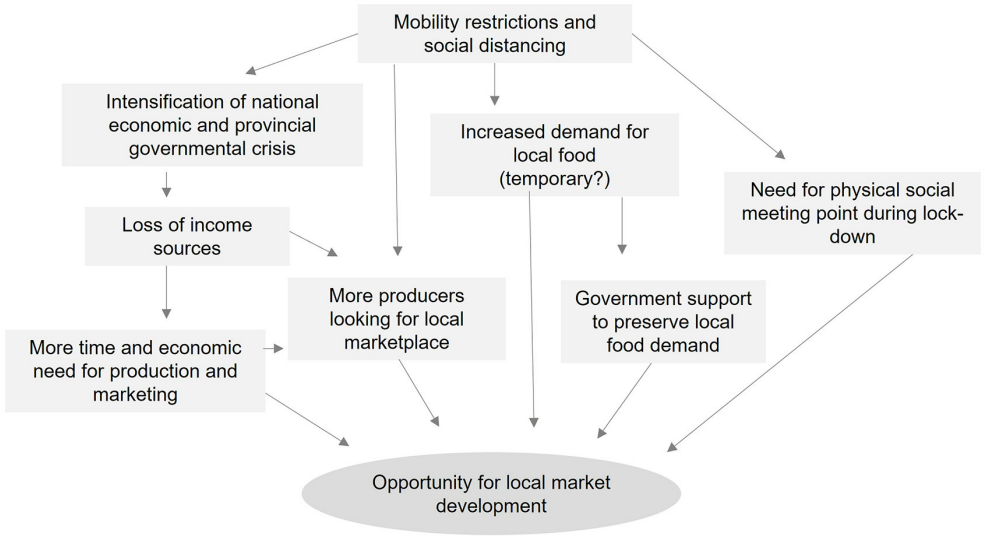

FIGURE 3 | Relational chart of changing conditions for local market development, based on the interview partners' perceptions.

Interview partners particularly perceived mobility restrictions and mandatory isolation as initial factors disrupting their operations. The relational analysis conducted by linking the other factors mentioned by the interview partners therefore starts with these two important new conditions (**Figure 3**).

The general context for the producer markets and shops to evolve during the pandemic was described by one interview partner as follows:

> *Having the borders closed made us look a little more inward, and an economic crisis began to emerge from which you know that in this region most of the people ask for some jobs in the public sector or some private jobs, but most of them are self-supporting, artisans (...). It was this situation that made appear these markets (. . .). In some places they began to work as an economic alternative, let's say, for the crisis (I2-ind).*

Although the implementation of the markets was apparently conducted within a crisis situation, and, as we show in the following, aimed at satisfying basic needs of the local population, the notion of *new opportunities* with a positive connotation brought by the changing conditions was revealed from the market participants' narrations.

> *The truth is that it [the pandemic] does not worry me much, on the contrary, I really like what we are doing here. We generated a link and very interesting discussions with the colleagues of the market group. And well, I see this as an opportunity, not as a problem. For me this was an opportunity (I4-gr).*

When explaining the above context of restrictions (**Figure 3**), local producers also reported experiences from their role as consumers. On the consumer side, the lockdown led to increased demand of consumers to access food in the direct neighborhood during strict curfews.

From the producer perspective, it was reported that loss of off-farm income due to the national economic crisis, before the pandemic and its further deterioration caused by the pandemic, led to an increased need to earn income from farming/processing and local marketing activities. In this regard, producers living and working in the Province of Chubut also referred to the ongoing provincial government crisis (e.g., leading to very long payment delays for public employees and strikes). Furthermore, in the entire study region, some producers were affected by severe fires that hit the region and burned 19,605 hectares[4] of forest and agricultural land between February and March 2021. Moreover, mobility restrictions, inhibiting other businesses (e.g., tourism and wage work), and hindering marketing of products in other closed local or inter-regional markets, led to more available work time, to increased need to redirect produce to very local market channels, to innovate and to change habits:

> *(. . .) because habits changed, although we lived in a certain rural environment, there was more time (...) that is to say, in the previous daily life there was not so much time to take advantage of all the apples, all the walnuts, everything, or to start cooking cakes or making bread (...). Someone who was an artisan became a baker, started making salads or sweets.* (I4-gr).

Given these circumstances, interview partners reported an increased demand of local producers for alternative physical marketplaces in the different residential locations (span. *parajes*). Furthermore, emergency support of the local municipal governments to establish (temporary) local markets was highlighted as a new and favorable condition in some of the markets. This was explained in the context of temporary closures of some established mixed food and handcraft markets during

[4]Personal communication: Servicio Nacional de Manejo del Fuego, Government of Argentina.

the lockdown. Here the municipalities responded with support to provide alternative market options for local (food) producers. In some cases, local authorities provided plots for outdoor markets and buildings for indoor shops, mostly in community or municipality centers, which were closed during the lockdown. In other cases, public support was provided to cover expenses for the daily functioning of markets (i.e., gas or electricity) or to adjust sanitary requirements to the market demands.

Restrictions that affected the opening of local markets were the established distancing protocols for physical markets, in particular regarding the restricted number of people allowed in closed marketplaces. This led to the development of organizational schemes for the rotational attendance of the markets to adjust to the sanitary protocols and a distribution of tasks also considering personal situations of the participants, i.e., high risk groups were excluded from serving the public as sales personnel.

All assessed SOPGs reported that during the strict lockdown, the demand in the local markets, both regarding consumers and producers, was very high and dropped gradually as restrictions were lifted. However, this was also attributed to two seasonal particularities in the region. First, the decline of local fresh products offered in the off-season, and second, the pronounced seasonality of tourism as an important economic factor for the local economy.

Finally, interview partners' narratives emphasize that the exceptional emergency, and changes caused in the individual routines, stimulated critical personal and societal reflections, such as the need for strengthening and revaluing grassroots initiatives for developing and transforming the local food system toward increased food sovereignty.

Objectives of the SOPGs and Activities Conducted

The analysis of objectives pursued by the different SOPGs under the changing conditions during the pandemic revealed three overall aims. These were: (i) to permanently establish producer shops in the different residential areas within the study region, also beyond the pandemic, and/or to reinforce already existing producer markets; (ii) to utilize the producer shops and markets as places of community development, and peer-learning through knowledge co-creation and exchange; and (iii) to articulate and potentialize political concerns of food sovereignty through collective action.

These overarching and general aims were approached by the SOPGs through specific objectives and activities (**Table 1**). Objectives and activities conducted were found to be similar between cases, except for some obvious organizational objectives typical for the producer shop organization. Therefore, no comparative analysis was conducted, and differences highlighted only where they applied. The objectives showed a principal divide regarding their nature. There are *reactive, short-term mitigation objectives* of the SOPGs to provide emergency relief in direct response to conditions changed by the pandemic and immediate needs, and *proactive, longer-term transformative objectives* to work on post-pandemic growth of the producer shops and markets and on broader local food system development. Short-term mitigation objectives directly responded to the changing conditions (cf. Section Changing Conditions for Market Actors to Operate), both in terms of economic needs to generate alternative household income, to sustain local food supply, and to provide physical places for social interaction and solidarity-based peer-to-peer aid for the local population during lockdown. Therefore, they can be classified as *reactive*, as they directly *respond to changed conditions*. In contrast, longer-term transformative objectives have a more *proactive* notion, hence they reflect actors' objectives of *initiating change* to transform the local food system.

Further, based on the analytical categories (see **Figure 2**), it was revealed that the SOPGs' overall aims, specific objectives and activities conducted addressed different aspects of the local food system, i.e., *economy*, *production*, *consumption*, and *community development*. This distinction is used to group objectives in **Table 1**. It constitutes the first analytical step to highlight the diversity of objectives and activities conducted, subject to further analysis of linkages with the agroecological principles (Section Linkages of Objectives and Activities With Agroecological Principles). The diversity reveals the holistic and transformative approach pursued by the SOPGs; not only to mitigate impacts of the pandemic on local producers and consumers, but also to actively contribute to the development of local agroecological production, local and solidary economy, convergence and relation-building between local consumers and producers, and broader community development.

The heterogenous character of objectives and activities indicates that motivations of participating producers went beyond the individual purpose of generating and diversifying income (*economy*) and pointed to more community-oriented social and environmental concerns, for instance classified under *community development*, *consumption,* and *local production*.

There were different motivations for objectives represented in the different SOPGs, explained by one interview partner as follows:

> *Until today we are thinking and rethinking what we want to be as a market, if we want to be a market with certain characteristics, or a simply commercial market. (…) there is a group of colleagues who have a beautiful and harmonious commercial vision, I say harmonious because it is not within the framework of capitalist commerce, that is, just to make money, but it is thought from a more communitarian point of view, but it is still a commercial vision. Then there is another group that is more interested in being there for community reasons, without looking so much at the commercial aspect, which is the case of many people who participate and do not sell much (…). Then there is another group of colleagues who are thinking about "how can we organize it so that we can fulfill both needs, let's say?" (I2-ind).*

By analyzing the nature of the activities that the SOPGs prompted (**Table 1**), it was revealed that only some activities were carried out by individuals at the farm- or processing-activity level, such as to produce more, to diversify production based preferentially on local resources (brought in or bartered from peers), and to start selling through different marketing channels. All other actions were taken at the shop/market activity system level (e.g.,

TABLE 1 | Objectives and activities of the SOPGs.

Analytical categories		Specific objectives	Activities* conducted to reach objectives
Reactive short-term mitigation	Economy; Production; Consumption; Community development	Generate alternative income sources in response to income losses caused by the pandemic crisis. Sustain local food offer supply during lockdown. Establish meeting points for social interaction and collective action during lockdown. Solidary peer-to-peer support to cope with socio-economic challenges.	- Collaborate with municipalities to open markets. (g) - Implement COVID protocols in the markets. (g) - Improve markets' physical infrastructure. (g) - Provide material/labor support by peers/consumers. (g) - Establish social media to organize/promote shops/markets. (g) - Ask peers to start farming/processing business. (i) - Exchange knowledge on farming/processing practices. (g) - Start producing beyond self-consumption. (i) - Implement bartering practices. (g) - Work voluntarily in market organization. (g) - Purchase staple food as community (food coops). (g)
	Economy; consumption	Generate alternative and diversified income sources beyond shock mitigation. Create consumer-producer proximity without intermediaries. Expand and diversify markets in support of the local economy. Incentivize local/healthy/diversified consumption.	- Negotiate with municipalities for continuing support (physical places, food safety protocols, permits). (g) - Offer products on different local markets. (i) - Collectively define fair prices. (g) - Implement bartering practices. (g) - Purchase primary products from local peers. (i) - Use social media to attract more consumers. (g) - Share knowledge among producers and consumers (consumption and farming practices). (g) - Organize seed/seedling exchange events. (g) - Generate networks between markets to complement product ranges to attract consumers. (g)
Proactive longer-term transformative	Production	Expand and diversify markets based on local farming and processing practices. Strengthen local/agroecological production.	- Prioritize local (agroecological) products offered. (g) - Promote agroecological practices within the marketing groups. (g) - Ask peers to start farming/processing business. (i) - Purchase primary products from local peers. (i) - Organize seed exchange events. (g) - Start producing beyond self-consumption for sale. (i) - Offer trainings and workshops on agroecological practices. (g)
	Community development	Markets as social meeting points, and places of learning. Strengthen local and solidary social networks for collective action.	- Develop group-based and participatory organizational structures and tools for producer shops. (g) - Train participants in relevant organizational topics. (g) - Implement remuneration schemes for rotational attendance by market participants. (g) - Implement social media platforms to organize and promote markets. (g) - Exchange knowledge between peers and with other local markets (processing, market organization). (g) - Link market spaces with other community activities (workshops, trainings, events). (g) - Conduct solidarity peer activities to overcome economic crisis. (g) - Purchase staple food as community (food coops). (g)

**Conducted by individuals at the farm and processing level (i); at the SOPG level (g).*

organizational and training activities) and done to reinforce linkages between shops and markets with the local communities (cultural events, workshops, fundraising, etc.). Remarkably, these activities reflect important investments of human and social capital by the SOPGs to reach their objectives. Most of the activities which were directly related to the producer shop organization were conducted by participants *ad honorem*.

Moreover, activities were identified that aimed at the increase of human and social capitals through changes in relationships between actors and co-learning within the SOPGs (e.g., through participatory and group-based organization of the producer shops, trainings and knowledge co-creation and exchange activities), and with the local communities (e.g., through raising consumer awareness of local production and consumption practices and through consumer involvement in the producer shops and markets). In this context, *knowledge exchange*, *participation*, *togetherness*, *empathy*, *solidarity*, *tolerance*, *trust*, *commitment*, *awareness*, and *autonomy* were frequently used in the interview partners' descriptions of the SOPGs' relations, their objectives and activities, their engagement with the local community, and their values and future aspirations. The groups pursued a combination of direct marketing-related and socio-cultural and political objectives and activities. However, the analysis of activities showed that the marketing-related objectives where emphasized, while community development was less represented in concrete activities.

Reported challenges encountered in the autonomous, participatory and solidarity-based approach implemented by the SOPGs were the high amount of time to be invested by individuals *ad honorem*; managing group conflicts and decision-making in the organization of activities, assuring continuous participation of producers, particularly during normalization of conditions after lockdown ended, and seasonal decrease of economic revenues from selling in the markets. In this regard, the SOPGs that implemented the producer shops reported that some producers stopped participating after lockdown ended and when the high selling season was over. However, those SOPG members who kept up with the shop or market activities

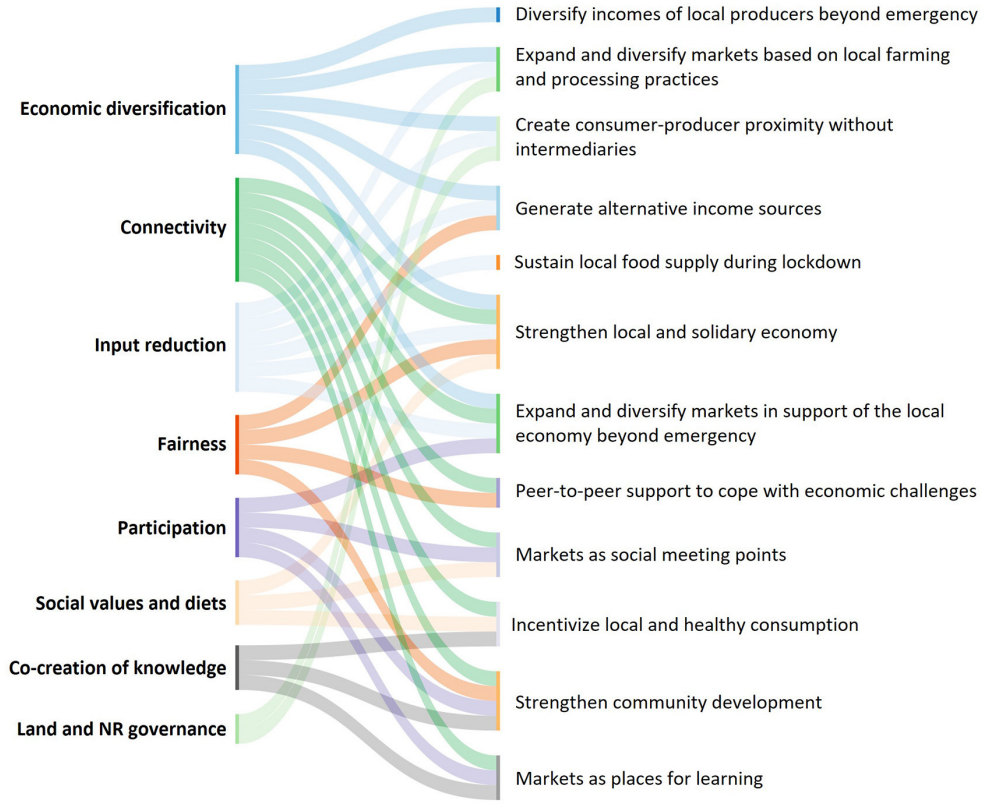

FIGURE 4 | Assignment of SOPGs' objectives and agroecological principles.

stated a pronounced commitment to continue in the collective construction process, pointing at the long-term establishment of producer shops and markets as instruments for local food system transition toward food sovereignty.

Linkages of Objectives and Activities With Agroecological Principles and How They Respond to Changing Conditions

Figure 4 shows the multiple linkages between the objectives of the SOPGs and the agroecological principles. These linkages are explained in the following for each principle also regarding how they respond to the changing conditions (see Section Changing Conditions for Market Actors to Operate). In order to give more meaning to the principles, each of them is introduced by citing its definition according to Wezel et al. (2020).

Economic Diversification

"Diversify on-farm incomes by ensuring that small-scale farmers have greater financial independence and value addition opportunities while enabling them to respond to demand from consumers." One key objective of the SOPGs was to generate new income sources for local producers, based on local and solidarity marketing approaches, and direct consumer-producer relations without intermediaries. Although the assessed producer markets existed before the pandemic, and most producers who participated in the new producer shops had produced and marketed locally before, it became clear that by having a growing number of producer shops to market their products, they were incentivized to conduct activities to increase and/or diversify their production and marketing during the pandemic. Thereby, they were able to partially serve the (temporary) increased demand of local consumers. However, it needs to be underlined that most of the producers in the assessed SOPGs did not make their living from on-farm or processing income alone. In this sense the markets provided a platform to generate additional income to increase financial independence of the households by combining on-farm or processing income with other off-farm incomes. Further, the objective of supporting the development of local and agroecological production practices showed the motivation to incentivize local farm-level transitions beyond the individual production horizon and through collective marketing. In this regard, interview partners highlighted the need to diversify product ranges offered in the shops and markets to attract consumers and to respond to consumer demands.

Input Reduction

"Reduce or eliminate dependency on purchased inputs and increase self-sufficiency." The high relevance of this principle during times of mobility restrictions, temporary input-supply disruptions for producers and consumers, and mandatory social isolation of consumers was shown by the response of local

actors who established producer shops and markets to sustain local food supply during lockdown, responding to increased demand to produce, market and consume locally. Further, the articulated reliance on preferably local resources (such as flour, fruits and vegetables) by processors, and local seed production and exchange by farmers, directly responded to this principle. However, the principle was not fully applied. This was explained by the problem of (temporarily) limited local availability of certain products for production and consumption. Here, the SOPGs worked in collaboration with national farmer organizations, organic retailers, and food coops to obtain inputs needed in processing, such as sugar, coconut oil, etc., and products to increase product ranges for consumers in the markets (sugar, fruits, vegetables, yerba mate, etc.).

Fairness

"Support dignified and robust livelihoods for all actors engaged in food systems, especially small-scale food producers, based on fair trade, fair employment and fair treatment of intellectual property rights." The support of robust livelihoods by producers and local consumers participating in the markets became evident through the objectives and related activities to sustain local food supply during lockdown, to provide solidary-based peer-to-peer support to cope with economic challenges in times of economic crisis (and other catastrophes, such as the fires). Fair trade was encouraged through direct producer-consumer marketing without intermediaries, in some SOPGs through definition of prices based on production cost. Aiming to establish producer shops and markets as places of social interaction and learning, the SOPGs encouraged transparent communication of price structures to consumers, coupled with awareness-raising activities related to local and agroecological production. Whereas the groups' motivations to establish and operate the producer shops were principally based on volunteering, some groups made use of remuneration schemes for worktime provided by group members to serve the public. Thereby, where remuneration schemes were implemented, the groups developed mechanisms to approach issues of fair employment, within a context of economic need for income, to operate the shops.

Social Values and Diets

"Build food systems based on the culture, identity, tradition, social and gender equity of local communities that provide healthy, diversified, seasonally and culturally appropriate diets." Identified objectives and activities of the SOPGs are related to this principle, particularly with respect to facilitation of exchange of local knowledge on agroecological production, marketing, and consumption practices. Motivations expressed by interview partners in this regard were to incentivize local and healthy consumption, and to enhance the implementation of agroecological farming practices. Diversification of diets was directly addressed by the SOPGs through the ambition to expand the range of products available in the shops and markets for local consumers, and by offering different types of healthy products, partly little known to local consumers. This principle also reflects cultural practices of parts of the local population who follow alternative and healthy lifestyles and emphasize solidarity and autonomy aspirations. Interview partners reported that local identity-building was encouraged through the shops and markets as social meeting points for collective action during social isolation, an example of how activities responded to the changing conditions.

Land and Natural Resource Governance

"Strengthen institutional arrangements to improve, including the recognition and support of family farmers, smallholders and peasant food producers as sustainable managers of natural and genetic resources." The SOPGs constitute new community-based institutional arrangements to form producer shops and markets. Interview partners characterized the shops and markets as places of institutional and organizational innovation to build an alternative local food system based on food sovereignty. Indeed, the new institutional arrangements adopted by the groups did not directly refer to land and natural resource governance. However, the SOPGs geared their objectives toward building a platform to facilitate broader institutional innovation within the local food system, also regarding management of natural and genetic resources (e.g., land rights and local seed production). Solidarity-based objectives and activities within the SOPGs were reinforced by the changing conditions: for instance, through peer-to-peer support to cope with economic challenges at the household level, through establishment of bartering systems, and through the objective to strengthen social community interaction (for example, through fundraising and campaigns to collaborate with the victims of the fires). Further, the emergency support provided by local governments was explained as a result of the new situation caused by the pandemic. However, in most cases, this support was temporarily limited to the emergency situation. Only in the case of pre-existing markets and in the case of one producer shop, did the government prove continued support through longer-term contracts to sustain the shop beyond the emergency situation. Hence, in these cases, the new situation helped to encourage local governments to support the new institutional arrangements that were created by the SOPGs. However, interview partners underlined the rather conflicting relation between the SOPGs and local authorities, and the lack of support for local agricultural development in general. Reference was made to the absence of territorial land-use regulations, pressure by the real estate sector, and missing recognition by local governments of local (smallholder) farmers as capable and sustainable managers of locally limited agricultural lands.

Connectivity

"Ensure proximity and confidence between producers and consumers through promotion of fair and short distribution networks and by re-embedding food systems into local economies." Connectivity was most obviously reflected in the objectives and activities of the SOPGs. This principle is inherent to the main objectives of the groups as they emphasized consumer-producer and producer-producer proximity through short distribution networks and strengthening local economies. Furthermore, the producer shops and markets were seen to play an

important role as places for social interaction, joint learning and collective politically motivated action. These functions are also reflected in the implementation of the principles of *fairness*, *participation*, and *knowledge co-creation.* The producer shops were established under changed conditions and with direct consumer participation. Consumer participation was particularly pronounced in the reported support of consumers in the construction of the shops (e.g., in form of donations or volunteer work). In turn, the SOPGs' objectives and activities aimed at incentivizing solidary economy, and relationship-building between consumers and producers. This was even more pronounced with respect to the bartering practices conducted by the SOPGs, when producers took the role of consumers through exchange of products for self-consumption.

Participation

"Encourage social organization and greater participation in decision-making by food producers and consumers to support decentralized governance and local adaptive management of agricultural and food systems." Increased connectivity between the involved actor groups and the agency of the SOPGs to implement the shops and markets can be regarded as a product of new social organization. Furthermore, the groups aimed at developing new social organizational structures and processes for the shops' functioning and for its integration into local community development, based on multi-actor participation, horizontal decision making and peer learning (see also **Table 1**). Regarding decision making, the groups opted for consensus-based processes, requiring more participation in debates compared to majority vote processes. Local adaptive management was encouraged and implemented when the SOPGs readily responded to the various changing conditions (see **Figure 3**), by opening new markets and by developing new organizational arrangements.

Co-creation of Knowledge

"Enhance co-creation and horizontal sharing of knowledge including local and scientific innovation, especially through farmer-to-farmer exchange." Activities conducted by the SOPGs showed that horizontal learning was approached through informal and formal learning. Informal learning occurred as part of the daily marketing activities (e.g., exchange of knowledge on alternative production and consumption practices, learning about organizational issues). Formal learning events were organized by the SOPGs, such as trainings for participants on topics of market administration and price definition (in some of the shops, provided by group members and/or by the local public extension agency). The implementation of new marketing formats under new conditions led to an increased need for learning by involved actors. Interview partner highlighted the importance and richness of horizontal learning processes that evolved within and between the SOPGs and with consumers, and how these learning processes enriched the collective processes (see also principles *connectivity*, *participation* and *governance*).

DISCUSSION

Up to now most studies related to the COVID-19 pandemic crisis and local food system actors' adaptations to changing conditions were conducted in the early months of the pandemic, based mostly on online surveys (e.g., Tittonell et al., 2021; Zollet et al., 2021), and on expert opinions (e.g., Worstell, 2020; Nemes et al., 2021). We opted for a qualitative case study using in-person semi-structured interview methods with individuals and groups to obtain in-depth insight from first-hand local food actors' perceptions, during 2021, when conditions stabilized, and on-going processes had been in place for more than 12 months. We studied how self-organized producer groups (SOPGs) adapted their marketing objectives and activities under changing conditions caused by the pandemic crisis, considering agroecological principles to understand emerging change processes.

The analysis of changing conditions supports our previous findings in the case study region, showing disruptions in local food actors' operations mainly caused by mobility restrictions, closures of principal roads, the provincial borders, and some local markets (c.f. Frank and Amoroso, in press). In consequence, local producers' marketing and access to inputs were most affected, and they faced overall economic challenges to generate income. For consumers, access to places where to purchase food was restricted to very local options in the neighborhoods. The important impact of the closure of provincial borders, both for consumers to purchase food, and for producers to reach consumers and to purchase production inputs, is explained by the high social and commercial interconnectedness within the rural-urban continuums in the study region (Bondel, 2009). Within this context, the changed conditions triggered local food actors to focus on and to reorganize local marketing, based on collective action.

Due to the mobility restrictions and health protocols during lockdown, several farmer and handicraft markets were closed in the study area. These altered conditions supported the formation of SOPGs and the opening of producer shops, attended by one or two people, offering products from all participating producers. Within the SOPGs, the presence of producers with urban-rural migration backgrounds helped to promote links with urban environments and with consumer groups, realize activities within the markets and connect to other community development activities, beyond mere marketing transactions (Craviotti et al., 2021). Another important condition for the SOPGs to implement their responses was the increased engagement by the local government to establish the producer shops. As analyzed by Ejarque et al. (in press), in the early 2000s, when some of the pre-pandemic markets were established in the study region, local governments also provided support. However, the quality of collaboration was variable between different markets and often ephemeral (Ejarque et al., in press). This risk was also observed in some of our cases: where public institutions provided temporary support during lockdown, it turned into a conflicting situation in some of the SOPGs in the course of normalization of conditions, when the state (re-)claimed the facilities (buildings, plots) for other purposes, such as for community activities or sports. This

reported conflict, on the one hand, evidenced the objectives of the emerging SOPGs to sustain and expand the established producer shops, markets, and networks beyond the emergency situation. On the other hand, it explains the desire for autonomy underlined by some of the groups. Here, our results suggest that under normalization of conditions, governments' commitment in favor of local food system development based on agroecology needs to be guaranteed to sustain and expand local transition initiatives over time.

Overall, our findings agree with those of other studies regarding the high capacity of local food actors to respond to the changing conditions caused by the pandemic. While other studies showed this capacity at the onset of the pandemic, our study adds that the capacity was maintained over time and under gradual normalization of conditions. In particular, this was shown by the SOPGs' longer-term objectives and activities conducted to keep producer shops and markets going. The reactive and immediate shock mitigation potential, also found by other studies in the early stages of the pandemic, was illustrated by the characterization of the producer shops and markets, and by the diverse objectives and activities brought to the territory by the SOPGs (c.f. **Table 1**). Most other studies in the field related this potential to concepts of resilience (Béné, 2020; Savary et al., 2020; Thilmany et al., 2020; Perrin and Martin, 2021; Tittonell et al., 2021). Regarding the short-term mitigation objectives of the SOPGs, we found this argumentation reasonable, when resilience is considered as '*the ability to cope with shocks and to keep functioning in much the same kind of way*' (Walker, 2020). However, looking at the longer-term objectives and activities of the SOPGs, it becomes clear, that the groups' aims and objectives did not strive at keeping the local food system functioning in much the same kind of way, but to radically change its structure. This shows the transformative potential of actors to operate in complex adaptive systems, as conceptualized for sustainability transitions in general (Hölscher et al., 2018), and more particular in our case, for agroecological transitions in food systems (Wezel et al., 2020). In resilience thinking, this transformative aspect explains that the SOPGs responded to disturbances by working toward new domains, reorganizing the local food system's structure, redefining values and aims, and contributing to increased resilience of the envisaged transformed local food system (Folke et al., 2010).

Regarding agroecological transitions reflected in our cases, we found that actors' responses under changing conditions were consonant with agroecological principles. By emphasizing healthy and local food production and consumption, and by promoting a common identity and reinforcing local ties, the assessed producer shops and markets and the organizational structures implemented by the SOPGs, conceptually relate to civic food networks (Renting et al., 2012), and to agroecological transitions promoted by such networks (González De Molina and Lopez-Garcia, 2021). In particular, we found that the objectives and activities of the SOPGs aimed at the revaluation of social, cultural and environmental meanings of food, and of changing relationships between producers and consumers to gain control over food production and distribution processes (c.f. Renting et al., 2012; Opitz et al., 2017).

The translation of this transformative potential into concrete actions was encouraged by the changing conditions. Changed conditions led to the occurrence of shared and complementary immediate needs of local producers and consumers, for instance, the need for social interaction and solidarity-based peer-to-peer support in times of economic crisis, as well as the need of local producers to generate alternative and diversified incomes, and the need of consumers to purchase food locally. To address these and other identified needs, social and human capital was immediately mobilized by the SOPGs to (re-)organize local food supply chains in alternative networks under suddenly changing conditions. This mobilization confirms the high ability of SOPGs to readily respond to changing conditions by making use of available capitals. Moreover, the mobilization of social and human capital facilitated joint visioning and learning for local food system development, fostered social and organizational embeddedness of marketing activities in local communities, based on solidarity and shared values (Chiffoleau, 2009). This highlighted the relevance of direct physical producer shops and markets as places for producer-producer, consumer-producer and consumer-consumer interactions. However, the interactions went beyond the issues of generating alternative incomes and to access food. They offered space for the above social purposes (Golsberg et al., 2010). Whereas in other regions, alternative marketing through digital channels was most pronounced during lockdowns (Cendón et al., 2021; Craviotti et al., 2021; Gutiérrez et al., 2021), consumers' preference of physical places linked to the social/emotional dimension of purchasing food was also revealed by Butu et al. (2020), who studied digitalization efforts for direct marketing during lockdown.

Longer-term proactive objectives and activities of the SOPGs, such as the permanent establishment of producer shops and activities to promote solidary economy and local agroecological farming and consumption practices further indicate that the groups are committed to sustain and expand their innovative practices beyond lockdown. Apparently, this finding is not surprising, as most producers were interested and/or actively engaged in alternative food practices before the pandemic. Nevertheless, it shows that changing conditions led to new needs articulated by producers and pushed them to change from the usual. The proactive character indicates that they took advantage of the changing conditions to realize their aims. This was shown by critical reflections and learning regarding sustainability of food practices within the SOPGs and with the local community. Thereby, new opportunities facilitated collective change in objectives and actions, based on learning by doing. These learning by doing processes were triggered by the changing conditions, hence new situations encouraged learning within the SOPGs. Restrictions and protocols required learning about new market organization formats (processes and structures). Further, the groups reported that learning was addressed and enacted regarding agroecological production and consumption practices, highlighting the relevance of horizontal learning processes for agroecological transitions (Anderson et al., 2019). In this sense, the crisis situation can be qualified as a trigger event for learning by local food actors to innovate. A lasting outcome of the collective processes is the improved

preparedness (resilience, transformative potential) of actors to readily respond to future crisis, based on the learning from concrete (positive) experience (Kolb, 1984), and based on the newly gained knowledge, as well as newly established social networks and institutional arrangements in civic food networks. This was illustrated by the development of the new producer shop formats and by the novel strategy of reselling staple food products bought-in from other regions within the SOPGs and to local consumers, in line with the concept of food coops (c.f. Little et al., 2010).

The relevance and potential of agroecological principles for these alternative networks to develop and to operate under changing conditions was shown by the explanatory analysis of multiple interrelations of the SOPGs' objectives and activities with the principles of agroecology (Wezel et al., 2020). The changing conditions triggered change of action toward agroecology, showing that agroecology principles became a relevant means to respond and adapt to changing conditions. This was, although to varying extents, found for all principles considered in the analysis, and most pronounced regarding the principle of economic diversification and those related to social aspects (connectivity, participation, governance, knowledge co-creation). These principles were at the center of the SOPGs' objectives and activities. The adaptive management in response to a sudden shock situation was primality based on the operationalization of the principles of participation and connectivity.

Connectivity refers to the important role of consumers in agroecological transitions in food systems. In our concrete case, we showed the high relevance of connectivity and participation for the implementation and maintenance of the producer shops and markets. In line with other studies (e.g., Cendón et al., 2021; Prosser et al., 2021), increased demand for local (agroecological) food within the established civic food networks was reported by the SOPGs, based on their observation of high demand in the markets by local consumers during lockdown, and continuity of the shops' and markets' functioning and frequentation after lockdown ended. Other studies found growing consumer demand and changes in consumption behavior, either due to changing preferences for healthy food (Bisoffi et al., 2021), decrease in purchase power (Workie et al., 2020), easier access to food, or ideological-political positioning linked to consumer-producer proximity and knowledge about where and how food is produced (Craviotti et al., 2021). Our case shows that the issue of access to marketplaces and food also played an important role during lockdown, leading to (temporary) changes in buying behavior of local consumers. Further, from the assessed cases, substantial organizational and material support of the SOPGs by consumers revealed a further interest by consumers to contribute to the growth of alternative local marketing.

Our study gives only limited insight into consumers' roles because it did not cover consumers' perceptions on the SOPGs and the implemented producer shops and markets. Furthermore, changes in consumers' behavior during the expected future normalization of conditions need to be monitored. Reflections made by the interview partners from the SOPGs regarding the maintenance and growth of the producer shops and markets highlighted the important role of consumers' buying behavior, their preferences for agroecological products, and their interest in actively contributing to local agroecological transitions (c.f. Cendón et al., 2021). While we found some activities that are very likely to be sustained by the SOPGs and the participating community under normalization of conditions, such as bartering, food coop community purchases, and further consolidation of the producer shops and markets, the sustainability of changes in consumer behavior remains the big unknown variable with regard to lasting changes brought about by the pandemic (Bisoffi et al., 2021). To assess the role of consumers, and to better identify consumers' motivations and preferences for buying local food and to participate in alternative markets, we are currently conducting further consumer research related to the producer shops and markets in the study region. We consider it important to better understand why or why not consumers supported the local alternative markets in the context of the pandemic and under normalization of conditions, also taking into consideration possible socio-economic and cultural differences in the local population. This will contribute to the debate of limitations of alternative food networks to grow and to move out of niches (Sarmiento, 2017), and to contribute to scaling of agroecological transitions (González De Molina and Lopez-Garcia, 2021).

CONCLUSIONS

In light of findings from other recent research on the COVID-19 pandemic crisis and local food system actors' adaptations to changing conditions, our study responds to the call for in-depth case research to elucidate changing conditions for local actors to develop local markets and to assess the relevance of agroecological principles as a means of responding to changing conditions and to unfold longer-term transitions.

Although projections regarding the sustainability and evolution of the social processes that drove the assessed collective responses are difficult to make, our results showed that agroecological principles became important means to implement concrete local actions for transitions in a crisis situation. Moreover, we argue that through collective learning and action, encouraged by a difficult crisis situation, local food actors became better prepared for future changing conditions related to crises. They realized their capacity to act, increasing their self-determination. By showing that actors change their actions toward agroecology when new needs and opportunities arise from a crisis, it can be expected that future food crises will possibly provide additional triggers for actors to implement further local agroecological food system transition strategies.

Finally, our study showed how the consolidated agroecological principles can be used to qualitatively investigate characteristics, potentials and constraints of local actions for transitions in order to better grasp agroecological pathways enacted in real territories, and to provide decision support for policy makers to foster and potentialize such new local and community-based institutional arrangements.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article can be made available by the authors upon request, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. All interview partners gave their consent to audio record the interviews and to use the strictly anonymized recorded interview material for research purposes within the project (2019-8191.PL459.001).

AUTHOR CONTRIBUTIONS

MF conceived of the study, with conceptual support by BK, ME, ML, MN, and MA. MF, ME, and ML developed the interview guide and conducted the interviews and related field work. MF analyzed the data for the analysis categories 1, 3, 4 and 5 (see **Figure 2**). ME, ML, and MN collaboratively analyzed the data within the analysis category 2 (see **Figure 2**). The manuscript was principally written by MF, reviewed and commented by BK, ME, ML, MN, and MA. All authors contributed to the article and approved the submitted version.

FUNDING

The research received funding support from German Academic Scholarship Foundation (PhD scholarship MF), Foundation fiat panis (Grant number 02-2018) (material costs for field work), National Institute for Agricultural Technology (Project 2019-8191.PL459.001) *Fortalecimiento de la producción local de alimentos frutihortícolas con énfasis en el enfoque agroecológico en la Comarca Andina del paralelo 42°*, and National Agency for the Promotion of Science and Technology (PICT 2017-4025) *¿Nuevos vínculos entre la producción y el consumo? Mercados de productos agropecuarios en Chubut, Patagonia Argentina* (transportation and material costs for fieldwork).

ACKNOWLEDGMENTS

The authors are grateful for the support of this research provided by interview partners and producer groups in the case study region. Further, we are thankful to the project partners within the above INTA project. Special thanks go to Liliana Barbosa and Leandro Sisón Cáceres for their valuable support in organizing field work and conducting interviews, and to Dr. Alexandra zum Felde for providing language editing support.

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