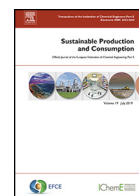




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The impact of COVID-19 on alternative and local food systems and the potential for the sustainability transition: Insights from 13 countries

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ABSTRACT

The COVID-19 pandemic has been a major stress test for the agri-food system. While most research has analysed the impact of the pandemic on mainstream food systems, this article examines how alternative and local food systems (ALFS) in 13 countries responded in the first months of the crisis. Using primary and secondary data and combining the Multi-Level Perspective with social innovation approaches, we highlight the innovations and adaptations that emerged in ALFS, and how these changes have created or supported the sustainability transition in production and consumption systems. In particular, we show how the combination of social and technological innovation, greater citizen involvement, and the increased interest of policy-makers and retailers have enabled ALFS to extend their scope and engage new actors in more sustainable practices. Finally, we make recommendations concerning how to support ALFS' upscaling to embrace the opportunities arising from the crisis and strengthen the sustainability transition.

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1. Introduction

From a sustainability transition perspective, a global crisis can provide unique possibilities to examine how the innovations and coping strategies adopted by food system actors facilitate – or hinder – the transition towards more sustainable food production and consumption systems. The mad cow crisis at the end of the 1990s had a profound effect on food systems in Europe and beyond, initi-

ating innovations and adaptations that contributed to their transition (e.g. development of traceability systems in long chains and emergence of alternative food movements) (Blay-Palmer, 2009). However, the COVID-19 outbreak stands out from previous global crises due to the rapidity of its spread and its all-encompassing disruption of supply chains. The agri-food system, in particular, has been impacted from production to consumption, both locally and globally (Clapp and Moseley, 2020). This paper aims to enrich the discussion about the implications of this crisis as an opportunity for sustainability transitions by examining alternative and local food systems (ALFS) (Tregear, 2011) and their responses to the COVID-19 outbreak. While many articles have been published in this topic during the last months, few of them offer an international comparative perspective. Our research included 13 countries around the world (Argentina, Australia, Austria, Canada, France, Hungary, Italy, Japan, Luxembourg, Norway, South Korea, Spain, and the UK). We focus on ALFS because these food systems are already in the process – or show promise – of ‘doing things differently’ (Le Velly, 2019), although their influence on the transition of food systems remains a matter of debate (Chiffolleau, Dourian, 2020). The study examines how ALFS reacted in the first months of the pandemic (March–June 2020), when the first lockdowns were enacted in most of the 13 countries. By combining the Multi-Level Perspective (Geels, Schot, 2007) with insights from social innovation research (Moulaert et al., 2013), we attempt to 1) shed light on the innovations and adaptations implemented within these systems, and 2) explore how these innovations and adaptations are creating or supporting a transition in food production and consumption systems more broadly. In particular, we examine how the combination of social and technological innovation, greater citizen involvement, and the increase in the interest of policy-makers and large retailers in these systems are enabling ALFS to extend their scope, and leading new actors to adopt more sustainable practices. We also make recommendations concerning how to support ALFS’ upscaling, to embrace the opportunities created by the crisis, and strengthen sustainability transitions.

2. Literature review

2.1. From disruption to sustainable transition

The COVID-19 pandemic has disrupted food systems worldwide, affecting food security and the nutrition of rural and urban populations and challenging the resilience of the global food system (Clapp and Moseley, 2020; van der Ploeg, 2020). The lack of seasonal workforce, the failure of contractual relationships, as well as the disruption of transport networks, increased the risk of supply-side shortages (Hobbs, 2020; Neef, 2020). Although the short- and medium-term impacts of the pandemic were mostly felt beyond the farm gate (Béné, 2020), the pandemic has further exposed the need to develop food systems that are healthier, more sustainable, equitable, and resilient (Bakalis et al., 2020; FAO, 2020; IPES-Food, 2020). For example, the potential of new production systems, such as agroecology, has been reaffirmed as a central component for shifting food systems beyond business as usual (Altieri, Nicholls, 2020). Several opinion papers published in academic journals in the first months of the pandemic also stressed the crucial role played by local food systems in responding to the crisis. In particular, they suggested that social and technological food system innovations, in connection to the re-localisation of supply chains, could play a crucial role not only in the pandemic response but also in making supply chains more sustainable and resilient (Belik, 2020; Darnhofer, 2020; Nandi et al., 2020; Worstell, 2020).

Although the focus of this article aligns with these initial analyses, we propose to further develop the hypothesis that the cri-

sis has opened up opportunities for social and technological innovation around local and regional food, favouring a sustainability transition in local food systems and strengthening their resilience. While since the start of the pandemic other empirical studies have been published on these topics, most of them focus on single countries or specific geographical areas (see e.g. Darrot et al., 2020; Thilmany et al., 2020; Blay-Palmer et al., 2021; (Prosser et al., 2021); ; (Tittone et al., 2021; Zollet et al., 2021)). This paper, on the other hand, provides a comparative perspective on 13 different countries, thus strengthening the findings of other works while providing widely applicable policy recommendations.

2.2. A landscape crisis strengthening innovation niches

The Multi-Level Perspective (MLP; Geels and Schott, 2007) is a framework widely used to address food system transitions to sustainability (El Bilali, 2019). The MLP is based on an ideal-typical narrative: transitions occur due to crises in the socio-technical landscape (i.e. at the macro scale) that weaken the socio-technical regime (meso scale) and open windows of opportunity for novelties and niche innovations (micro scale) to break through, thereby affecting the higher levels in the long term. From the MLP standpoint, the COVID-19 crisis can be considered a ‘meta-transition event at the landscape level that permeates into multiple regimes simultaneously’ (Wells et al., 2020). Through its pervasiveness, the pandemic has revealed the limits of the dominant global socio-technical regime (Clapp and Moseley, 2020), and has provided opportunities for innovation niches, helping to envision alternative futures (Wells et al., 2020).

We thus suppose that the crisis has increased the relevance of alternative and local food systems as innovation niches, the (re)emergence of which in the 1980s in Global North countries was often understood precisely as a reaction to the shortcomings of the agro-industrial regime (Brunori et al., 2012). Moreover, from a sustainability perspective, the crisis may have accelerated the processes highlighted in the MLP literature as being able to favour the development of more sustainable practices – namely: 1) The replication of these niches, 2) the scaling up of ALFS by attracting more participants and increasing production and sales, and 3) the diffusion of the ideas and knowledge of ALFS into the mainstream system (Seyfang, Haxeltine, 2012; Maye and Duncan, 2017). Combining the MLP with inputs from work on social innovation helps to refine these hypotheses.

2.3. Transformative capacity supported by social innovations

Although the term ‘social innovation’ has not stabilized, it generally refers to initiatives aimed at meeting social needs that are poorly or not at all met by dominant market or mainstream public policies (Moulaert et al., 2013). Recent work highlighted ALFS as social innovations that address social issues overlooked by the agro-industrial regime (Chiffolleau, Loconto, 2018). As an extension of the MLP, we thus suppose that the crisis has not only revealed the shortcomings of the regime but also proved that social issues are better addressed by ALFS, a situation which can attract new consumers and lead regime actors to pay more attention to these local initiatives.

Moreover, regarding sustainability transitions, while the MLP focuses on technological innovation as a driver of the emergence and scaling up of niches, here the emphasis is on bottom-up participatory initiatives and the everyday practices of ‘ordinary’ citizens and social entrepreneurs: through ‘creative bricolage’ (High, Nemes, 2007) collective solutions emerge and replicate, and incrementally or even radically change production and consumption systems (Moulaert et al., 2013; Chiffolleau, Loconto, 2018). We therefore hypothesize that the crisis favoured diverse

innovations and innovators, thus contributing to sustainability transitions.

2.4. Research hypotheses

By combining the MLP with social innovation approaches, we assume that the crisis has not only revealed that social issues are better addressed by ALFS than by the agro-industrial regime, but also accelerated diverse processes and innovations that favour more sustainable production and consumption systems. More precisely, we formulate three research hypotheses:

- i) the COVID-19 pandemic, as a landscape-scale shock, highlighted the shortcomings of the agro-industrial system (the regime), including social issues overlooked by the state and the market, thus leading new consumers to ALFS (niches), which better address these issues;
- ii) the pandemic contributed to the replication and upscaling of ALFS through prompting agri-food system actors, including ordinary citizens and social entrepreneurs, to implement technological and social innovations for handling social issues revealed or exacerbated by the crisis;
- iii) the pandemic increased awareness among policy-makers and large retailers (regime actors) of the need to strengthen links with ALFS actors to better meet social needs, at least during the crisis.

However, despite its global impact, the disruptions caused by the COVID-19 pandemic is liable to affect transition pathways in different ways based on country-specific characteristics. Comparing 13 countries thus enables these hypotheses to be tested on a broad scale, whilst taking diverse cultural and political contexts into account.

3. Methods

This paper is based on a qualitative research design, carried out through the participatory analysis of country case studies provided by a panel of ALFS experts (academic researchers and industry consultants) from 13 countries, representing five continents. Research designs based on eliciting the informed opinions of experts are useful in rapid response research contexts, especially when exploring contemporary processes in a time of crisis (Buchanan, Denyer, 2013) and for developing likely future scenarios (Parente, Anderson-Parente, 2011). Experts were recruited based on previous cooperation in ALFS-related transnational research projects and publications, with the aim of covering the greatest possible variety of geographic, economic, and socio-cultural contexts. To generate comparable information, country experts completed a detailed four-part questionnaire – designed through a participatory process – covering the following topics: 1. Researchers' background and access to data and basic information on COVID-19-related restrictions; 2. Characteristics of ALFS in the country prior to the pandemic; 3. Changes in ALFS arising from the COVID-19 crisis; 4. Innovations within ALFS resulting from COVID-19. (See Appendix D for the case study outline). The bulk of the data was collected during the summer of 2020. The three first authors conducted the preliminary textual analysis of the case studies, while the subsequent discussion and validation occurred in a participatory manner through online workshops with the expert panel. (Appendix E provides a detailed account of the process of the research, analysis, and co-ordination). Given that an appraisal of the large amount of data that was collected goes far beyond the scope of this paper, here we present some of the results from the first, third, and fourth parts of the questionnaire. The rest of the results will be presented in other articles.

4. Results

4.1. Contextualising the impacts of the crisis on ALFS

A brief characterisation of the history, scope, and importance of ALFS in different countries is important for explaining how ALFS reacted during the first months of the pandemic in relation to supporting or facilitating transition processes. Such cross-country reviews on ALFS characteristics have been lacking or limited to Europe (Kneafsey et al., 2013). In all 13 countries, the development of ALFS seems to be related to the rediscovery or renewal of traditional forms of direct sales from producers to consumers. While many of these traditional forms of local food marketing declined or disappeared between the post-war period and the onset of neoliberal policies of the 1980s in some countries (e.g. in Norway, UK, and Canada), they have always represented a significant channel for local food consumption in others (e.g. Italy and Spain). Despite the centralization of food consumption involving large-scale retailers that has occurred in all countries, alternative and local food systems have expanded since the beginning of this century. This is linked in many cases with the (media-related) impact of food scandals in the late 1990s and the 2000s (e.g. in South Korea, Japan, the UK, and France) which increased consumer concern (EIP-AGRI, 2015).

ALFS include all forms of direct sales – namely, farmers' markets, farm stalls in outdoor markets, farm gate sales, farm shops, roadside and mobile stalls, home delivery and box schemes, Community-Supported Agriculture (CSA), purchasing groups, and direct online sales. Short food supply chains (SFSCs) involving a single intermediary (artisan-, canteen-, grocery-, supermarket-, and food box programs developed by local governments, digital hubs managed by entrepreneurs, purchasing groups led by consumers, etc.) are also included in ALFS insofar as they maintain traceability and provenance back to the producer. More broadly, experts agree on the understanding of ALFS as 1) systems normally used by relatively small-scale producers (relative to each country's agrarian structure); 2) forms of agriculture typically involving limited synthetic inputs; and 3) characterized by direct consumer-producer connections, or by short food supply chains with a single intermediary.

While globally lacking, data are most typically available about direct sales; in this regard, our 13 cases show contrasting situations. In the UK, for instance, 10% of farms were estimated to be involved in food processing or direct sales in 2018-19, while in Canada 12.5% of farms use direct marketing. In Italy, on the other hand, 18% of farms use direct sales as their main sales channel (for 90-100% of production). Similarly, in Austria 27% of all farmers sell part of their production directly, generating an average 34% of their income.

The other important dimension for understanding ALFS' reactions during the crisis concerns the measures taken by governments at the onset of the COVID-19 pandemic: these were similar in most of the countries we examined. While a minority of countries, including Norway and Japan, took a 'soft' approach, strict lockdowns were implemented in most cases. Starting from March 2020, significant restrictions on citizens' movement and economic activity were imposed (people were asked to work from home, collective catering was suspended, and non-essential businesses were ordered to close or to operate only during limited hours). Appendix 4 shows the details of lock-down measures in each case study country.

4.2. Extending the scope of ALFS by responding to social needs and issues

Although the importance of ALFS differs among the 13 countries, the former attracted significant interest in all countries dur-

ing the first months of the pandemic. Fear of food shortages and the increase in teleworking, coupled with restaurant and bar closures and an increase in home cooking, led to larger purchases from short food chains and local shops. Consequently, in France, for example, demand for fresh products (fruit and vegetables, meat, and dairy products) from ALFS located near cities increased by a factor of three to ten. In the UK, sales of vegetable boxes increased by 111% during the first six weeks of the pandemic. The same happened in Italy, where a rise in the importance attributed to purchasing 'zero km' or local products was reported. In Australia, CSAs, urban farms and peri-urban agriculture saw demand for local food boxes, home delivery, and other direct marketing increase by up to 400% in the initial weeks of the crisis. Canadian experts also highlighted a four-fold increase in sales of vegetables and beef from ALFS compared to the same period in 2019. In Austria, sales increased by 22% at on-farm shops, and by 14% at farmers' markets.

In line with our hypotheses, the growth dynamics of ALFS can be understood in connection with their ability to respond flexibly and innovatively to social issues, both in response to the regime's shortcomings and in times of crisis. With some variation between countries, the crisis revealed the contribution of ALFS to 1) food safety, 2) food quality, 3) health, 4) social solidarity, and 5) food justice. These issues are key dimensions of social sustainability which can be expected from production and consumption systems.

In a context in which **food safety** became a primary concern, many consumers perceived ALFS products as less likely to be contaminated, as they had travelled shorter distances with less handling than is typical in long chains. Canadian CSA producers, for instance, reported customers' positive perception of limited human contact and increased safety. Similarly, Hungarian small producers reported rising consumer demand for vacuum-packaged products, and those who were able to meet this need increased their sales. In other words, the pandemic drove an increase in consumer demand for food safety, which in turn benefitted ALFS, just as it did after the 'mad cow' crisis in countries such as the UK and France (EIP-AGRI, 2015).

In a context in which many people had more time and initiative to cook, coupled with increased concerns about **food quality**, support for ALFS centred on their capacity to provide fresh ingredients and quality food. This support, however, varied greatly among countries: in Argentina – where 50% of the population live below the poverty line – the increase in cooking and quality food was mainly associated with urban, affluent consumers. In more affluent countries, such as Japan and Luxembourg, the growth in interest in quality food was more widespread.

This is closely related to the increase in demand for **healthy food**. Even though some studies found an increase in the consumption of unhealthy food, uncontrolled eating, and snacking between meals (Carroll et al., 2020), many consumers in the 13 countries we investigated maintained or developed a more diversified diet, rich in fresh products, or combined the two trends (Rodríguez-Pérez et al., 2020). Healthy diets were promoted by the media as a means of resisting the virus; moreover, many consumers wanted to avoid gaining weight due to the inactivity induced by the lockdown. According to our experts, this need for healthy, fresh food favoured the growth of ALFS, too. In Italy, almost 50% of the population prioritised health and well-being when making food purchases, raising demand for 'Made in Italy' products, and even more so for ALFS products. In several countries, such as Luxembourg and Japan, experts also reported more citizens creating (very) small-scale vegetable gardens, often for the first time. Similarly, in Argentina the number of household kitchen gardens increased during the pandemic. This phenomenon also occurred in Australia, with a substantial increase in kitchen gardens in urban and rural areas, driven by citizens' concerns about their physical and mental health.

The crisis also reinforced concerns about **social responsibility/solidarity**, with efforts being made to reduce the difficulties encountered by producers and consumers. In most countries, citizen-driven initiatives supported domestic producers, particularly local farmers, leading to an increase in ALFS purchases. However, different patterns can also be identified: in Argentina and Australia, the phenomenon occurred mainly among urban people with high or average incomes, while in France, Italy, Austria, Luxembourg, and Japan it was widespread throughout society. In France, while the Ministry of Agriculture and Food encouraged supermarkets to 'buy French', and, when possible, local products, for many consumers ALFS were perceived as a more direct way to support producers than by buying from supermarkets.

Food justice also attracted attention in most of the 13 countries, and the crisis both revealed and strengthened the contribution of ALFS to it. In most countries, outdoor markets were closed during the initial lockdowns, resulting in food-access-related constraints for mid- to low-income families who, countering the typical image of ALFS as elitist niches, often procure fresh food in these markets. In countries such as Hungary, however, outdoor markets were quickly reopened to alleviate this situation. Moreover, solidarity-oriented innovation within ALFS was highlighted in Spain, Italy, France and Hungary, as well as in South Korea where, for instance, purchasing groups or food boxes extended their focus to include disadvantaged people and persons at risk (e.g. students, elderly people, or households in quarantine). ALFS also contributed to addressing problems with food aid. In Australia, high prices and reduced supply created a crisis for those emergency food providers and charities that rely on donations and excess supermarket stock to provide food to vulnerable people. Urban agriculture initiatives stepped in, increasing donations of fresh produce to local and national food banks. ALFS were thus swiftly able to both address collective challenges and activate solidarity initiatives for specific groups of people – features which characterise social innovation (Moulaert et al., 2013).

4.3. Scaling-up ALFS through the interplay of social and technological innovation

A common constraint on the growth of ALFS has been their inability to scale up. The growing interest in ALFS, driven by the pandemic and supported by the interplay between social and technological innovation, however, has successfully addressed this constraint, reaching many producers and consumers who previously had little or no experience with ALFS. Many different locally adapted examples of this process emerged in the 13 countries, with some similarities.

Due to the closure or suspension of outdoor markets and catering, many small producers survived by turning to online sales, home delivery, pickup points, or drive-through markets, thereby developing new skills, platforms and channels, or repurposing old ones. Nevertheless, significant differences were also identified in this regard, indicating the importance of national cultural and political contexts. Family farmers in Southern and Eastern Europe and Argentina appeared to be less able to use ICT for marketing than their peers in Canada, Australia, Luxembourg, the UK, or Japan. In some countries, such as Italy, mainstream agricultural organisations (farmers' unions, ministries, and agricultural extension services) played a key role in supporting farmers to develop online marketing channels. On the other hand, in France and Australia, farmers in ALFS who were not familiar with digital tools were helped by open source software developers (e.g. Open Food Network, Reko Ring), as social entrepreneurs promoting an 'economy of the commons' (Bouré, 2017).

ICT and online social networks also boosted the expansion of CSAs or pre-existing consumer purchase groups, linking in new

consumers and producers or introducing new technological innovations. In Hungary, an e-commerce store was launched by a purchasing group, while another made the use of bank cards at pick-up points possible (innovations long expected but not implemented until the pandemic forced the issue). Similar developments were observed in Japan, France, Australia and the UK, where there were spontaneous efforts among citizens to support local producers – for example, by setting up Facebook groups to connect producers and consumers or neighbourhood groups. A situation often encountered was individuals with a pre-established trust-based relationship with a farmer (or group of producers) becoming a bridge between producers and new consumers. In Italy, so-called ‘solidarity apartment block purchasing groups’ helped to collect orders and deliveries in a bottom-up, self-organising manner. This process solved two problems: locating good quality local food and helping farmers who had lost their traditional buyers and did not have the skills, equipment, or connections to find new customers. Accordingly, this addressed practical challenges within ALFS that appeared to be one of the main barriers to scaling up before the crisis (EIP-AGRI, 2015).

Moreover, ICT and online social networks extended the scope of cooperation around ALFS. A Canadian farmer, for example, developed an online sales system and called upon recently unemployed truck drivers to deliver food to urban areas, increasing sales four-fold compared to the previous year. Similar examples, such as the organisation of ‘last mile’ deliveries through taxi drivers, were identified in various countries. However, in Central and Eastern Europe, as in Hungary, for example, less cooperation was observed (or rather remained within close tie relationships). This is believed to be a legacy of forced cooperation during the communist era, when all problems were meant to be solved by the state (Bakacsi et al., 2002).

4.4. Transformative interaction between ALFS and the regime

Our hypotheses also led us to examine how the innovations generated or reinforced through ALFS interacted with the actors and organizations of the socio-technical regime, especially policy-makers (from the national to the local level), and large retailers. Our analysis shows marked differences across the 13 countries. In France, citizen-driven ALFS developed rapidly to support both producers and consumers (who lost access to markets and food, respectively) and to compensate for inappropriate or delayed state and municipal action. In Southern and Eastern Europe, Argentina, and Australia, the decision to close outdoor markets caused severe problems and was strongly criticised. This process, however, also raised policy-makers’ awareness of the importance of ALFS for consumers of middle and lower socioeconomic status and small-scale producers. In some cities in Argentina, municipalities and national institutions provided trucks to deliver food; in South Korea, local government officials and farmers cooperated to organise drive-through sales of local food. The UK government classified farm shops as essential retailers, allowing them to stay open throughout the pandemic.

Another crucial problem on the input side of agricultural production was labour shortages. In countries such as France and Italy, where ALFS tend to employ a greater proportion of family and local labour, the situation highlighted the disadvantages of large-scale industrialized farming that is strongly dependent on migrant labour. On the other hand, in countries where ALFS tend to employ a greater proportion of non-local staff (e.g. in the UK and Austria), agricultural ministries set up platforms to connect unemployed people and farmers, even though these initiatives were largely unsuccessful.

Food insecurity also became a serious challenge for policy-makers, as many people lost their income due to business closures.

Additionally, food aid organisations had to reorganise their operations, as they typically employ many older volunteers who had to self-isolate at that time. In France and the UK, one of the solutions was the mobilisation of public canteens, kitchens and restaurants to prepare meals for food aid. Many of these initiatives started using food from local producers who were being severely affected by the crisis. The supply of food aid using fresher and more diversified local products, while insufficient to deal with the situation of food inequality, proved to be mutually beneficial – as it also did before the COVID-19 crisis (Hebinck et al., 2018) –, increasing product quality and improving the situation of medium-sized farms that were experiencing difficulties.

In parallel, the strategy of large retailers of channelling local food into supermarkets during the first months of the crisis varied according to the local cultural context. In some countries (e.g. Norway, Luxembourg, and the UK), retailers reinforced their local sourcing strategies to meet their customers’ expectations. In others, despite government incentives, retailers concentrated on basic supplies, often through imports, limiting themselves only to showcasing some local products. However, regardless of national ALFS traditions, new consumer trends (local products demand and rapid growth in home cooking and gardening) gave rise to new discourses among regime actors concerning the need to strengthen food security and sovereignty, self-sufficiency, and food system resilience in all the countries we analysed. Thus, the pandemic put into the spotlight – and into public debate – discourses formerly limited to ALFS innovation niches, thereby intensifying discussion about the desirable structure of food chains.

Even if the importance of ALFS in the 13 countries studied here is not the same, data collected by the experts shows that these systems addressed the same types of social issues during the crisis. Their ability to address the related social issues during this challenging time confirms that the latter engaged with important elements related to the social sustainability of production and consumption systems (food quality, food safety, food justice, etc.). Moreover, this enactment relied on relational and learning processes that have been shown to favour the more sustainable practices of producers and consumers (Chiffoleau and Dourian, 2020). However, depending on the country, how the related social issues were addressed differed: in some cases, the initiatives were mainly collective – in others, they were more individual; some reached a large population, others mainly involved more educated consumers; some received strong and rapid support from institutions, others weaker or delayed support; some were led by citizens and others retailers (or a combination of the two); some relied heavily on ICT, others only moderately. Taking these factors into account allows us to classify the countries along two axes, as shown in Fig. 1.

A heatmap (Fig. 2.) highlights the data which are behind the three groups which can be identified: i) France, Spain and Italy, mostly characterized by collective responses and citizen-driven initiatives; ii) Argentina, Australia, Canada, Hungary, mostly characterized by affluent consumers attraction, citizen-driven initiatives and institutional support; iii) UK, Austria, South Korea, Luxembourg, Norway, Japan, mostly characterized by ICT use, institutional support and retailers’ support.

5. Discussion

5.1. Academic contributions

Our study combines the MLP with social innovation approaches to explore the impacts of a landscape-level shock on innovation niches and their transformative capacity. This combination of approaches has rarely been implemented, and although the MLP is a valuable tool for analysing food system transformations, its capac-

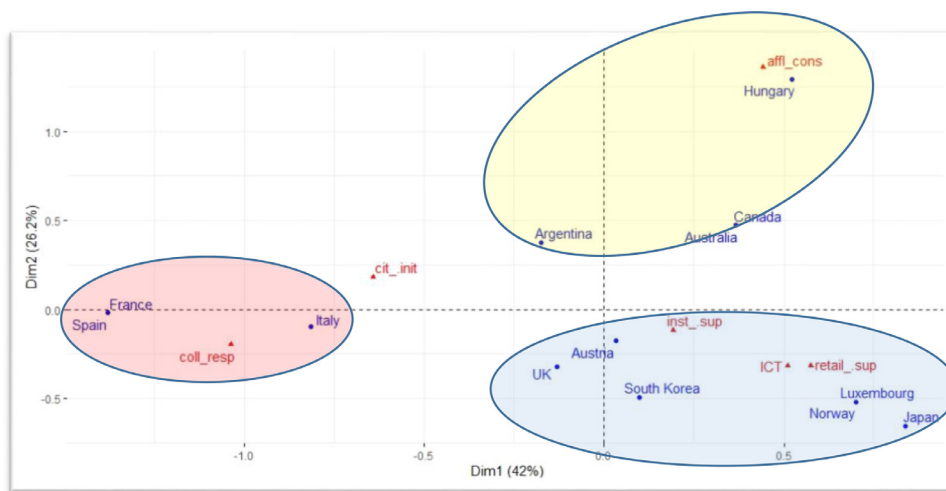


Fig. 1. Factorial correspondence analyses; 6 variables: *aff_cons*: attracted mostly affluent consumers; *coll_resp*: boosted collective responses; *inst_sup*: received institutional support; *cit_in*: boosted citizen-driven initiatives; *retail_sup*: received retailers’ support; *ICT*: relied on ICT use). The more similar countries are, the closer they are on the graph. The more characteristic a variable is for a country, the closer the country is located to that variable on the graph.

	<i>aff_cons</i>	<i>ICT_use</i>	<i>cit_in</i>	<i>coll_resp</i>	<i>inst_sup</i>	<i>retail_sup</i>
Argentina	Variable significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant
Australia	Variable significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant
Canada	Variable significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant
Hungary	Variable significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant
France	Variable not significant	Variable not significant	Variable significant	Variable significant	Variable not significant	Variable not significant
Italy	Variable not significant	Variable not significant	Variable significant	Variable significant	Variable not significant	Variable not significant
Spain	Variable not significant	Variable not significant	Variable significant	Variable significant	Variable not significant	Variable not significant
Austria	Variable not significant	Variable significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant
UK	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable significant
South Korea	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant
Luxembourg	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable significant
Norway	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable significant
Japan	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable not significant	Variable significant

Fig. 2. Heat map grouping case countries.

ity to explain the social processes involved in sustainability transitions is limited (El Bilali, 2019). In our study, this approach enabled the definition of three hypotheses whose testing shed new light on ALFS dynamics and their contribution to food system transition.

The results confirm our first hypothesis that the crisis revealed both the shortcomings of the established agro-industrial regime and the positive contribution of ALFS to addressing major social issues, such as food security, solidarity, and food justice. However, only some shortcomings of the agro-industrial regime were uncovered – especially the dependence of the latter on global supply chains and foreign labour, as highlighted by Clapp and Moseley (2020), among other studies. Similar to Pelin et al. (2021), we found that environmental impacts were minimally addressed, or even ignored completely; during the first stage of the pandemic, plastic consumption exploded (Janairo, 2021), with increasing demand for packaging also affecting ALFS. Additionally, consumers preferred local products for their own reassurance, perceiving them as safe and sustainable, but without questioning their environmental impact.

Our second hypothesis was also confirmed. The crisis fostered technological and social innovation and their coupling to address problems provoked or reinforced by the pandemic, thereby increasing the dynamism and resilience of ALFS, as also highlighted

in other studies (Thilmany et al., 2020; ; Blay-Palmer et al., 2021; Zollet et al., 2021). This coupling was initiated or facilitated by citizens, social entrepreneurs, and local authorities, through the digitization of physical markets and the organization of local logistics – as also confirmed by other studies (Fei et al., 2020). While ‘engaged’ citizens facilitated the extension of CSAs to new customers, others set up new structures to involve their neighbours in making purchases from local producers with the help of ICT and on-line social networks, as shown in other research (Tittonell et al., 2021). Additionally, conventional producers were able to communicate with new actors through the extension of some ALFS, as also found by Thilmany et al. (2020). These enlarged or new organisations enabled learning exchanges amongst actors already familiar with sustainability principles and practices and others with little or no experience of them. Earlier work has shown that such exchanges are an efficient lever of the transition of production and consumption systems (Chiffolleau, Dourian, 2020). However, while in some countries (France, Italy, and Argentina) group and community initiatives were more prevalent (connected to the historical tendency to develop collective action within ALFS) (Tarra et al., 2021), in others (e.g. Norway, UK, Hungary, Luxembourg, Japan and Australia), there appeared to be a tendency towards more individualistic responses (e.g. individual consumers buying directly from

farmers), which may induce fewer learning opportunities. Nevertheless, in both cases the diffusion of successful ALFS-related approaches, either through networks or Agricultural Knowledge and Innovation Systems (AKIS), contributed to their replication.

Finally, the study confirmed our third hypothesis, as the crisis reinforced the interest of institutional and food regime actors in local food and its potential for agri-food system transition (Campbell, 2021). In most countries, the conventional retail sector introduced more local food products to supermarkets, even if only to showcase them instead of selling them in larger quantities. These new trends that favour local food may be the first steps in creating a more sustainable food system, involving incremental innovation and gradual change in the regime (Brunori et al., 2011). On the other hand, the crisis may also have triggered a shift towards 'conventionalizing' local food, as has occurred with organic agriculture (Guthman, 2004). It remains to be seen whether governments and local authorities, especially in highly export-oriented countries, such as Canada, and highly import-dependent countries, such as Luxembourg and Japan, will truly give preference to ALFS – which are often demanding in terms of sustainability – or will instead support all forms of local sourcing to improve food security, regardless of their sustainability.

5.2. Implications for policy and management

Even though long food chains were able to withstand the crisis and serious food shortages did not occur, ALFS played an important role for consumers, including the most vulnerable ones, and appeared to be resilient, flexible, and capable of innovation and rapid adaptation (Fardkhales, Lincoln, 2020; Worstell, 2020; Sanderson-Bellamy et al., 2021). Their relatively small scale and the direct involvement of decision makers in their operational management contributed to their ability to react quickly and reconfigure supply chains as needed – a key asset during the crisis. These findings, which are in line with results obtained in other studies (Thilmany et al., 2020; Worstell, 2020; Blay-Palmer et al., 2021), provide new arguments that support the call for the re-localisation of food in all the countries under analysis, the downsizing of food companies, and the rebalancing of global vs. local, long vs. short chains. This implies the diversification of production in highly specialized agricultural regions, as well as financial investment in local and regional food infrastructure, including small-scale food processing, packaging, and storage infrastructure. However, this re-localisation must also emphasise agro-ecological practices that are needed to address other shocks already being felt, such as climate change and biodiversity loss (Altieri, Nicholls, 2020). A large quantitative study in France showed that vegetables in supermarkets directly supplied by local farmers were typically produced with chemical inputs due to supermarkets' 'zero-blemish' standard (Millet-Amrani, 2020). Similarly, ALFS' carbon emissions can be greater than those of long chains if they involve sub-optimal production systems or many trips by private car (Majewski et al., 2020). As environmental concerns increase, notably about pesticides and carbon emissions, policy-makers and managers must ensure that ALFS involve more sustainable production methods, including reducing plastic use and delivering carbon efficient 'last mile' distribution systems.

Another highlight of this cross-country study is the identification of the active role played by citizens in the COVID-19 crisis (Sanderson-Bellamy et al., 2021; Tittonell et al., 2021). Further developing the informal purchasing groups created or strengthened during the pandemic could accelerate sustainability transition in the food chain. These groups could be equipped with new digital tools, education and advice about supply chains to help structure their collective action and partnerships with farmers. Additionally, the legal and tax-related implications of selling through consumer

purchasing groups and home delivery services need to be clarified to support farmers.

Farmers also recognised that online sales and home deliveries were greatly appreciated by consumers. The challenge is to equip producers and micro-enterprises with ICT, train them, and facilitate local logistics by supporting pooling practices that reduce transport costs and emissions (Loiseau et al., 2020). However, ICT development and logistical optimization should not 'dehumanize' ALFS, because the social relationships within the latter are an important factor in the transition of production and consumption systems due to the social learning they facilitate (Reckinger 2018; Chiffolleau, Dourian, 2020).

Finally, the COVID-19 pandemic has highlighted the responsibilities of public institutions at all levels regarding agri-food systems, and the need for countries and regions to establish systemic sustainability- and resilience-oriented food policies (Campbell, 2021; Zollet et al., 2021). In the case of the European Union, for example, the Farm to Fork strategy is a promising step forward in this direction, but its most innovative elements are being pushed aside in favour of more conservative policies (the new CAP), manifesting the clear desire to maintain business as usual. The COVID-19 pandemic, as well as looming global threats such as climate change, however, clearly show that business as usual is no longer an option (Clapp and Moseley, 2020).

5.3. Limitations of the study and recommendations for future work

Our study involves various limitations. First, the experts' selection of cases was based on convenience sampling due to the impossibility of involving large numbers of ALFS stakeholders from different countries in the middle of the pandemic. Nevertheless, in most cases the views and opinions of ALFS actors (farmers and their associations, advisors, policymakers, retailers, consumers, etc.) were solicited by experts when answering specific questions. Furthermore, the access to first-hand empirical data of members of the expert panel varied greatly. Besides publicly available statistics, literature, social media, and news items, some experts made, or had access to country-wide surveys, while others had to rely on more limited datasets. (See Appendix B for data sources and Appendix A for secondary data by country.) This variation among experts was accounted for in various ways during the project: 1) in the first questionnaire, experts gave a detailed account of the information and data sources used; 2) for each answer, experts indicated the primary data sources and stated the answer's reliability on a five-point scale, which score was considered during the analysis; 3) finally, the analysis placed greater emphasis on country cases that included more accurate empirical data than on those with a less empirically sound grounding. Furthermore, the participatory analysis and discussion of the results helped to improve the validity of the study, reduce bias, and put different country cases into perspective. Future work should focus on further systematizing and validating the findings of this study, including by strengthening the participatory aspect of data collection and analysis through the wider participation of ALFS stakeholders and more structured data collection methods.

A final limitation concerns the fact that the study focuses almost exclusively on countries of the Global North. However, we argue that such a focus is necessary, considering that affluent nations are largely responsible for the unsustainability of food systems and need to lead the sustainability transition. Nevertheless, future research should more comprehensively take into account national contexts, as the sustainability of production and consumption systems differs among countries. Moreover, while the crisis has increased the visibility of new transition levers, further research is required to track whether and how the dynamics observed in the early months of the pandemic have been sustained.

6. Conclusion

This study focuses on how alternative and local food systems (ALFS) in 13 countries supported food system transition in their response to the COVID-19 pandemic, an event that has affected the whole world since spring 2020. Our research perceives this crisis as a 'large scale socio-economic experiment' – a once-in-a-lifetime opportunity to see how different systems embedded in different local contexts reacted to the same challenges.

Our study revealed that ALFS actors were able to meet social needs and maintain or develop their activities in the face of the disruptions caused by the pandemic through adaptation and innovation, often supported by intensive ICT use and citizen participation. These innovations increased the visibility of ALFS while extending their reach to more people due to their perception as a safe option, enhanced by the practicality of home deliveries and online payments. Previous work has shown that the reconnection characteristics of ALFS are not only a source of social cohesion but also drivers of sustainability, as they support professional dialogue as well as the social recognition of those individuals who are making an effort to produce or consume more sustainably. By boosting social innovation with the help of technological innovation, the pandemic may thus accelerate a transition to sustainability. On the other hand, there is a lot of uncertainty surrounding the response of regime actors. Much of this uncertainty relates to whether grassroots and radical niches will be able to persist and expand, or whether their innovations will be co-opted by regime actors. For food system sustainability, a combination of both approaches could be beneficial, but only under specific conditions. Accordingly, we recommend that policy-makers develop a favourable landscape for supporting and framing these two approaches – as tends to exist in the countries in which ALFS are relatively well-established, such as France and Italy.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

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