

# Accepted Article

## Survival strategies of producers involved in short food supply chains following the outbreak of COVID-19 pandemic: a Hungarian case study

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### Author contribution statement

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/soru.12358](https://doi.org/10.1111/soru.12358).

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Zs.B., L.B., I.F., É.O., G.N. conceived the original idea. É.O. and G.N. made substantial contributions to obtain the data, including the interviews for the case study. I.F. performed the original calculations that were refined by Zs.B. and L.B. G.N. prepared the case study. A.M. and E. M-G. provided input for the theoretical framework. Zs.B. took the lead in writing the manuscript, with the support of G.N. and L.B. All authors discussed the results and contributed to the final manuscript. I.F. supervised the project.

### **Acknowledgements**

The authors express their gratitude to the producers who participated in the research, and to the National Association of Interest Representations for Small-scale producers, Hungarian LEADER Association for Rural Development, ‘Mindenegyüttmegy Egyesület’ (an NGO for strengthening of the social cohesion of urban-rural communities), University of Pécs - Department of Ethnography and Cultural Anthropology, University of Miskolc – Department of Cultural and Visual Anthropology, Corvinus University - Department of Agricultural Economics and Rural Development, Nyíregyháza Consumer Purchase Group, and the Hungarian Permaculture Association for their contribution during the process of data collection. The help of Simon Milton with language editing is greatly appreciated. Thanks for Eszter Zámori for her illustration.

### **Statements**

**Data availability statement:** upon acceptance data will be shared through an open repository (e.g. Zenodo, or other).

**Funding statement:** This study was supported by the Hungarian National Research, Development and Innovation Fund in the form of grants [IF (130485), L. Baráth (135387), Z. Benedek (135460)].

**Conflicts of interest:** none.

**Ethics approval statement:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Patient consent statement:** Participation in our survey was voluntary and anonymous. Interviewees shared their experience; no personal data were collected.

**Permission to reproduce material from other sources:** not applicable.

## 1. Introduction

The outbreak of COVID-19 caused unprecedented disruption to the global food distribution network (Barrett 2020, Hobbs 2020, Torero 2020). Although the major impact, with the exception of those who suffered from medical issues, appeared to be economic (Béné 2020, Laborde *et al.* 2020), the spread of COVID intensified existing concerns regarding the (un)sustainability of the global food system, potential threats to food security (of the poor, mostly), and to the resilience of local food system actors (Béné 2020, Laborde *et al.* 2020, Swinnen 2020, Volpato *et al.* 2020). Many authors regard the COVID-related situation as a real-time experiment concerning the sustainability transition (Bodenheimer & Leidenberger 2020, Cohen 2020), with a special focus on local food systems and short food supply chains (SFSCs). These alternative systems may fulfil a number of roles and functions and include a diversity of actors as well as marketing channels, making them reliable elements of the food system in terms of maintaining operations, compared to the relatively small number of transnational agrifood enterprises (Hendrickson 2015, Lamine 2015, Tendall *et al.* 2015). A consensus seems to be evolving about their importance during COVID (Blay-Palmer *et al.* 2020, Boons *et al.* 2020, Cummins *et al.* 2020, Swinnen 2020). Individuals and local networks are hypothesized to be able to adapt more easily and rapidly to changing conditions than larger ones (Cabell & Oelofse 2012). On the other hand, heterogeneous responses were reported by the grey literature and the media, and concerns have been formulated by many authors that many SFSC producers faced challenges accessing the market due to lock-down measures and social distancing and/or labour shortages (Holden 2020, Torero 2020). In fact, solid empirical evidence about the actual strategies, opportunities, and responses of small-scale producers employed to take advantage of the current situation (or at least moderate its impacts) is still lacking.

The aim of this paper is to document early, first-wave COVID-19 impacts experienced by small-scale food producers in Hungary, and to differentiate some of their early responses. In presenting empirical data, this work contributes to filling a knowledge gap about the actual reaction of small-scale farmers to the market-related disruptions caused by the pandemic, not only in terms of economic outcomes but also in relation to strategic decision-making and behavioural-attitudinal transformations. The concept of resilience was used to build a framework. The related literature is reviewed in the following section.

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## 2. SFSC-farm resilience at a time of global crisis: background and literature review

The multifaceted nature of local food systems, alternative food networks, and SFSCs has prevented the formulation of an academic consensus about definitions (Michel-Villareal *et al.* 2019, Schmutz *et al.* 2018). In this paper, with consideration to the core concepts specified by Gruchmann *et al.* (2019), Schmutz *et al.* (2018) and others, the focus was on those small-scale producers who offered their products to spatially proximate customers directly, or through a limited number (ideally, zero) of intermediaries.

Defining resilience is similarly challenging (Tendall *et al.* 2015). According to Schipanski and her colleagues (2016), resilience applied to agriculture is ‘the capacity of food systems, including the actors within them ... to cope with interacting and cumulative forces that undermine food access and equity’ (p. 600). Béné (2020) developed a model of resilience pathways to study the resilience of local food system actors (e.g. farm households) in the context of COVID. Although the model was originally proposed for the study of the COVID experience in low and middle income countries, it offers generalizable conceptual resources. In this model, resilience resulted from a set of capacities, meaning a combination of assets and other resources. Béné emphasized the role of financial assets, and, to a lesser extent, social capital during COVID (Béné 2020), while the latter was also found to be exceptionally important by many others (e.g. Paganini *et al.* 2020, Thilmany *et al.* 2021, Tiftonell *et al.* 2021). The role of human capital in the COVID context was also validated (Darnhofer 2021, Tiftonell *et al.* 2021). In his model, Béné stressed (2020) that farm households might use these assets, or forms of capital (understood as ‘inputs’ in the resilience process), to shape adequate strategies that created resilience *per se*, or intermediary outcomes. Adequate strategies increased the chance of positive outcomes (e.g. an increase in income, more balanced cash- and workflow as a result of changes, access to other suppliers, etc.), or reduced the possibility of harmful consequences (such as selling productive assets, ceasing operation, or reducing health-, education- or high quality food-related expenses). In the model, intermediary outcomes (resilience) determine long-term outcomes (individual or household well-being). The focus of this paper is on producers’ actual responses (the development of specific marketing strategies) that potentially helped them to better adapt or mitigate the impact of the shock caused by the pandemic.

Recently, an emerging body of literature has focused on sources of resilience in the context of producers participating in SFSCs: the issue is particularly relevant in light of the pandemic. Smith *et al.* (2016) claimed that SFSC producers successfully coped with crisis in post-flood Australia due to their local production and sourcing of inputs, greater flexibility, lower level of dependence on modernized infrastructure (which could not be used on wet soil), and in-depth local knowledge in terms of social relations and infrastructure such as passable roads.

Sources of resilience of producers selling at farmers’ markets were found to be the direct consumer-producer interactions that instantly conveyed preferences, as well as a diversity and abundance of customers (with diverse preferences) and producers (who offered a wide range of products). Spaces for direct interactions also provided opportunities for personal learning and knowledge exchange for all actors involved (King 2008, Milestad *et al.* 2010). One strength of SFSC producers was found to be their reflexive character (being critically self-aware, and willing to restructure their business in the face of challenges) (Moore *et al.* 2014). According to Darnhofer *et al.* (2010b), resilience at the farm level can be built through adaptability and change when learning and innovation are explicitly

targeted outcomes. The role of place-based experiential learning and networking appears to be particularly important (Darnhofer *et al.* 2016, Knickel *et al.* 2018, Šūmane *et al.* 2018). In an unpredictable economic environment, flexible farm organization (i.e. remaining open to new activities) and diversification and risk-sharing strategies both in terms of production and marketing can enhance the adaptive capacity of farmers (Benedek *et al.* 2021, Darnhofer *et al.* 2010a, de Roest *et al.* 2018). Furthermore, the ability to reorganize to respond to an unforeseen event was shown to be ensured by strategies that enable bricolage and tinkering, or in other words, that make reconfiguration and reorganization possible (Darnhofer 2021, Zagata *et al.* 2020).

Based on the findings presented above, the pathway model of Béné (2020) was extended. Some specific sources of resilience appear to have been important in the COVID context, while others have been irrelevant (Figure 1).

< Figure 1 comes here >

*Direct consumer-producer interactions* (forms of social capital) represent the core of SFSCs – these enable preferences to be conveyed; in the context of COVID, an increase in demand for (fresh) products (Butu *et al.* 2020, Kolodinsky *et al.* 2020), and potentially a rise in home delivery services. A *redundancy* (abundance and replication of system components and procedures that guarantee operational continuity in the case of shocks) and a *diversity of actors* (not labelled as a resilience capacity in the Béné model) ensured that some producers emerged to respond to new demands in spite of challenges. A *redundancy of facilities* (a combination of financial assets and social capital, such as stocks themselves, as well as cooperating to share cooling or delivery capacity, as described by Smith *et al.* (2016) in a post-flood context) might be less important in situations of increased isolation. The *reflexivity of producers* (human capital) was supported by *individual learning mechanisms*. The role of *producer interactions and cooperation* (another form of social capital) was questionable during the pandemic due to the need for social distancing, although evidence exists that marketing channels based on the cooperation of producers, such as box schemes and consumer purchase groups, experienced unprecedented growth (Diesner 2020, Nemes *et al.* 2020, Wheeler 2020). To the best of our knowledge, the role of agricultural knowledge systems (universities, extension services, etc., also understood as factors of social capital) in promoting the resilience of small-scale producers has not been studied before. However, to acknowledge their potential importance in the transition of agri-food systems to sustainability (Mapiye *et al.* 2021, Van Oost & Vagnozzi 2020), and particularly in the face of unexpected turbulence (Marshall *et al.* 2020), they are displayed in Figure 1, but not analysed in details.

The remainder of the paper presents the empirical analysis that was conducted to characterize and sort the responses of small-scale producers. Resilience is remarkably difficult to measure (Béné 2020). For the purpose of this study, resilience was operationalized and identified if the original level of sales of an SFSC component was maintained or exceeded in the lock-down period. Applying such a narrow and business-centred framing allowed us to provide a fast and objective assessment of early responses by keeping the related questionnaire short and simple (which was very much needed, as farmers had very little time for interviews due to the constant changes) in spite of the limitations it causes by overlooking broader interconnected system-level considerations. Of the sources of resilience, marketing styles and channels were the focus of attention.

### 3. Data and empirical strategy

The empirical analysis was based on Hungarian data. The most important local measures and tendencies affecting sales through SFSCs in Hungary are briefly summarized. The proportion of individuals in voluntary isolation was large, resulting in an increase in demand for online and home delivery services. Most shops (ones that did not sell food, medicine, or hygiene-related items) closed, including restaurants, except if they offered food for takeaway. The ongoing operation of markets was explicitly encouraged by the Ministry of Agriculture. Nonetheless, many of them closed, as local organizers (mostly governments) did not want to take any political or other risks. A few markets chose to operate online, on a pick-up-only basis. Restrictions on movement allowed only citizens of over 65 years of age to enter shops or markets between 9 a.m. and 12 p.m. This time period largely covered the usual opening hours of farmers' markets, which experienced a substantial drop in turnover (Nemes *et al.* 2020).

#### 3.1. Sample selection

Primary data were gathered through a set of structured interviews containing a mix of closed and open questions that were implemented between 6 April and 12 May, when emergency measures were most stringent in Hungary. Small-scale producers were approached by representatives of specified networks who had already been in contact with the related farmers for a long time. All these networks concentrate on small-scale producers and local food systems, often in rural areas and far from big cities; they were Local Action Groups within the EU-financed LEADER program for rural development – consumer purchase groups, non-governmental organizations, etc. Due to the character of these organizations, no further restrictions (e.g. arbitrary thresholds) were introduced concerning sample selection. Personal contact ensured the willingness of farmers to respond during a time of challenge and uncertainty caused by the very first wave of COVID-19. Most of the respondents provided data through telephone interviews. Due to the method of data collection, the resulting sample (similarly to other studies focusing on producers involved in SFSCs) is not representative.

The interviews were complemented with an in-depth case study of an artisan cheesemaker, Steve (a pseudonym), whose experiences were closely tracked through semi-structured conversations every two weeks during the time of restrictions, and two 60-minute structured interviews, one conducted at the beginning of the time of closure, and one after re-opening. As such close follow-up required commitment from the producer, a dedicated interviewee was chosen based on their prior contribution to research projects (as a farmer stakeholder). The dairy sector represented a good reference point as it involved a high level of flexibility at different stages of production, from the beginning stages (e.g. decisions related to a broad assortment of products), to the end (e.g. a great variety of final customers could be targeted, from restaurants to individual customers, through diverse marketing channels).

#### 3.2. The structure of the interviews and variables

First, the sector the producers were operating in was defined. Based on changes in sales due to COVID-related restrictions (see Table 1), a single variable ('change in sales') was derived that showed whether a producer experienced cessation (0), a decrease (1), no change (2) or an increase (3) in sales. Similarly, an 'income' variable was generated for the calculations that incorporated all other categories of annual gross income.

Producers were requested to evaluate the importance of the marketing channels they used both before and during COVID according to the income these channels provided. A five-point Likert scale was utilized (1: I do not use this channel; 5: this marketing channel is very important in terms of my sales). This scale is similar to the one used for evaluating schoolwork in Hungary, so was easily understood by respondents. (As for the specific channels, the term 'directory' was used for sales made through the website of a fellow producer or an association.) The number of sales channels producers used was calculated *a posteriori*; this included all the channels that were mentioned whose importance was rated as at least '2'. A further variable was derived to characterize sellers' online presence and use of Information Communication Technology (ICT) either for the purpose of communication ('1') or online sales ('2') versus no use of such tools at all ('0').

Producers were also asked whether they perceived different problems concerning the different stages of production. Answers were transcribed and coded *a posteriori*. Regarding problems, the variables reflecting the stages of production were awarded three values: '0': there is no problem; '1': there are some general problems not related to COVID; '2': problems emerged in relation to the outbreak of COVID. In a second phase, COVID-related problems were further distinguished thematically. The strength of this approach was that it allowed the identification of key problematic areas, their relative importance, as well as the expectations of producers, without bias resulting from the anticipation of researchers.

### 3.2. Methods

First, changes in the importance of marketing channels were calculated and their significance was tested with non-parametric Wilcoxon rank sum tests (Wilcoxon 1992).

Next, as qualitative results implied that farmers might have adopted different strategies to manage the COVID-related crisis, quantitative methods were applied to divide farmers into segments based on their reactions, with the aim of identifying successful strategies. Different marketing strategies were assessed through k-means clustering analysis. Thus, two cognitive objectives were expected to be met: a) verifying the assumption that SFSCs had the potential to ensure the economic survival of small-scale producers after the outbreak of COVID; and b) based on evidence, highlighting the important elements of survival strategies of small-scale producers.

The number of clusters was defined through Calinski/Harabasz Pseudo F tests (Caliński & Harabasz 1974). Definitions of two, three, and four clusters were assessed; the interpretation of more clusters might have been problematic in relation to the relatively small sample. Definition of three clusters provided the optimal solution. Although all the three clusters contained successful and less successful producers, a diversified strategy that involved home delivery services, and did not abandon personal relationships with customers (taking the expectations and requirements posed by social distancing into account) seemed to promote resilience the most. Details are presented in Section 4.3.

Channels whose importance during the first wave of COVID was reported to reach or exceed 1.5 were involved in the clustering exercise. Cross validation was undertaken in the following step to test the differences between the clusters concerning variables that were not involved in the clustering itself, but used to describe marketing behaviour pre-COVID, and farm characteristics. Non-parametric Kruskal-Wallis tests were applied, supplemented by pairwise Wilcoxon rank sum tests with Bonferroni correction to better understand the differences between the clusters. Results of the cross-validation are reported together with the results of the clustering exercise in Section 4.3.

#### 4. Results and discussion

One-hundred-and-thirty-six small-scale producers participated in our survey. In terms of location, 19 out of the 20 NUTS III statistical regions were represented in the sample. Descriptive statistics are displayed in Table 1.

<Table 1 comes here>

Farms, despite being small-scale, varied in size as expressed in terms of annual gross income. This diversity increased the relevance of the results. Fifty-nine percent of producers experienced negative impacts – namely, cessation or decrease in sales. Thirty-one percent managed to maintain the level of sales; many of these respondents expressed that this required a thorough revision of their marketing strategy. Ten percent were able to take advantage of the situation by increasing sales (many of them manyfold).

Evaluation of the changes in sales with regard to farm size revealed that only producers operating on the smallest scales decided to cease selling completely – the smaller they were, the more likely this was to occur. Presumably, the role of off-farm income was greater among smaller producers, and the new situation of lock-down demanded such a complex adaptation process in every sphere of operation that no time or energy was left for the management of sales. Analysis of qualitative comments reveals that many of the very small producers were elderly (a quite widespread phenomenon in Hungary – see Zagata & Sutherland 2015), and had decided to cut all contact with people for fear of becoming infected, and had thus stopped selling altogether. As one of the producers explained:

*‘We are old and belong to the category of people at risk, so we cannot go to the market, and our sales have stopped completely’.*

Small-scale producers characterized by an income of 8,500 – 14,100 EUR were most likely to have experienced an increase in sales. These agents were big enough in terms of production capacity to use multiple marketing strategies (of substantial relevance in terms of being able to adapt rapidly), but were small enough to be able to respond promptly to the changes.

##### 4.1. Changes in the importance of marketing channels

Producers had used 4-5 marketing channels pre-COVID, on average. Figure S1. in the Supporting Information shows the changes in perceived importance of the most important marketing channels

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calculated from the results shown in Table 1. The few successful sales channels ('home delivery' and channels based on ICT), were relatively unpopular before the pandemic, while most channels declined in importance.

Before the outbreak of COVID, markets represented the most important marketing channel (see also Table 1), in line with previous findings (Benedek *et al.* 2018, Szabó 2017). The greatest reduction in sales was experienced in relation to fairs and festivals (banned by lock-down measures), as well as restaurants (among which only places that offered take-away and home-delivery were able to remain open), and markets (affected not only by a significant decrease in consumer interest due to social distancing, but the restrictions on opening times introduced for older citizens).

Farm gate sales are typically a very personal offline mode of sales in Hungary, involving customers visiting farms in person (produce is often displayed in front of the farm gate to attract the attention of passers-by). The importance of this channel decreased somewhat due to the need for social distancing, but the personal nature of the related transactions apparently prevented a major decline (Benedek *et al.* 2020). The role of independent shops decreased after the outbreak of the pandemic. These shops (often very small ones) usually do not offer home delivery services, and, similarly to markets, suffered substantial economic losses due to the increased isolation and the imposition of 'elderly shopping hours'. Many of these shops decided to close in spite of the fact that regulations allowed them to remain open.

The fact that the importance of consumer purchase groups was so small, and did not grow much during the pandemic, might need some explanation. In general, consumer purchase groups and vegetable box schemes seemed to be the great winners of the pandemic (Diesner 2020, Nemes *et al.* 2020, Wheeler 2020), but producers in our sample lived further from bigger cities where such schemes are more common in the Hungarian context, and it appears that the majority of our producers could not take advantage of this successful trend.

#### 4.2. Emergence of problems at different stages of production and marketing

Problems identified in Table 1 are shown in the order of severity after the outbreak of COVID. Though problems arose at several stages of production, sales suffered most, while online sales – although a problematic area pre-COVID – caused further problems for a small number of producers only; apparently this approach was more important as a solution (see also Section 4.1). Table 2 shows the key areas associated with COVID-related problems according to the different stages of production and marketing. As online sales were less problematic during COVID, this channel is not displayed in Table 2. The relative self-reported importance of the problems is shown in brackets (the latter do not add up to 1.00 for two main reasons: Several producers mentioned more than one problem, and further problems were mentioned that were classified into an 'other' category that is not shown in Table 2.) Some key areas are illustrated with quotations from producers (in italics).

< Table 2 comes here.>

Many of the problems the producers mentioned are general ones that would also apply to all actors in the food system. However, many problems (shown in bold in Table 2) appear to be specific to producers involved in SFSCs. This is partly because the latter mainly had direct relationships with their customers, and meeting at traditional points of sale was severely affected by the restrictions.

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Furthermore, due to the small scale, these producers could react to the new situation very rapidly by changing their production strategy, introducing new processes such as vacuum-packaging (as demanded by Hungarian consumers after the outbreak of COVID in the hope of avoiding infection), or making home deliveries to keep abreast of regulations or changing consumer demand. Due to the uncertainty related to the duration of the social or regulatory changes, profound alteration to strategies was more difficult to accomplish in the case of conventional, industrialized and centralized agricultural enterprises.

#### 4.3. Alternative marketing strategies of small-scale producers

In the next section, the results of the clustering exercise are provided.

The top section of Table 3 displays the results of the k-means clustering analysis. The bottom section displays the results of validation with variables that were not involved in the clustering itself. Values that proved to be significantly different from the values of other clusters based on the pairwise Bonferroni-corrected Wilcoxon tests are shown in bold (p values are shown in Table S1 in the Supporting Information).

<Table 3 comes here.>

The means of the variables significantly differed among the three clusters, implying that small-scale farmers may be classified into three distinct groups based on their marketing strategies during the pandemic. All three clusters include successful and less successful producers; however, certain strategies regarding the use of specific marketing channels (as described by Cluster 3) resulted in a higher probability of an increase in sales.

Almost all the variables had the smallest values in the first cluster ('traditional smallholders'): these members generated the least income and had also used the fewest channels, mostly traditional (offline) ones pre-COVID (around two or three). Table 1 and Figure S1. in the Supporting Information reveal the relative importance of channels before and during the pandemic. The relevance of the most important channel (market) was substantially reduced, and further two out of the four most important modes of sales (festivals and restaurants) were completely eliminated. In other words, these producers were least likely to use sales channels that later proved to be successful. Many producers lost ground and had no idea what was going on or what could be done. Perhaps it did not occur to them to be proactive, so they rather waited for external help. One producers explained:

*'As all the festivals have been cancelled, we have practically no sales nowadays. We started to slaughter the animals to reduce fixed costs. Customers may expect home deliveries but it takes too much time, it doesn't pay off. Producers should cooperate to sell their products together in bulk'.*

By eliminating productive assets, this producer failed to mitigate what Béné (2020) identified in his resilience pathway model as harmful consequences – similarly to those who ceased operating.

On the other hand, the smaller scale at which producers in Cluster 1 operated allowed some room to change quickly and respond to challenges. Additionally, being very small at the beginning made growth easier and more spectacular. During the pandemic, these entrepreneurs preferred to

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maintain personal relationships with their customers; for example, the importance of farm gate sales remained relatively high. Those producers who were willing to enter the online space (or had a relative or friend who could help them do so) could achieve considerable success. One producer summarized their story the following way:

*'Our customer base changed a lot. During the winter we served 10 families. Because the market closed, now we deliver to 30. They send their orders through Facebook messages. We only have three cows, it was easy to switch. It would have been way more challenging with more animals'.*

Members of Cluster 2 ('e-commerce salespeople') and Cluster 3 ('customer relationship managers') applied similar strategies in many respects; an important difference however was that Cluster 3 members appeared to be more successful in monetary terms. Members of both clusters had diversified marketing portfolios before the pandemic. They all greatly increased their home delivery services, which was typically coupled to sales through social media or other ICT-related channels. The level of farm gate sales was the lowest among 'e-commerce salespeople', while they were the most skilled users of ICT tools in the sense that they used online channels for selling purposes in the greatest proportions. As a producer from Cluster 2 informed us:

*'All direct sales stopped due to the lock-down, but the turnover of our e-commerce store increased.'*

This opinion was shared by many producers of Cluster 2. Another producer pointed out that not only did marketing strategies change, but also the mix of products, while the level of processing allowed for flexibility:

*'Customers are seeking different products now. For example, instead of bakery products we are selling many different types of flour and other raw materials these days, even through our e-commerce store, which did not happen before. Many of our customers are allergic or follow special diets; they are afraid of leaving their homes now, thus we offer them home delivery services, even for market customers, which they greatly appreciate.'*

Producers in Cluster 3 ('customer relationship managers') were able to increase their sales the most among the small-scale farmers. The role of markets in their case did not decline greatly (compared to the average of the whole sample pre-COVID); it appears that they successfully coped with the challenge posed by the decrease in the number of customers in general. One producer explained:

*'We collected e-mail addresses in order to keep in touch with customers. Now we are contacting everyone to keep them updated about regulations, opening times, availabilities, etc. This has resulted in a more personal relationship with customers (for example, many of them followed us on Facebook), but it requires a lot of extra effort.'*

Additionally, the strategy of the latter was exceptional as they also focused on improving their farm gate sales alongside home delivery services during the first lock-down period. As one of the producers noted:

*'Although our resellers at the market closed, our farm gate sales increased significantly, partly as some NGOs that offered social services increased their orders.'*

Furthermore, although many of them used social media mostly for communication purposes, they successfully managed to significantly increase their online sales, either through their own e-commerce stores or through directories. According to a producer:

*'Those who have invested in marketing and communication with customers can now easily serve them, and even more as demand increases. We have a Facebook page on which we publish details of all our products on a weekly basis. We have created a Google-form-based delivery system'.*

A closer look at the channels they preferred compared to members of other clusters (markets and farm gate sales), and the more intensive use of home deliveries, revealed that these producers stressed the importance of maintaining direct interaction (a strategy which Benedek *et al.* 2020 claims contributed to the successful management of the COVID crisis, in spite of the challenges posed by social distancing rules). The intermediate level of the 'online presence' variable showed that even if these producers used ICT tools, this was (at least originally) mostly for communication purposes. The importance of customer relationship management for these producers was also reflected in the interview excerpts.

Although spatial analysis was not carried out, many producers from Cluster 3 (9 out of 18) were operating in the Balaton-uplands area, a popular holiday region. They were participants of the same local territorial quality system of certification developed by the local LEADER Local Action Group. The rest of the producers in this cluster were connected to consumer purchase groups. Thus, they all were used to using online platforms, and cooperating for the purpose of marketing. Willingness to cooperate (similarly to in other post-Soviet countries; see e.g. Banaszak & Beckmann 2010, Möllers *et al.* 2018, Verhees *et al.* 2018) is generally very low among Hungarian small-scale farmers (Bakucs *et al.* 2012), thus purely being open to cooperation is a sign of open-mindedness among them (Benedek *et al.* 2018).

To conclude, the key to the success of the members of Cluster 3 might have been – besides strategic channel selection – acknowledgement of the role of communication and the importance that was placed on improving social capital. Though the related literature is expected to grow in the coming period, the importance of the mobilization of social capital in the context of food systems during COVID has been already stressed by Thilmany *et al.* (2021), Darnhofer (2020), Darnhofer (2021), and Herrington and Mix (2020).

When asked what kind of changes would become more permanent, respondents most typically specified (36 per cent) 'online operations', followed by an increase in the importance of home delivery services (14 per cent). No systematic differences between the clusters was revealed in this regard. Twenty-six percent of the sample mentioned that they wished to return to their original strategy most of all.

However, reacting rapidly to changes related to one stage of production might have created unexpected problems in others, which required hard decisions and an eagerness to engage in trial-and-error solutions. To reflect on the importance of skills and strategies that enable bricolage (Darnhofer 2021), and also to account for all the work and effort that supported the establishment of a successful marketing strategy (the choice of a set of fruitful marketing channels) and mobilization of diverse resilience capacities (Béné 2020) within a short period of time, the case study of Steve, an SFSC actor, is presented in the following section. (The full case study is available as Case Study S1 in the Supporting Information; Section 4.2. includes a brief summary.)

#### *4.4. Adaptation and resilience: coping with a complex web of challenges*

Steve, an artisan cheesemaker and self-made entrepreneur, was self-confident, used to taking the initiative and shouldering risk, and did not wait for external support. His main marketing channel pre-COVID became sales to fashionable restaurants located in the surrounding tourist destinations (which mainly operate during summer) and in the capital, Budapest, some 150 km away. Additionally, he visited a local farmers' market to generate continuous cash flow year-round. Seeing the crisis coming, he developed a new business model that focused on individual customers he knew from the farmers' market, through offering home delivery services. He also sent his Google form-based ordering sheet to a couple of closed e-mail lists through his friends, thus he was able to reach out to a number of new customers living mostly in the capital. Soon he had considerably more than one hundred individual orders, but such changes generated several challenges, from administration through production to delivery.

His first Google form was very simple. Additionally, many customers ordered through e-mail, Facebook message, or by phone. Orders had to be synthesized, confirmed, and any confusion cleared up, etc., which required a lot of further manual work. The system improved with time as Steve learned more about Google and Excel programming, and by the end of the restrictions the system was well set up and running almost automatically. Nevertheless, as consumer demand changed, Steve finally replaced his 'garage-band' solutions with a professional webshop with the help of an IT-expert friend. Another challenge involved the preparation of cargo for delivery. At first, customers could order any amount, and orders were put together prior to delivery. However, the sales strategy quickly changed to allow only the purchase of standardized amounts which were put together on the spot, just before handover. Finding an efficient packaging method and materials was also based on a trial and error procedure. Delivering so many orders required a considerable amount of time (and route-optimization software), especially as Steve originally did not want to ask for external help to comply with expectations considering social distancing. However, as the new business model became an unexpected success, he had to ask some trusted relatives and friends to help him. Hiring a professional delivery company was not an option as this would have required the rapid professionalization of administration processes and preparation, too, which was not possible during the turbulent times of the beginning of the crisis.

Steve's success depended on various factors. He was used to experiential learning mechanisms, and to launching small innovations every day in his business. He started to learn and use various ITC applications immediately when he saw their utility, from Google spreadsheets and add-ons to free route optimization softwares. He creatively used whatever means were available to build up a

functioning system, but he was keen to change, according to variation in demand. He was perceptive but also lucky to develop a novel and workable marketing strategy that later paid off.

Timing was also crucial. Steve usually had calmer periods of business, and early spring was normally one of these, which he normally used to make repairs, plan – and relax. This normally calm period gave him enough time for all the learning, experimenting, and dealing with the increased workload that was necessary to withstand the crisis. His previous marketing strategy involved non-stop work during the summer and on Saturdays at a farmers' market, with much less work from October until February – with spending watched very carefully. The new business model offered the potential for more balanced cash- and workflow and free weekends, which created a strong source of motivation for the whole process of innovation and experimentation.

Having and using different kinds of social networks and ties was also crucial to the success of the business. First of all, Steve needed a great deal of support from his wife, not only to manage the day-to-day routine when he had to work hard, but also in relation to the business – with preparing orders. Additionally, Steve used strong ties (close, trusted relationships such as family and friends) to find help for the business when needed. Furthermore, he used weak ties (remote friends and acquaintances) to connect different social groups and reach out to new customers. Finally, he placed importance on customer relations: he not only communicated continuously with his customers, but immediately responded to their changing demands.

To summarize, Steve's flexible and innovative character made the business work. He replaced investment with creativity, innovation, and learning (human capital), the use of a family and kinship network (social capital), and a huge amount of work. However, not all producers were as resourceful and lucky as Steve, as was revealed by the survey described above. Although Steve's case is certainly not generalizable, it underlines the conclusions drawn by the quantitative analysis: that success – resilience at the farm level – depends on the mobilization of a specific combination of resilience capacities, including strategic decision-making.

#### *4.5. Sources of resilience among Hungarian small-scale producers in the COVID-context*

The following paragraphs summarize the results in the light of various sources of resilience. Although the original aim was to account for and classify diverse marketing strategies, the analysis of the use of specific sets of marketing channels also enabled us to verify the importance of different forms of social capital. The importance of direct relationships was validated, although the dimensions changed in many cases as the role of ICT tools and virtual space dramatically increased with social distancing. Successful crisis management required the skilful use of social media for increasing online sales, but also to keep in touch with customers to maintain direct sales in turbulent times. Furthermore, the greater reliance of producers as a community on ICT tools might be a double-edged sword. Although digitalization in SFSCs has considerable potential for increasing resilience (Michel-Villarreal *et al.* 2021, Quayson *et al.* 2020), a digital inclusion agenda may be needed globally before ICT tools become a general source of resilience among small-scale producers (Marshall *et al.* 2020, Mehrabi *et al.* 2021).

The importance of diversity and redundancy as pre-existing system-level sources of resilience is apparent, as a remarkable number of producers were able to continue operating without major losses, thereby ensuring the provision of food. A diversity of production and marketing strategies pre-COVID allowed for quicker and easier adaptation. Although a lack of logistic and delivery

capacity redundancy did prevent many from successful crisis management, others were able to offset this deficiency by restructuring other activities. A redundancy of inputs and facilities proved to be important when either input procurement was challenging, or newly established procedures (such as vacuum packaging) required specific materials and cheap bricolage solutions.

To summarize, participation in SFSCs allowed for operations to continue during the period of COVID restrictions given that producers were able to activate resilience factors. Successful activation required the embeddedness of a producer in social processes such as digitalization, and a commitment to maintaining (or even deepening) communication with customers, and using other forms of social capital. While financial assets (stocks) were also important, the mobilization of human capital (engagement in bricolage, experimenting, and an openness to learn) was another key factor of success after the outbreak of the pandemic.

One limitation of this work is its narrow specification of resilience. For example, sales may have been maintained at the cost of degrading the working conditions that potentially support the development of farms (and thus well-being of stakeholders) in the long term. Although our aim was specifically to describe methods of crisis management, and the majority of factors that were investigated were admittedly transitory in nature, the results may be regarded with caution as a nuanced understanding of farm and food system resilience, and deeper processes of rural change remained hidden.

Whether the findings described herein are specific to the Hungarian context or generalizable (e.g. to other post-Soviet countries, Europe-wide, or at a wider scale) is a subject for further research.

### **Conclusions and recommendations**

This paper has described and systemically analysed the strategies developed by small-scale producers, that emerged in response to the outbreak of the COVID-19 pandemic. An important difference between COVID and other types of disasters such as earthquakes, floods, etc. is that social relations were disrupted due to the need for isolation and restrictions on movement, while infrastructure remained intact, and a shortage of food was not a threat. This obviously called for specific solutions. For the analysis, a resilience framework was adopted, with special emphasis on the strategic decision-making of small-scale producers concerning the distribution of food. A mixed-method approach was applied to ensure deeper insight into individual as well as general strategies.

The evidence provided here clearly shows that the response of producers to disruptions was heterogeneous: hardships could lead farmers, on the one extreme, to go out of business, but in other cases to significant improvements in sales. Success and failure depended on the 'activation' of resilience capacities. Certain farms involved in SFSCs were indeed able to respond rapidly and continued to distribute food. Nonetheless, many producers who had been previously engaged in direct sales faced serious challenges when prior sales channels declined in importance. The key to success was the strategic reconstruction of marketing channels through the adaptive use of a heterogeneous set of ICT tools, even if this required profound modifications of other stages of production, or the restructuring of whole business strategies.

The characteristics typical of SFSCs (e.g. smaller product assortment, low cost-efficiency, relative inflexibility, etc.) suggest that most of the latter changes will be temporally limited (Hobbs 2020, Smith *et al.* 2016), especially as most coping strategies occurred at the individual level. Our study provides evidence that many producers regard their reflexive mechanisms as only short-term

solutions. On the other hand, especially as further waves of COVID (or further pandemics) are predicted, conclusions should be identified to ensure an increase in resilience. As actual marketing channels might depend on context (the provision of home deliveries proved to be especially successful during the first wave of COVID), a diversified marketing strategy that allows rapid switchover to more promising channels might be an important element of economic survival. Additionally, improving human capital (e.g. greater reflexivity, willingness to take the initiative, etc.), as well as the enhancement of the embeddedness of producers in social processes and different networks might also be crucial. The individual responsibility of producers to learn and respond is undeniable, but resilience could be strengthened through knowledge exchange agendas, networks and services.

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#### Supporting Information

Figure S1. Changes in perceived importance of marketing channels

Table S1. p values of the pairwise Wilcoxon tests.

Case Study S1.

Illustrations

#### List of captions

**Figure 1.** Sources of resilience at the level of farms participating in SFSCs.

**Table 1.** Descriptive statistics

**Table 2.** Key COVID-related problems

**Table 3.** Results of clustering and validation

#### Supporting Information

**Figure S1.** Changes in perceived importance of marketing channels

**Table S1.** p values of the pairwise Wilcoxon tests.

#### Supplementary material

**Data S1.** Data.

Figure 1.



Note: image credit: E.Z. (name removed for the review process) for the authors.

Table 1.

Variable	Frequency (%)	N	Mean	SD	Min	Max
<i>Change in sales due to COVID-related restrictions</i>						
changes in sales	-	129	1.44	0.76	0	3
stop (0)	6.2	8	-	-	-	-
decrease (1)	52.7	68	-	-	-	-
no change (2)	31.0	40	-	-	-	-
increase (3)	10.1	13	-	-	-	-
<i>Annual gross income (without financial support and allowances)<sup>a</sup></i>						
income	-	131	1.55	1.05	0	3
below 2,800 EUR (0)	19.1	25	-	-	-	-
2,800 – 8,500 EUR (1)	29.8	39	-	-	-	-
8,500 – 28,200 EUR (2)	28.2	37	-	-	-	-
more than 28,200 EUR (3)	22.9	30	-	-	-	-
<i>Importance of marketing channels pre-COVID</i>						
market	-	136	3.09	1.83	1	5
farm gate sales	-	136	2.82	1.58	1	5
festival	-	136	2.40	1.58	1	5
restaurant	-	136	2.40	1.59	1	5
home delivery	-	136	2.11	1.39	1	5
independent shop	-	136	2.04	1.41	1	5
farmstay and farmland food service	-	136	1.71	1.35	1	5
directory	-	136	1.54	1.09	1	5
retail chain	-	136	1.42	1.02	1	5
own ecommerce store	-	136	1.38	0.92	1	5
consumer purchase group	-	136	1.30	0.84	1	5
public procurement	-	136	1.29	0.89	1	5
number of channels pre-COVID	-	136	3.20	2.20	0	11
online presence	-	134	0.66	0.78	0	2
no use of ICT tools (0)	53.0	71	-	-	-	-
communication (1)	27.6	37	-	-	-	-
online sales (2)	19.4	26	-	-	-	-
<i>Importance of marketing channels during COVID</i>						
market	-	136	2.13	1.57	1	5
farm gate sales	-	136	2.65	1.61	1	5
festival	-	136	1.08	0.47	1	5
restaurant	-	136	1.21	0.81	1	5
home delivery	-	136	2.40	1.57	1	5
independent shop	-	136	1.71	1.19	1	5
farmstay and farmland food service	-	136	1.19	0.77	1	5
directory	-	136	1.68	1.29	1	5
retail chain	-	136	1.30	0.83	1	5

Variable	Frequency (%)	N	Mean	SD	Min	Max
own ecommerce store	-	136	1.66	1.32	1	5
consumer purchase group	-	136	1.24	0.79	1	5
public procurement	-	136	1.15	0.65	1	5
<i>Problems</i>						
sales and marketing (in general)	-	134	0.86	0.95	0	2
no problems (0)	53.0	71	-	-	-	-
COVID-unrelated problems (1)	8.2	11	-	-	-	-
COVID-related problems (2)	38.0	52	-	-	-	-
production of raw materials	-	136	0.50	0.82	0	2
no problems (0)	70.6	96	-	-	-	-
COVID-unrelated problems	8.8	12	-	-	-	-
COVID-related problems	20.6	28	-	-	-	-
logistics, storage, and delivery	-	134	0.44	0.81	0	2
no problems	76.1	102	-	-	-	-
COVID-unrelated problems	3.7	5	-	-	-	-
COVID-related problems	20.2	27	-	-	-	-
processing, packaging	-	135	0.34	0.71	0	2
no problems	80.0	108	-	-	-	-
COVID-unrelated problems	5.9	8	-	-	-	-
COVID-related problems	14.1	19	-	-	-	-
online sales	-	135	0.31	0.59	0	2
no problems	75.5	102	-	-	-	-
COVID-unrelated problems	17.8	24	-	-	-	-
COVID-related problems	6.7	9	-	-	-	-

Note: <sup>a</sup>: Average gross annual income in Hungary was 12,700 EUR in 2019.

Table 2.

Key area of production and marketing	Number of farmers finding this area problematic during COVID	Specific problem area	Proportion of a specific problem mentioned	Characteristic quote
Sales and marketing (in general)	52	Closed or limited marketing channel(s)	0.40	<i>'Sales dropped by 80 per cent. The market closed and our regular customers do not come to the farm gate. They</i>
		<b>Limited contact with customers due to social distancing</b>	0.19	

Key area of production and marketing	Number of farmers finding this area problematic during COVID	Specific problem area	Proportion of a specific problem mentioned	Characteristic quote
		Changes in demand	0.17	<i>are old, frightened, and cannot afford premium products anymore.'</i>
		No new contracts nor agreements due to uncertainty	0.08	
		<b>Time demand of online presence as a newly introduced process</b>	0.07	
Production of raw materials	28	Input procurement	0.54	<i>'The procurement of fertilizers and pesticides became more difficult. Fortunately, we have a stock of seeds enough for a year, but in general, it's very difficult to get them now, especially when ordered from abroad.'</i>
		Labour shortages	0.36	
		Problems with machinery (procurement, servicing)	0.07	
Logistics, storage, and delivery	27	Limits to existing capacity	0.59	<i>'Now it's not that customers come to us, but we are delivering to them. We are using cooling boxes but it doesn't work in the case of bigger quantities, or on a very hot day'.</i>
		<b>More difficult handovers due to social distancing</b>	0.14	
		<b>Time requirement for home deliveries (as newly introduced service)</b>	0.14	
Processing, packaging	19	Procurement of packaging materials formerly used	0.54	<i>'Producers of wrapping materials cannot keep up with the increase in demand – there is a shortage. Now we're wrapping everything and we use materials that we'd never dreamed about using'.</i>
		<b>Demands posed by newly introduced procedures</b>	0.36	
		Demand of workers for social distancing	0.07	

Note: Problems concerning online sales are not displayed. Problems specific to producers involved in SFSCs (who were able to respond to the new situation rapidly) are shown in bold.

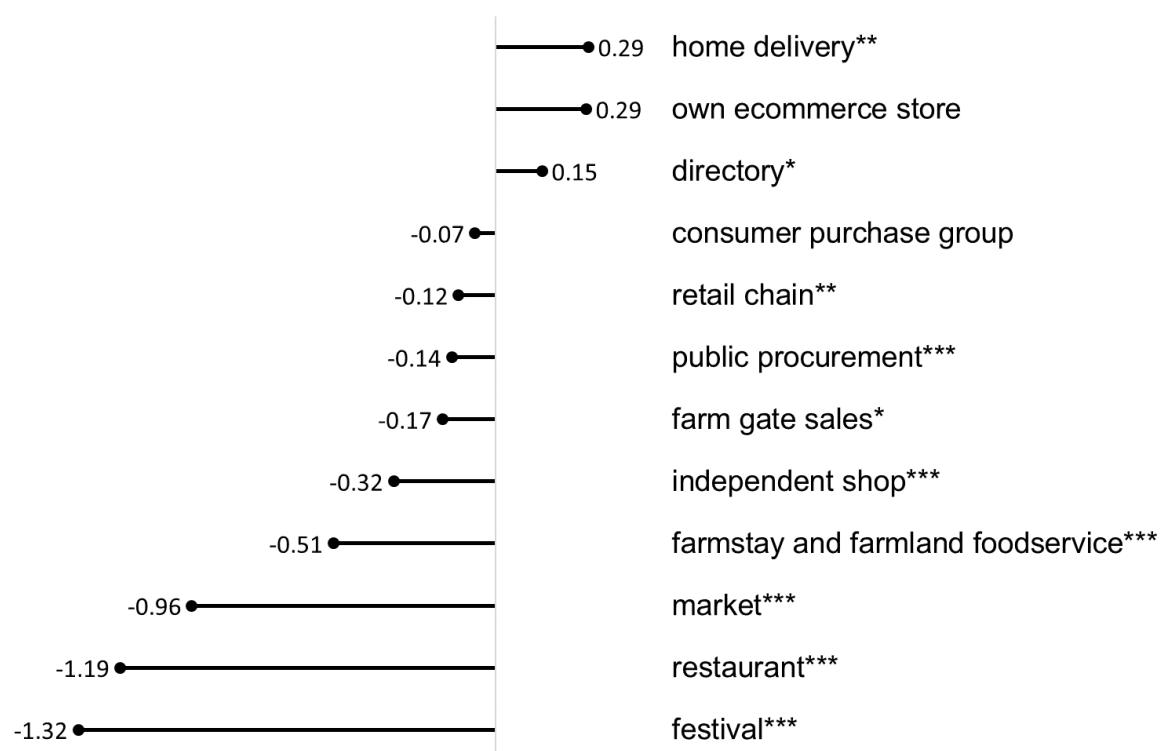
Table 3.

Variable	Cluster 1 'traditional smallholders'	Cluster 2 'e-commerce salespeople'	Cluster 3 'customer relationship managers'	Kruskal-Wallis (p value)
N	96	18	22	-
<i>Importance of channels during COVID</i>				
market	2.03	1.67	2.91	0.064
independent shop	<b>1.39</b>	2.00	2.91	0.000
own ecommerce store	<b>1.14</b>	2.89	2.95	0.000
directory	<b>1.21</b>	2.39	3.18	0.000
farm gate sales	<b>2.54</b>	<b>1.33</b>	<b>4.18</b>	0.000
home delivery	<b>1.89</b>	<b>2.72</b>	<b>4.41</b>	0.000
<i>Validation</i>				
independent shop pre-COVID	<b>1.73</b>	2.67	2.85	0.0003
own ecommerce store pre-COVID	<b>1.11</b>	2.28	1.75	0.0000
directory pre-COVID	<b>1.20</b>	2.33	2.20	0.0000
farm gate sales pre-COVID	2.78	2.06	<b>3.65</b>	0.0004
number of channels pre-COVID	<b>2.51</b>	<b>4.28</b>	<b>5.55</b>	0.0000
online presence	<b>0.45</b>	<b>1.67</b>	<b>0.95</b>	0.0000
income	<b>1.41</b>	1.67	2.20	0.0002
changes in sales	1.40	1.22	<b>1.80</b>	0.0018

Note: outstanding values verified by the Bonferroni-corrected Wilcoxon rank sum tests are shown in bold.



Figure S1.



Note: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Perceived importance was measured on a five-point Likert scale (1: 'not used at all' 5: 'very important').

Table S1.

Variable	Wilcoxon test p values		
	Cluster 1 vs Cluster 2	Cluster 2 vs Cluster 3	Cluster 1 vs. Cluster 3
<i>Importance of channels during COVID</i>			
market	0.0243	0.1099	0.9699
independent shop	0.0001	0.1145	0.0017
own ecommerce store	0.0000	0.3994	0.0000
directory	0.0000	0.2955	0.0000
farm gate sales	0.0000	0.0000	0.0000
home delivery	0.0000	0.0000	0.0000
<i>Validation</i>			
independent shop pre-COVID	0.0056	0.3924	0.0192
own ecommerce store pre-COVID	0.0190	0.0391	0.0000
directory pre-COVID	0.0001	0.9649	0.0001
farm gate sales pre-COVID	0.0055	0.0011	0.2138
number of channels pre-COVID	0.0000	0.0185	0.0006
online presence	0.0215	0.0001	0.0000
income	0.0010	0.6690	0.0318
changes in sales	0.0147	0.0100	0.4484

Note: The levels of significance after Bonferroni correction: 1%: 0.0033; 5%: 0.0167; 10%: 0.0333.