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Disrupted Market Relations in Agriculture in North Macedonia: the COVID-19 Crisis

Abstract

The COVID-19 crisis has stressed the importance of, and need for, a stable and functional food system, able to provide consumers with a continuous supply of quality food at affordable prices. The pandemic has also highlighted the role of agricultural producers in the food supply chain, with small farmers being the most vulnerable category. This global crisis has actually deepened the problems faced by farmers, especially those on the verge of sustainability. The purpose of this analysis was to provide an overview of the disrupted links in agriculture, as a result of the initial COVID-19 crisis. A survey was carried out with 91 farmers in North Macedonia. Moreover, in-depth interviews were conducted with selected traders and processors. In general, farmers assessed that the crisis negatively affected their economic operations. The critical parts of the supply chain derive from the disrupted link between farmers and traders/processors, lack of field technical support resulting from the mobility restrictions, uncertainty in

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cooperation, lower production quantities, and varying quality of the agricultural products. Availability and cost of seasonal workforce was also pronounced as an issue. The dominant family farms small-scale structure and lack of aggregation in the sector challenged the resilience and effective response to the crisis. From buyers' and processors' perspective, the crisis effect was marked through the disrupted communication with farmers, low awareness of the need for change, and drastic decline in the HORECA channel sales. The agricultural and rural policy is designed to address measures adjusted to the needs of the key actors in the sector. The priority set of measures should support the food supply chain, enhancing farmers' networking and aggregation, and on-farm and off-farm diversification, along with improved communication, information systems and digitalisation. Improving productivity and competitiveness remains an effective strategy for sustainable operations, greater resilience and risk adaptation in crises such as the pandemic.

Keywords: agri-food supply chains, COVID-19, market distortions, North Macedonia

Introduction

What the world has seen, and should ascertain from, the experience of the unexpected COVID-19 pandemic, is that food security and continuous food supply are the most important factors for the survival and health of any country and its inhabitants. In this respect, there is a clear need for stable domestic and global food production and supply chains. The COVID-19 virus pandemic has caused major shocks in all segments of the agri-food chains, with simultaneous impacts on primary production, food processing, transport and logistics, as well as ultimately food demand. But not all subsectors and products were equally affected, that is, different products and different subsectors have experienced disruptions at different stages in the agri-food chain (OECD 2020). The functioning of the agri-food chains is extremely important, not only from the perspective of nutrition of the population, but also for the whole economy. In such exceptional conditions, the 'restart' primarily needs to rely on the principles of food security and development of long-term policies to reduce agricultural uncertainty.

Recent studies to emerge (FAO 2020; ITC 2020; Duvall 2020; Lusk 2020; WB 2020) highlighted the negative effects which the COVID-19 virus pandemic had on agricultural markets and the way agriculture functions in rural areas. The largest consequences detected in the initial pandemic waves (March to September 2020) were related to: market changes in supply and demand; supply chain disturbances due to restrictions on products and labour movement; disturbances in primary production due to lack of input and labour; potential long-term changes due to increased transport costs; occurrence of disrupted supply chains and increases of substitution between products. For small producers, various restrictions and regulatory measures introduced to prevent the spread of the virus meant threats to health and food safety, increased transport and production costs, logistical bottlenecks, input problems, decreases (and sometimes increases) in demand, and uncertain cash flow and access to finance (ITC 2020). Due to the specifics of the situation caused by the spread of the virus, one of the main problems that occurred and necessitated a prompt solution was connected to the labour force, especially seasonal labour (EC 2020a). The production sector for fresh consumption was particularly vulnerable. There were differences in the impact degree in different phases of the chains in terms of the type of production, i.e. the subsector. For example, labour and limited movement of workers caused greater problems in fruit growing and horticulture due to their labour-intensive nature (OECD 2020).

The consequences of the crisis and the potential risks and ‘bottlenecks’ are still present. For these reasons, it is necessary to find a suitable response in order to overcome the risks, by creating appropriate measures and policies. As key participants in the agri-food supply chain, small and medium farmers directly felt the consequences of the situation, especially in the area of market prices and prices of agricultural input (Arias 2020). Many studies have emerged since the pandemic outbreak across the globe, emphasising the vulnerability of agri-food chains and, in particular, smallholder farmers, hence the need for effective resilience strategies (for example, Clapp and Moseley 2020; Cullen 2020; Morton 2020; Quayson et al. 2020; Middendorf et al. 2021; Tougeron and Hance 2021).

Smallholder family farming is a distinctive feature of the agricultural sector in North Macedonia. With 178,000 farms in the country and an average farm size of 1.8 hectares, around 61% of the producers use less than one hectare, and half of the farms make less than 2,000 EUR output value per annum (SSO-FSS 2017). Agriculture is one of the key sectors in the economy of North Macedonia, taking up, on average, a 10.7% share in the country's gross value added (GVA) during the period 2010–2019 (SSO 2021). Coupled with the food industry, the share of the agri-food complex is estimated at 12–15% of the national GVA. The sector also absorbs significant employment, representing around 14% of the total labour force, or 111,000 people, in 2019 (SSO 2021). Around three-fourths of the agricultural output comes from crop production (vegetables, fruit, cereals, industrial crops, grapes and wine), while the most important livestock productions are milk and meat (cattle, pigs and lamb).

The COVID-19 pandemic was confirmed to have reached North Macedonia in February 2020, and by March 2020 the initial wave state of emergency had been declared, which involved posing strict restrictions and subsequently mobilising preventative measures such as closing schools, restaurants, non-food shopping outlets, limiting transport and imposing curfews. Agriculture and agri-food chains in North Macedonia were also affected by the market restrictions, lack of seasonal workers, movement restrictions, and difficulties in organising transport and logistics. This phenomenon was especially evident in the case of the intensive agricultural crops, where the disrupted food supply chains resulted in increased levels of food loss (Orozovic and Petrovska Mitrevska 2020).

The situation caused by the spread of the COVID-19 virus has stressed the need to conduct different types of analyses that will provide guidance on how to improve the situation with disrupted and severed links in agriculture. Participatory approaches involving different stakeholders are commonly used to elicit perceptions and experiences, and hence frame the problems in farming systems (Thiele et al. 2011; Belanche et al. 2021). Moreover, the use of participatory approaches helps to better understand the needs of smallholder farmers and other participants in the agri-food chains (Middendorf et al. 2021), while also providing valuable insights for analysts, researchers, and ultimately policymakers. In this regard, the purpose of the present analysis is to investigate the disrupted market relations in the agricultural sector that have occurred as a result of the initial waves of the COVID-19 crisis in North Macedonia. Special attention is paid to understanding the primary agricultural producers' perceptions and the main challenges and impacts on their practices faced during this crisis. These perceptions are explored through a tailor-made survey exploring their production, marketing, communication and information channels. Additionally, approaches with different stakeholders' involvement focusing on resistance and resilience enable the investigation of local level responses to the disease and its impacts – in this case, the susceptibility and vulnerability of agricultural value chains to COVID-19, and as such effective learning that can be further scaled up (Morton 2020). Therefore, the views of other chain actors are also consulted in order to obtain a clearer picture of the situation and the disturbed market relations between the key participants in the chain. The findings capture the perceptions and highlight some key concerns about the disrupted market relations and the agri-food chain resilience.

The introductory section is followed by a description of the data sources and applied methods. The next section provides an overview of the main findings, with a special focus on primary production through the perspective of agricultural producers, and issues pointed out by the agri-food traders and processors. The discussion and concluding remarks are presented in the last section, highlighting proposed intervention areas to overcome the posed challenges, especially for the most vulnerable segment of small-scale producers.

Materials and Method

Primary and secondary sources were used in this analysis. Primary data were collected through a direct survey, which involved interviewing a sample of 91 agricultural producers from six (predetermined) of the most important agricultural subsectors in the country: vegetables, fruit, grapes, field crops, dairy production and meat production. These six subsectors together comprise 76% of the total agricultural goods output in the average national 2010–2019 economic accounts in agriculture (SSO-EAA 2020). The sample frame was drawn in collaboration with the National Federation of Farmers – a nation-wide umbrella organisation of farmers that maintains a database of approximately 3,000 active commercial agricultural holdings throughout the country. The sample was stratified by farm type in order to ensure adequate representation in terms of the six most important subsectors (15 respondents each for vegetables, fruit, grapes, dairy production and meat production farm types and 16 cereal farms). In addition, adequate territorial and farms' economic size distribution were taken into account. The following conditions were considered for the farms to be included in the sample: (i) to be an individual agricultural holding, following the national definition (use a minimum 1,000 m^2 of agricultural area, or own a minimum of one cow and one calf, or five adult sheep in the herd, SSO-FSS 2017); (ii) to have an existing production in at least one of the six selected subsectors; (iii) to be a holder of the agricultural holding, and be willing and available to take part in the survey.

A semi-structured questionnaire was composed, in order to obtain the necessary data from the agricultural producers who are the key and central part of the food supply chain and the main focus of this analysis. The questionnaire contained general data on the agricultural holding (basic data on the holder, type of production, production facilities, farm's physical and economic size, and main management aspects). Furthermore, the farmers' attitudes regarding the market functioning, problems and challenges in the past period (affected by the pandemic caused by the COVID-19 virus), were examined through a series of structured and open-ended questions. Emphasis was placed on the input supply markets and sales markets (market channels through which producers sell their products). Some of the questions elicited single answers, while some gave the options for multiple answers, and some enabled ranking of a certain opinion/attitude using a 7-point Likert scale. The open-ended questions provided an additional opportunity to express the qualitative perceptions of the respondents.

Given the conditions of restrictive movement and recommendations for avoiding direct contact, the survey was conducted through a telephone interview. To further simplify the data collection process, the questionnaire was prepared in an electronic form (using the Microsoft Forms platform). In this way, the survey was conducted more efficiently, and in a shorter period of time, while the risk of errors in data entry was reduced. Since the survey was conducted by the National Federation of Farmers, the enumerators received appropriate training and support for conducting and completing the survey questionnaire. The survey was carried out in the period spanning 15 September to 5 October 2020. All contacted farmers consented to participate in the survey. In order to obtain additional insights into the relation to other levels in the chain, several interviews were conducted with representatives of other chain actors (input suppliers, processors, traders/exporters, institutions). Depending on the data, mainly descriptive statistics were used with standard measures of central tendency and variability.

The analysis was supplemented with secondary data sources, which aided in the contextualisation of the research. The desk research of available legislative documents, programmes, reports and other relevant literature contributed to a more appropriate conceptualisation of the survey itself – a reflection of the experiences and measures taken in the given circumstances – and assisted in drawing adequate conclusions and recommendations.

Results

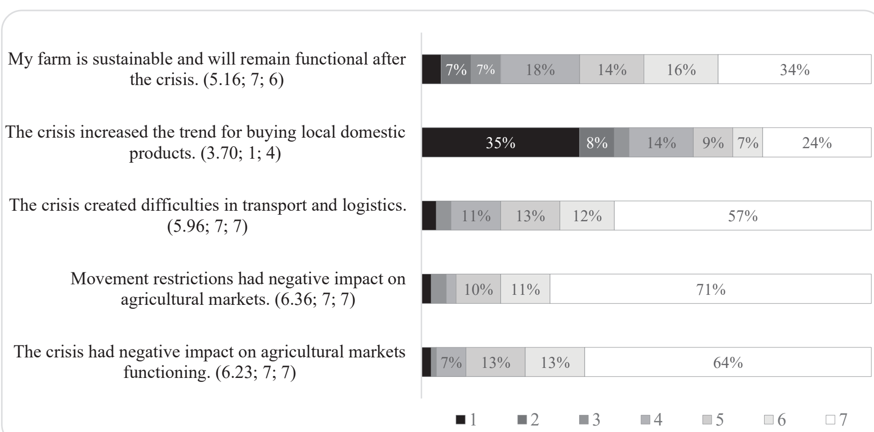
Producers' views on the challenges caused by the COVID-19 crisis

The results represent the findings from the direct survey of individual agricultural holdings, with a total of 91 respondents completing the survey. In terms of the characteristics of the sample, 80% of the farm holder respondents were male (n = 73) and 20% of respondents were women (n = 18). The average age of the respondents was 45 years (45.3 years for men and 43.6 for women), with the majority of respondents (70%) between the ages of 40 and 60. Most respondents had completed secondary education (73%), 24% had a higher education level, and 3% had a primary education level. Almost all respondents had access to the internet (99%), while 95% used smartphones and 88% used computers. On the other hand, a much smaller percentage (38%) used electronic banking or card payments online (44%).

All of the agricultural producers which participated in the survey had experienced some form of negative effect on their economic operations since the beginning of the COVID-19 crisis. With regard to the agricultural producers' perception of the effects of the initial COVID-19 crisis wave, their expectations were that this unfavourable situation would further deepen and the production season would end with losses (65% of respondents); 29% of respondents believed that they would neither make profit nor loss (Table 1). Regarding the direct impact of the crisis on their agricultural holdings, 48% predicted no change in the produced quantities of agricultural products, and 37% expected a reduction. The respondents noted that the crisis had a direct impact on the purchase/sale prices in two-thirds of the cases, while one-third of respondents did not register any changes. In general, agricultural producers did not experience significant problems with larger stocks of the produced products, which was expressed through the neutral views of respondents regarding the impact of the level of stocks of final products. Neutral statements were also most frequent in terms of input availability (still, 43% of respondents told of negative experiences with acquiring input). An expected response was received regarding the impact of the crisis on the labour availability – a problem which emerged in the agricultural sector globally. The respondents in our survey had generally negative (68%) and neutral (32%) experiences in terms of labour supply, as well as the impact on labour wages. Movement restrictions had a negative effect on all farm types, but were most pronounced at the vegetable farms in the survey.

Regarding the perceptions of the respondents towards the general effects of the COVID-19 crisis on the agricultural sector and markets, 64% stated that the crisis had a very negative impact (Figure 1). One of the reasons for the overall negative consequences was related to the measure implemented to restrict movement, which, especially in the beginning, created difficulties in the organisation of transport and logistics, as well as the organisation of the workforce. Respondents generally believed that their farms are sustainable and will continue to function after the end of the crisis; this was especially seen in the views of fruit growers and milk producers.

Figure 1. Respondents' perception in regard to the impact of the crisis (mean; mode; median), scale 1 (fully disagree) to 7 (fully agree)



The crisis caused some immediate additional costs according to the respondents, mainly related to respecting the measures for protection and

Table 1. Frequency of agricultural producers' responses regarding their perception of the initial COVID-19 crisis waves' effects (mean - $\overline{X}$, mode – MOD, median – MED) (n = 91)

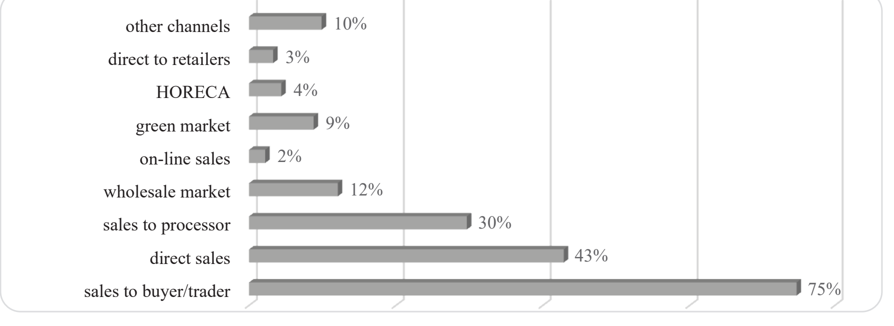
	Frequency (%)							$\overline{X}$	MOD	MED
	-3	-2	-1	0	1	2	3			
General initial COVID-19 wave effects										
In future, the crisis will affect my farm's economic performance: negatively (-3 to -1), will not affect (0), positively (1 to 3).	21	30	26	22	1	0	0	-1.47	-2	-2
The crisis has so far affected the overall economic operations of my farm: negatively (-3 to -1), not affected (0), positively (1 to 3).	23	22	25	29	0	1	0	-1.36	0	-1
This production season I achieved an economic result: loss (-3 to -1), neither loss nor gain (0), gain (1 to 3).	16	15	33	30	5	0	0	-1.08	-1	-1
Effects on farm output										
The crisis impacted producer prices: decreased (-3 to -1), no change (0), increased (1 to 3).	33	9	24	33	1	0	0	-1.40	-3	-1
The crisis had a direct impact on my farm's quantities produced: decreased (-3 to -1), no change (0), increased (1 to 3).	3	12	22	48	12	1	1	-0.38	0	0
The crisis affected my final products stocks levels: decreased (-3 to -1), no change (0), increased (1 to 3).	1	4	18	57	11	3	5	0.04	0	0
Effects on farm input										
The crisis affected the availability of input: lower availability (-3 to -1), no change (0), higher availability (1 to 3).	1	12	30	56	1	0	0	-0.56	0	0
The crisis affected input stocks: decreased (-3 to -1), no change (0), increased (1 to 3).	1	3	22	64	9	1	0	-0.21	0	0
The crisis impacted input prices: decreased (-3 to -1), no change (0), increased (1 to 3).	1	4	20	63	8	3	1	-0.14	0	0
Effects on farm labour										
The crisis impacted labour availability: lower availability (-3 to -1), no change (0), higher availability (1 to 3).	25	16	26	32	0	0	0	-1.35	0	-1
The crisis impacted labour costs: increased (-3 to -1), no change (0), decreased (1 to 3).	34	8	18	25	8	5	2	-1.10	-3	-1

safety: disinfection, gloves, masks, etc. (62%); additional transport costs (14%); and additional storage costs (8%); while 26% had experienced no changes in this regard. The crisis also posed some additional obligations, such as extra care for the elderly (29%); and increased care for their own health (40%); 42% reported no additional responsibilities.

Market links during the pandemic

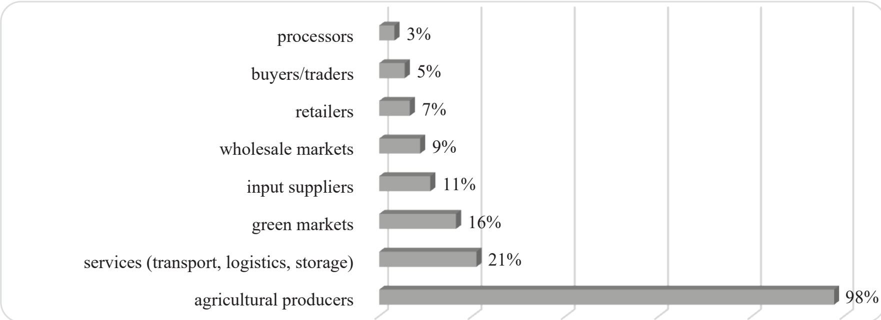
Most of the surveyed agricultural producers typically sold their products through intermediaries: buyers or traders (75%), direct sales from home (43%) or directly to processors (30%). More details are given in Figure 2. Several levels of intermediaries operate in the chains. This directly affects the margins received by the agricultural producers. An additional indicator of this phenomenon is the low share of direct sales to the retail facilities, HORECA channel (hotels, restaurants and catering), green and wholesale markets.

Figure 2. Typical sales channels among the surveyed farmers



The COVID-19 crisis has had a more pronounced impact on the agricultural producers and companies trading in fresh fruit and vegetables, but has not affected so severely the processing industry. Faced with the problems and destabilisation of the markets, the respondents perceived themselves (small-scale farmers) as the most vulnerable part of the agri-food value chain (Figure 3).

Figure 3. Critical parts of the chain – stakeholders that are most affected by the coronary crisis (according to the respondents/multiple answers option)



In total, 82% of agricultural producers stated that, since the beginning of the crisis, they had not changed their sales channels. The respondents reported several problems, such as closure of the wholesale market in Strumica and the disturbance in the HORECA canal. Therefore, part of the crop production was sold directly to the traders at lower prices, while some of the surplus was discarded, and some was left in the fields. In the case of livestock, most of the lambs were left for breeding or fattening, while some of the dairy producers had started on-farm processing into dairy products. A smaller share of the surveyed farmers (18%) stated that they had changed their sales channel as a result of the first waves of the crisis, and approximately the same number of respondents (21%) stated that they see possibilities to consider new strategies and investments in storage, product finalisation or on-farm processing to shorten the existing chains (Figure 4). They also still see other opportunities in the form of developing a distribution channel – introduction of door-to-door sales, sales through social media, services for personal delivery or transport through suppliers directly to the final consumer.

The mobility restrictions motivated some of the respondents to switch to sales facilitated through the internet. However, due to the nature of the agricultural products and the functioning of traditional retail and wholesale markets, online sales of fresh agricultural products are less developed compared to processed products (and other types of consumer goods). Accordingly, 83% of the respondents had not participated in online sales so far. The respondents believed that the best way to sell online is through social networks such as Facebook, but also through trading platforms and through their own online store or website (Figure 5).

Figure 4. Consequences of the COVID-19 crisis on producers

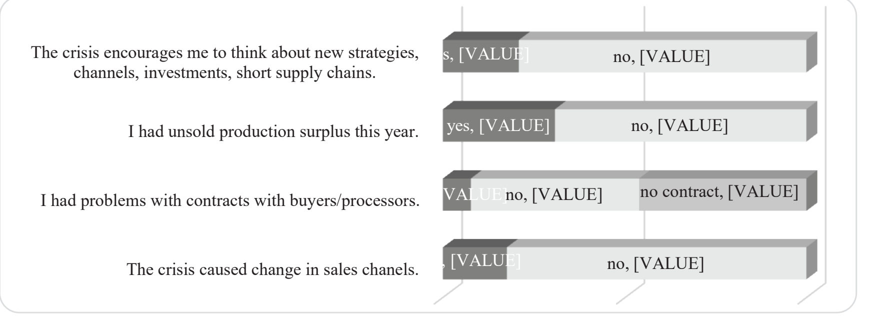
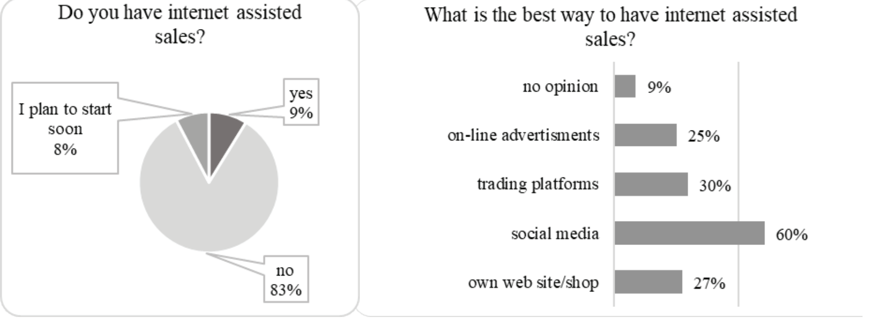


Figure 5. Respondents' views on online internet assisted sales



The perishable nature of agricultural products, along with the lack of trust and control among participants in online commerce, are the main factors influencing the restriction on agricultural producers becoming engaged more actively in web-based operations. Respondents usually lacked technical skills, knowledge and expertise to operate online (2.76 average of 7; mode equal to 1 – lowest valuations of expertise, median value 3).

In terms of obtaining information and advice, all respondents stated that there is no difference in the use of sources during the COVID-19 crisis. They typically obtained their information from communicating with other producers, buyers, processors or traders, farmers' associations/federations, cooperatives and networks, authorities and other relevant institutions (Table 2).

Table 2. Frequency of agricultural producers' responses regarding their sources of market information (mean - $\overline{X}$, mode – MOD, median – MED) (n = 91)

Sources of market information	**1**	**2**	**3**	**4**	**5**	**6**	**7**	$\overline{X}$	**MOD**	**MED**
	Frequency (%)									
	never ……………………….. frequently									
Other producers	3	1	3	9	10	25	48	5.90	7	6
Buyers/processors/traders	2	2	4	18	16	14	43	5.58	7	6
Input suppliers	8	4	4	21	13	24	25	5.01	7	5
Farmers' federation	3	15	13	15	26	19	8	4.33	5	5
Association/cooperative	37	5	4	7	9	20	18	3.74	1	4
Social networks	19	20	12	11	23	8	8	3.54	5	3
Media (TV, internet)	22	30	19	9	11	2	8	2.95	2	2
Extension service	52	26	9	7	3	1	2	1.96	1	1
Government	59	22	4	7	8	0	0	1.81	1	1
Market information system (MIS)	69	18	3	4	5	0	0	1.59	1	1
Statistics office	73	16	8	2	1	0	0	1.43	1	1

The most frequently required information for agricultural producers is related to the markets and prices of agricultural products. To a lesser extent, producers stated that they also needed information regarding input; access to funding sources; product quality and safety standards; new marketing opportunities; and information on dealing with the crisis.

With regard to the government's response and the crisis management measures, the majority of the interviewed respondents believed that there was a lack of direct measures and direct financial assistance to the sector, and that, in addition, the regular subsidies disbursement was lagging. Respondents believed that those direct sector measures are essential in finding efficient ways to regulate agricultural products' marketing and would restrict price distortions, while also safeguarding against opportunistic behaviour throughout the chain. Additionally, personal tax exemption and assistance in procurement of seeds and other kinds of input were mentioned as concrete measures that would aid farmers in dealing with the crisis and its aftermath.

Processors'/traders' perspective on the challenges caused by the crisis

The main aspects of the COVID-19 crisis that affected the traders of fresh agricultural products and agri-food processors, elicited through interviews with several key representatives from this segment of the value chain, are summarised in Table 3.

Table 3. COVID-19 crisis implications for traders and processors in agri-food supply chains

Positive		Negative	
Traders	**Processors**	**Traders**	**Processors**
– Encouragement for investment in value-added products – Encouragement for innovation in sales and distributive channels for direct sale – Possibility of developing, and participating in, an e-commerce	– Increased demand for canned products – Increased sale of the stocks – Increased trend of buying packaged products in supermarkets	– Decreased sales of fresh agricultural products (safety precautions of consumers) – Decreased sales due to lack of standardised packaging – Drastic sales interruption in HORECA channel – Increased costs for transport, storage, protection measures and safety – Increased costs for hiring labour, additional shifts and transport – Change in purchase/sale/market prices as a result of additional handling	– Drastic sales interruption in HORECA channel – Increased costs for transport, storage, protection measures and safety – Increased costs for hiring labour, organisation of additional shifts and transport – Organisation of international transport and quarantine of the drivers at the beginning of the COVID-19 crisis

Source: In-depth interviews with relevant actors in the value chains.

The interviewed representatives of companies that trade fresh agricultural products (vegetables, fruit, grapes and field crops) found that the COVID-19 crisis negatively affected their operations, especially in the initial phases. These companies faced many difficulties at different levels in cooperation with the stakeholders in the supply chains. On the supply side, the main issues were identified in disruption of market connections and communication between agricultural producers and traders. The primary reasons for this were seen in movement restrictions during lockdown, difficulties in organisation of the transport, and reduced visits of the agronomists in the field for advisory services and quality control of the raw materials. The lack of technical support in the field by the agronomists of the companies resulted in insufficient cooperation, uncertainty among the agricultural producers, reduced production volumes, change of varieties and, in some cases, reduced quality of the raw material. On the demand side, fresh agricultural products traders have faced difficulties related to the contracts' additional deferred payment, and changes in the quantities demanded. In addition, the preference of international markets and supermarket chains to localise the procurement of products from closer regions negatively affected the turnover of the companies that export fresh agricultural products.

On the other side, the agri-food processors have experienced increased demand for processed and canned products. However, the negative impact was particularly pronounced through drastic sales interruption in the HORECA channel and companies' increased costs for transport, storage, additional labour engagement and safety measures.

Discussion and Conclusions

The COVID-19 crisis has stressed the importance of, and need for, a stable food system that operates in all circumstances and is able to provide consumers with sufficient and continuous supply of quality food at affordable prices. The pandemic has also highlighted the role of farmers in the food supply chains. The structure of agricultural holdings in North Macedonia has been unfavourable for decades, with a large, predominant number of very small family holdings with limited production capacity (MAFWE 2021). The insufficient use of production capacities results in low productivity levels. Further challenges are the lack of more investments, limited sources of finance, insufficient entrepreneurship skills, less available farm labour, and still-poor horizontal and vertical cooperation and integration (Kotevska et al. 2021; MAFWE 2021). Agriculture remains the core employer in rural areas, as other employment opportunities are very limited, hence the intensified depopulation, starting well before the COVID-19 crisis, which imposed economic, social and environmental consequences, in rural areas in particular. Small farmers are the most vulnerable category, as they have to deal with the shocks caused by the COVID-19 crisis, both from a health and an economic point of view at the same time. One of the major conclusions which can be drawn is that the global crisis has actually deepened the existing problems faced by farmers before the pandemic, and especially affected those farmers who are on the edge of sustainability.

On the consumption side, at the beginning of the crisis (spring 2020), the market was mainly disrupted as a result of the initial storage of larger stocks of food in households, which gradually normalised. As a favourable effect, the pandemic has contributed to increasing consumers' awareness of the interrelationships between health, ecosystems, supply chains, consumer models and sustainability (EC 2020b). Eventually, agriculture was among the few sectors, alongside the information and communication sectors and real estate, that grew in North Macedonia in 2020 (WB 2021), but, nevertheless, the above-discussed pre-COVID-19 structural deficiencies in the sector remain a challenge.

Agricultural producers lack the opportunity to 'work from home'. Those specifics of agricultural production, which depend on open-field operations and input, output and labour market communications, have caused difficulties in the organisation of the agricultural holdings and affected the coordination of those with domestic work responsibilities. This is also noted in the survey, as some of the respondents with elderly family members, who were with restricted by certain movement hours, had to take over some of their regular chores. Those respondents with school-age children emphasised the urgency of staying at home to assist their children during online classes (the trade-off being having less time, or additional costs, for example, for the purchase of fodder food due to the impossibility of putting the cattle out to pasture). The role of women was especially pressured, as a recent study found that women in the agricultural sector in North Macedonia usually have a larger workload than men, working, on average, 11.1 hours per day versus 9.7 working hours per day for men; moreover, most of the work done by men is paid, whereas almost half of the work done by women is unpaid (Dimitrievski et al. 2019). This phenomenon is more pronounced among small producers, who rely mainly on family labour.

The general conclusion of the surveyed primary producers is that the crisis has negatively affected their economic operations. The majority of the respondents stated that there had been no significant change in the quantities of agricultural products produced, but one-third expected a decrease in output quantities, while two-thirds believed that the crisis had negatively affected producer prices. Similar findings have already been reported in other countries, where farmers across different farming systems expressed growing concerns regarding COVID-19's adverse effect related to the access to input, reduction in yields, ability to plant, feed livestock, sell livestock, and hire labour (Middendorf et al. 2021). In any case, the COVID-19 crisis has affected disposable finances and cash flow coverage. In that sense, maintaining the liquidity of the holdings, i.e. the ability of the holdings to settle their current liabilities with current inflows, is one of the main risk factors. Farmers in North Macedonia are already experiencing difficulties with access to credit, where lack of trust and information, lack of education, lack of flexibility of banks and additional costs are especially a burden for the smallholders, resulting in low numbers of farmers using credits (Simonovska et al. 2019). Therefore, a key factor in overcoming the crisis is improving the availability and accessibility of adequate sources of funding, especially for small producers who already face difficulty in accessing capital. In this situation, investments in fixed assets are often delayed, hence the most important element is access to favourable working capital. One option is to follow the European Union's crisis response through increased flexibility in taking loans or guarantees to cover operating costs on favourable terms (low interest rates or flexible repayment plans) in the package of measures intended for producers (EC 2020a).

One of the key problems faced by agricultural producers is the availability and cost of labour, regarding which the respondents in our survey expressed having generally negative experiences. The shortage of seasonal labour in agriculture has already been a persisting problem in the country for years (Orozovic and Petrovska Mitrevska 2020), and as such has been particularly pronounced by the COVID-19 health-socio-economic crisis. The main challenges lie in the increased cost of per diem wages and the organisation of transport and logistics for seasonal workers. During the lockdown, according to the needs of the producers, movement permits were provided for certain categories of farmers. In the European Union as well, the measures related to the sector provide flexibility in relation to the movement of seasonal workers, which is extremely important in certain operations (harvesting, planting, maintenance of plantations, etc.).

The COVID-19 pandemic marks an inflection point, demanding revised policy responses towards strengthening the food systems and enabling greater resilience during the current pandemic and future crises – not only those related to health, but also those concerning challenges such as climate change, biodiversity losses, population changes and natural disasters (Clapp and Moseley 2020; Tougeron and Hance 2021). The need to invest in more diversified production and supply networks should thereby be emphasised, while also providing for social protection measures (Clapp and Moseley 2020). This is particularly important in the case of small-scale production, which constitutes a major part of North Macedonia's food supply. A strategy for adjusting and reducing the risk is to modernise the holdings through investments in storage, finishing, processing or logistics, and so this potential direction for the development of the small farm businesses should continue to be adequately supported by policy measures. The producers could also benefit from providing a more diversified offer and hence become more economically independent.

The COVID-19 crisis has highlighted the need for resilience and adaptability of agricultural holdings. For some respondents, this crisis caused disruption of the usual sales channels (for example HORECA, workers unions, green markets). As a result, some of them sold their products directly to traders at lower prices, while some of the surplus was discarded, and some was left in the fields; moreover, in the case of livestock, herds intended for sale were kept for breeding or prolonged fattening. Closing certain sales channels in some way forces other channels to be found or strengthened, such as direct sales, direct delivery or e-commerce, or introduces new, more innovative strategies.

Determining the critical points in the chain depends on the perspective from which they are viewed. Agricultural producers, represented by respondents in the survey, believe that they are the group most affected by the COVID-19 crisis, and in fact the experiences of other countries point to small agricultural producers among the most vulnerable in the agri-food chain. Critical parts of the chain highlight the emergence of reduced communication flow, especially among small farmers, barriers to market connectivity, low awareness of the need for change, and a drastic decline in the HORECA sales channel. Moreover, additional critical parts of the chain are the relations with the suppliers of input/raw materials (interrupted relations with the suppliers, lack of technical support in the field, lack of meetings and direct communication).

A more efficient information sharing system is also needed. Producers included in the survey indicated that most often they receive information related to the market, marketing and prices of agricultural products through communication with other producers, buyers, processors or traders and input suppliers. This confirms the pre-COVID-19 situation already stated in other value chain studies in the country; for instance, a nationwide study for markets organisation in North Macedonia, applying the participatory approach, found that vegetable, fruit, cereals and meat producers in most instances lack market information and they mostly communicate with other farmers in order to gather and share information on the markets and prices, rarely using other sources of information (Structural Analysis 2019). The access to information with regard to policy measures and application preparation was also evaluated as weak by farmers in North Macedonia, comparative to the situation in other Western Balkan countries (Martinovska Stojcheska et al. 2016). Maintaining regular multidirectional communication between all participants in the chain, horizontally and vertically, is a basic prerequisite for ensuring functionality and coordination. Interruptions in communication and lost links between agricultural producers, companies trading in fresh produce and processors, as well as suppliers of input, have been identified as problems that arose during the crisis caused by COVID-19. This caused some uncertainty among the producers, regarding whether their products will be purchased, at what price, what quality is required, which varieties and so on. In that sense, it is necessary to introduce measures that will enable the implementation of functional and successful communication between the participants in the chain, with more active use of information technology. This, fuelled by the above-mentioned unexpected circumstances, stresses the need for faster and more effective digitalisation. Digitalisation is a prerequisite for both online communication and e-commerce, as all actors in the supply chains and consumers increasingly seek a more direct connection. Since the COVID-19 crisis has mostly worsened smallholder farmers' traditional struggles, technology can contribute to improving these conditions and preventing future major disruptions in the farming business and overall livelihoods of this vulnerable group (Quayson et al., 2020). Beside the potential for generating new revenue streams, digital technology may also contribute to more efficient farm management by digitising certain operations and activities (e.g. livestock feeding, fertigation, farm accounting, etc.), as well as through platforms such as mobile banking.

Most of the measures adopted to deal with the COVID-19 crisis in the country so far take the form of financial support for the business sector and short-term social protection measures. Very few measures are aimed directly at the agricultural sector. Rural areas and the rural population were largely left out of the scope of the measures. The respondents pointed out that they need direct financial assistance, assistance for procurement of input, and assistance for new investments, while they also alluded to a particular problem, namely the untimely subsidies reimbursement. The very structure of agricultural and rural policy needs to be adapted to the needs of producers. Above all, it is important that policies are clearly focused, stable and consistent, in order to reduce uncertainty for farmers and thus encourage long-term planning for the development of their farms. Communicating the policy measures and assisting the agri-food producers in the process of application are of crucial importance for the better use of available funds, especially in terms of the rural development support (Martinovska Stojcheska et al. 2016). Furthermore, a redefinition of the support structure is needed. Specifically, the larger part of the budget transfers in the country is directed towards the measures for direct payments (around 85% on average for the period 2017-2019, Kotevska et al. 2021) as opposed to the structural measures and measures for rural development. The budget for the latter pillar should be enlarged to better respond to the development needs of agricultural holdings, particularly given the COVID-19 crisis, but also in general for the advancement of life and work conditions in rural areas. Such orientation has already been recognised in the latest national strategy for agriculture and rural development (MAFWE 2021), with plans to increase the structural and rural development measures share in total budgetary support up to 40% in the period 2021–2027. Improving productivity and general competitiveness are thus set as strategic priorities of the agricultural and rural development policy, but given the effects of the COVID-19 crisis, they should be further emphasised as a strategy for resilience of farms and more successful adaptation to the crisis.

The support of food supply chains, and especially the local dimension, needs to be emphasised and prioritised in upcoming policies. Locally based initiatives should be supported to add value to the production and improve the position of producers within the agri-food chain. This further highlights the need for provision of budgetary support to producers in order to increase the competitiveness of farms and investments in funds for production, processing and marketing of agricultural products.

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